Proceedings of the 2nd Universitas Kuningan International Conference on System, Engineering, and Technology

2 December 2021, Kuningan, West Java, Indonesia

UNISET 2021

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Preface

The 2nd Universitas Kuningan International Conference on System, Engineering, and Technology (UNISET) will be an annual event hosted by Universitas Kuningan. This year (2021), the second UNISET will be held on 2 December 2021 at Universitas Kuningan, Kuningan, West Java, Indonesia.

“Opportunity and challenge in environmental, social science and humanity research during the pandemic Covid-19 era and afterward” has been chosen as the main theme for the conference, with a focus on the latest research and trends, as well as future outlook of the field of Call for paper fields to be included in UNISET 2021 are: natural science, education, social science and humanity, environmental science, and technology.

The conference invites delegates from across Indonesian and South East Asian region and beyond, and is usually attended by more than 100 participants from university academics, researchers, practitioners, and professionals across a wide range of industries.

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Needs Analysis of Literacy Teaching Material at Elementary Schools

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Abstract: The purpose of this study is to describe the needs of literacy teaching materials in elementary schools. The schools in question is the elementary school in Kuningan District. The research method used is descriptive qualitative using data collection techniques such as interviews. Interview given to teachers and students are drawn from 30 elementary schools in the district of Kuningan. From the interviews, it was concluded that for the literacy program in elementary schools in Kuningan District needed teaching materials which; 1) in accordance with classroom learning material; 2) according to the level of student understanding; 3) contains the character values / habituation of behavior; 4) contains knowledge or insight; 5) contains self-development; 5) in the form of stories or fiction; 6) contains instructions so students easily understand and know what they have to do; 7) stimulates critical thinking; 8) contains elements of Sundanese / Kuningan culture and language; and 10) interesting. Therefore, the recommendation of the author is that experts or researchers in the field of literacy or related parties can develop teaching materials that are appropriate to this need.

Keywords: needs analysis; teaching materials; literacy; elementary school

1 Introduction

Historically in English, the word literacy is synonymous with "literature" which means "literature". Then, more generally, this word means' better educated or literate. Only since the end of the 19th century has this word referred to the meaning of "the ability to read and write" but still retained its original meaning of being "knowledgeable or educated in a particular field". (The EFA Global Monitoring Report Team, 2005).

Then, in 1966, UNESCO created a functional definition of this literacy, which is "A person is functionally said to be literate or literate if they are involved in all activities where literacy is needed to function effectively in a group and community and also to enable him to continue to use the ability to read, write, and calculate for himself and community development (Keefe and Copeland, 2011). The notion of literacy continues to develop, but in general this literacy is interpreted as one's ability to read and write.

Literacy continues to grow. Literacy carried in the 21st century is not limited to literacy in terms of reading and writing. Literature in the 21st century is more directed at how a person accesses and understands information that now seems to have no limits.

Therefore, Indonesia is currently promoting a literacy program that is well known as the National Literacy Program. And at the school level there is the School Literacy Program. However, there are several problems encountered in the literacy program in schools,
especially elementary schools. Some of the problems faced are as follows. The first problem is
the low literacy ability of elementary students, especially language literacy. Second, the
difficulties faced by elementary school students in improving their language literacy skills are
the incomplete literacy practices undertaken by teachers, the lack of available literacy
environments, and different levels of parent literacy that have an impact on the lack of
information literacy obtained by students from home (Kharizmi, 2015) .

Related to the lack of available literacy environment, what will be the focus of attention in
this research is the lack of literacy teaching materials available in elementary schools,
especially in Kuningan District. Therefore, the authors conducted preliminary interviews with
teachers at several elementary schools in Kuningan District, namely: SDN 1 Bungurberes,
SDN 1 Jalatrang, SDS Ksaaturi, SDN Babakan Jati, and SDN Cikaso. The interview was
conducted on 2-10 February 2018. The results of the interview are as follows. 1) Students'
literacy ability is still low. 2) Obstacles to literacy are due to the lack
of appropriate teaching materials and there are still teachers who do not understand literacy. 3)
The teaching materials available are only in the form of reading books which sometimes the
context is not appropriate for students and learning. 4) There are still many students who use
Sundanese as their mother tongue, which hinders the process of learning to read, including
reading comprehension.

The teaching material itself is everything that is conveyed to students in learning. As stated
by Richard that teaching materials can be presented in various forms, which clearly must be
able to help students in the learning process.

In language teaching, anything which can be used by teachers or learners to facilitate the
learning of a language. Material may be linguistic, visual, auditory or kinesthetic and they may
be presented in print, audio, or video form, on CD-Roms, on the internet or through live
performance or display (J. C. and R. S. Richard, 2010)

In the beginning, literacy was only meant as a person's ability in terms of reading and
writing and counting. The term "literacy" is defined as "the ability to read and write" or the
ability to read and write. This word then develops according to the development of knowledge
(Boeriswati, 2017). Furthermore, Unesco explained that literacy in learning is a set of unity of
the ability to use the skills to read, write, and count in accordance with the contexts obtained
and developed through the learning process and application in schools, in families,
communities, and other relevant situations (Faizah, 2017).

Furthermore, the opinion on literacy was put forward by The National Literacy Act which
defines literacy as "an individual's ability to read, write, and speak in English, and compute
and solve problems at levels of proficiency necessary to function on the job and in society to
achieve one's goals, and develop one's knowledge and potential. " This means that literacy is
closely related to one's ability to read, write, speak, and process the information obtained to
solve problems encountered in daily life. There is also PIRLS (Progress in International
Reading Literacy Study) which defines literacy as the ability to understand and use written
language that is needed by the community or that is of value to individuals (Kharizmi, 2015) .

Next is the understanding of Literacy expressed by PISA (Program for International
Student Assessment) on Reading Literacy, that reading literacy is the ability to understand,
use, reflect, and engage with written texts, to achieve one's goals, to develop one's knowledge
and potential, and to participate in society (Thomson, Hillman, & De Bortoli, 2013)

The explanation of each item is as follows. Understanding refers to the ability to get
meaning from what is read. This can include the meaning of words or it can be more
complicated in identifying the basic theme of a narrative. Using, relating to the understanding
of applications and functions. For example, applying what has been read to a task or direct
goal, or using what is read to strengthen or change beliefs. Reflecting, in terms of emphasizing the idea that reading is interactive, where readers make connections with their own thoughts and experiences when engaging with texts. Involved, involving the motivation of the reader to read and consists of construction including interest in and pleasure to read, sense control over what someone reads, and reading practice. Written text, including text from various media - handwritten, printed and digital. They can include visual displays such as diagrams and pictures. Written texts can be in various formats, including continuous and non-continuous, and in various types of texts, such as narration and exposure.

Based on this understanding, in the beginning this literacy was interpreted as literacy, meaning someone's ability in literacy or literacy discourse. This ability will not be separated from the ability to read and write, both reading and writing the beginning or reading and writing comprehension. Because that is what will be the basis for the next ability related to the ability to absorb and interpret information. The ability to absorb and interpret this information will not be exceeded if the ability to read technical and understanding is not exceeded. In other words, when we discuss literacy it will not be separated from matters relating to the ability of literacy, or the ability to read the symbol of letters into the sound of words and other language sounds.

However, of course this literacy is not only limited to this. Nowadays the understanding of literacy has developed. As stated by PIRLS above, the literacy ability can then be used for the benefit of society and or something useful for life. That is, with the ability of literacy that humans can do something that is needed in their lives in society. He can also use it to do something useful for the personal life and surrounding society.

Therefore, a study of the development of teaching materials needs to be done. However, the study of teaching material needs to be done first. That is so teaching materials that will be developed according to the needs in the field. Therefore, this research focuses on the need for literacy teaching materials in elementary schools in Kuningan Regency.

Needs analysis is an effort made by researchers to find out the needs or something desired by students, teachers, and related parties related to literacy teaching materials. Meanwhile, Kemp said that needs analysis involves examining gaps and identifying potential causes of gaps (also called causes of analysis) the cause of the gap is used to determine the right intervention (Morrison, 2007)

Analysis of needs in the development of this teaching material certainly has its uses. The main use is that it can be used as a benchmark for researchers in finding the ideal form of teaching materials in accordance with the needs of students and teachers as well as related parties who use teaching materials. This is in line with what was mentioned by Richard that the use of needs analysis is as follows; Provide a basis for evaluating a program or component of a program, provides a basis for planning the goals and objects of a program, help develop tests and other assessment procedures, help determine the appropriate teaching methods, provide a basis for developing syllabi and teaching materials for a language program, and providing information that can be used as a program report to an external agency or organization (JC Richard, 2002)

The needs analysis itself is divided into two categories, namely target needs and learning needs. (Hutchinson and Water, 1987). Target needs pertain to what students need to do in certain situations or targets. These target needs include necessities, lacks, and wants. Necessities are types of needs that are determined by the target situation; what students must know and how to function effectively in the target situation. Meanwhile, deficiencies are mismatches between targeted abilities and abilities that are already possessed by students. This shortcoming will be known when we know the needs
of students as well. The desire is the perception or awareness of students of their needs in learning something (Nation & Macalister, 2010).

Some of the research conducted on needs analysis that is used as a reference is as follows. First, research with the title "Need Analysis on English Teaching Materials for Science Students" (Diana & Mansyur, 2018). In this study, the theory of needs analysis used is based on the needs of the target, namely needs, desires, and deficiencies. The target is students.

Second, research with the title "A Needs Analysis Study for Preparatory Class Elt Students" (Ulum 2015). In this study the pattern analysis of the needs of the target situation is used based on the needs of students. Third, the research entitled "Needs Analysis For Identifying ESP Material for Medical Record Students in APIKES Citra Medika Surakarta." (Setiawati, 206). This research identifies the need for English teaching materials for special purposes, namely teaching English to medical students. Needs analysis is also based on target needs which include needs, shortcomings, and desires.

From the three studies it can be concluded that the needs analysis is done by looking at the target needs which include deficiencies, needs, and desires. From there it can also be seen that the analysis of teaching material needs is more for English material, both reading and writing, which for Indonesian students is a foreign language. Maybe because English is considered more difficult. Analysis of needs about Indonesian language teaching materials, especially literacy is still lacking. Therefore, herein lies the novelty of this research, which is analyzing the needs of Indonesian literacy teaching materials. Of course this study needs to be done considering teaching material is important in the process of acquiring a skill, including literacy. And of course we have agreed that literacy skills, especially at the elementary level must be considered.

2 Methods

This research used descriptive qualitative method. The data collection technique used is interview. Interviews were given to teachers and students in 30 elementary schools in Kuningan District. Ten elementary schools in Kuningan edge, ten elementary schools in Kuningan Madya District, and ten elementary schools in Kuningan City district.

Before conducting research, researchers met with the headmaster to ask permission to conduct interviews with the teacher who was the coordinator of the literacy program at his school. After obtaining permission, the researchers conducted interviews regarding the needs, lack, and want of literacy teaching materials. Then, researchers processed using qualitative data processing procedures. The procedure is, data collection, data reduction, data tabulation, data analysis, and data presentation (Creswell, 2012)

3 Results and Discussions

Needs analysis is done by conducting interviews with teachers and students at 30 elementary schools in Kuningan District. Samples were taken from several elementary schools that are spread out of Kuningan, Midle Kuningan, and Central Kuningan.
3.1. Results and Discussion of the Interview with the Teacher, Teacher Interview Results are related to Needs

The second question related to the needs are: According to Mr / Ms, what kind of teaching materials are needed for the implementation of the literacy program? For this question, the answers of 30 respondents varied greatly, and each respondent answered more than one answer. However, the authors conclude there are seven answers in common, namely: 1) need literacy teaching materials that are suitable for classroom learning; 2) need literacy teaching materials that are appropriate to the level of understanding of students; 3) need teaching material that contains the values of character / habituation of behavior; 4) need teaching material that contains knowledge / insight; 5) need teaching materials that contain self-development; 5) need teaching material in the form of stories / fiction; 6) teaching materials that contain instructions are easy for students to understand so students know what they need to do; and 7) need teaching materials that contain elements of Sundanese/Kuningan culture and language.

For item needs, the results of the interview can be concluded as follows, that the teacher needs teaching material that: in accordance with classroom learning; according to the level of understanding of students; contains the character values / habituation of behavior; includes knowledge / insight; contains self-development; in the form of stories / fiction; contains instructions so that students can easily understand; contains elements of Sundanese culture and language / Kuningan local wisdom; and stimulates students' critical thinking.

3.2. Teacher Interview Results are related to Lack

The first question relates to the lack is "According to Mr / Ms, how the conditions of teaching materials for literacy programs that exist today ?. For this question, the answers of each teacher vary, and many of them answer more than one. However, the authors conclude their mean answers are as follows; 1) teaching materials are still improperly relying on books in the library; 2) literacy is still using textbooks; 3) there are many literacy books that are not suitable with the development and needs of elementary school children.

The second question related to the lack is: According to Mr / Ms, whether teaching materials for literacy programs that exist today have shortcomings? If yes, can you / explain the shortcomings ? For this question, all respondents (100%) answered yes. The explanations vary and each teacher answered more than one deficiency. There are also teachers who provide explanations that do not fit the direction of the question. After the authors conclude the answers about the lack of literacy teaching materials are as follows; 1) not suitable with the development / understanding of the child; 2) lack of interest in reading students; 3) lack of character load; 4) lacks even does not contain clear instructions so students do not know what to do; 5) literacy teaching materials are still in the form of textbooks.

For lacking items, the interview results can be concluded that the existing literacy teaching materials have the following shortcomings: still minimalist; not suitable with the development / understanding of the child; lack of interest in reading students; lack of character load; lacks even does not contain clear instructions so students do not know what to do; and literacy teaching materials are still in the form of textbooks.

3.3. Teacher Interview Results are related to Want

The first question related to the want is "If you will develop a teaching material for the literacy program, what kind of teaching material do you want? ". For this question, the answers of the teachers varied and each of the many teachers answered more than one wish. After the writer concludes, the answers about the desire of literacy teaching materials are
as follows: 1) want interesting and current literacy teaching materials so that students want to read; 2) want teaching materials that support the learning process in the classroom; 3) want teaching materials that fit the level of student understanding; 5) want teaching materials that contain character values; 6) want teaching materials that contain science and skills; 7) want teaching materials that contain local wisdom, and 8) want teaching materials that have passed expert testing.

The second question related to the want is: "Do you want teaching material that contains instructions that direct students to read technical well?". For this question all respondents (30 people / 100%) answered no.

The third question related to the want is Do you want teaching material that contains instructions that direct students to be able to understand discourse? For this question all respondents (30 people / 100%) answered yes.

The fourth question related to the desire want is "Do you want teaching material that contains instructions that direct students to think critically? For this question all respondents (30 people / 100%) answered yes.

The second question related to the desire want is: Do you want literacy teaching materials that contain elements of local wisdom Kuningan? For this question all respondents (30 people / 100%) answered yes.

For want items, the results of the interview are that the teacher wants teaching material that: interesting and up-to-date so students want to read; support the learning process in the classroom; according to the level of understanding of students; load character values; includes science and skills; loading local wisdom, includes instructions on understanding discourse; and stimulates students' critical thinking.

3.4. Results and Discussion of Interviews with Students

For students also asked questions relating to needs, shortcomings, and desires. Based on the results of interviews with students obtained the following results.

3.5. Students Interview Results are related to Needs

The first question relates to the need is "Do you know about literacy in your school?". For this question, all students answer yes. That means that in elementary schools in Kuningan district have implemented the school literacy program.

The second question related to needs are: For literacy activities, what kind of reading books do you need? Of the 30 students interviewed their answers varied and each student answered more than one answer. And on average they answered that they needed teaching materials in the form of: 1) story books; 2) knowledge books; 3) history books; and 4) books that contain morals.

The third question related to needs are: Do you think, the reading book you should be able to understand? What is the reason? Of the 30 students, all answered yes. The reason is that the intended teaching materials can be understood by them.

The fourth question related to needs are: Do you think the literacy reading should be interesting? (For example, the color is interesting, the picture is good, the writing is funny, etc.)? What is the reason? For this question, out of 30 students 19 people answered yes, with the reason that they were interested in reading it and 11 people answered no. Their reason is because the contents are important. there are students who don't give reasons.

The fifth question related to the needs are: Do you think, the reading book should contain text about Kuningan District? Why? Out of 30 students, 21 students said yes. the
average reason is because let me know the history of Kuningan. while 9 people answered no by not giving reasons or answering not knowing.

Questions sixth relates to the need is: Do you think, reading books that you read on the literacy program should make you think critically (want to ask, wanting to know more, and would like to comment on? Why? Of the 30 students all answered yes. However, when asked the reason for average silence.

For item needs, the results of interviews with students can be concluded that for the literacy program they want: story book; knowledge books; history books; books that are easy to understand; a book that contains about Kuningan district; interesting books; and books that contain moral messages.

3.6. Students Interview Results are related to Lack

The first question is related to the lack: Does your school provide reading books for literacy at school? For this question all students answer yes.

The second question related to lack is: Do you often find difficult words / sentences in the text that you read in the book you read? Out of 30 students, 27 answered yes, and the rest said no / never.

The third question relates to the deficiency is: Are books that you read interesting (color, letters, pictures, etc.)? For this question, all students answer yes.

The fourth question related to lack is: Does the reading book contain text about Kuningan District? If there is, for example about what? For this question, all students answer no.

The fifth question related to lack is: Does the textbook convey character values to you? For example what? For this question, all students answer yes. They answered the example of the characters that they got were nationalism, respecting parents, please help, save, be diligent, and not give up.

Questions sixth associated with lack is: Does the textbook makes you want to ask, wanting to know more, and would like to comment on? For example how? For this question, all students answer yes. But most of them can not explain further.

The seventh question relates to lack is: Is reading books that you read commands / assign something to you? For example, asking to make poetry and so on. For this question all students answer no (one of them answers: maybe ever).

For lacking items, it can be concluded that according to students the existing literacy teaching materials have the following deficiencies: In the books they read they still often find difficult words; In the book they read it does not contain content of local wisdom; The book they read does not contain follow-up instructions on what they read.

3.7. Students Interview Results are related to Want

The first question related to want is: Next, if you want to make reading books for literacy, what kind of reading book do you want? For this question, students' answers vary, and they have more than one answer. After being concluded, they want books that are: 1) story books, 2) books that have moral messages, 3) interesting books, and 4) books that contain knowledge.

The second question related to want is: What kind of themes do you find interesting? For this question, students' answers vary, and they have more than one answer. Once concluded they want a theme about school stories, stories that have moral messages, stories about animals, adventure stories.

The third question related to the want is: Do you want a reading book in which there are stories about legends or folklore originating from Kuningan District? Why? For this
question, all students answer yes. The reasons are: 1) to know the history of Kuningan, 2) so that Kuningan can become famous.

The fourth question related to want is: Do you want books to read that make you think critically? (For example, want to ask more questions, want to comment, want to do something). For this question, most students (22 people) answered yes, although when asked the reason why they did not answer. Meanwhile, the rest did not answer, and they together did not give a reason.

The fifth question related to want is: Do you want a literacy reading book that assigns you with certain skills, such as making poetry, retelling stories, and so on? For this question, all students answer yes, even though they are reluctant to give reasons for their answers.

For want items, it can be concluded that students want teaching material as follows: story book, books that have moral messages, interesting books, knowledge book; books that contain elements of local wisdom; and books that make them think critically.

4 Conclusions

Based on the results of research and discussions that have been carried out, it can be concluded that the needs of literacy teaching materials in elementary schools in Kuningan District are:

1) in accordance with classroom learning material; 2) according to the level of student understanding; 3) contains the character values / habituation of behavior; 4) contains knowledge or insight; 5) contains self-development; 5) in the form of stories or fiction; 6) contains instructions so students easily understand and know what they have to do; 7) stimulates critical thinking; 8) it contains elements of Sundanese / Kuningan culture and language; and 10) interesting.

Based on these conclusions, the researcher recommends to related parties and or to further researchers to compile teaching materials that suit these needs. Thus, it is hoped that the School Literacy Program in elementary schools in Kuningan District will produce students' literacy abilities that are in line with expectations. In addition, with teaching materials that fit the needs it is expected that the culture of student literacy will increase.

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References


Conservation of Salt Lick Locations Utilized by Sumatran Elephant (*Elephas Maximus-Sumatranus*) in Tangkahan, North Sumatra

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Abstract. Community perception towards salt lick behaviour by Sumatran Elephant (*Elephas maximus sumatranus*) is an important element for investigation to support the wildlife conservation in a Conservation Response Unit (CRU) area. The aims of this study were to identify the analyze the community perception and understanding on the importance of salt licks to Sumatran Elephant and to analyze the relationship between demographic element (social, economy, culture) of the local community and salt lick behavior by the elephants. This study was conducted in Kuala Buluh and Kuala Gemoh Hamlet, Tangkahan, Langkat Regency, North Sumatra, Indonesia. The community was chosen purposively as they reside in the conservation area. Data were collected through interviews with 100 respondents and analyzed by Spearman’s correlation test. The results showed that community perceptions towards salt lick behavior were varied, ranging from moderate, strong to very strong relationship. The education factor has a positive relationship with perceptions of salt lick behavior and elephant conservation ($\rho = 0.228$; $p = 0.022$), the higher the level of education, the better the understanding. While the distance from the settlement to the salting location was significantly negative ($\rho = -0.537$; $p = 0.000$), the closer the settlement to the elephant salting location, the better the perception. Duration of residence was negatively related to perception ($\rho = -0.145$; $p = 0.151$), the longer they resided, the less understanding by the community towards the salt behavior and elephant conservation. It was suspected that the longer they resided will increase their participation to the ecotourism site, hence they were less likely to enter the forest. In general, the community nearby CRU Tangkahan supported the existence of salt licks location by maintaining, while not changing the form of the authenticity and not damaging the location from ecotourism activities.

Keywords: Sumatran Elephant; Demographic Element; Spearman’s Correlation Test

1 Introduction

The salt lick location of the Sumatran elephant is a location that produces natural mineral salts contained in water, mud, soil and on rock surfaces. This location plays an important role...
in providing mineral salts for Sumatran elephants and other wildlife in the forest. The utilization of natural mineral salts is known when elephants exhibit salting behavior. The expression or attempt to accept or adapt to different internal or external conditions is characterized as animal behavior [1]. As a result, the Sumatran elephant will exhibit salting behavior when his body requires mineral salts for metabolic activities and when food digestion begins.

The purpose of salting is to strengthen bones, teeth, and/or tusks [2]. Salt lick behavior on Sumatran elephants in Tangkahan is seen when elephants are following a grazing program to find food carried out by Conservation Response Unit (CRU) management into the forests of Gunung Leuser National Park, as well as when traveling back to the elephant enclosure around the riverbank. As a result, the demand for this mineral salt is critical for the physiological balance of elephant. The extent to which local knowledge can be appreciated and utilized in building a good conservation area management system determines the community's participation in managing biological resources. Furthermore, this local knowledge encourages the community to participate in the preservation of the natural salt location because it provides benefits (both material and non-material) that can be obtained by the community from conservation activities, ensuring that its continued existence benefits them.

2 Materials and Method

2.1. Study site

This research was conducted from March to September 2021. The selection of research locations was based on the hamlet closest to the Conservation Response Unit (CRU) Tangkahan, namely Kuala Buluh and Kuala Gemoh Hamlet, Namo Sialang, Batang Serangan District, Langkat Regency, North Sumatra. Tangkahan is a buffer zone area of Gunung Leuser National Park (TNGL).

2.2. Sampling methodology

The community who reside in the area around the Tangkahan Conservation Response Unit (CRU) were the primary focus of this study. The location of data collection was determined by purposive sampling by taking into account the proximity of the community housing distance to the location of elephant salting. Interviews were conducted by means of purposive sampling directly to the community owners of ecotourism businesses, traditional leaders and local government officials. The total number of respondents was 100 respondents in 2 hamlets. Information on data collected regarding gender, age, education level, settlement history, settlement distance, income level, community knowledge about elephant salting and participation in protecting salting sites for elephants was obtained through interviews and filling out questionnaires by community respondents.

2.3. Data analysis

The information gathered during the interviews was evaluated descriptively. Furthermore, data on community understanding about salting elephants and their participation in conserving elephant salting sites were evaluated using a Likert scale to turn the data into quantitative data. Likert scale was employed in the adjustment system [3]. The relationship between the socio-economic culture of the community and the community's impression of the salt elephant in Tangkahan was then examined using the Spearman correlation [4].
3 Results and Discussion

The community's perspective of the behavior of Sumatran elephants salt licking and elephant conservation in the region close to the salting place is deemed very significant because the community perception will help elephant conservation at CRU run properly. Public perceptions of the salt lick behavior of Sumatran elephants in Tangkahan are varied, ranging from moderate to very strong. According to data analysis, there is a public knowledge about elephant salt lick behavior (54.2%), elephants feeling the presence of mineral salt (56%), elephants consuming mineral salt (57.6%), elephants using tusks/legs to obtain mineral salts (59.2%), elephants consuming bark when minerals are lacking (64.8%), and knowledge of Sumatran elephants as herbivores (90%).

Furthermore, public perceptions of elephant conservation in Tangkahan also varied, ranging from strong to very strong. This is demonstrated by a 66.4% of understanding of the elephant protection as regulated by law and the diminishing elephant habitat, 75.8% of understanding the Sumatran elephant in Tangkahan as educational objects, 91.6% of understanding the Sumatran elephant in Tangkahan as a tourist attraction, 94.2% of understanding the Sumatran elephants in Tangkahan as a source of economic income, and 96.4% of understanding that elephants are rare animals (96.4%).

Based on the results of the study, the Tangkahan community supports the existence of the Sumatran elephant salt location by maintaining, not changing the shape of the authenticity and not damaging the location from ecotourism activities. Figure 1 shows that 56% of respondents from Kuala Buluh stated that they did not change the shape and authenticity of the salt location, while 40% from Kuala Gemoh promised not to damage the salt location from ecotourism activities. It is characterized as diversified, ranging from moderate to very strong, in terms of the community's viewpoint of salt lick behavior and Sumatran elephant conservation in Tangkahan. A person's perception varies due to the influence of several elements such as experience, background, the environment in which he lives, motivation, and others. The factors that influence a person will lead to varied interpretations of things, such as the location of elephant salting and the behavior of adult and cub elephants salting at natural salt sites (Figure 2). These statements and perceptions imply that all respondents have sufficient social capital to participate in and support the success of CRU’s conservation efforts. Furthermore, the Tangkahan community has a positive attitude toward elephants, which give economic benefits to the local population.
On the education aspect in general, there is a favorable association between perceptions of elephant conservation and education ($\rho = 0.228; p = 0.022$). As a result, the greater the Tangkahan community's educational level, the better their awareness of salt lick behavior and Sumatran elephant conservation. When evaluated from the perspective of the community's educational attainment in Tangkahan (Figure 3), the highest level of education is Senior High School (SMA) with 60% in Kuala Buluh and 56% in Kuala Gemoh, respectively. Communities in both hamlets try to send their children to high school, even though the school is far from their hamlet. In addition, the community uses the government road to the school, which is quite easy to navigate despite being made up of a mix of soil, stone and sand with several holes. Tangkahan's high school education could be explained in this way. In terms of the percentage of people who are not in school, only 10% of Kuala Buluh Hamlet is out of school, whereas there are no such persons in Kuala Gemoh Hamlet. When it comes to welfare, education levels below elementary school fall into the "not prosperous" category [5]. In general, Tangkahan people whose education is at the elementary level and below were estimated to be 18%. In addition, the level of education is very influential on the mindset of the community [6]. People with a higher education will have broader perspectives, higher aspirations, and desires, and will strive to attain their goals. People with a poor level of education, on the other hand, will be satisfied with what they own.

![Figure 1. Perception (%) of community towards Sumatran Elephant’s salt lick sites.](image-url)
Figure 2. Documentation of elephants’ salt licking behaviour. (a) mature elephant, (b) calf.

Figure 3. Education profile of the community in two hamlets. Each hamlet has a different history of settlement depending on how long it has been inhabited and whether or not it has a tourism-related business. Figure 4 reveals that 54 percent of respondents who have resided in Kuala Buluh Hamlet for more than 15 years and 46 percent in Kuala Gemoh Hamlet have lived there for more than 15 years. When compared to Kuala Gemoh Hamlet, which has a population of 26 percent, only 6% of them in Kuala Buluh Hamlet have lived for 11 to 15 years.

However, people who have lived for about 6 to 10 years are 24% more in Kuala Buluh than in Kuala Gemoh about 12%. People who have lived for less than 5 years in the hamlets of Kuala Buluh and Kuala Gemoh are around 16%. Furthermore, based on data analysis, length of stay in the community was negatively related to perceptions of salt lick behavior and Sumatran
elephant conservation ($\rho = -0.145; p = 0.151$). It is thought that the longer they live, the more ecotourism service activities they engage in, making them less likely to visit the forest.

The distance between where the Tangkahan people live and the salt licks on the elephants varies. The distance starts from less than 1 km to more than 6 km. In Figure 5, it is known that 36% of the people of Dusun Kuala Buluh are located less than 1 km away and 14% are at a distance of more than 6 km from the salting location for elephants. Furthermore, the majority of the people in the hamlet of Kuala Gemoh (64%) live at a distance of more than 1 km to 3 km. In addition, 10% of the community live at a distance of less than 1 km and more than 6 km from a mineral salt source for elephants. When viewed from the overall Tangkahan ecotourism activities, the people of Kuala Buluh hamlet are also closer to the center of tourist destinations than Kuala Gemoh hamlet. Furthermore, based on the results of data analysis, it turns out that the distance from which people live has a very significant negative correlation with perceptions of salt lick behavior and Sumatran elephant conservation ($\rho = -0.537; p = 0.000$). Because of this relationship, the closer individuals live, the better they understand salt lick behavior and Sumatran elephant conservation. The mahouts in charge of caring for the elephants or the CRU management are thought to be the main sources of knowledge for the general population concerning Sumatran elephant conservation. This expands their understanding of some of the activities of elephants in mahouts' care, such as elephant salting, the location of salting in the jungle, and the protection of these wildlife species.
When observed in each hamlet, the community in the research location is included in the productive class based on age class. This corresponds to the age of the population based on the level of productivity, namely 15 years (not productive), 15 to 55 years (productive), and >55 years (unproductive) [7]. The age group under 15 years is 8% in the Kuala Buluh hamlet community and 10% in the Kuala Gemoh hamlet community. Figure 6 shows that the age group 15 to 55 years old has the highest percentage, with the hamlets of Kuala Buluh (76%) and Kuala Gemoh (74%) respectively. Furthermore, the citizens of Kuala Buluh and Kuala Gemoh each account for 16% of the population over the age of 55 (Figure 6). According to [8] that a person's productivity at work is strongly influenced by age. Generally, someone who is in the productive age will earn more income than someone who is in the non-productive age. The age structure will affect the economic activities carried out by the community. Thus, the productive age class in the hamlet physically has the potential to increase their income in the tourism sector. This is in accordance with the results of the Spearman correlation analysis that the relationship between the age of the people in Tangkahan and the level of income shows the value of the rho coefficient ($\rho = 0.253; p = 0.011$) and there is a significant positive relationship between the two variables. So, the older you get, the more people's income in Tangkahan increases. This is thought to have something to do with knowledge of the economic value obtained from the use of Sumatran elephants as a tourist attraction. Meanwhile, community age has a negative correlation with knowledge of Sumatran elephant salt locations ($\rho = -0.247; p = 0.013$). This association indicates that the older the respondent, the less information they have regarding where to salt the Sumatran elephant. This could be due to the fact that they have rarely been deep into the forest, thus their knowledge of where to find salt elephants is dwindling. Despite the fact that people over the age of 55 have less understanding about elephants, they nonetheless support elephant conservation by ensuring the presence of natural salt places for elephants.
The level of community income in Tangkahan generally comes from tourism sector activities. As seen in Figure 19, it is the current condition of the income of the Tangkahan community. The income of the people of Kuala Buluh hamlet is around 76% and Kuala Gemoh about 88% is below the district minimum wage (UMK) (Figure 7). Thus, the level of community income is included in the low category because many people have income below the Langkat district minimum wage in 2021, which is Rp. 2,710,988,-. From observations with the community, that if the current tourism sector activities decline, the community's income will also decrease. This low level of community income is due to the COVID-19 pandemic that has hit the world, including Indonesia. The government is making various efforts to overcome the pandemic, one of which is large-scale social restrictions (PSBB) to reduce community activities outside the home if not necessary. This factual condition causes the entire community to be affected, including people who carry out activities in the tourism sector in Tangkahan.

Since the government has imposed restrictions on activities in public facilities, flight restrictions, and the closure of the Tangkahan tourism destination, this has resulted in a decrease in visits by foreign tourists and domestic tourists, whose impact is chained by the decline in people's income. According to [9] stated that foreign tourist visits to Indonesia also decreased cumulatively in the period January to June 2020 by 59.96% (3.09 million people) compared to the number of foreign tourist arrivals in 2019 (7.72 million visits). The tourism sector is a source of foreign exchange for the country and has an important contribution to strategic employment.

Based on the results of interviews, the Tangkahan community has difficulty in operating costs and maintaining building facilities because they do not have the costs due to the impact of the pandemic. Furthermore, according to [10] that 62.1% of small businesses had difficulty financing business operations during the pandemic. The same thing happened in several regions in the archipelago, for example in North Sulawesi, indicating that entrepreneurs have difficulty covering operational costs when the destination is closed [11]. This also happens on a global scale, according to [12,13] that the specific problems experienced by destinations during the
pandemic are insufficient and even inadequate operational and maintenance costs. Therefore, the impact of this pandemic has resulted in Tangkahan community groups that were previously not included in the income below the UMK eventually become below the UMK due to the wide-scale restrictions.

![Figure 7. Profile of income of the community based on the district minimum wage in two hamlets.](image)

However, based on the value of the rho coefficient between people's income levels and perceptions of salt lick behavior and Sumatran elephant conservation, the relationship is very low, even meaningless and insignificant ($\rho = 0.076$; $p = 0.452$). Thus, although the Covid 19 pandemic is still causing a decrease in the income of the Tangkahan community, this does not affect their perception and does not become a limiting factor in conserving Sumatran elephants.

Positive public perceptions of elephant salt sites conservation are beneficial to elephant conservation outside of their natural environment. Because local communities are the closest to elephant habitat, their engagement in elephant conservation management is critical. The extent to which local knowledge can be appreciated and utilized in building a good conservation area management system determines the community's participation in managing biological resources. Then, how concerned are local populations about their environment, so that they may encourage efforts to preserve and manage biodiversity both within and outside the area? Furthermore, how many advantages (both material and non-material) can the community derive through conservation initiatives in order for its existence to continue to be beneficial? These questions remained to be answered in further deeper investigation in the future.

### 4 Conclusion

In the forest of Gunung Leuser National Park, the location of the Sumatran elephant's salt lick (salt lick) is crucial for the Sumatran elephant as a supply of natural mineral salt. As a result,
this place must be safeguarded against harm. The CRU and the Tangkahan people worked together to safeguard the site of the salt. This is based on the community's understanding of elephant conservation and the socioeconomic conditions of the community's culture, which are described as diversified, ranging from moderate to strong.

5 Acknowledgments

The authors are appreciative for the financial support they have received for this study from Deputi Penguatan Riset dan Pengembangan Kementerian Riset dan Teknologi/ Badan Riset dan Inovasi Nasional under budget year of 2020 with contract no. 12/E1/KP.PTNBH/2021.

References

Abstract. This study aims to describe the algebraic reasoning ability of high school students in reflective and impulsive cognitive styles. The design of this study is case study under qualitative descriptive research. Cluster sampling and purposive sampling were used as data collecting technique. The research subjects were four students of MA Nurul Huda Beringin with categories: two reflective subjects and two impulsive subjects. This study employed cognitive style test (MFFT), algebraic reasoning test, interview test and observation as the instruments. The data analysis techniques used in the form of data reduction, data presentation and drawing conclusions. The data were triangulated to test the validity. The results of the analysis algebraic reasoning abilities showed that the reflective subject has been able to meet the indicators at level 6 of algebraic reasoning (replacing numeric numbers with parameters, performing algebraic operations on two parameters and knowing the special nature of algebraic operations). Meanwhile, impulsive subjects have not been able to fulfill the indicators of level 6 algebraic reasoning (replacing numeric numbers with parameters, performing algebraic operations on two parameters and knowing the special nature of algebraic operations) in full. This is because the impulsive subject has not fully used the distributive property of algebraic multiplication in the process of solving three problems.

Keywords: Algebraic Reasoning; Cognitive Style; Reflective-Impulsive

1 Introduction

The National Council of Teachers of Mathematics (NCTM) state that the main goal of learning mathematics should be encourage students' belief that mathematics make sense, to increase students' sensitivity to the power of mathematics, and to believe in students' thinking abilities. NCTM (2000) also explain that in learning mathematics there are five basic abilities which are standard mathematical abilities, namely problem solving, reasoning and proof, communication, connection and representation. The five basic skills described by NCTM must be mastered by students so that their learning will be more meaningful. One of them is reasoning ability.

Kusumawardani, Wardono and Kartono (2018) argue that mathematical reasoning ability is about reasoning and by mathematical objects needed to draw conclusions or make a new statement that is true based on several statements which has been proven true or assume
previously. There are many kinds of mathematical reasoning ability, one of them is algebraic reasoning ability. Algebra is a branch of mathematics that studies the concepts or principles of simplification and problem solving through certain symbols or letters. The ability to make reason about good algebra will minimize the difficulties experienced by students related to symbols which is difficult to understand.

Kobandaha and Fuad (2019) in their research state that: “One of the causes of these difficulties is the understanding of symbols, variables, which are in algebraic material. Though mastery of algebraic material is an important competency for middle school students.” This statement means that one of the causes of the difficulties experienced by students is the understanding of symbols and variables in algebraic material. Mastery of algebraic material is an important competency for high school students. But unfortunately, the algebraic reasoning ability of Indonesian students is still relatively low.

Through Trends in International Mathematics and Science Study (TIMSS) data in 2011 for Indonesian students, it was found that the lowest average percentage of Indonesian students' ability was algebraic reasoning ability. This is indicated by the average percentage of results in the reasoning domain of 17% and in the algebraic domain of 22% which is the lowest result among the four domains in TIMSS (Rosnawati, 2013). Then the latest results from TIMSS in 2015 showed that students' mathematical reasoning abilities were still low.

Several previous studies on algebraic reasoning have been carried out by researchers. One of them is a study conducted by Nuraini et al., (2016) at SMP Negeri 1 Margoyoso. There are 4 levels of algebraic reasoning in this study, namely level 0, level 1, level 2 and a level higher than 2 but has not reached level 3. The results showed that from 10 subjects, 2 people obtained subject data for level 0 algebra reasoning, there are 2 subjects for level 1 algebraic reasoning, 3 subjects for level 2 algebraic reasoning and 3 subjects for algebraic reasoning higher than level 2 but have not reached level 3 as many as 3 people.

Based on the results of preliminary studies or observations made by researchers, there are still many students who have not been able to solve algebraic reasoning problems regarding the Three Variable Linear Equation System perfectly. The preliminary study questions given contain two indicators of algebraic reasoning at the SMA/SMK level, namely replacing numeric numbers (numbers) with parameters and performing algebraic operations on two parameters.

![Figure 1. Preliminary Result Study](image)

Rosita (2018) states that: “The process of algebraic reasoning in problem solving needs to get the attention of teachers and lecturers to help students develop algebraic reasoning abilities. Cognitive style is a dimension to review students’ algebraic reasoning abilities”.

The
purpose of this statement is that the process of algebraic reasoning in problem solving needs teacher’s attention to assist students in developing their algebraic reasoning abilities, and cognitive style that is a dimension to examine these algebraic reasoning abilities.

Based on the explanation above, the researcher conducted a study to analyze the algebraic reasoning ability of MA students or equivalent to high school students in terms of reflective and impulsive cognitive styles.

2 Research Method

The design of this study is case study under qualitative descriptive research. Cluster sampling and purposive sampling were used as data collecting technique. The selected research subjects were 4 students of class X MA Nurul Huda Beringin. This study employed cognitive style test (MFFT), algebraic reasoning test, interview test and observation as the instruments. The cognitive style test in this study used the Matching Familiar Figure Test (MFFT). This test examined the speed and accuracy in selecting two items/images that are exactly similar among images. The data analysis techniques were in the form of data reduction, data presentation and drawing conclusions. The data were triangulated to measure the validity. The triangulation technic has done by combining observation, interview and documentation.

3 Research Results

3.1. Algebraic Reasoning Ability of Reflective’s Subject

3.1.1. Reflective’s Subject 1

![Figure 2. SR1 answer to questions 1 and 2]
The results of the description and analysis of SR1 show that SR1 meets all indicators of the level of algebraic reasoning for question three but does not meet the indicators of algebraic reasoning level 6 in questions one and two. In general, SR1 solves problems by writing down, knowing and asking information, making examples and general forms / equations, and solving problems through elimination and or substitution methods. Based on the leveling according to Godino et al., (2014) and the assessment guide of Permendikbud No. 53 of 2020, it can be concluded that the subject of SR1 has reached level 6 of algebraic reasoning for question three with good grades.

3.1.2. Reflective’s Subject 2
The results of the description and analysis of SR2 show that SR2 meets the level indicators of algebraic reasoning for all questions. SR2 solves each problem systematically starting from writing down, knowing and asking information, making examples and general forms / equations, solving problems through elimination and or substitution methods, using distributive properties of algebraic operations and making conclusion answers. Based on the leveling according to Godino et al., (2014) and the assessment guide of Permendikbud No. 53 of 2020, it can be concluded that SR2 has reached level 6 of algebraic reasoning for each number of questions with very good scores.

3.2. Algebraic Reasoning Ability of Impulsive’s Subject
3.2.1. Impulsive’s Subject 1
The results of the description and analysis of SI1 show that SI1 meets all indicators of the level of algebraic reasoning for questions one and three but does not meet the indicators of algebraic reasoning at level 6 for question two. In general, SI1 solves each problem systematically starting from writing down, knowing and asking information, making examples, making general forms / equations, solving problems through elimination and/or substitution methods, using distributive properties of algebraic operations and making conclusion of the answers. Based on the leveling according to Godino et al., (2014) and the assessment guide of Permendikbud No 53 of 2020, it can be concluded that SI1 has reached level 6 of algebraic reasoning for questions one and three with good grades.

3.2.2. Impulsive’s Subject 2

Figure 8. SI2 answer to questions 1 and 2
The results of the description and analysis of SI2 show that SI2 meets all indicators of the level of algebraic reasoning for questions one and three but does not meet the indicators of algebraic reasoning at level 6 for question two. In general, SI1 solves each problem systematically starting from writing down, knowing and asking information, making examples, making general forms / equations, solving problems through elimination and/or substitution methods, using distributive properties of algebraic operations and making conclusion answers. Based on the leveling according to Godino et al., (2014) and the assessment guide of Permendikbud No. 53 of 2020, it can be concluded that SI2 has reached level 6 of algebraic reasoning for questions one and three with good grades.

4 Discussion

The results of the analysis of the algebraic reasoning test showed that reflective subjects tend to spend a long time and clearly in solving each question. This tendency is in accordance with the results of research conducted by Aprilia et al., (2015) which states that the thinking process of reflective students tends to think first before answering questions during interviews and when they do the tests, they try repeatedly on the scribble sheet and immediately write the results on the answer sheet.

One reflective subject did not fully meet the level 6 indicator of algebraic reasoning. While one other reflective subject was able to solve all the questions and fulfill the level 6 indicator of algebraic reasoning in full. However, in general, reflective subjects are quite careful in solving the problems given. The answers are written systematically, began from writing down what was known and what was being asked, making examples and equations,
operating equations using the distributive property of multiplication and substitution/elimination methods, to make conclusions.

Impulsive subjects took algebraic reasoning tests by writing down their ideas directly on the answer sheet. And during the interview process, the impulsive subject immediately responded quickly to the questions given. This tendency is in accordance with the results of research by Aprilia et al (2015) which states that the thought processes of impulsive subjects tend to respond quickly to questions given during interviews and write down all the ideas that are in their minds during the test process.

Impulsive subjects have not fulfilled all the indicators of the level of algebraic reasoning in full. This is evidenced by the lack of accuracy of impulsive subjects when working on questions. Impulsive subjects did not write down what information was known and what was asked in the question. Impulsive subjects also have not fully used the distributive property of algebraic multiplication during the problem solving process. Nevertheless, the answers of impulsive subjects were quite systematic.

In general, both reflective and impulsive subjects were able to solve algebraic problems and fulfill the indicators of algebraic reasoning, although not completely. This can be seen in the subject's answer during the problem solving process that does not use the distributive property of algebraic multiplication. The distributive nature of algebraic multiplication is very important for students to understand and is included in the indicators for the level of algebraic reasoning at the SMA/SMK level. However, some answers use methods other than substitution and elimination, namely factoring.

In this study, according to four selected subjects it can be concluded that the two students were reflective subjects and two students were impulsive subjects. Those who reflective subjects were better at solving the three questions given compared to impulsive subjects, although there were some error results. This is in accordance with the research conducted by Fitril et al., (2019) which states that the number sense ability of reflective subjects is better than that of impulsive subjects. Then the results of research by Ningsih and Cintamulya (2018) where the thinking ability of reflective subjects is better than impulsive subjects.

5 Conclusions and Suggestions

Based on the results of the analysis of students' algebraic reasoning abilities in impulsive reflective cognitive style, the researchers concluded that in solving algebraic reasoning questions, reflective subjects were able to meet the indicators at level 6 of algebraic reasoning (replacing numeric numbers with parameters, performing algebraic operations on two parameters and know the special properties of algebraic operations). Meanwhile, the impulsive subject has not been able to fulfill the indicators of level 6 algebraic reasoning (replacing numeric numbers with parameters, performing algebraic operations on two parameters and knowing the special nature of algebraic operations) in full. This is because the impulsive subject has not fully used the distributive property of algebraic multiplication in the process of solving three problems.

This study has limitations due to the COVID-19 pandemic, including the limited number of participants and the difficulty of collecting participants for the research process. From the results of the research that has been done, there are several suggestions, as follow:
1. For teachers, it is hoped that the teacher will pay more attention to the students’ different cognitive styles. In addition, teachers must also pay attention to the abilities of students, especially algebraic reasoning abilities with different levels. This will be a reference to maximize the learning process.

2. For further researchers, it is hoped that they can examine more deeply the pattern of students' tendencies in reflective and impulsive cognitive styles in solving problems. In addition, they can raise the number of participants. This will make the research more validated.

References


Mathematics Learning Design using Phet Interactive Simulation to Support Students Mathematical Understanding

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Abstract. Technology has a significant role during the period of Pandemic Covid-19 to support students learning. The purpose of this study was to enhance 3rd-grade primary school students’ mathematical understanding using PhET Interactive Simulation in fractions learning. The quasi-experiment research design was administered in order to answer the research question. The participants of this study were 48 3rd grade students in Kuningan, West Java. The data were collected through tests of students’ mathematical understanding of fractions and classroom observation. The result of this study proves that PhET Interactive Simulation was significantly improved students’ mathematical understanding of Fractions.

Keywords: Mathematics Learning; PhET Interactive Simulation; Covid-19 Education

1 Introduction

The spread of the 2019 Corona Dieses Virus (Covid-19) has affected education systems around the world. In response to these conditions, most schools have implemented physical distancing (social distancing) and implemented teaching and learning practices through distance learning (PJJ) to prevent the spread of transmission to students [1]. The Indonesian government through the Ministry of Education and Culture (Kemdikbud) has decided to implement the PJJ policy or in other terms known as distance learning/remote learning since March 24, 2020 (Kemdikbud, 2020). This condition makes students in Indonesia experience the same thing as in other countries, where they are taught by teachers through online media during the period of the spread of Covid-19 [2].

As a consequence of the implementation of PJJ, today we are witnessing students using their laptops or smartphones to access online learning content from home as a consequence of the spread of the 2019 Corona Dieses Virus (Covid-19), this also occurs in the practice of learning mathematics. However, there is debate among experts in the field of mathematics education about the most optimal way to teach mathematics. On the one hand, some experts argue that teaching mathematics should include a clear explanation from the teacher about the procedures followed by practice and correction [3]. On the other hand, those who argue that good mathematics learning occurs when students learn to complete mathematical tasks and understand mathematical concepts independently through reasoning, investigation, and proof [4] [5]. The debate then raises the question “PJJ will be optimal for teaching mathematics to students?”
Research evidence shows that online-based mathematics learning is much more problematic than other subjects [6]. Mathematics which tends to be abstract requires teachers to be able to provide a strong conceptual and procedural understanding and develop reasoning abilities for students in learning mathematics. The reality on the ground in the context of mathematics education in Indonesia during the pandemic shows that mathematics learning is still dominated by learning activities that are rigid and less interactive [7]. This may happen considering that during the pandemic, time, location and distance are a big problem at this time [8]. It should be realized that the unpreparedness of teachers and students towards online learning is also a problem. The shift from conventional learning systems to online systems is very sudden, without proper preparation. But all of this must be carried out so that the learning process can run smoothly and students actively participate even in the conditions of the Covid-19 pandemic. The application of distance learning with online media raises various debates related to accessibility, affordability, flexibility, and learning pedagogy [9]. Distance learning makes it difficult for teachers to provide explanations and provide the desired tasks to meet student learning needs [5]. The results also show that students who study online are more anxious than students who study in traditional classes on learning materials that are considered complex [10]. High mathematics anxiety affects student learning achievement or low mathematics learning achievement [11]. Satisfaction during online learning or distance learning is considered an important factor for student success [12].

Based on the description of the problems described in the previous paragraph, this study offers a solution by using PhET interactive simulation to improve students' mathematical understanding and reasoning skills in learning mathematics.

2 Method

2.1. Research Design

A quasi-experimental study was conducted to answer the research questions. There were two research groups of 3rd-Grade students participating in this research. One group was conducting mathematics learning using PhET Interactive Simulation, and the other one conducting mathematics through normal teaching. In particular, the research design presented in Table 1.

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre-test</th>
<th>Treatment</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>$O_1$</td>
<td>PhET</td>
<td>$O_2$</td>
</tr>
<tr>
<td>Control</td>
<td>$O_1$</td>
<td>Powerpoint</td>
<td>$O_2$</td>
</tr>
</tbody>
</table>

2.2. Participants

Two groups (each 24) of fourth-grade students (9 to 10 years old), who were learning fractions in the school participated in this quasi-experimental study. The two classes of the participants were located in an elementary school in Kuningan, Indonesia.

2.3. Intervention

The instructional design in the experimental group was delivered by the first author while the students in the control group delivered by the teacher. The experimental group was conducting mathematics learning using PhET interactive simulation, and the control group was conducting mathematics using PowerPoint. The treatment in each group was conducted in
three time series of a mathematics lesson, 3 x 150 minutes. The lesson plan was developed to deliver mathematics learning on the topic of fractions.

2.4. Data Analysis

Statistical analysis of the quantitative data was conducted using independent sample t-test. The prerequisite tests consist of normality, homogeneity, and balance tests that were conducted before the independent sample t-test. The normality test was conducted to determine whether the sample under study is normally distributed or not. The normality test in this research used the Kolmogorov Smirnov. The homogeneity test was conducted to determine whether variants of the populations are homogenous or not. All the statistical tests were conducted through a statistical software program named IBM SPSS 26.

3 Result

4.1. Descriptive Statistic Result

The first phase of the data analysis process was conducted using the descriptive analysis to draw the data collected from the pre-test and post-test of control and experimental groups. The descriptive statistic result of pre-test and post-test of control and experimental groups are presented in Table 2.

<table>
<thead>
<tr>
<th>Group</th>
<th>Statistic</th>
<th>Score Pre-Test</th>
<th>Score Post-Test</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Mean</td>
<td>33.95</td>
<td>66.87</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Std. Deviation</td>
<td>9.08</td>
<td>10.91</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td>10.00</td>
<td>35.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>50.00</td>
<td>90.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>35.20</td>
<td>76.04</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Std. Deviation</td>
<td>7.50</td>
<td>13.10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td>20.00</td>
<td>40.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>50.00</td>
<td>100.00</td>
<td></td>
</tr>
</tbody>
</table>

The data presented in Table 2 shows the descriptive statistic score of the pre-test of SMU score on the control group that conducted learning through PowerPoint ($M = 33.95$, SD=$9.08$, Min $= 10.00$, Max $= 55.00$). Following this result, the post-test of SMU on the control group students shows ($M = 66.87$, SD=$10.91$, Min $= 35.00$, Max $= 90.00$). On the other hand, according to the data presented in Table 2, the experimental group of students who were conducting learning through PhET Interactive Simulation show that the pre-test score of SMU ($M = 35.20$, SD=$7.50$, Min $= 20.00$, Max $= 50.00$). Moreover, the post-test score shows ($M=$76.04, SD=13.10, Min=40, Max=100).

4.2. Normality and Homogeneity test

The normality and homogeneity test was conducted as a prerequisite test to determine the type of hypothetical test conducted through the parametric or non-parametric test. The normality test of the post-test score is presented in Table 3.
According to the normality test result of the post-test score of SMU presented in Table 3, the normality test for SMU of students that participating mathematics learning using PowerPoint indicates that $D(24 = 0.200, P > 0.05)$, therefore it can be concluded that the SMU score of students with PowerPoint is normally distributed. Moreover, the result of the normality test for students who participated in mathematics learning using PhET interactive simulation indicated that $D(24 = 0.200, P > 0.05)$, therefore it can be concluded that the SMU score of students with PhET interactive simulation is normally distributed.

After the prerequisite test conducted through the normality test, then the homogeneity test of the variance was conducted to determine whether the data were homogenous or heterogenous. The result of the homogeneity test presented in Table 4.

### Table 4. Test of Homogeneity of Variance

<table>
<thead>
<tr>
<th>Variable</th>
<th>Levene Statistic</th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMU</td>
<td>.519</td>
<td>1</td>
<td>46</td>
<td>.475</td>
</tr>
</tbody>
</table>

As the data presented in Table 4, the post-test score of SMU shows ($P = 0.475, > 0.05$). Therefore, the result of the homogeneity test presented in Table 4 indicates that both the post-test score of SMU is homogeny. Following this result of the normality and homogeneity test, then the hypothetical test was conducted through a parametric test using the Independent sample t-test.

#### 4.3. Independent Sample T-Test

The hypothesis test was conducted through an independent sample t-test using. The use of independent sample t-test in hypothesis testing was underlined by the normality and homogeneity test of the post-test score of students’ fractions understanding. The result of the test are presented in Table 4.

### Table 4. Independent Sample T-Test of Post-Test Score

<table>
<thead>
<tr>
<th>Variable</th>
<th>Levene’s Test for Equality of Variance</th>
<th>Sig.</th>
<th>T</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-Test SMU</td>
<td>.519</td>
<td>.475</td>
<td>-2.633</td>
<td>46</td>
<td>.011</td>
</tr>
</tbody>
</table>

According to the data presented in Table 4, the result of the independent sample t-test shows that ($t(48) = -2.63, P < 0.05$). Therefore, it proves that PhET Interactive Simulation was significantly improved students' mathematical understanding of Fractions.
4 Discussion

Mathematics teaching and learning in the pandemic period was challenging for the teachers to support students’ understanding of mathematics concepts. Therefore, the use of digital technology have an important role to support teaching and learning practice in school. Educational technologies that afford students a virtual environment have the potential to scaffold and support teaching and learning [13].

This research provides evidence of the implementation of alternative media name PhET Interactive Simulation to help students understand mathematics concepts, especially in understanding fractions. The findings of our study proved that PhET Interactive Simulation has significantly enhanced students’ mathematical understanding of fractions. This is in accordance with the previous research conducted by [14] proved that students that learn mathematics using PhET Interactive Simulation significantly enhance students’ performance. The use of interactive simulation also could give students more deep conceptual understanding.

5 Conclusion

According to the findings and the discussion mentioned earlier, there are some conclusions related to this study. The PhET interactive simulation was proved that have a significant effect on the SMU on learning fraction. The PhET interactive simulation media was influential in developing SMU. Therefore, the PhET interactive simulation is decent to implement by mathematics educators as an alternative learning media in teaching mathematics.

References


A Preliminary Study of Scanning Electron Microscopy (SEM) for Characterization of the Wood Pellet Process of Sengon Wood (Albizia Chinensis)

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Abstract. Previously, Sengon wood waste from existing sawmills was underutilized. Therefore, one way to utilize this wood waste is to convert it into fuel because the energy demand in this world continues to increase. In doing so, an initial study was conducted to determine the characteristics of wood pellets from Sengon wood using Scanning Electron Microscopy-Energy Dispersive of X-ray Spectroscopy (SEM-EDX), resulting in more porosity in the middle than at the bottom and top because the middle is denser than the inside of the Sengon wood pellet, while the upper part has fewer pores because the outer part of the wood pellet experiences friction with the ring die so that the resulting pores are smoother. Meanwhile, on average, the elements that have been tested have the highest atomic weights, namely C-K elements (40.36%); elements O-K (52.08%); element CuL (1.29%); Elements of AIK (0.85%); SiK element (1.95%); CIK elements (0.42%); KK elements (1.39%) and CaK elements (1.64%).

Keywords: Electron Microscopy; X-Ray; Wood Pellet Process

1 Introduction

Energy needs in Indonesia continue to increase while reserves of fossil energy sources are running low. One of the new and renewable energy sources that have been widely developed is biomass alternative energy because it has great potential to be developed in overcoming the energy crisis in Indonesia. One of these biomass energies is wood pellets, which are the result of the densification of the remaining processed wood waste in the form of sawdust. Biomass resources have been considered as one of the most promising renewable raw materials to replace fossil resources today. Potential application of renewable energy sources to replace fossil fuel combustion as the main energy source in various countries, and discusses issues related to biomass combustion in boiler power systems. Where biomass includes organic matter produced as a result of photosynthesis as well as municipal, industrial and animal waste materials. A summary of the basic concepts involved in burning biomass fuels is presented. Renewable energy sources (RES) supply 14% of the world's total energy demand. RES is biomass, hydropower, geothermal, solar, wind, and marine energy. Renewable energy is the main source of energy, domestic and clean or inexhaustible. The percentage share of biomass was 62.1% of the total renewable energy sources in 1995. Experimental results for various
fuels and biomass conditions are presented. Numerical studies are also discussed. Biomass is an attractive renewable fuel in utility boilers, with elements including K, Na, S, Cl, P, Ca, Mg, Fe, Si involved in the reactions leading to ash fouling and slagging in the biomass combustion chamber. [1],[2],[3]

Biomass energy is one of mankind's earliest energy sources, especially in rural areas where it is often the only accessible and affordable energy source. Biomass worldwide ranks fourth as an energy source, providing about 14% of the world's energy needs. All human and industrial processes generate waste, that is, the normally unused and unwanted products of a particular process. Solid waste generation and recovery varies dramatically from country to country and deserves special mention. The burning speed of pulverized biomass fuel is much higher than that of coal. The use of biomass fuels provides great benefits as far as the environment is concerned. Biomass absorbs carbon dioxide during growth and emits it during combustion. The utilization of biomass as a fuel for electricity production offers the advantages of renewable and CO2-neutral fuel. [4],[5],[6],[7]

Impurities and bottom ash were collected from low power boilers after burning wood pellets and studied using several analytical techniques to characterize and compare samples from different areas and determine the suitability of the analytical techniques used. TGA results show that the fouling contains high organic matter (70%). XRF and SEM-EDS measurements revealed that Ca and K were the main inorganic elements and showed a clear trend in the Cl content which was negligible in the bottom ash and increased as it penetrated the deepest layer of impurities. Calcite, magnesia, and silica appeared as the main crystalline phases in all samples. However, bottom ash is mainly composed of calcium silicate. KCl behaves identically to Cl, preferably appearing in the sample of adherent impurities. [8],[9],[10],[11]

The efficient and profitable combustion of biomass is often limited by operational problems related to ash. Knowledge of ash smelting and sintering is very important, in terms of predicting and mitigating ash-related problems in biomass-fired boilers. The four parts of the Pinus sylvestris tree are the trunk, bark, base of branches, and twigs. A simultaneous thermal analyzer (STA) was used to characterize the smelting behavior of selected biomass fuels in an oxidizing atmosphere. The STA experiment shows that the smelting process of the studied fuel ash starts at a temperature range of 930-965 °C. Scanning electron microscopy (SEM) is equipped with energy dispersive X-ray spectrometry (EDX). The results of the analysis showed that the log ash remained loose structure even after 1000 °C sintering treatment. However, the ash from the upper branches showed signs of sintering at 1000 °C. The results obtained from this work can be considered useful information of industrial interest to predict the melting behavior of forest biomass ash. [12],[13],[14]

Based on some of the literature and the problems above, in this research, it is necessary to conduct an initial study of wood pellets taken from underutilized sawmill waste, to be developed into biomass fuel in the form of pellets. The purpose is that the results of this study can be a reference that can be applied to the need for renewable fuels. The initial study carried out was Scanning Electron Microscopy- Energy Dispersive of X-ray Spectroscopy (SEM-EDX) to determine the density level of the bottom, middle, and top of the wood pellet, in addition to knowing the elements in it so that the characterization of wood is known. Sengon (Albizia chinensis) wood pellets.

2 Methodology
SEM Scanning Electron Microscopy is a high magnification microscope that images the surface of a sample using scanning by electron beams. With the working principle of firing high-energy electrons (1 - 20 kV) through the sample and then detecting secondary electrons and backscattered electrons and x-ray characteristics. Where the electron gun used is a tungsten hairpin gun with a filament in the form of a tungsten coil that functions as a cathode. The voltage applied to the winding causes heating. The anode will then form a force that can attract electrons to move towards the anode. Magnetic lenses are used to focus electrons towards a point on the sample surface from a focused electron beam to scan (scan) the entire sample by being directed by a scanning coil when electrons hit the sample, there will be the scattering of electrons, either Secondary Electron or Back Scattered Electron from the sample surface and will be detected by the detector and displayed in the form of an image on a CRT monitor and why SEM is used because electrons have a higher resolution than light. Light is only capable of reaching 200nm, while electrons can reach resolutions of up to 0.1 – 0.2 nm. By using electrons, several types of reflections will be obtained which are useful for characterization purposes, as shown in Figure 1. SEM block diagram.

![SEM block diagram](image)

**Figure 1.** SEM block diagram [15]

Characteristics with Scanning Electron Microscope-Energy Dispersive of X-ray Spectroscopy (SEM-EDX) was carried out to observe the surface morphology, pore size, and elemental content of the lower, middle, and upper Sengon wood pellets with the process as presented in Fig. Figure 2. The interaction of high energy (kV) electrons with (solid) material are shown here. When the electron beam is scanned on the surface of the sample, electrons interact with the atoms on the surface as well as below the sample surface. The electron beam is used to describe the surface shape of the material. analyzed, as a result of this interaction most of the electron beams managed to come out again, these electrons are referred to as Backscattered Electrons, a small portion of the electrons enter the material and then transfer most of the energy to the atomic electrons so that they bounce off the surface of the material, namely Secondary Electrons. The formation of secondary electrons is always followed by the
emergence of characteristic X-rays for each element so that it can be used to measure the
element content in the wood pellet material being analyzed in this study.

The process of formation of Backscattered Electrons in Figure 2, occurs in the atoms of the
deeper part of the sample surface. This is due to the collision between the electrons from the
source and the atomic nucleus, where the mass of the protons that make up the nucleus is
greater than the electrons, so each collision will cause to reflect most of the electrons forward,
some of which will be reflected back in the direction where they came, namely outside the
surface of the material. These backscattered electrons tell us about the atoms they collide with
and their bonds in phase. So that the contrast in the image formed from Backscattered
Electrons is within certain limits. When the source electron in the process in the material only
passes above the electron or orbital of an atom, the electron may transfer some of its kinetic
energy to one or more electrons in that orbit. The electron will become unstable and in an
excited state so that it leaves its position and exits the surface of the material, then the electron
is known as a secondary electron. Because the secondary electrons have low energy, only
electrons located or very near the surface of the material can escape. With the help of a special
detector, secondary electrons can be utilized to form a good image of the surface morphology
of the material. Surface structures such as grain boundaries, edges, porosity, peaks, or valleys
will look more detailed with a higher resolution than Backscattered Electrons.

2.1. Sampling Experiment

The sampling of Sengon wood pellets utilized sawing waste of Sengon wood in the
Malang area where this Sengon wood waste is widely spread, as Malang has a tropical climate
with an average temperature of 23° C. The chemical components in this wood can be divided
into cellulose, hemicellulose, lignin, and extractives. In the process of making pellets assisted
by a wood pellet machine and a rotary kiln with a length of 12000 mm which is used to reduce
the moisture content of Sengon wood powder which is on average 80% to 8-11%, then the
pellet making process can run, by means of Sengon powder. into the pellet machine
continuously through a steel circle with several holes having a size of 10 mm. This
compaction process produces a material that is dense and will break when it reaches the
desired length. Pellet fuel has a diameter of 10 mm and a length varies between 15–30 mm. In
the process of making pellets, it produces heat due to friction of the tool which facilitates the
process of binding the material and reducing the water content of the material up to 5-10%.
The results of the process of making wood pellets are as shown in Figure 4. Wood pellets of Sengon wood waste using the machine in Figure 3 below.

![Figure 3](image1.png)

**Figure 3.** A. Wood pellet machine schematic; B. Ring die; C. Roller

![Figure 4](image2.png)

**Figure 4.** Wood pellets from Sengon wood waste

After the pellet-making process has been completed, testing of the image and composition data of the oxidized sample with the SEM tool is carried out, the sample is placed and affixed to the SEM specimen holder with the cross-section pointing vertically upwards or the objective lens. So that the arrangement of the layers of Sengon wood pellets can be seen clearly. With a double tip made of conductive carbon material on both sides that serves to deliver all electrons that enter the sample out through grounding. The sample chamber is vacuumed to ensure that the SEM column is free of air molecules and for EDX signal acquisition for optimal X-Ray detection.

### 3 Result and Discussion

SEM-EDX test results for microstructure testing on waste wood pellet samples from Sengon sawmills. The results of the average EDX analysis of the elements contained in Sengon wood pellets can be seen in Table 1.
Table 1. Average composition of Sengon wood pellets

<table>
<thead>
<tr>
<th>Material</th>
<th>Specimen</th>
<th>Wt (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>CK</td>
</tr>
<tr>
<td>Wood</td>
<td>A</td>
<td>38.04</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>42.00</td>
</tr>
<tr>
<td>Sengon</td>
<td>C</td>
<td>41.06</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>40.36</td>
</tr>
</tbody>
</table>

Table 1. The average elemental composition of sengon wood pellets showed that the elemental composition from the results of EDX analysis, obtained the average element contained in sengon wood pellets, namely C-K elements (40.36%); elements O-K (52.08%); element CuL (1.29%); Elements of AIK (0.85%); SiK element (1.95%); CIK elements (0.42%); KK elements (1.39%) and CaK elements (1.64%) from the average test results, the largest percentage of OK elements was (52.08%) while the percentage of carbon (C) was a determinant of good wood pellet quality or not.
Figure 5. SEM-EDX micrograph on Sengon wood pellet taken three points: A, B, and C

Figure 5 showed the energy emission formed by Sengon wood SEM-EDX wood pellets taken at three points, those are A, B, and C, resulting in the atomic weight of the combined elements in which the highest percentage was OK (50.71%) on the graph of point A with an atomic percentage of 47.74%. The second-highest combined element was C-K (38.04%) with an atomic percentage of 47.70%. While at point B, the highest percentage was O-K (50.25%) followed by C-K (42%). Then at point C, the highest element was OK (55.29%) then followed by CK element (41.06%). In Figure 5, the three largest elements was in the OK element and followed by the most to -2, that was CK elements, then followed by the combined elements of Si-K, Al-K, Cu-L, Ca-K, KK, CL-K appeared with a small percentage. The energy emitted by the atoms in the wood pellet was the highest atom/element of C (carbon), followed by element O. There were radiant energy of several metals (Al, K, Ca), semi-metals (Si), and non-metals (Cl) but only in small quantities. Therefore, the carbon element was the highest composition of wood pellets as shown in Figure 6 as the results of SEM micrographs with different magnification scales.

Figure 6. Results of SEM Micrographs with a magnification scale of 1,000X, 2,500x, 10,000 and 5,000x

In the SEM test in Figure 6, it can be seen the surface visualization of the object being tested, from the SEM photo it can be seen the surface of the Sengon wood pellets and their
density. The results of the SEM analysis of the wood pellet’s surface showed that there were many pores, where this wood pellet had high porosity due to the lack of pressure in the process of making wood pellets. In the process of making wood pellets, the pressure will be made higher so as to produce wood, the better pellets, because the more porosity the easier the compaction process and the better the quality later, where a lot of porosity provides a larger surface area for bonding, as evidenced by looking at the results of SEM Micrographs with a magnification scale of 1,000X, 2,500x, 10,000 and so on. Maximum 5,000x magnification was to see the pores on the top, middle, and bottom. The enlargement of the Sengon wood pellets pores in the middle was more than at the bottom and top because the middle was denser than the inside of Sengon wood pellets. The top had fewer pores as the outer part of the wood pellet had friction with the ring die on the wood pellet machine. on the wood pellet there is a metal element that looks white or bright which is probably a metal element. In addition, it also has an unequal pore size as the pelletizing process occurred faster on the outer surface of the pellet, so this layer had much smaller and smoother pores than inside the pellet.

4 Conclusion

Based on the results of the preliminary study analysis using SEM-EDX micrographs on Sengon wood pellets, it was concluded that this wood pellet sample contained C-K elements (40.36%); elements O-K (52.08%); element CuL (1.29%); Elements of AlK (0.85%); SiK element (1.95%); CIK elements (0.42%); KK elements (1.39%) and CaK elements (1.64%). From the results of the average test, the largest percentage of elements was O-K (52.08%) where the percentage of carbon (C) was a determinant of a good quality wood pellet. While the results of SEM micrographs with a magnification scale showed that the pores were at the top, middle and bottom. Pores in the middle were more than at the bottom and top because it was denser than the inside of Sengon wood pellets. The top had fewer pores because the outer part of the wood pellet had frictions with the ring die so that the resulting pores were smoother.

References


The Development of Problem-Based Learning Grounded from Cognitive Learning Theory: Improving Students' Creative Thinking Skills

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Abstract. The problem under study is the students’ low creative thinking ability. The objective of the study is developing problem-based learning grounded from cognitive learning theory to improve students’ creative thinking skills, particularly students in social studies. Accordingly, the study employed research and development involving exploratory and quasi-experimental methods, the non-equivalent control group pretest-posttest design. The subject of the research was six schools: four public and two private Junior High Schools. The data collection was in the form of tests, observations, and focus group discussions. Meanwhile, the analysis of data acquisition techniques used quantitative and qualitative approaches (qualitative processing was to measure the effectiveness of the learning process and students’ achievement in creative thinking skills which based on the result of observations). The study obtained a learning model, learning tools such as syllabus, lesson plan (RPP), learning materials, observation sheets and creative thinking skills tests. These things can be used in the subject of social studies, Junior High School. The study revealed that the development of problem-based learning grounded from cognitive learning theory could improve students’ creative thinking skills.

Keywords: Problem-Based Learning; Cognitive Learning; Creative Thinking Skill

1 Introduction

Transferable skills are defined as an ability that developed in one situation and can be transferred to another. In this case, learning condition in the classroom to real life situation [1], for example, the ability to think creatively.

Creative thinking is a cognitive mental activity to generate and develop new ideas as the development of pre-existing ideas. This is to make a decision in overcoming problems. We notice that the progress in various areas of life is due to humans' creative thinking that eventually be beneficial for life. This statement shows that the creative thinking activity certainly need to be developed through educational field. If a person is accustomed to think creatively, he will easily express various ideas to find the right solution to the problems he encountered. Besides, he will easily adapt to various life crises. Accordingly, educators need to develop students' creative thinking skills. Thus, when students are graduated from school, these abilities can be a provision living in society.
Based on the observations done in several junior high schools, Kuningan Regency, and based on the results of the pre-research done by the researchers, it was found some students with low creative thinking skills. This can be seen from the number of students who did not pay attention to the teaching and learning process and the difficulty in following and expressing their opinions in discussion or questioning activities. In addition, it was also found that the students could not relate the materials received. In details, the researchers present the result of pre-research, the creative thinking skills of the eighth graders in Kuningan Regency as follows:

**Table 1.** The Results of Pre-Research on Creative Thinking Ability of the Eight Graders in Kuningan Regency

<table>
<thead>
<tr>
<th>Category</th>
<th>Aspect</th>
<th>Minimum Criteria of Mastery Learning (KKM)</th>
<th>Average Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Creative Thinking Skills</td>
<td>75</td>
<td>70</td>
<td></td>
</tr>
</tbody>
</table>

Table 1 showed that the average score for Students' creative thinking is still below the minimum criteria of mastery learning (KKM). This indicates that students' creative thinking abilities are still relatively low. This is due to several factors such as the teacher's habit of one-way materials presentation. Thus, the students could not explore and solve the problems independently related to social studies. The learning process is only directed at the students’ ability to memorize and receive information without directly involved in the process of understanding the information. For example, connecting the knowledge gained to their daily lives.

The low creative thinking ability is caused by the lack of effort in shaping and inculcating the act and thinking habits from an early age. School as the main and fundamental education for individual development lacks coordination of creative attitudes and thinking. This is not in line with John Dewey's statement [2] that "schools must teach children the right way of thinking". Thinking processes can be optimized and further developed if a teacher can ask questions with a higher level of complexity.

Bloom's taxonomy is a revision of the top domain of learning: analysis, synthesis or creation, and evaluation are higher order thinking skills. Learning and practicing HOTS in and out of school will give students the tools they need to understand, infer, relate, categorize, synthesize, evaluate, and apply the information they know. This is to find solutions to new and existing problems [3].

The above problems arise maybe due to the selection of an inappropriate learning model. There are numerous kinds of learning models. The selection and application of the right model for learning will certainly provide maximum output. Thus, the students will easily understand the materials provided by the teacher and could improve their learning outcomes.

One of the learning models that can improve creative thinking skills is problem-based learning. Problem-based learning (PBL) is one of the teaching models used to train creative thinking skills in solving problems. This can be related to the problems encountered by students in everyday life, neither in groups or individually. In addition, PBL can also provide mastery concepts and higher abilities.
Basically, cognitive learning theory is a learning theory that emphasizes more on the learning process than the results. This theory states a person does not only focus on the relationship between stimulus and response in the learning process, but also look at how a person behaves in achieving his learning goals. The principle of cognitive learning theory is the process of learning is more important than the results. In addition, the perceptions and the understanding in achieving learning goals portray the behavior of an individual, learning materials are separated into small components and then studied separately. This theory also mentions that student's active participation is a must. Besides, the learning activity also needs complex thinking process Given that the general purpose of education is not merely transferring the knowledge but to improve learning abilities, the learning system should put more focused on learning models that can represent more effective learning criteria. This can be done by assessing various learning models such as the implementation of the PBLK Model. The development of the problem-based learning model grounded from cognitive learning theory (PBLK) aims to further improving the result of the application which still has several weaknesses. For example, the difficulty in providing personal assessments and the ineffectiveness of the discussion activity to empower students' creative thinking skills.

2 Methodology

The design of the study was research and development. Operationally, it begins with collecting material from the field as a basis for designing a development model. The implementation of limited field trials and the result of extensive testing of PBLK model product was carried out using exploratory and quasi-experimental methods, the non-equivalent control group pretest-posttest designs. The setting of the study was in six Junior High schools in Kuningan Regency. The subject of the study, the trial field, involved two schools for a limited trial and four schools for an extensive trial in the academic year of 2019-2020. These six schools were divided into an experimental class (using PBLK learning) and a control class (using conventionally varied lectures). The selected model class was based on the research objectives (purposive) which became the sample for the trial model learning developed by the researchers.

3 Results and Discussions

3.1. Limited Trials

Limited trials were conducted in two schools: SMP Negeri 1 Kuningan and SMP Yos Sudarso. The hypothesis being tested was PBLK learning model is effective to improve the students' creative thinking skills. The results were obtained as follows:

Table 2. Hypothesis Test Results of SMP Negeri 1 Kuningan Independent Samples Test

<table>
<thead>
<tr>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>HOT Equal variances</td>
<td>5.730 4.861 60 .396</td>
</tr>
<tr>
<td>F</td>
<td>Sig. t Df Sig. (2-tailed)</td>
</tr>
<tr>
<td>.396</td>
<td>.476  .856  .396</td>
</tr>
</tbody>
</table>
Based on aforementioned result, SMP Negeri 1 Kuningan and SMP Yos Sudarso obtained similar value of Sig. (2-tailed) of <0.05. Referring to the basis for decision-making in the Independent sample t-test, it can be concluded that the PBLK learning model is effective in improving students' creative thinking skills.

3.2. Extensive Trials

The revised learning tools post the limited trial were then extensively tested in four schools: SMP Negeri 4 Kuningan, SMP Negeri 6 Kuningan, SMP IT Al-Mutazam, and SMP ITUS. Referring to the obtained data, there are differences in the average improvement in students' creative thinking skills before and after learning with the PBLK model. The improvement (gain) obtained from the experimental class and control class are described more clearly through the following diagram.

---

**Table 3. Hypothesis Test Result of SMP Yos Sudarso Independent Samples Test**

<table>
<thead>
<tr>
<th></th>
<th>Levene’s Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
</tr>
<tr>
<td>HOT</td>
<td>1,306</td>
<td>.583</td>
</tr>
<tr>
<td></td>
<td>equal variances assumed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3,216</td>
<td>.041</td>
</tr>
<tr>
<td></td>
<td>equal variances not assumed</td>
<td></td>
</tr>
</tbody>
</table>
The results of the n-gain values in the extensive trial stage belong to the medium category. It was also found that the n-gain obtained in the experimental class is higher than the n-gain value of the control group. This indicates that the use of the PBLK model can effectively improve students' creative thinking skills.

Based on the results of the independent sample t-test, it was found the value of Sig. (2-tailed) of the four research subjects of 0.000 < 0.05. Referring to the basis for decision-making in the Independent sample t-test, this means that the PBLK learning model is effective in improving students' creative thinking skills.

To discuss with, the authors focus on several things related to the results of the study, such as: The PBLK model is a potential and relevant model in the social studies of Junior High School.

Haladyna and Shaughnessy in Stahl [4] stated that teacher's strategies and learning environments play an ultimate role in shaping students' thinking skills. An effective strategy will stimulate the students to analyze, interpret, respond, evaluate, and create [5]. Therefore, learning must be changed from learning to remembering the way of thinking. To facilitate the teachers' need in achieving educational goals, the development of the PBLK model can be directly applied in the learning process in the classroom. Furthermore, the results of this study are supported by relevant previous research by Hasmiati, Jumadi, Rachmawaty [6] entitled the implementation of the Problem Based Learning (PBL) in improving students' creative thinking skills and learning outcomes. Based on the studies, the PBL model is able to improve higher creative thinking skills. Similarly, the development of the PBLK model in this study is able to facilitate and meet teachers' needs. This includes the continual application of 21st-century learning and forming the students' character and shaping the students' creative-thinking orientation. Thus, they are accustomed to involving creative thinking in decision-making and problem-solving. Most educators understand and realize that the effective learning reflects the effectiveness of student learning. We have long realized that it is important to train children to think creatively. Thus, the children become intelligent, creative, and are able to solve the problems related to their daily lives. This awareness has also underpinned curriculum development.
Accordingly, our curriculum prioritizes contextual learning involving social (children's daily life) and cognitive contexts (children's learning process).

The limitations of the research are: 1) In the process of achieving the objectives of this research, the researchers had optimally tried to provide the best result and they realized the weaknesses and limitations still applied; 2) The research instrument developed to obtain data on the results of student's creative thinking skills has not revealed all the desired aspects. Even though, the trials have been conducted prior to obtaining the data in this study; 3) The researchers’ limited ability in empowering model teachers and directing the observer to observe the students' and teachers' activities; 4) The error on data analysis was still presented even though the researchers had tried to minimize it; 5) There are deficiencies in learning tools. Thus, the researchers expect further research to complement the weakness. Accordingly, perfection can be achieved; 6) The research has a limited scope which is in the classroom and in the school environment. In addition, other variables such as parents and social influences have not been significantly associated in this study. On the other hand, the researchers realize that these variables greatly affect the effectiveness of the model application. In addition to the limitation, the strengths of the research are: 1) This learning model effectively improves the students' creative thinking skills in Junior High School; 2) This PBLK model learning tool can develop multiple intelligences of Junior High School students such as social intelligence, spatial intelligence, interpersonal intelligence, and linguistic intelligence; 3) In social studies learning, the implementation of this model can arouse students' interest and enthusiasm. This is because it empowers students to think creatively and dynamically; 4) The activity and the level of students' understanding of the teaching material increased. This certainly affects their learning outcomes, creativity, and mastery of learning; 5) this research brings a positive impact. The students and teachers have a new awareness to respect and love the social environment. This study frees the school environment from various social problems due to the diversity of Indonesian society. In addition, this study influences educational policy to design a higher perspective of learning curricula, from elementary school to university level.

4 Conclusions

Based on the results of the study, the following conclusions can be drawn by researchers:

1. The development of problem-based learning grounded from Cognitive Learning Theory (PBLK) can improve students' creative thinking skills.
2. The product of the PBLK model has been verified and is relevant to be implemented in the subject of social studies at SMP. The PBLK model presents effective learning criteria.
3. The implementation of the PBLK model is highly effective in improving students' creative thinking skills. This is shown from most students starting to show high enthusiasm, confidence, determination, and trying to create new things or ways after the PBLK implementation.
4. The use of the PBLK model in social studies received positive responses from all components of education. This includes teachers and students as test subjects for the implementation of the PBLK model.
References


The Application of Legal System Theory in Handling Consumer Dispute by the Consumer Dispute Settlement Agency (BPSK) Of Kuningan Regency

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Abstract. The rapid influence of technology development in the business world is affecting the level of competition. Business actors are required to do numerous marketing activities to meet consumer needs. These activities are frequently profit-oriented and disregard consumer rights and protection. In fact, Consumers can be harmed through inappropriate information, product counterfeiting, and product quality. Thus, consumers, producers, or business actors' disputes are existed. This study aims to determine and examine BPSK regulation of consumer dispute resolution and its implementation in the Kuningan Regency. This study employed the empirical-juridical method with a socio-legal approach. The study revealed BPSK regulation on consumer dispute resolution in Kuningan Regency has referred to the law of consumer protection. Meanwhile, the implementation of BPSK duties and authorities is up to the Decree of the Ministry of Industry and Trade Republic of Indonesia. Structurally, the application of legal system theory on consumer dispute resolution indicates that human resource is incompetence and BPSK is still lacking in owning infrastructure. These things become a hindrance in dispute resolution. In addition, people are not fully aware of their rights and obligations as consumers with legal protection. Accordingly, the Government's systematic efforts to reform the law and socialize the role and function of BPSK–resolving disputes between consumers and business actors, are highly needed.

Keywords: Consumer; Dispute; Legal System

1 Introduction

Being a country that is developing in all areas, the government attempts this development would be indulged by all citizens. Moreover, the state constitution of Indonesia is a democratic which places people's sovereignty as the basis for arranging a national development system. Accordingly, national development must be directed to the realization of a just and prosperous society. This should be based on the values of Pancasila and the 1945 Constitution of the Republic of Indonesia.[1]

Realizing a just and prosperous society is not an easy task. Thus, the government and society need to endeavor these ideals earnestly. This is because in the current era we enter the world of free-market due to technology and information advances.[2] One of the government's efforts in the trade sector is the enactment of Law Number 8 of 1999 on Consumer Protection. This law cannot be separated from countless related problems occurred. This is also mentioned in the preamble of the Consumer Protection Act point b
“that the national economic development in the globalization era must support the growth of the business world. Thus, various goods and/or services containing technology are produced to improve the welfare of the community and obtain goods and/or services certainty of trade without resulting in consumer losses”. [3]

The swift demand of the public for goods and/or services is used by business actors to carry out various forms of economic business activities to seek a profit. For this reason, they frequently disregard consumer rights which results in an unbalanced position between business actors and consumers.[4]

The ultimate factor that becomes consumers’ weakness is the low level of consumers’ right awareness. This is due to the low level of consumer education. Therefore, the Consumer Protection Law is becoming a strong legal basis for the government and non-governmental consumer foundations in empowering consumers through guidance and education. Law on Consumer Protection Number 8 of 1999, a provision on consumer dispute resolution, becomes one of the solutions in resolving consumer-related matters.[5]

In solving consumer disputes, Article 45 Paragraph (1) of the Consumer Protection Law states that consumer disputes settlements can be moved through the courts or out of court based on the disputing parties' voluntary choices. However, this does not mean the parties must firstly agree in filing a lawsuit.[6]

The government's responsibility for consumer protection is in the form of establishing a Consumer Dispute Settlement Agency or BPSK. BPSK is a non-litigation agency tasked with and authorized to examine, resolve, and settle disputes between consumers and producers, or business actors related to non-trading goods and services used. [7]

The procedure for resolving consumer disputes by BPSK is regulated according to Article 4 paragraph (1) of the Decree of the Ministry of Industry and Trade Republic of Indonesia Number: 350/MPP/Kep/12/2001 the Implementation of BPSK’s Duties and Authorities. Consumer dispute resolution by BPSK can be done through mediation, arbitration, and conciliation based on the choice and approval basis of the concerned parties.[8]

In Kuningan Regency, consumer dispute resolution handled by BPSK keeps increasing every year as shown in the following table:[9]

<table>
<thead>
<tr>
<th>No</th>
<th>year</th>
<th>Number of cases</th>
<th>Dispute Resolution Method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Conciliation</td>
<td>Mediation</td>
</tr>
<tr>
<td>1.</td>
<td>2018</td>
<td>49</td>
<td>20</td>
</tr>
<tr>
<td>2.</td>
<td>2019</td>
<td>45</td>
<td>16</td>
</tr>
<tr>
<td>3.</td>
<td>2020</td>
<td>60</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>154</td>
<td>5</td>
</tr>
</tbody>
</table>

Referring to the aforementioned table, the level of the community's legal awareness of consumer rights has begun to form. This is certainly becoming a challenge for BPSK in Kuningan Regency to play a more role in resolving disputes submitted by consumers. Based on the foregoing background, the authors are interested in conducting research on how BPSK regulates consumer dispute resolution, and how is the application of legal system theory of consumer dispute resolution by BPSK in Kuningan Regency?
2 Method

Based on the problem under-studied, the study employed juridical-empirical methods. This is because this study was conducted to analyze consumer dispute resolution done by the Consumer Dispute Settlement Agency (BPSK). The data collection technique was triangulation (combined). Meanwhile, the data analysis was inductive because the results of qualitative research emphasize more on meaning than generalization. Additionally, this study was specifically used descriptive-analytical research. The juridical-empirical method, on the other hand, involved data collection techniques of library research and field studies. [10]

3 Results and Discussions

3.1. The regulation of Consumers Dispute Settlement Agency (BPSK) refers to the laws and regulations

The legal basis for the establishment of the BPSK is Article 49 paragraph (1) of Law Number 8 of 1999 concerning Consumer Protection and is reaffirmed in Article 2 of the Decree of the Ministry of Industry and Trade Number 350/MPP/Kep/12/2001 stating that each city or regency must form a BPSK. The BPSK is presented as an institution that protects consumer interests related to out-of-court disputes. Up to these days, consumer disputes have been resolved through a lawsuit in court. However, it is possible for the judiciary to not accommodating consumers’ disputes due to long processes and highly bureaucratic reasons.

To fulfill the previously-mentioned provisions, BPSK of Kuningan Regency has been established based on the Decree of the President Republic of Indonesia Number 22 of 2013, the Establishment of a Consumer Dispute Settlement Agency in Sumedang Regency, Kuningan Regency, Wonosobo Regency, Ngawi Regency, Kab. Tanjung Jabung Timur, Sarolangun Regency, Donggala Regency, East Belitung Regency, Pontianak Regency, Ogan Ilir Regency, Palu City, and Kotamobagu City. To ease the consumers in reaching out to BPSK, this decree does not include territory restrictions. Thus, the consumers can file a complaint to any BPSK they desire. Each consumer who is harmed can sue the business actors through responsible institutions or courts under the general court environment.[11]

In its implementation, BPSK of Kuningan Regency resolves consumer disputes based on the provisions of Article 4 letter c of Government Regulation of the Republic of Indonesia Number 58 of 2001, the Guidance and Supervision of the Implementation of Consumer Protection, states increasing the role of national and local BPSK can be done through quality improvement of human resources and institutions.

The guidance and supervision by the Government are not merely regulated in Law Number 8 of 1999 on Consumer Protection but are also regulated in Government Regulation Number 58 of 2001, the Guidance and Supervision of the Implementation of Consumer Protection. The later regulation elaborates more on the guidance and supervision by the Government. One of the objectives is to create a business climate and foster healthy relationships between business actors and consumers.
3.2. The application of legal system theory by BPSK of Kuningan Regency in resolving consumer disputes

The Legal system theory was initiated by Lawrence Meire Friedman. According to him, the elements of the legal system are consisting legal structure, legal substance, and legal culture.[12] The legal structure includes executive, legislative, judicial agencies, and any related institutions. The legal substance covers norms, regulations, and laws. Meanwhile, Legal culture includes the community’s views, habits, and behavior on the values and expectations of the applicable legal system. In other words, legal culture is the climate of social thinking of how the law is applied, violated, or implemented.[13]

Structurally, human resources and infrastructure become the main hindrances of BPSK of Kuningan Regency in resolving consumer disputes. Human resources at the BPSK of Kuningan Regency are 14 (fourteen) people. However, only a few are experts in handling consumer disputes and no one is having a Mediator or Arbitrator certification.

The budget and infrastructure of the BPSK in Kuningan Regency come from the Regional Revenue and Expenditure Budget (APBD) of Kuningan Regency. However, since Law 23 of 2014 concerning Regional Government was enacted, trade affairs that regulate consumer protection, become part of the Provincial Government affairs. Thus, the budget of BPSK implementation in Kuningan Regency is taken from the Regional Revenue and Expenditure Budget (APBD) in West Java Province. For this reason, its implementation becomes more demanding, the filing and the financial reporting process.

Substantially, the implementation of consumer dispute resolution by BPSK is constrained due to the shortcoming in the regulations of the Consumer Protection Act, Article 52 letter a, the consumer protection law, which lists the BPSK’s duties and authorities in handling and settling the consumer disputes by mediation, arbitration, or conciliation. This indicates that once the mediation process fails, there is no common ground for problems between consumers and business actors. This is because BPSK does not have the authority to do so unless it is not an arbitration choice by the parties.

Furthermore, Article 52 letter c of the Consumer Protection Law includes Standard Clauses. However, to ensure legal certainty from the supervision process, this Law does not regulate the procedures for supervision or sanctions that can be imposed on business actors who violate such a law. Likewise, Article 52 letter m regulates administrative sanctions to business actors who violate provisions of the consumer protection law. In reality, BPSK does not have the guideline and authority to impose such an action.

Culturally, the Kuningan community applies an agrarian culture which is characterized by a family culture. Therefore, all matters related to disputes are always avoided. Even if the problems occur, they prefer to forgive. This condition complicates the BPSK in tracing the problems encountered. The responsibility to protect consumers does not purely on law enforcers’ shoulders but also on the community as consumers. In such a way, they can be smart buyers (know how to select appropriate products and services) and be critics of their relationship with business actors who will have the transactions with them. Unfortunately, this has not grown well in the culture of our society.

4 Conclusions

a. BPSK Regulation in Resolving Consumer Disputes in Kuningan Regency covers in: Law Number 8 of 1999 concerning Consumer Protection, Government Regulation of
the Republic of Indonesia Number 58 of 2001 on the implementation of Guidance and Supervision on Consumer Protection, Presidential Decree of the Republic of Indonesia Number 22 of 2013 on the Establishment of BPSK in Kuningan Regency and other related agency, the Decree of the Ministry of Industry and Trade Republic of Indonesia Number: 350/Mpp/Kep/12/2001 concerning the Implementation of BPSKs Duties and Authorities.

b. The application of the Legal System theory-- the implementation of dispute resolution by BPSK of Kuningan Regency. Structurally, they do not have the resources and infrastructure needed to handle dispute resolution. Substantially, there must be a renewal of the Consumer Protection Act. Culturally, the Kuningan community has an agrarian culture characterized by a family culture. Thus, all matters related to disputes are always avoided. Even if the problems exist, they prefer to forgive.

5 Recommendations

a. The government should immediately conduct legal reforms to the Law Number 8 of 1999 concerning Consumer Protection, Government Regulation of the Republic of Indonesia Number 58 of 2001 on Guidance and Supervision of the Implementation of Consumer Protection, and Decree of the Ministry of Industry and Trade Republic of Indonesia Number: 350/Mpp/Kep /12/2001 concerning the Implementation of BPSK Duties and Authorities. They are no longer suit society's development and the advances in information technology.

b. There is a need to strengthen BPSKs Duties and Authorities in the regions. This is to ensure independence and legal certainty since each decision made by BPSK is principally final and binding.

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Development of Geometry Teaching Materials Assisted Geogebra Android to Improve Mathematical Connection Ability

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Abstract. This research aims to develop valid, practical, and effective geometry teaching materials with the help of GeoGebra android to improve students' mathematical connection abilities. The method used in this research is research and development. The developing process of teaching materials uses the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). The analysis phase includes an analysis of the needs of learning resources, curriculum, and materials. The design phase includes making a framework of teaching materials, determining reference books, and preparing teaching materials assessment instruments. The development phase includes module development, expert validation, and revision of teaching materials. The implementation phase is the testing phase of teaching materials that are validated and revised to students. The evaluation phase is to analyzes the strengths and weaknesses of the teaching materials that have been tested. The criteria of quality of teaching materials are validity, practicality, and effectiveness. This teaching material is declared valid by assessing the material and media expert with an average of 89% and 85%, respectively. In addition, the module was declared practical by the results of the student response questionnaire, with an average of 78%. Furthermore, based on the results of the student’s mathematical connection ability test, teaching materials are effective in helping students to understand geometrical material and improve their mathematical connection abilities. Based on these results, it can be concluded that the GeoGebra android-assisted teaching materials developed are valid, practical, and effective.

Keywords: Teaching Material; Geogebra; ADDIE Model

1 Introduction

The 2013 curriculum applied in Indonesia requires teachers to act as facilitators for student learning. As a learning facilitator, the teacher has the most important task to develop teaching materials that can facilitate students to find mathematical concepts [1]. A teacher can develop good teaching materials if he/she has a good mastery of the material as well. Mastery of mathematical material is called mathematical content knowledge (MCK) [2], [3]. According to the National Council of Teachers of Mathematics (NCTM), MCK is “Mathematical content and discourse, including mathematical concepts and procedures and their interrelationships; some representations of mathematical concepts and procedures and ways to
reason mathematically, solve problems and communicate mathematics effectively at various levels of formality [2].

Research [4], [5] state that the MCK for prospective teacher-students is still in the poor category. Research [4] states that the overall MCK for prospective teacher-students is not strong, and the two lowest-performing MCK areas are Geometry/Measurement and Probability/Statistics. Furthermore [5] states that the MCK for prospective mathematics teacher-students included in the poor category. Some of the mathematical materials are still not fully understood. One of which is geometry materials.

Geometry as a branch of mathematics is unity, hierarchical in its delivery and understanding. [6] states that teachers with strong MCK can present mathematics as a consistent and related structure. Therefore, MCK is described as mathematical content and discourse, including mathematical concepts and procedures and their interrelationships [2]. Thus, the teacher as a facilitator must be able to present mathematics as a consistent and related structure. According to [7], [8] the ability to relate or connect in mathematics is called mathematical connection ability.

Connection in mathematics learning is an essential ability [7]. Without a mathematical connection, students must learn and remember too many separate mathematical concepts and procedures [9]. Therefore, the ability to connect mathematically is one of the abilities that must be possessed by prospective teacher-students to develop good teaching materials in an effort to create effective learning. Efficient, fun so that it can realize the achievement of student competencies.

Research [10], [11] states that the mathematical connection ability of prospective teacher-students is included in the low category. Based on this, it is necessary to innovated mathematics learning in higher education so that it can take place optimally and can facilitate the mathematical connection abilities of prospective teacher students well.

As easier as access to technology for students, the integration of technology into teaching materials has the opportunities to enrich the student learning experience. Various technologies, such as dynamic and interactive media, can be used as additional features in teaching material. GeoGebra software is one of the dynamic and interactive technologies that can be used as additional features in teaching material [3], [12] (Sumarni & Prayitno, 2016). GeoGebra can be used to introduce or explain a particular topic in greater depth through the construction process [3].

Several previous studies have stated that GeoGebra software can facilitate the improvement of students’ mathematical abilities in learning geometry including [3], [13]–[20]. However, the limitation of media facilities, in this case, the number of laptops used, is one of the obstacles to the GeoGebra-assisted learning process.

In this study, we used the Android version of the GeoGebra software as a learning medium to overcome these obstacles. GeoGebra android has a relatively small storage capacity and can be operated without internet access (offline) [21]. And based on a survey, all students used android as a learning medium during the pandemic, so they are no matter by using GeoGebra android.

According to the background of these problems, this study aims to develop an Android version of GeoGebra-assisted geometry teaching materials to facilitate the mathematical connection abilities of prospective mathematics teacher students. Although there are many opportunities provided by GeoGebra-based teaching materials, there are still not many that emphasize the connection ability. Thus, the process of developing geometry teaching materials using the Android version of GeoGebra to facilitate the mathematical connection abilities of prospective mathematics teacher students along with their qualities
will be the focus of the discussion of this study. The quality of the teaching materials developed is measured based on the criteria of validity, practicality, and effectiveness [22].

2 Research Method

The type of research is research and development. The development model used is the ADDIE model [23]. The product developed from this research is a valid, practical, and effective GeoGebra-assisted geometry teaching material to improve students' mathematical connection skills. The research subjects were the first-year students at a private university in West Java in the 2020/2021 academic year, totaling 29 students. The process of developing these teaching materials follows the phases of the ADDIE model, namely analysis, design, development, implementation, and evaluation. The analysis phase is carried out to analyze the need for module development. The analysis carried out includes an analysis of learning resource needs, curriculum analysis, namely determining learning outcomes and indicators of competency achievement by the KKNI curriculum as well as material analysis, especially on geometry materials.

The design phase is carried out to design the writing of teaching materials based on the results of the analysis phase. The activities carried out are: making a framework of teaching materials; determining references related to spatial building materials; and compiling teaching materials assessment instruments. The development phase is the stage to realize the framework for the preparation of teaching materials that have been designed. In addition, at this phase validation and revision of teaching materials are also carried out, so that the developed teaching materials can achieve the expected goals. The fourth phase is implementation. This phase aims to conduct experiments of teaching materials that have been validated and revised.

The teaching materials were tested in a small group (limited test), namely on the first-year students at a private university in West Java. After testing the teaching materials, students were asked to give their responses to the teaching materials by filling in a questionnaire. This questionnaire aims to obtain data on the practicality of teaching materials. The evaluation phase is carried out to analyze the advantages and disadvantages of teaching materials that have been tested. The phase of analysis was carried out based on the results of the student response questionnaire. This activity is a means of improvement of the development process that has not been carried out optimally. In addition, the evaluation process is also carried out at every other stage to produce teaching materials that are by the research objectives.

The data collection techniques were (1) observation to find out things related to learning, including mathematics learning resources used by lecturers and students as well as student learning difficulties, especially related to geometry materials; (2) structured interviews to find out things related to the effectiveness of teaching materials in the learning process in terms of their usefulness and potential to improve mathematical connection abilities; (3) validation of teaching materials is used to measure the validity of the developed teaching materials, this validation is addressed to material experts and media experts; (4) the provision of questionnaires is used to determine the practicality of the teaching

2.1. Materials Developed.
The data collection instruments in this study were interview guidelines, teaching material validation sheets, and student response questionnaire sheets. The data analysis techniques in this study were analysis of the validity of teaching materials, data analysis of mathematical connection ability tests, and analysis of the practicality of teaching materials questionnaires. The data on the validity of teaching materials is obtained based on the results of the validation of teaching materials that have been carried out by the validator. The validation of teaching materials was measured using a four-scale Likert scale, ranging from 1, strongly disagree, to 4, strongly agree. The scores that have been obtained based on expert judgment are then converted into percentages. This percentage is calculated using the formula (1).

\[ \frac{\sum x}{\sum} \]

where \( V \) is the percentage of module validity, \( \sum x \) is the total number of expert judgments, and \( \sum x_i \) is the total number of ideal scores. After the percentage results are known, the level of validity of the developed teaching materials is then grouped into the product validity criteria as shown in Table 1.

<table>
<thead>
<tr>
<th>No</th>
<th>Criteria of Validity</th>
<th>Level of Validity</th>
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<tbody>
<tr>
<td>1</td>
<td>Very valid</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Valid</td>
<td></td>
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<tr>
<td>3</td>
<td>Less valid</td>
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</tr>
<tr>
<td>4</td>
<td>Invalid</td>
<td></td>
</tr>
</tbody>
</table>

The practicality data of the module was obtained based on the results of the student response questionnaire. The results of the questionnaire were measured using a four-scale Likert scale, namely strongly agree, agree, disagree, and strongly disagree. The student response questionnaire consists of positive statements and negative statements. For positive statements, the response strongly agrees is given a score of 4 and so on until the response strongly disagrees is given a score of 1. For negative statements, the score is the opposite of the score for positive statements. The module practicality score is calculated using formula (2).

\[ \frac{\sum P}{\sum} \]

where \( P \) is the percentage of the practicality of the module, \( \sum P \) is the sum of all students' response scores, and \( \sum P \) is the sum of the maximum possible scores of all students' responses. After the results are known, the results are then grouped into product practicality criteria. The product practicality criteria are presented in Table 2.
### Table 2. Product practicality criteria

<table>
<thead>
<tr>
<th>No</th>
<th>Criteria of Practicality</th>
<th>Level of Practicality</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>very practical</td>
<td>very practical</td>
</tr>
<tr>
<td>2</td>
<td>practical</td>
<td>practical</td>
</tr>
<tr>
<td>3</td>
<td>less practical</td>
<td>less practical</td>
</tr>
<tr>
<td>4</td>
<td>impractical</td>
<td>impractical</td>
</tr>
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</table>

3 Results and Discussion

3.1. Teaching Material Development Process

This research produces a product in the form of GeoGebra-assisted teaching materials on geometry material to develop students’ mathematical connection abilities. The development of the module follows five phases in the ADDIE model. In detail, the phases taken are as follows.

Analysis

Analysis of learning resource needs is carried out based on the results of observations. Observation results show that in learning, lecturers and students use English-language electronic books as the main source. The book is considered not to lead to mathematical connection skills and is less constructivist because it does not explicitly focus on developing constructions about the relationship between concepts. In addition, the lecturers have prepared GeoGebra-based teaching materials, but due to computer facilitation that not all students have, efforts are needed to develop solid geometry teaching materials assisted by GeoGebra android software. In this pandemic period, all students use Android phones in learning, so the development of geometry teaching materials with the help of Android GeoGebra is claimed to be very relevant to the media owned by students. In addition, curriculum analysis was also carried out to find out the curriculum used and for the learning outcomes of learning in the solid geometry course.

Design

Making a framework for the preparation of teaching materials based on guidelines for the preparation of teaching materials which includes a) introduction contain brief descriptions, learning outcomes, b) presentation contain material descriptions, sample questions, practice questions, interactive activities, summaries, and c) closing contain formative tests, answer keys, and bibliography. At this phase, the selection of reference books and the preparation of teaching materials assessment instruments were also carried out, consisting of teaching material validation sheets for material experts and media experts, student response questionnaire sheets, and interview guidelines.

Development

The teaching materials developed broadly include material descriptions that lead to mathematical connection abilities, interactive GeoGebra-based android activities, and
assignments in the form of learning videos. The teaching materials are then validated by material and media experts. In terms of material, the aspects assessed include the feasibility of the content, the feasibility of presentation, and the feasibility of language. In terms of media, the aspects assessed include the feasibility of graphics and electronic media. The validation process resulted in several suggestions from experts. The suggestions include (1) the worksheets that have been made are good because they are accompanied by steps to construct concepts using GeoGebra so that students find them themselves, but it needs to be accompanied by a capture of the GeoGebra menu icon, (2) adding problems that can develop mathematical connection abilities, (3) it is necessary to add the worksheets cover and bibliography, (4) attach a video link about giving an example of construction carried out by the lecturer. All of these suggestions are used to revise the developed teaching materials.

Implementation

At the implementation phase, experiment of teaching materials that have been validated and revised is carried out. This experiment is intended to see the level of practicality of teaching materials. The experiment of teaching materials was carried out on the first-year students of a private university in West Java for the 2020/2021 academic year, totaling 29 students. After using the teaching materials, students were then asked to fill out a questionnaire. This questionnaire aims to see student responses to teaching materials that have been developed in terms of several aspects, namely ease, attractiveness, and efficiency. Furthermore, the effectiveness of teaching materials is seen based on the results of interviews with students. It includes the benefits of using teaching materials and the results of student work on these teaching materials.

Evaluation

The teaching materials that have been tested are then analyzed for their advantages and disadvantages. Analysis of teaching materials was carried out based on the results of student response questionnaires. The advantages of the developed teaching materials include: (1) construction instructions for geometry material concepts and sample questions on the developed teaching materials are easy to follow and understand, (2) the teaching materials developed are interesting and encourage students to carry out construction activities to find geometric concepts, and (3) can help study the solid geometry material. While the disadvantages of this teaching material are that some words are typos.

3.2. Quality of teaching materials

The quality of the teaching materials developed was analyzed based on the validity, practicality, and effectiveness of the teaching materials (Nesri & Kristanto, 2020). The results of the analysis based on each of these criteria are then presented as follows.

3.3. Validity of teaching materials

The validity of the teaching materials developed is based on the results of assessments carried out by experts. The results of the assessment from material experts on the aspect of content feasibility obtained a validity percentage of 82%, while in the presentation and language feasibility aspects, the validity percentages were 89% and 90%, respectively. The average score of these three aspects is 87%.

Therefore, in terms of material, the teaching materials that have been developed are very valid. The data on the validation analysis of teaching materials from material experts can be seen in Table 3.
Furthermore, the results of the assessment of media experts on the feasibility aspect of graphics obtained a validity percentage of 82%, and on the feasibility aspect of teaching materials obtained a validity percentage of 89%. From these two aspects, an average score of 86% was obtained. Therefore, from media experts, the teaching materials that have been developed are very valid. Data analysis of the validation module from media experts can be seen in Table 4.

### Table 4. Media expert validation results

<table>
<thead>
<tr>
<th>No</th>
<th>Aspect</th>
<th>Percentage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Graphic feasibility</td>
<td>82%</td>
<td>Valid</td>
</tr>
<tr>
<td>2</td>
<td>Teaching materials feasibility</td>
<td>89%</td>
<td>Very Valid</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>86%</td>
<td>Very Valid</td>
</tr>
</tbody>
</table>

3.4. The Practicality of teaching materials

The practicality of the teaching materials developed was analyzed based on the results of the student response questionnaires. The practicality of teaching materials was reviewed for ease of use, attractiveness, and efficiency. In the aspect of ease of use, the percentage is 80%, in the attractiveness aspect, the percentage is 78%, and in the efficiency aspect, the percentage is 80%. From these three aspects, an average score of 79% was obtained. Therefore, it can be concluded that the modules developed are practical to be used by students. A comparison of the percentage of the practicality of teaching materials in each aspect is presented in Figure 1.

![Figure 1. Comparison of the percentage of practicality of teaching materials in each aspect](image)
The practicality of these teaching materials shows that they are easy to use by students, attractive, and efficient. Ease of use refers to how well the organization of the materials and technology used in the teaching materials is. The material organization is an important element in facilitating learning [24]. In addition, student acceptance of the technology used in teaching materials will also affect how well students will learn [25]. The attractiveness of teaching materials is related to student learning motivation. When student motivation is high, the student tends to get optimal mathematics learning outcomes [3], [12]. The use of GeoGebra in the activity of constructing geometric concepts in teaching materials can increase student learning motivation [26]. Thus, the attractiveness of the teaching materials in this study will facilitate students to study the material well. This is also confirmed by the efficiency of the teaching materials in this study which are in the good category.

3.5. Effectiveness of Teaching Materials

The effectiveness of the teaching materials developed was analyzed based on the results of observations and interviews conducted and supported by the results of student work on activities in teaching materials. From the results of the interviews, it is known that the teaching materials developed can "help students in independent learning, and these teaching materials motivate students to practice more independently constructing the concept of the surface area of building space". In addition, students admitted that the teaching materials developed also included mathematical connection abilities and could potentially improve students' mathematical connection abilities. In the teaching materials, some sections guide students to construct the concept of definitions, formulas for area, and volume of each geometric and the relationships between the concepts. The results of the interview are reinforced by examples of student work activities which are shown in Figure 2. The activity of working on teaching materials shows that the learning activities provided in the teaching materials have facilitated students to construct and relate concepts in mathematics.

Figure 2. Results of student work activity
According to the results of interviews and students' work, it can be concluded that the teaching materials developed have the potential to be effective in helping students understand geometrical material. Also, they have the potential to improve their mathematical connection abilities, through the activity of constructing concepts using GeoGebra. This is in line with research [3] which states that GeoGebra-assisted teaching materials can help students find mathematical concepts through construction activities.

**Figure 3.** Examples of construction activities using GeoGebra

In Figure 3 students can construct a rectangular pyramid by using the instructions for constructing a triangular pyramid, triangular prism by using the instructions for constructing a rectangular prism. In addition, the developed teaching materials also contain examples of problems that can be solved using GeoGebra. Examples of problems and solutions using GeoGebra can be seen in figure 4. The example shows how activities developed in teaching materials facilitate students to solve problems given by using their thoughts by utilizing GeoGebra.

**Figure 4.** Examples of geometry problems and their solutions using GeoGebra
The teaching materials developed in this research have both practical and theoretical impacts. Practically, these teaching materials can be used by lecturers to facilitate students in learning the topic of solid geometry through activities that encourage the development of mathematical connection abilities. Furthermore, these teaching materials can be used by students to study independently because these teaching materials provide material construction instructions, examples of questions that can be solved using GeoGebra and manually. Theoretically, the process of developing teaching materials described in this article can be used as a reference for developing teaching tools with similar types and purposes.

4 Conclusions

From the results of research and development of GeoGebra android-assisted teaching materials that have good quality to develop students' mathematical connection abilities. The teaching materials developed in this study were valid, practical, and effective. Based on the assessment of material and media experts, the teaching materials have an average validity score of 87% (very valid) and 86% (very valid). Based on student assessments, the practicality of the module has an average score of 79%, so it can be concluded that the teaching materials are practical. Finally, based on student responses as users and supported by the results of student work, the teaching materials developed are also effective. Although these teaching materials have gone through the validation and experiment steps, it must be acknowledged that the development of these teaching materials still has limitations. Conclusions regarding the validity, practicality, and effectiveness of the module in developing students' mathematical connection abilities are still limited to the subject of this research and its context. Therefore, it is recommended for other researchers to investigate the effect of these teaching materials on students' mathematical connection abilities by using different research designs, such as experimental research, and with more research subjects.

5 Acknowledgments

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References


Mycorrhizal Species Diversity in Salam Rhizosphere (Syzygium Polyanthum) in Ex-Sand Mining Land in Cipancur, Ciawigebang District, Kuningan Regency

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Abstract. Mining activities on ex-excavated land cause critical land damage and will affect the ecosystem of the land. As one of the efforts to restore the condition of the former excavated land is by reclamation or revegetation. The use of Arbuscular Mycorrhizal Fungi (AMF) is an alternative that can be developed with various benefits including increasing plant growth, increasing soil nutrient absorption, and increasing plant tolerance to extreme conditions. This study aims to identify the types of mycorrhizae in the rhizosphere of salam (Syzygium polyanthum) in the ex-sand mines of Cipancur Village, Kalimanggis District, Kuningan Regency. The identification and observation of AMF colonization was carried out at the Laboratory of the Faculty of Forestry, Universitas Kuningan. The materials used were soil and root samples under a Salam tree (Syzygium polyanthum) stand. Spore morphology was identified using INVAM (2008). The results showed that the number of spores found under stands of Salam trees (Syzygium polyanthum) from 16 sample plots was 1,949 spores consisting of 3 types of AMF, namely Glomus sp., Gigaspora sp., and Acaulosprora sp.

Keywords: Arbuscular Mycorrhizal Fungi; Ex-Dug C; Reclamation

1 Introduction

Utilization of non-renewable natural resources through sand mining activities must be able to reduce the level of environmental damage for human welfare. Post-mining land damage begins with the destruction of the physical, biological, and chemical properties of the soil followed by changes in the shape and structure of the landscape [1]. The decrease in the quality of the topsoil on ex-mining land is characterized by damage to soil structure, accelerated erosion, excessive washing, soil compaction, decreased soil pH, accumulation of heavy metals in the soil, depletion of organic matter, decreased plant nutrients, and decreased exchange capacity of cations, decreased microbial activity [2]. Changes in the structure and function of the landscape, both in the form of natural events and human disturbances, will have an impact on changes in the composition of plant and animal species [3]. The return of the soil layer to the former post-mining excavation is not able to restore the land condition to the same as the condition before mining [4]. However, knowledge about functional soil microbial changes in land as a result of reclamation with vegetation succession is still inadequate [2].
The post-sand mining land in Cipancur Village has soil with a composition that is poor in nutrients. This is an obstacle for the success of revegetation activities. The existence of arbuscular mycorrhizal fungi (AMF) from plant rhizosphere in nature has an important role because of the mutualism symbiosis with almost 90% of land plant species [5]. Efforts to improve these conditions need to be carried out by land reclamation using biological agents with mycorrhizae in addition to improving the local ecosystem, intervention in the reclamation of ex-sand mining land is needed to accelerate the succession process [6].

One of the silvicultural techniques that can be used to implement it is the application of isomic technology (microbe isolates) or the utilization of potential soil microbes such as mycorrhizae [7]. All genera of arbuscular mycorrhizal fungi do not have the same morphological characteristics, so it is necessary to know their identity so that the existence and diversity of arbuscular mycorrhizae is required. Identification of mycorrhizae found in ex-sand mining areas is very important as an initial effort for land reclamation. The purpose of this study was to determine the diversity of mycorrhizal species in the rhizosphere of salam (Syzygium polyanthum) in the former sand mining area of Cipancur Village.

2 Methodology

Research site at the Silviculture Laboratory, Faculty of Forestry, Universitas Kuningan and soil samples on ex-sand mining land in Cipancur Village, Ciawigebang District, Kuningan Regency.

The tools used to take soil samples and plant roots were plastic bags, hoes and markers. The tools used for observation in the laboratory are sieves graded 1mm, 425um, 106 um, 45um, and 0.0308 um. Centrifuge, test tube, test tube rack, computer, circular needle, dropper, tweezers, slide, bacterglass, digital microscope, digital scale, spray bottle, petri dish, measuring cup, small bucket, gloves [8].

The materials consisted of soil samples and roots of Salam trees (Syzygium polyanthum) with a solution of 60% granulated sugar, 10% KOH, 2% HCL, Melzer and Aquades reagents. Soil samples were taken as much as 500 grams/sample. Isolation of spores from soil samples was carried out by referring to the wet pour and filter method [9] with modified centrifugation [10]. The AMF spores obtained from the isolation were then isolated and prepared with PVLG solution to be identified. The data obtained were analyzed descriptively and presented in the form of identification results of arbuscular mycorrhizal fungi, starting from spore morphology based on: color and size shape. The morphology of the spores was identified using [11] Mycorrhizal colonization was observed on the roots of the sample plants using the root staining technique. The method used for cleaning and staining the sample roots. The percentage of mycorrhizal colonization can be calculated using the colonized root length method [12]. The degree or percentage of infected roots is calculated using the following formula:

\[
\text{Infected roots} \% = \frac{\sum \text{infected roots}}{\sum \text{all observed roots}} \times 100\%
\]
3 Result and Discussion

The presence of AMF is characterized by the presence of internal hyphae, external hyphae, vesicles, arbuscules, or internal spores in the plant root system [13]. The results of the identification of AMF spores in the rhizosphere of salam (Syzygium polyanthum) in Cipancur Village were obtained as many as 1,949 different AMF spores. The types of spores obtained have the characteristics of different spore shapes and colors. The spores were then grouped based on shape and color so that three types of AMF spores were obtained, namely Acaulospora, Glomus, and Gigaspora.

Table 1. Total Spores found in the rhizosphere of Salam (Syzygium polyanthum)

<table>
<thead>
<tr>
<th>Sample</th>
<th>Total Spores FMA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Acaulospora</td>
</tr>
<tr>
<td>Salam 1</td>
<td>20</td>
</tr>
<tr>
<td>Salam 2</td>
<td>17</td>
</tr>
<tr>
<td>Salam 3</td>
<td>22</td>
</tr>
<tr>
<td>Salam 4</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>71</td>
</tr>
</tbody>
</table>

Figure 1. Graph of total spores in the rhizosphere of Salam (Syzygium polyanthum)

Based on Table 1, the genus glomus was found in the rhizosphere of Salam (Syzygium polyanthum) as many as 1,313 spores, this is in line with research [14] which said that the distribution of the genus was very dominant in each tree stand. In line with research [15], the genus glomus in its distribution always dominates in every plant root. While the genus Acaulospora as many as 71 spores, and the genus gigaspora as many as 565 spores.
The genus Acaulospora is characterized by having a globus, sub-globus, irregular to elliptical shape. The spore wall consists of 2 layers where the innermost spore wall is equipped with a germination orb.

The color of the spores varies from yellow, orange, brownish, dark red to brownish red [11]. The acaulospora spores found were round and elliptical, orange and yellow in color, the spore wall consists of 2 layers.

The genus Glomus is characterized by a round shape, the spore wall consists of more than one layer. The color of the spores of the glomus genus varies from yellow, brownish yellow, yellowish brown, light brown, to dark brown and black. [11] The spores found are round to oval in shape, the color of the spores ranges from clear, yellow to brownish.

The genus Gigaspora is characterized by its characteristic bulbous suspensor. Gigaspora spores are spherical in shape and relatively large in size. The color of the spores varies from yellow, greenish yellow, brownish yellow to yellowish brown [11]. Gigaspora spores found are round, yellow in color, have only 1 layer of walls and are sized.

**Figure 2.** Types of mycorrhizae found under stands of Salam trees (*Syzygium plyanthum*)
Environmental or edaphic conditions are very decisive in the distribution of arbuscular mycorrhizal genera. Genus Glomus, Acaulospora and Gigaspora are 3 different genera and indirectly have different environmental adaptations. According to [11], the level of adaptation of this genus has variations in tolerance and its own uniqueness in each genus.

Figure 2. Salam root (Syzygium polyanthum) infected with roots

The observations obtained after staining the roots showed the presence of round structures called vesicles and arbusculars. The appearance of these structures indicates that there has been infection or symbiotic colonization between the observed plant roots and AMF.

4 Conclusion

The diversity of species of Arbuscula Mycorrhizal Fungi (AMF) in stands of Salam trees (Syzygium polyanthum) from 16 sample plots was 1,949 spores consisting of 3 types of AMF, namely Glomus sp., Gigaspora sp., and Acaulospora sp.

References


Masyarakat di Mandailing Natal. (The mycorrhizal on Land Explore Former Gold Mine Community in Mandailing Natal).”


The Impact of Entrepreneurial Orientation on SMEs Performance in West Java Province: Market Orientation as Mediating Variable

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Abstract In this study, we examine the effect of Entrepreneurial Orientation on the performance of SMEs by using the mediating impact of Market Orientation. We used respondents from four regions in the West Java Province of Indonesia. After the questionnaires were distributed using the purposive sampling method, a total of 188 respondents were obtained. The analytical technique used in this study was Structural Equation Modeling (SEM). From the results of the study, it was found that orientations can affect the performance of SMEs. Entrepreneurship Orientation and Market Orientation can affect the performance of SMEs. From testing the mediating effect, it is found that Market Orientation can mediate the relationship between Entrepreneurial Orientation and the performance of SMEs. The research results can provide information for entrepreneurs who want to explore Entrepreneurial Orientation and Market Orientation.

Keywords: Mediating Variable; Market Orientation; SEM

1 Introduction

Amid technological developments and uncertain times, SMEs are required to survive and be sustainable. Entrepreneurship is needed to survive [1, 2]. Most businesses usually fall into the SME business category [3]. SMEs have facilitated the dynamics in most business organizations in developing countries because they create new jobs and generate additional capital for the business [4]. Researchers are always interested in finding answers to what makes some entrepreneurs more successful than others, particularly in small and medium-sized enterprises (SMEs) from developing countries who usually struggle with survival [5].

Indonesia is one of the developing countries in the Southeast Asia region, and much research on the performance of SMEs has been carried out [6-11]. Several researchers revealed the importance of Entrepreneurial Orientation in influencing the performance of SMEs [6, 8, 9, 11]. However, several research results related to the effect of Entrepreneurial Orientation on SME performance still found contradictory [12-16]. [17] employ three dimensions (proactiveness, risk-taking, and competitive aggressiveness) into Entrepreneurial Orientation. The results show that proactiveness and competitiveness have a significant and positive impact on the performance of SMEs, while risk-taking has a significant and negative effect on the performance of SMEs. Furthermore, referring to research [13], Entrepreneurial Orientation has a positive and significant direct impact on the performance of SMEs. Then, research conducted by [14] shows that Entrepreneurial Orientation has a positive and
significant effect on company performance. Several previous studies have shown inconsistencies in research results and the degree of dimensions they use.

According to [18] typology, Entrepreneurial Orientation is companies that are still small, including SMEs in which almost all activities carried out are focused on the owner’s management. Furthermore, there are two views on the use of Entrepreneurial Orientation dimensions, namely unidimensional [19, 20] and multidimensional [21].

The inconsistency of the relationship between Entrepreneurial Orientation and the performance of SMEs can be resolved by intervening variables. Research conducted by [22] used learning theory as a mediation variable. Furthermore, the study conducted by [23] used the Network tie variable as a mediating variable.

So the researcher assumes that Market Orientation will be an important variable that can bridge the relationship between Entrepreneurial Orientation and SME performance. Strategic Orientation consisting of Market Orientation (MO) and Entrepreneurial Orientation (EO) are intangible resources that can ensure the survival of the organization in the long term and facilitate the achievement of superior performance [24, 25]. Resource-Based View (RBV) Theory shows that companies have two resources, they are tangible and intangible.

This study aimed to examine the effect of Entrepreneurial Orientation on SME Performance and the mediating effect of the Market Orientation variable. Furthermore, the literature review, research methodology, test results, managerial implications, future research, and research limitations will be explained.

2 Literature Review

2.1. The SME Performance

Law Number 20 of 2008 concerning UMKM states that the criteria for Small Businesses are to have a net worth greater than Rp. 50,000,000.00 (fifty million rupiahs) up to a maximum of RP. 500,000,000.00 (five hundred million rupiahs) excluding land and buildings for business premises. Performance is a latent construct that has different meanings in the academic literature. Each definition reinforces other points of view, methods, and views as a result where none of them can clearly explain the meaning of performance. Generally, the performance of SMEs is considered the result of constructive management activities and can be assessed using several norms, including efficiency, effectiveness, productivity, and growth [26].

The performance of SMEs is the ability to achieve the wishes of the company’s stakeholders [27]. Therefore, performance is the strength of the company to produce satisfactory results and actions [28]. Currently, the high performance of SMEs helps to remove the blockade and generates wide opportunities for SMEs to develop and compete strongly in the global market [29]. Therefore, entrepreneurs responsible for managing SMEs try to get better SME performance through new procedures, plans, and strategies during the entrepreneurial life cycle [30]. In this study, we will use subjective measurements to assess the performance of SMEs in Indonesia.

2.2. Entrepreneurial Orientation and Market Orientation

[19] conceptualization of EO, based on previous research by [31] and [20], is the most widely used framework for EO construction in which the three dimensions of EO—
innovation, proactive, and risk-taking together form a unidimensional and must be combined when measuring EO. Miller defines the term 'entrepreneurship' as only applies to companies that simultaneously act on all three dimensions. The dimensions may be independent (that is, they may vary independently). At the same time, the construct may be considered homogeneous and, in that sense, 'unidimensional,' i.e., a firm is considered entrepreneurial if it acts on all three dimensions [2, 20].

However, in its journey, the concept of Entrepreneurial Orientation has added two dimensions, namely aggressiveness and autonomy [21]. [21] argue that Entrepreneurial Orientation is a concept measured by a multidimensional degree consisting of five dimensions (proactiveness, risk-taking, innovativeness, aggressiveness, and autonomy). So this causes confusion among researchers whether it is better to use unidimensional or multidimensional [32]. Researchers who focus on entrepreneurial Orientation are currently divided into two lines, namely Miller, Covin, and Slevin, who consider unidimensionality more appropriate, and Lumpkin and Dess, who think that the more precise measurement is multidimensional [33].

In their research, [5] show that Entrepreneurial Orientation has a positive effect on the performance of SMEs in Pakistan. Furthermore, [34], in their research that employed the dimensions of Entrepreneurial Orientation in the form of unidimensional in testing its effect on the performance of SMEs, obtained positive and significant results. The description above provides empirical evidence that Entrepreneurial Orientation can improve the performance of SMEs. Thus, we propose a hypothesis:

H1: Entrepreneurial Orientation has a significant effect on SME Performance.

Market Orientation is an organizational culture that focuses on understanding market conditions in terms of customers and competitors [35]. [36] define Market Orientation as a series of activities, processes, and behaviors derived from implementing the marketing concept. In this definition, [36] define the construction of Market Orientation into three components: intelligence generation, intelligence dissemination, and responsiveness, and call it the MARKOR dimension. On the other hand, [37] defined Market Orientation as organizational culture based on three components: customer orientation, competitor orientation, and inter-functional coordination, and named this instrument MKTOR. In this study, the Market Orientation dimension to be used is from [37] that has received the greatest attention from academics in the last few decades.

Studies by [37-40], report the direct impact of Market Orientation (MO) on the performance of SMEs. Based on the description above, we propose a hypothesis:


Several researchers have also tested the relationship between Entrepreneurial Orientation and Market Orientation [25, 35, 41]. In their research, [41] reported that Entrepreneurial Orientation could affect Entrepreneurial Orientation positively and significantly, and Market Orientation can mediate the relationship of Entrepreneurial Orientation on company business performance in Malaysia. Furthermore, in their research, [35] found that the relationship between Entrepreneurial Orientation and Market Orientation has a positive and significant effect. In their study, [25] report that Market Orientation can affect company performance in Pakistan by using Entrepreneurial Orientation as a moderating variable. From the description above, we propose a hypothesis:

H3. Entrepreneurial Orientation can affect Market Orientation.

H4. Market Orientation can mediate the impact of EO on SME Performance
2.3. Research Framework

3 Methodology

3.1. Data

The period of collecting respondent data is carried out from March to May 2021. The population of this research is SMEs located in West Java Province (Bandung, Cirebon, Kuningan, and Majalengka). The data was collected through an online questionnaire using a purposive sampling approach to test the proposed model. The selected respondents are those who are still running their business activities during the COVID-19 pandemic. From the questionnaires that have been collected, there are 188 respondents whose data can be processed. (see table 1).

| Table 1. Characteristics of Respondents |
|-------------------------------|-----------------|----------------|
| Gender            | Male     | 124 | 66%  |
|                  | Female   | 64 | 34%  |
| **Total**        |          | 188 | 100% |
| Education         | S3 (Doctoral) | 0 | 0%   |
|                  | S2 (Master)  | 3 | 2%   |
|                  | S1 (Bachelor)| 90 | 48%  |
|                  | SMA (High School) | 95 | 51% |
| **Total**        |          | 188 | 100% |
| Age              | 17-34 Years | 93 | 49%  |
|                  | 35-50 Years | 89 | 47%  |
|                  | >50 Years   | 6 | 3%   |
| **Total**        |          | 188 | 100% |
| Location         | Bandung   | 52 | 28%  |
|                  | Cirebon   | 45 | 24%  |
From the questionnaire, it can be seen that a total of 188 respondents were collected where respondents located in Bandung area were 52, Cirebon 45, Kuningan 67, and Majalengka 24 SMEs. There are 124 male and 64 female SME owners. From the characteristics of education, most of them are SMA (High school) graduates as many as 95 respondents. In terms of age, there were 93 responses between the ages of 17 to 34 years, 89 respondents aged between 35 to 50 years, and the remaining six respondents aged over 50 years.

3.2. Measurement

A seven-point Likert scale is used to measure three structural categories: Entrepreneurial Orientation, Market Orientation, and SME business performance. The seven-point Likert scale can be said to be valid and appropriate because many previous studies have used seven scales to measure Entrepreneurial Orientation, Market Orientation, and SME performance [12, 42-44]. In this study, we developed a questionnaire from several previous researchers. Entrepreneurial Orientation (proactiveness, risk-taking, and innovativeness) from [19, 20], Market Orientation from [37] and SME performance from [2, 45] which focuses on the assessment of the measurement of subjectivity. This study uses Structure Equation Modeling (SEM) analysis where the initial test performed is Confirmatory Factor Analysis (CFA) to assess convergence and discriminant validity. Convergent validity was used to measure the correlation of items in one construct to ensure that the items were correlated and measure the same basic dimensions [46]. Furthermore, according to [47] loading factor must be above 0.5 in order to test its reliability. The Cronbach Alpha used to investigate the reliability of the scale must be above 0.7 [48].

4 Result and Discussion

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Loading Factor</th>
<th>Average Variance Extracted</th>
<th>Composite Reliability</th>
<th>Average Mean</th>
<th>Average Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR3</td>
<td>0.750</td>
<td>0.541</td>
<td>0.914</td>
<td>5.52</td>
<td>1.09</td>
</tr>
<tr>
<td>PR2</td>
<td>0.713</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PR1</td>
<td>0.709</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>IN3</td>
<td>0.730</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IN2</td>
<td>0.740</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>IN1</td>
<td>0.789</td>
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<tr>
<td>RT3</td>
<td>0.775</td>
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<tr>
<td>RT2</td>
<td>0.723</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.1. Validity and Reliability

The overall results from the CFA indicate that the measurement model has met the statistical criteria of goodness of fit. CMIN/DF score is 2.056, GFI score is 0.936, AGFI score is 0.889, CFI score is 0.944, RMSEA score is 0.075. Furthermore, the Entrepreneurial Orientation construct with the largest Composite Reliability score is 0.914, the second is SME performance with 0.851, and Market Orientation is 0.827. Average Variance Extracted (AVE) for each variable is above 0.5, and the factor loading value is above 0.5 with a significance level of 5%; these results are in accordance with an adequate indicator level [49].

Table 2. Hypothesis Testing

<table>
<thead>
<tr>
<th>Description</th>
<th>β</th>
<th>p-value</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1 Entrepreneurship Orientation -&gt; SME Performance</td>
<td>&lt;0.01</td>
<td>0.252</td>
<td>Accepted</td>
</tr>
<tr>
<td>H2 Market Orientation -&gt; SME Performance</td>
<td>&lt;0.01</td>
<td>0.468</td>
<td>Accepted</td>
</tr>
<tr>
<td>H3 Entrepreneurship Orientation -&gt; Market Orientation</td>
<td>&lt;0.01</td>
<td>0.424</td>
<td>Accepted</td>
</tr>
</tbody>
</table>

The data were further analyzed using the Structure Equation Model (SEM) approach. SEM is used because the tool tends to be more appropriate for theory testing [47]. From this test, it was found that the effect of Entrepreneurial Orientation on the performance of SMEs was found to be significant < 0.01 (β = 0.252) so that H1 was accepted. Furthermore, the relationship between Entrepreneurial Orientation and Market Orientation was significant < 0.01 (β = 0.424), so H3 was accepted. The relationship between Market Orientation and SME performance was significant < 0.01 (β = 0.468), so H2 was accepted. Then, to examine the mediating effect of environmental scanning on the relationship of Entrepreneurial Orientation on the performance of SMEs, the Sobel Test calculation method was used. The results of the mediation test obtained a Z value of 3.366 and a significance value of 2 tailed < 0.01. The results of the Sobel test indicate that Market Orientation can mediate the relationship between Entrepreneurial Orientation and SME performance so that H4 is accepted.
Conclusion

In this study, we examine the effect of Entrepreneurial Orientation on the performance of SMEs and the mediating effect of Market Orientation in West Java Province, Indonesia. From the results of the study, it was found that Entrepreneurial Orientation has a positive and significant effect on the performance of SMEs. The results of this test illustrate that the Entrepreneurial Orientation consisting of proactiveness, risk-taking, and innovativeness possessed by owners or managers at the highest level in SMEs can affect the performance of their business activities. Furthermore, the results of the Market Orientation test on the performance of SMEs were found to have a positive and significant effect. The results of this test indicate that the better the entrepreneurial Orientation that SME owners have will improve their ability in market orientation, especially for SMEs. In the last test, we tested the mediating effect of Market Orientation on the relationship between Entrepreneurial Orientation and SME performance. From the results of testing the mediation effect, it was found that Market Orientation can mediate the relationship between Entrepreneurial Orientation and SME performance. The test shows that Market Orientation can be an important variable that must be considered in analyzing the performance of SMEs and their relationship to Entrepreneurial Orientation. However, SMEs are also inseparable from various shortcomings in their business activities, starting from the lack of funds and resources. So that in the theory of Resource-Based View (RBV), it is explained that there are two resources owned by each company, namely intangible and tangible resources, in achieving sustainable competitive advantage. So Entrepreneurial Orientation and Market Orientation can be important predictors that can be considered for SME owners.

This research has limitations; namely, the variables we use in this study are limited to Entrepreneurial Orientation and Market Orientation. Also, the respondents we used in this study only came from four regions in the province of West Java. In distributing the questionnaire, we used an online questionnaire and only collected 188 respondents.
References


Ecological Distribution of *Ficus* Spp in Kuningan District, West Java, Indonesia

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**Abstract.** *Ficus* spp is a group of plants which has high diversity and generally found in lowland ecosystems. Information about ecological distribution of *Ficus* spp in Kuningan District was carried out through literature studies, field observations and herbarium materials. The materials and methods used in this study were the locations where *Ficus* spp and herbarium grew. The purpose of this study was to determine the ecological distribution of *Ficus* spp. in Kuningan District. The results showed that *Ficus* spp found consisted of 24 species scattered in lowland forest ecosystems in the north, south, west and east of Kuningan District. The highest number of species found was in the eastern part of Kuningan District with 19 species, while the smallest number was in the western part of Kuningan District. namely 5 species. The name of *Ficus* spp found in all locations were *Ficus ampelasia* Burm.f., *Ficus fistulosa* Reinw.ex Blume, and *Ficus variegata* Blume. Tree habitus is the one that dominates the distribution of *Ficus* spp, which is as much as 79.17% of the total species found, while the place where it grows is found at an altitude of 500 m asl - 1,300 m asl. It can be conclude that *Ficus* spp. can grow in the lowlands, especially areas that are disturbed and the distribution of the genus is very wide.

**Keywords:** Ecological Distribution; Ficus spp; Distributio Ficus spp

1 **Introduction**

Kuningan is a district located in the east of West Java Province in a geographical position E 108° 23” – 108° 47” and S 6° 45” – 7° 13” [1]. The specific characteristic possessed by Kuningan District in terms of land cover and use include natural forest, plantation forest, and agricultural land [2]. The potential and function of the forests that are spread out in each area of Kuningan District vary, including thee that have conservation function and production function. On the eastern slopes of Mount Ciremai National Park, there are 43 plant species belonging to 34 genuses and 9 families, one of which is moraceae [3].

*Ficus* spp. is a plant from the family moraceae which is widely distributed in the tropics and subtropics [4]. Because this plant can live in extreme conditions and is a source of food for the animals, *Ficus* spp. plays an important role in ecology [5]. Judging from its habitus, *Ficus* spp. is an awoody plant with a life form of tress, shrubs, small tress, stranglers, creepers, lianas (spreading) or as wild roots (hemi-epiphytes, epiphytes, creeping roots) [6]. Almost all parts of *Ficus* spp. can be utilized, ranging from food sources, and traditional medicines, to simple tools and ship frames with light loads [7]. Currently, the use of Ficus spp for medicinal
plants [8], especially in the field of pharmacology, began to be developed because of the high content of polyphenols and flavonoids, which are strong antioxidants [9].

In a previous study in Gunung Tului, Kuningan District, West Java, 11 species were found on the western slope [10] and 12 species in total, spread from 600 m asl to 1,000 m asl [11]. Furthermore, this type is also recorded; there are 10 types of Ficus scattered on the eastern slopes of Mount Ciremai which is part of the Mount Ciremai National Park [12]. In several places in Kuningan District, it is not yet known about the type and distribution and identification of Ficus spp. in Kuningan District, and it is felt that it is important that further research be carried out.

2 Methodology

The methods used in this research are field observation and literature study. Field observations were carried out in the Bukit Barisan area (south) and Karangsari Research Station Mount Ciremai National Park (west) in Kuningan District because information about the distribution of Ficus spp. at that location had not been carried out. Meanwhile, for the Seda area of Mount Ciremai National Park (north) and Gunung Tului (east) of Kuningan District, information about the distribution of Ficus spp. is available, so only a literature study is needed.

In the western and southern regions, data was collected using a purposive sampling method, namely by placing plots at each height. The variables observed were the type and number of species [13], while the distribution of Ficus spp. was mapped from coordinates on Ficus spp. found using the Global Positioning System (GPS) through field observations. Vegetation analysis was used to determine the dominance of Ficus spp. while the data analysis of the distribution map of Ficus spp. was obtained by processing with the Arc Gis 10.2 device. Processing is done to get a map of land cover, elevation, slope, and distance [9].

3 Result and Discussion

Based on the results of field observations and literature studies of vegetation conditions in the Seda area of Mount Ciremai National Park (north), the area is dominated by Pinus merkusii, Cinnamomum sintoc, Gnetum gnemon, Schima wallichii, Sterculia oblongata, Artocarpus sp., Dillenia excelsa, and Zizygium polyanthum. [14]. At this location, 10 species were found, namely Ficus ampelas Burm.f., Ficus benjamina, Ficus calophylla, Ficus fistulosa Reinw.ex Blume, Ficus hispida, Ficus padana, Ficus retusa, Ficus ribes, Ficus septica, and Ficus variegata Blume. The height of the place to grow starts at 700 m asl to 900 m asl and goes up. The dominant species at this location is Ficus hispida L.f. Many are found along the inspection road, which is an open and dry area. This is similar to the results of research [15] that this tree species mostly grows in open areas, river banks, and secondary forests.
Figure 1. (a) Number of Types Ficus spp (b) Habitus of Ficus spp

The Bukit Barisan area (south) is dominated by *Vllebrunea rubenscens*, *Castanopsis argentea*, *Melaleuca sp*, and *Eurea javanica*, which are included in secondary vegetation, with a steep and very steep topography [13] and a number of Ficus spp. 9 species were recorded, including *Ficus ampelas* Burm.f., *Ficus benjamina*, *Ficus elastica* Roxb. ex Homem, *Ficus fistulosa* Reинw.ex Blume, *Ficus glaberrima* Blume, *Ficus hipsida*, *Ficus kurzii* King, *Ficus montana*, and *Ficus variegata* Blume. The dominant species in this area is *Ficus fistulosa* Reинw ex Blume, which is found from an altitude of 500 m asl. to 1,300 m asl. in a cool area to the edge of an open forest.

In the Karangsari Research Station area of Mount Ciremai National Park (west), vegetation is dominated by plantations and shrubs with the types of *Pinus merkusii*, *Persea americana*, *Toona sureni*, and *Artocarpus heterophyllus* [16], which found five species, namely *Ficus ampelas* Burm.f, *Ficus fistulosa* Reинw.ex Blume, *Ficus ribes* Reинw.ex Blume, *Ficus septica* Burm.f, and *Ficus variegata* Blume. The height of the place to grow starts at 1,075 m asl. to 1,300 m asl. The species that are commonly found are the same as locations in the south, namely *Ficus septica*. Based on observations, this species is spread under stands of *Pinus merkusii*, shrubs to open areas.

Figure 2. Map of Distribution of Figs in Kuningan District

*Ficus* spp. were found to have different habits which is a form of plant adaptation to environmental conditions in different places so that they can grow in that area. However, the identity of Ficus is determined through the characteristics of leaves, fruit, and stipules, thus allowing one type of Ficus to have several types of habits [17]. The habitus of *Ficus* spp. in Kuningan District are trees, shrubs, climbers, lianas, hemi epiphytes based on the identification results as follows:

1. *Ficus ampelas* Burm.f.
   Habitus tree, 15 - 25 meters high, with a diameter up to 30 cm, white gummy, Single leaf, alternate, protruding, tapering base and tip, jagged edges, upper surface dark green, lower surface light green. Orange fruit diameter: 1 cm. The leaves are sometimes used to grind utensils.

2. *Ficus benjamina* L.
   Habitus tree, height between 20 and 25 meters, taproot. The stem is blackish brown, erect, round, with a rough surface. There are hanging roots on the stem. Single leaf, located opposite each other, oval shape, pointed flat edge. Leaf pinnate. A Single flower emerges from a leaf axil, with a round, smooth crown. Buni fruit, round, green, and red when ripe. Hard round seeds are white.

3. *Ficus botryocarpa* Miq
   Habitus tree height range from 6-14 meters, with a woody trunk, monopodial branching, and round, brown appearance. Alternate leaves, pinnate spine. Leaf shape: oblong, elongated, tapered tip, dark green color and paler at the bottom.

4. *Ficus calophylla* Blume.
Habitus tree, up to 30 meters high. Single leaf, alternate. Broad leaf shape at the tip (ovate), pinnate leaf veins. Small fruit 1 cm in diameter, brownish yellow.

5. *Ficus copiosa* Steud.
   Habitus tree, more than 10 meters high, 90 cm in diameter, slender trunk, Decussate leaves, gathered at the end of the stem, oval oval leaf blade, serrated edge. Round fruit, 1-2 cm in diameter, greenish brown color

6. *Ficus drupacea* Thunb
   Trees up to 40 meters high, 90 cm in diameter, brown to yellow. Elliptical to egg-shaped leaves, blunt tip, slightly pointed. The fruit appears in the leaf axils, oval-shaped and red.

7. *Ficus elastica* Roxb. ex Hornem
   Trees up to 20 meters high, cylindrical in shape, dark brown in color. Single leaves are arranged alternately, oval at the base and tapered at the tip. The edges of the leaves are flat. The fruit is ovoid and 1-2 cm in size, with a greenish yellow color.

8. *Ficus fistulosa* Reinw.ex Blume
   Habitus tree, up to 20 meters high, 20 - 25 cm in diameter. stem with white sap. Twigs are often empty. Stipules are about 10 mm long, glabrous. alternative Leaves, simple, penni-to triple-veined, glabrous. Fruit measuring 10 mm in diameter, yellow-brown, round, fleshy figs are placed in bundles with twigs and stems.

9. *Ficus glaberrima* Blume
   Habitus tree up to 25 meters high, up to 40 cm in diameter, blackish trunk. Single leaf, spiral, lanceolate, base blunt to rounded, flat leaf edge, dark green surface color, pale green underside. Fruit rounded up to 1.2 cm in diameter.

10. *Ficus glandulifera* (Wal. Ex. Miq.) King
    Habitus trees grow up to 30 meters high, their twigs and leaf stalks covered with brown hair. The leaves are elliptical to egg-shaped. Fruits are round, up to 1.2 cm in diameter, and dark purple in color.

11. *Ficus globosa* Blume
    Climber habitus, hemi-epiphyte. The leaves are spirally arranged, long-stemmed, oval, and glossy green. The fruit is slightly round, green with white spots, and covered with fine brown hairs, appearing in pairs in the axils of the leaves.

12. *Ficus hispida* L.f
    Habitus tree up to 10 meters tall, 20 cm diameter, white gummy stem, single leaf, opposite rounded to lanceolate, base rounded to blunt, pointed tip to tapered, serrated edge. Fruit rounded yellow, hairy on the outside, and up to 2 cm in diameter.

13. *Ficus kurzii* King
    Habitus trees, up to a height of 30 meters, have coarse leaves arranged in a spiral, elliptical to oval. Paired fruits appear in the axils of the leaves, 1-2 cm in diameter, dark red, purple, or black.

14. *Ficus Montana*
    Shrubs with a habit of reaching less than 50 cm tall; leaf shape varies; rough surface, jagged leaf edges. The small fruit is green when young and red when ripe.

15. *Ficus padana* Burm.f.
    Habitus shrubs up to 15 meters high, wide canopy and branching. Diameter 30 cm. Single leaf spread, egg-shaped, upper surface green, lower surface covered with white fine wool hair. Fruit appears in leaf axils, flattened round, 4-5 cm in diameter. Black red.

16. *Ficus retusa* L.
Shrub or tree with a height of up to 5 meters high. Smooth stems are gray. The leaves are ovate in shape and spirally arranged. Berries appear at the ends of the branches.

17. *Ficus ribes* Reinw. ex Blume
   Small trees up to 10 meters in height, up to 15 cm in diameter. Single leaf, spiral, lanceolate, base unequal, pointed tip, flat edge. The upper surface is dark green, while the lower surface is yellowish green. Fruit that has been rounded up to 1 cm in diameter.

18. *Ficus septica* Burm.f.
   Habit trees or shrubs, up to 10 meters high, and up to 20 cm in diameter. Pushing rounded base, pointed tip, flat edge, dark green top surface, light green bottom surface, alternating single leaf. Flat rounded fruit, 2 cm in diameter, green.

19. *Ficus subulata* Blume
   Shrubs to trees with a height of up to 15 meters high. Climbers are often epiphytic. The leaves are tapered at the tip, and dark green; the underside is light green.

20. *Ficus sinuata* Thunb
   A hemi-epiphit can be a large tree up to 30 cm in height, and 60 cm in diameter. Single leaf alternate, oval, tapered base, leaf tip tail, jagged edges. smooth green top surface, and a rough pale green bottom surface. Fruit with a diameter of up to 1.5 cm.

21. *Ficus sundaica* Blume
   Habit tree heights reach up to 30 meters, and their diameters up to 60 cm. Black stem. Single leaf, alternate, round to protruding, flat edge, dark green upper surface, light green lower surface. Fruits are rounded or oblong elongated, up to 1.5 cm in diameter.

22. *Ficus tinctoria* Forst. f.
   Habit strangler trees, up to 15 meters high. Stems are whitish gray, with green leaves, smooth texture, and symmetrical. Small brown fruit, 1 cm in diameter.

23. *Ficus variegata* Blume
   Habit a large tree, up to 30 meters high, up to 70 cm in diameter. Single leaf, spiral, ovate, rounded base, pointed tip, serrated edge, green top surface, light green bottom surface. Fruit rounded, yellowish green or red when ripe, 3-5 cm in diameter.

24. *Ficus virens* Aiton
   Habit tree, up to 15 meters high, 30 cm in diameter. Single leaf, spiral, lanceolate, blunt base, blunt tip to rounded, flat edge, upper surface green, lower surface yellowish green. Fruit, that is and ranges in color from cream to pink.
4 Conclusion

Ficus spp found consisted of 24 species spread in lowland forest ecosystems in the north, south, west and east of Kuningan Regency. The highest number is in Gunung Tilu or the eastern part of Kuningan as many as 19 species, while the smallest number is found in the Karangsari Research Station or the western part of Kuningan namely 5 species. The names of Ficus spp. found in all locations were Ficus ampelas Burm.f., Ficus fistulosa Reinw.ex Blume, and Ficus variegata Blume. Habitus of trees dominates the distribution of Ficus spp, which is 79.17% of the total species, while the place of growth is at an altitude of 500 m asl - 1,300 m above sea level.

References


Utilization of Eco Enzyme for Wastewater Treatment (Greywater) at Kuningan University

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Abstract. Greywater in Kuningan University comes from bathing, hand washing and washing utensils. The waste is discarded into the environment without going through the treatment stage so that it has the potential to pollute the environment. In this study, we used an environmentally friendly and cost-effective biological treatment method. This method uses eco-enzyme derived from a mixture of brown sugar, pineapple and water in a ratio of 1:3:10 which is fermented for 90 days. The purpose of this study is to determine the characteristics of greywater before and after being treated using eco-enzyme with a concentration of 10% for 5 and 15 days. Results obtained show that the eco enzyme is effective in aerobic conditions with a duration of 15 days after it's being confirmed in the Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number: P.68/Menhk/Setjen/Kum.1/8/2016 concerning domestic waste quality standards. Further research is needed to find a more appropriate dose of eco enzyme so that the BOD and COD content of greywater which discarded into the environment meets environmental standards.

Keywords: Greywater; eco enzyme; pineapple; kuningan university.

1 Introduction

Along with the increasing number of people who inhabit a certain place with all their activities, a number of wastewater will also be generated. If it isn't managed properly, the wastewater will become a serious problem. Wastewater can come from household, industrial or other public places that contain materials which can endanger human life and living things that can interfere the environmental sustainability [1]. The wastewater which comes from businesses and residential activities (real estate), restaurants, offices, commerce, apartments and dormitories is called as domestic wastewater [2]. Greywater is wastewater that comes from bathing and washing activities [3]. Water pollution that occurs is a result of the absence of an adequate wastewater treatment system.

Greywater that is produced every day in Kuningan University is directly discarded into the drainage without prior treatment. It can affect on decreasing the quality of downstream waters and causing a stink aroma. Environmentally friendly waste treatment has been implemented through the “Green Campus” policy in Kuningan University with the Reduce, Reuse, Recycle (3R) program in accordance with the criteria that set by UIGreenmetric [5]. Environmentally friendly and sustainable treatment is needed to organize the greywater in Kuningan University environment, it is by producing Eco Enzyme. Eco enzyme is a complex solution produced by
fermenting fresh kitchen waste, sugar (brown sugar or molasses) and water. The color is dark brown and has a strong sweet and sour aroma of fermentation for household needs, agriculture, farm, gardening and others [6].

Eco enzyme is a solution of complex organic substances which produced from the fermentation process of organic waste, sugar, and water. The color of Eco enzyme liquid is dark brown and has a strong sour/fresh aroma [7]. When the fermentation process is completed, the eco-enzyme (dark brown liquid) will be formed and used for disinfecting house floors, baths, insecticides and sewer cleaning fluids [8]. Based on the problem of greywater waste in Kuningan University which is discarded into the environment without going through a treatment process, it is necessary to immediately conduct research on waste treatment using eco-enzyme, a liquid made from environmentally friendly raw materials.

2 Methodology

The research was carried out in Kuningan University from April to August 2021. The testing of the characteristics of greywater before and after being treated with eco-enzyme was carried out at the Sucopindo Cirebon Laboratory. The Greywater as a research material was taken from the waterways outlet of each bathroom and kitchen. The raw materials for making eco enzymes are pineapple and brown sugar which obtained from traders around the campus and the water is obtained from a well in Kuningan University. The tools used consist of jars with threaded lids, organic material chopping knives, chopping mats, plastic buckets, balance sheet and writing utensils. Measuring equipment for greywater characteristics before entering the laboratory consists of a thermometer, water pH meter, TDS meter.

Figure 1. Research Location

Primary and secondary data collection and analysis are presented in Figure 2 below:
Eco enzyme is made through a three-month fermentation process. The raw materials for eco enzyme are brown sugar, organic waste and water, with a ratio of brown sugar (1 part), organic materials (3 parts) and water (10 parts). Organic waste utilizes fresh fruit and vegetable waste collected from the campus canteen and campus activities that provide banquet facilities in the form of fruits. The next ingredient is brown sugar that obtained from the society around the campus and the water is obtained from a well. The stages of making eco enzyme are presented in Figure 3 below.
Sampling of the greywater of the outlets uses the composite place sample method in accordance with SNI 6989.59:2008 concerning the method of taking wastewater samples. Greywater samples which obtained from the outlets at Kuningan University were composited using the Composite Place Sample method as shown in Figure 4a. The results of internal data analysis are recorded on a tally sheet as analysis material as shown in Figure 4b. Samples to be tested externally are taken and put in a special container [10]. Sample testing uses eco enzyme that is made from pineapple which has a low pH [11].

Greywater sample testing was carried out at Sucofindo Laboratory Cirebon with two activity stages. The first stage of sample testing was carried out before it's being given of eco-enzyme treatment and testing was carried out after the sample was given of eco-enzyme in the second stage. The second stage of sample testing was carried out after 5 days and 15 days [8] with an addition of a concentration of 10% eco enzyme [12]:

![Figure 4. Sampling Stages (a) and Greywater Characteristic Analysis (b)](image)

3 Result and Discussion

3.1. Eco Enzyme Characteristics
The raw materials consist of skin and flesh of pineapple, brown sugar and water. Raw materials were put into airtight plastic jars with a ratio of 1:3:10 (1 part sugar, 3 parts fruit/vegetables, 10 parts water) (Neupane, K. And Khadka, R. 2019) [13]. These materials were fermented for 90 days and stored in a cool place and not exposed to sunlight [14]. The stages of making eco enzyme are presented in Figure 5.
After the fermentation period is completed, eco-enzyme liquid will be obtained with a fresh sour aroma such as vinegar [15] which has a dark brown color indicating that the eco-enzyme has been completely fermented [16]. The results of measurements of pH, TDS and pineapple eco enzyme aroma are presented in table 1 below:

**Table 1: characteristics of Pineapple Eco Enzyme**

<table>
<thead>
<tr>
<th>Repetition</th>
<th>pH</th>
<th>TDS (mg/l)</th>
<th>Volume (liter)</th>
<th>Aroma</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.10</td>
<td>1840</td>
<td>2.8</td>
<td>Fresh sour</td>
</tr>
<tr>
<td>2</td>
<td>3.20</td>
<td>1980</td>
<td>2.8</td>
<td>Fresh sour</td>
</tr>
<tr>
<td>3</td>
<td>3.10</td>
<td>1890</td>
<td>2.85</td>
<td>Fresh sour</td>
</tr>
<tr>
<td>4</td>
<td>3.10</td>
<td>2070</td>
<td>2.87</td>
<td>Fresh sour</td>
</tr>
<tr>
<td>5</td>
<td>3.10</td>
<td>2000</td>
<td>2.55</td>
<td>Fresh sour</td>
</tr>
<tr>
<td>Average</td>
<td>3.12</td>
<td>1956</td>
<td>2.774</td>
<td>Fresh sour</td>
</tr>
</tbody>
</table>

The test results of a low pH below 3.5 indicate the character of fresh sour. The low pH value of eco-enzyme is a result of the high content of various organic acids [17, 18]. The higher the organic acid content such as acetic acid or citric acid, the lower the pH value [19].

### 3.2. Greywater Sample Characteristics

Greywater used in this research is waste that collected from each outlet in Kuningan University (Figure 6). Samples were collected in buckets and then put in clean plastic jerry cans to be analyzed at the Sucofindo Cirebon Laboratory.
The analysis includes physical, chemical and biological parameters which refer to the Minister of Environment and Forestry Regulation number 68 of 2016 concerning domestic waste quality standards. The results of the analysis are presented in table 2 below:

Table 2: Greywater before being given a treatment

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Test Results</th>
<th>Environmental Quality Standard</th>
<th>Methods (*)</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH at lab</td>
<td>-</td>
<td>6.71</td>
<td>6 – 9</td>
<td>4500-H⁺-R</td>
<td></td>
</tr>
<tr>
<td>BOD 5 days 20 °C</td>
<td>mg/L</td>
<td>49.4</td>
<td>30</td>
<td>5210 B</td>
<td></td>
</tr>
<tr>
<td>COD by K₂Cr₂O₇</td>
<td>mg/L</td>
<td>141</td>
<td>100</td>
<td>PO/CBN-</td>
<td></td>
</tr>
<tr>
<td>Total Suspended Solid</td>
<td>mg/L</td>
<td>28.3</td>
<td>30</td>
<td>2540 D</td>
<td></td>
</tr>
<tr>
<td>Oil &amp; Grease</td>
<td>mg/L</td>
<td>&lt; 4</td>
<td>5</td>
<td>5520 B</td>
<td></td>
</tr>
<tr>
<td>Ammoniac</td>
<td>mg/L</td>
<td>7.8</td>
<td>10</td>
<td>4500-NH₃-F</td>
<td></td>
</tr>
<tr>
<td>Total Coliform</td>
<td>colony/100 mL</td>
<td>2900</td>
<td>3000</td>
<td>9222 B</td>
<td></td>
</tr>
</tbody>
</table>

The results of the analysis of pH, TSS, oil & grease, ammonia and total coliform were under the environmental quality standards. However, BOD and COD are still above the quality standard, it means that it still requires a treatment. The low TSS value is due to infrequent or no bathing and washing activities [20]. Such conditions are also possible due to limited activities in the use of bathrooms and washing areas. Wastewater which only includes waste water from sinks, washrooms and bathrooms and others that are not too dangerous to be discarded of [11].

3.3. Greywater Sample Characteristics after Being Treated for 5 Days

The results of Greywater after being treated with 10% eco-enzyme for 5 days in an airtight jerry can are presented in table 3 below:

Table 3: Greywater after being treated

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Test Results</th>
<th>Environmental Quality Standard</th>
<th>Methods (*)</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH at lab</td>
<td>-</td>
<td>3.80</td>
<td>6 – 9</td>
<td>4500-H⁺-R</td>
<td></td>
</tr>
<tr>
<td>BOD 5 days 20 °C</td>
<td>mg/L</td>
<td>1904</td>
<td>30</td>
<td>5210 B</td>
<td></td>
</tr>
<tr>
<td>COD by K₂Cr₂O₇</td>
<td>mg/L</td>
<td>5440</td>
<td>100</td>
<td>PO/CBN-</td>
<td></td>
</tr>
<tr>
<td>Total Suspended Solid</td>
<td>mg/L</td>
<td>381</td>
<td>30</td>
<td>2540 D</td>
<td></td>
</tr>
<tr>
<td>Oil &amp; Grease</td>
<td>mg/L</td>
<td>210</td>
<td>5</td>
<td>5520 B</td>
<td></td>
</tr>
<tr>
<td>Ammoniac</td>
<td>mg/L</td>
<td>4.43</td>
<td>10</td>
<td>4500-NH₃-F</td>
<td></td>
</tr>
<tr>
<td>Total Coliform</td>
<td>colony/100 mL</td>
<td>18000</td>
<td>3000</td>
<td>9222 B</td>
<td></td>
</tr>
</tbody>
</table>

The results of the analysis of physical, chemical and biological parameters show the values above the environmental quality standards. The high value of COD results in low dissolved oxygen content and an increase in BOD value [21]. This condition is caused by the treatment carried out under anaerobic conditions and microorganisms cannot function in environmental conditions with pH > 9.5 and < 4 and even die [22]. Beside that, the existing enzyme
substances produced with organic materials of fruit waste or organic solid waste and molasses added as a substrate in the anaerobic process triggers the high TDS of eco-enzyme [23]. The addition of eco-enzyme which is strongly acidic in the sample results a decrease in the pH value [24].

3.4. Greywater Sample Characteristics after Being Treated for 15 days

The results of Greywater after being treated with 10% eco-enzyme for 15 days in an open container are presented in table 4 below:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>-</td>
<td>8.2</td>
</tr>
<tr>
<td>TDS</td>
<td>mg/L</td>
<td>1030</td>
</tr>
<tr>
<td>Aroma</td>
<td>mg/L</td>
<td>Tidak beraroma</td>
</tr>
</tbody>
</table>

The measurement results show that the pH value and aroma parameters of the waste have met environmental standards. This is possible because the work process of bacteria and enzymes under aerobic conditions is more optimal. Aerobic bacteria will work more optimally if their oxygen needs are met so that the rate of decomposition of pollutants is more effective [25]. However, TDS still requires further treatment even though the value is better than the 5-days treatment in an airtight container (2190 mg/L). The high TDS value is due to the accumulation of organic material substrates and sugar/molasses in the fermentation process [16].

4 Conclusion

The results of the greywater analysis at Kuningan University have pH, BOD and COD content above the quality standard if it's confirmed by the Minister of Environment and Forestry Regulation number 68 of 2016 concerning domestic waste quality standards. Parameters TSS, Oil & Grease, ammonia and total coliform have met the quality standards, this is because the activities that cause the generation of these parameters are relatively more limited. Greywater that is discarded into the environment requires prior treatment so that it does not burden and pollute the environment.

Greywater treatment that is environmentally friendly and cost-effective is to use eco-enzyme made from pineapple. The eco-enzyme substances made from pineapple has a blackish brown color and a strong acid (pH 3.12) with a fresh distinctive aroma containing high dissolved organic materials. Greywater treatment using pineapple eco enzyme is effective in aerobic conditions with a duration of more than 5 days.
References


The Implementation of Autonomous Learning in English Language Teaching (ELT)

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Abstract This research aimed at examining the implementation of autonomous learning in English Language Teaching (ELT) in vocational high school 2 Kuningan. The method used in this research is descriptive qualitative research. The participants of the research are 2 English teachers and 16 students. The instrument used to collect the data are observation, interview, and questionnaire. The findings show that semi-autonomous learning is implemented in the process of English Language Teaching (ELT) in this pandemic situation by using zoom, WhatsApp group and Moodle platform as the media of teaching and learning process. The second, students are aware and understand autonomous learning, but most of them still difficult to implement autonomous learning in their learning process. Therefore, it is concluded that the implementation of autonomous learning in high school is not optimal/maximum yet because of many obstacles faced by both teachers and students.

Keywords: autonomous learning; English language teaching; high school

1 Introduction

Autonomous learning is one of learning methods that existed since 1981 which was discovered by Henri Holec (1981) father of learner autonomy. Wang (2010) pointed out that autonomous learning is a modern learning theory based on constructivist theory. The learning activities in this method are students- centered. Hayta and Yaprap (2013) also define that autonomous learning as the ability to involve themselves in their own learning process. In this learning method, students are responsible for their own learning process. They learn according to their own needs.

There are three reasons which can help learners take more responsibility for their learning. First, learners who choose will be more effective at controlling their learning because they have learned what they want to learn. Learners who are responsible for their learning will be able to learn outside of the classroom; and third, learners who know how to learn will be able to transfer their learning method to other subjects. Tanjung (2018) stated that Indonesian students who are still learning English cannot be separated from the presence of a teacher. This means that most students just learn English when they are in school.

Autonomous learning has become a major issue in English language teaching. The success of learner depends on their learning style through appropriate learning method. During this pandemic situation, autonomous learning is one of suitable methods for teaching and learning process. Based on the foregoing, and several previous studies that most of them
are analyzing autonomous learning in higher educations with a normal situation. So, the author is interested in examining the implementation of autonomous learning in Vocational High Schools, particularly in this pandemic situation in which students are learning online.

2 Methods

In this study, the researcher applied a qualitative research design. To conduct the qualitative research to enhance understanding of personal culture, beliefs and values, human experience, and circumstances, and develop theories describing these experiences. Qualitative research does not convert linguistics symbols into digital data but uses the word of participants or researcher to describe the phenomenon under study. The study aimed to know how the teacher implementation of autonomous learning in English language teaching (ELT) and the students response about the implementation of autonomous learning in English language teaching (ELT) in Vocational High School 2 Kuningan. Which the participants of the research are 2 English teachers and 16 students of 10th and 11th grade.

This study used three instruments such as; observations, interview and questionnaire. The observation done in the zoom meeting, moodle platform and WhatsApp Group. Meanwhile, the interview is done to the teacher by using some modified questions by Borg & Al- Busaidi (2012). Another instrument is questionnaires which given to the both of participants. The list of questionnaires for students is adapted from Ustunluoglu (2009) and for the teacher questionnaire is adapted from Borg & Al-Busaidi (2012).

3 Results and Discussion

The result of the observation shows that the two English teachers implemented autonomous learning in the process of teaching and learning. It was also found that the teachers focused on semi-autonomous learning method where students should be encouraged to do some learning autonomously under the guidance of the teachers. At the same time, teacher should adopt new teaching methods to complete the transition from a teacher-centered teaching model to a student’s-centered teaching model.

The role of the student must still be defined when deciding what kind of material will be explained and what kind of topic will be discussed. The teacher must be aware of the materials that students require, particularly in online learning activities, as there are numerous misunderstandings during the teaching and learning process. So, in choosing the kind of material and topic that will be discussed and then customizing it to the situation of the teaching and learning process, the involvement of the students is needed.

Therefore, students’ involvement is clearly needed. So, it is also related to the teaching methods that teachers use and classroom management; with student involvement, the teacher will know what kind of teaching method to use and how to manage the classroom itself, making it easier to see how learning is assessed. In autonomous learning students must be able to identify their own needs, strengths, and weaknesses, monitor their progress, and evaluate their own learning in addition to learning independently and cooperatively.

Other discoveries in the process of observation are how feasible to qualify the needs in the teaching and learning process. The researchers discovered that the course's objective can be seen in figure that shows a basic competence which is the goal of a course. There is a list of
materials that must be taught in one semester based on the syllabus and it was needed for students and it was needed as a teacher’s reference in qualify the goal criteria in the teaching and learning process.

However, the kinds of tasks and activities that teachers give to students are still slightly more feasible. In these pandemic situations, teachers have a little difficulty carrying out learning activities; many activities are cut by the teacher, which influences the tasks that are assigned to the students.

In addition to classroom management during the online teaching and learning process, the teacher faces some challenges in dealing with students. Many students do not attend the Zoom meeting for a variety of reasons, and some turn off their cameras. It makes teachers confused about choosing a learning method to make the online teaching and learning process conducive.

Another finding was that while some students’ ability to qualify their needs was quite feasible when learning cooperatively and independently, they were still unfeasible when identifying their needs, strengths, and weaknesses. Most students face many difficulties in the process of teaching and learning English, and it is still difficult to identify their needs, strengths, and weaknesses in learning English.

During the interview the question is about what teachers’ perception through the implementing of autonomous learning in English Language Teaching (ELT) with a list of questions are adapted from (Borg & Al-Busaidi, 2012) and modified. The interview result is used to persuade and answer the first research question.

There’s a little different perspective about autonomous learning from the teacher. The first teachers believe that autonomous learning is a process where students can learn on their own with the teacher as a facilitator or guide. She believes that the role of teacher still needed in the way of implementing autonomous learning in English language teaching. Meanwhile, the second teacher believes that autonomous learning is a student-learning centered where students can learn independently without being “fed” by the teacher.

The two teachers have the same opinion related to the characteristics of autonomous learners, the first teacher said that students can be said as an autonomous learner if they have a quick response to the teacher instruction and know what to do. It is in line with the second teachers’ opinion, she believes that a quick response from students is one of the characteristics of autonomous learners.

About the effect of autonomous learning in English Language Teaching, both of teacher have the same opinion that autonomous learning should be very influential in English Language Teaching. The first teacher said that in this pandemic situation autonomous learning play an important role in the process of teaching and learning. Moreover, the second teacher stated that the implementation of autonomous learning in the 10th grade was hard, the transition period of the students being a big obstacle in implementing this method, which making this method ineffective.

Both of teacher were implementing autonomous learning method in the process and it’s become the main methods in the process of teaching and learning online, the second teacher said even though the method was less effective if implemented in 10th grade, but the situations was forces us as teacher to implement that method to adapt to this pandemic situation.

In the way involving students in making decisions both of teacher have do the same thing, which involves students in decision-making in the classroom, such as establishing rules in the classroom and haggling over the teaching and learning activities by doing voting.

The main difficulties that their faced is about the internet quota, both of teacher claimed
that SMKN 2 Kuningan was a middle school, so that many of students were complaining about internet quota even though it has been subsidized by the government. Another difficulty mentioned by the first teachers that students’ self-awareness is very low; they must be being caught by the teacher to join the class because there are still many students that skip the class.

In the last question of interview was related to the conclusion of all the questions before. It is about, is the implementation of autonomous learning in pandemic situation is effective or not. Both of teacher stated that it still ineffective because the situation. The student must adapt to the new situation that forced them to change their leaning method.

Meanwhile, both teachers had the same opinion at several points and chose to “agree” with the statements. It can be seen in the nineteenth point. They agreed that learner autonomy is promoted by activities that encourage learners to work together. The twenty-seventh point about learner autonomy is then promoted when students can select their own learning materials. Then, learner-centered classrooms provide ideal conditions for developing learner autonomy. Learning how to learn is key to developing learner autonomy, and they agree that learning to work alone is central to the development of learner autonomy.

At some points, the teacher has a slight difference of opinion. The first teacher chooses to strongly agree, while the second teacher chooses to agree, indicating that they both agree with the statement. It can be seen in the fourth point that they agree that autonomous means that learners can make choices about how they learn to learn. On another point, both teachers agree that involving learners in decision making about what to learn promotes learner autonomy and that confident language learners are more likely to develop autonomy than those who lack confidence.

There are some disagreements on some points, such as the eighth point, which states that learner autonomy means learning without a teacher, and the ninth point, which states that it is more difficult to promote learner autonomy with proficient language learners than with beginners. Next is the twentieth point about learner autonomy. Autonomy is only possible with adult learners. Autonomy requires the learner to be totally independent of the teacher and the last is about promoting autonomy is easier with beginning language learners with more proficient learners.

4 Discussion

According to observations and interviews, autonomous learning in high school was still cannot being full autonomous. Because there are still many students who do not qualify the criteria for being autonomous learners. According to Little (2011), autonomous learners must understand their plans’ goals, act, plan and implement learning activities, and review and evaluate their own learning. Many students skip class and must be coerced into attending by their teachers.

Based on the findings of the interviews, both teachers stated that autonomous learning is being used, particularly in this pandemic situation, and that they are being forced by the situation to implement autonomous learning methods in English Language Teaching (ELT). So far, the implementation of autonomous learning in SMKN 2 Kuningan is still semi-autonomous due to the numerous difficulties encountered in the teaching and learning process, as well as all the limitations.

Moreover, the data obtained from questionnaire which is distributed to the teachers and students. The data obtained from the teacher’s questionnaire shows that the results are in
accordance with the results of previous observations and interviews. The data gained from the teacher questionnaire is to support and strengthen another two instruments. In the result of questionnaire, the two teachers agree on several points and disagree on a few others. Both teachers agree that the implementation of autonomous learning at the high school level is not completely autonomous.

Meanwhile, the results of the student questionnaire differ slightly from those of the previous observations. Some of the students are aware and understand autonomous learning, but they still difficult to implement autonomous learning in their learning process.

5 Conclusion

The Autonomous learning method is a good method to implement in the teaching and learning process. Especially in this pandemic situation, the use of autonomous learning is very important in the process of teaching and the learning process. Students’ participation is essential in this method.

To sum up, the findings of this study show that teachers have been implementing autonomous learning methods in English Language Teaching (ELT) to encourage students to become more active and independent, particularly in pandemic situations, but there are still many problems and obstacles that teachers face when implementing autonomous learning methods. As a result, implementing this method in high school is still not maximized. So, teacher still implementing semi-autonomous learning strategies.

References

Abstract. One of the functions of urban forests is to absorb and store carbon through processes carried out by vegetation. Bungkirit urban forest, Kuningan Regency, is the forerunner of the urban forest in Kuningan Regency, with an area of 2 ha. The purpose of this study ware to analyze the diversity and carbon stored in trees in Bungkirit urban forest. The census method was used to identify tree species. Diameters were measured in class $\geq 5$ cm. The storage carbon analysis ware carried out using an allometric equation based on the biomass storage value. The results showed that there were 420 individual trees from 38 species and 25 families. The dominant species found were *Gmelina arborea*, *Samanea saman*, and *Tectona grandis*. The total stored carbon is 13.03 t/ha. Carbon storage in dominant tree species, namely *Gmelina arborea* (3.08 t/ha), *Samanea saman* (2.51 t/ha), and *Tectona grandis* (2.21 t/ha). Shown significant correlation between carbon stock and number of trees.

Keyword: Urban Forest; Tree; Carbon Stock

1 Introduction

Urban forest is an ecosystem dominated by trees located in or around settlements (Endreny, 2018). Urban forests play an important role in improving the comfort, environmental quality, and welfare of the surrounding communities (Dobbs et al., 2018). Urban forest tree communities provide environmental service benefits, namely in the form of cultural, provisioning, regulating, and supporting services (Brink et al., 2009; Endreny, 2018). Oslomarka's urban forest in Norway during the period 1970-2020 has provided environmental service benefits in the form of three provisioning services, namely food, water, and wood; five cultural services, namely recreation and tourism, cultural and art inspiration, spiritual experience, sense of place, and education; one regulating service, namely climate regulation; and one habitat service, namely the provision of habitat (Berglihn et al., 2021).

Carbon storage is one of the urban forest ecosystem services with the regulating service mechanism (Berglihn et al., 2021; Davies et al., 2011; Endrenya et al., 2017; Lwasa et al., 2014; Nowak et al., 2013; Nowak et al., 2007; Zuo et al., 2017). Carbon storage in the form of biomass is important to the adaptation and mitigation of climate change (Davies et al., 2011). Research in Beijing, Buenos Aires, Cairo, Istanbul, Los Angeles, Mexico City, Moscow, Mumbai, and Tokyo, showed that the economic value of carbon storage was $7.9 billion (Endrenya et al., 2017).

Trees Urban forests are components that carry out carbon storage and sequestration (Strohbach et al., 2012). The process of photosynthesis is the ability of trees to make and store
food by absorbing carbon dioxide $\text{CO}_2$ (Nowak et al., 2013). During tree growth, $\text{CO}_2$ will be stored in plant tissues in the form of biomass, either above ground or in the soil in different amounts (McPherson, 1998). One urban forest tree can store 1.57 tons of biomass or the equivalent of 0.79 tons of carbons (Dangulla et al., 2021). Trees of Bungkirit urban forest ability to store carbon is not much known. The objectives of the research are therefore to assess the diversity of Bungkirit urban forest trees, estimate their carbon storage potentials, and determine whether or not, carbon storage correlation between the number of the tree.

2 Methodology

Bungkirit urban forest is located in Kuningan Regency, West Java ($6^\circ58'28.12''$S Latitude, $108^\circ27'49.17''$E Longitude). The area of the urban forest are 2 ha (fig. 1). The mean annual rainfall is 1000 - 5000 mm/year while mean monthly temperatures range between 18-32 $^\circ$C.

![Figure 1. Location of Hutan Kota Bungkirit](image)

Trees diameter was measured in diameter class $\geq$ 5cm by the census method. Basal Area (BA) was determined using the equation as follows

$$BA = \frac{1}{4} \pi D^2$$

Where $BA = $ Basal Area, $D = $ Diametere, and $\pi = 3.14$
Species composition, diversity, mean structural characteristics (DBH and basal area), biomass and carbon stock were computed for preliminary analysis. Species diversity determined with the Shannon-Weiner’s ($H'$) was determined using the equation as follows

$$H' = - \sum_{i=1}^{k} p_i \ln p_i$$

Where $H'$ = Species Diversity, $k$ = Number of species, $p_i$ = Proportional abundance of the species.

Aboveground Biomass (AGB) and Aboveground Carbon (AGC) in this study were estimated using the general allometric equation (Hairiah et al., 2001) follows.

$$AGB = 0,11 \rho D^{0.62}$$

Where AGB = Aboveground Biomass, $\rho$ = Wood Density, and D = Diameter

The wood density ($\rho$) for all species were obtained from the World Agroforestry database (http://db.worldagroforestry.org/wd). Regression and Correlation Analysis in determining the direction of the relationship between carbon storage and the number of trees.

#### 3 Result and Discussion

##### 3.1. Trees Diversity

The results of the study recorded 420 trees from 36 species and 25 families. The diversity index is 6.04, the species with the highest number and diversity index are *Gmelian arborea* (94 and 1.35), *Samanea saman* (84 and 1.21), and *Tectona grandis* (73 and 1.05).

<table>
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<th>$H'$</th>
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<th>Species</th>
<th>Indv.</th>
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<td>Swietenia</td>
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3.2. Biomassa and Carbon Stok

The estimated total biomass in Bungkirit City Forest trees is 5.44 t/ha or the equivalent of 13.03 t/ha carbon. The species with the highest total biomass were *Gmelina arborea* (13.14 and 3.09), *Samanea saman* (10.69 and 2.51), and *Tectona grandis* (9.41 and 2.51).

### Table 2. Biomass and Carbon Stok

<table>
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<th>Carbon (t/ha)</th>
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<th>Spesies</th>
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<td><em>Ceiba pentandra</em></td>
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<td><em>Ficus carica</em></td>
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<td><em>Lagerstroemia speciosa</em></td>
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<td>34</td>
<td><em>Tectona grandis</em></td>
<td>9,41</td>
<td>2,21</td>
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</table>
The regression and correlation analysis found a significant correlation between carbon and the number of trees ($F=954.004 \ p>0.000$). The regression equation is $y = -0.011 + 0.032x$ with $R^2$ value 0.965 and standard error 0.14.

Figure 2. Histogram of Normality and Probability Plot

4 Conclusion

The results showed 420 individual trees from 36 species and 25 families. The dominant species found were *Gmelina arborea* ($H'=1.35$), *Samanea saman* ($H'=1.21$), and *Tectona grandis* ($H'=1.05$). The total stored carbon is 13.03 t/ha. Carbon storage in dominant tree species, namely *Gmelina Arborea* (3.08 t/ha), *Samanea saman* (2.51 t/ha), and *Tectona grandis* (2.21 t/ha). The regression and correlation analysis found a significant correlation between carbon and the number of trees.
Reference


Patterns of Changing Pedagogical Content Knowledge
Prospective Biology Teachers in the Covid-19 Pandemic

Z. Abidin, A.F. Hindriana, A. Ginanjar, B. Hasbi

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Abstract. This study analyzes the pattern of changes in the PCK of prospective Biology teachers related to the application of alternative teaching practices in the Covid-19 pandemic. This study uses a cross-sectional quantitative method with a sample of prospective Biology teachers in semesters 3, 5 and 7 with a total sampling technique. The instruments used are CK, PK, PCK test sheets and concept map tests. The research data were analyzed by ANOVA test and multiple linear regression assisted by SPSS 22. The results showed the average CK test results for prospective student teachers in semester 3 > 7 > 5, PK in semester 5 > 3 > 7, PCK in semester 5 > 3 > 7, and concept maps in semester 5 > 3 > 7. Based on the results of the ANOVA test there is no difference in the average CK and concept maps and vice versa for PK and PCK students of prospective teachers in semesters 3, 5 and 6. Based on the results of multiple linear regression analysis there is no effect of CK and PK on PCK in all semesters. Based on this, the pattern of changes in CK, PK, PCK and concept maps in learning during the pandemic does not run linearly with the number of semesters that have been taken. This has implications for learning during a pandemic by LPTKs should be able to increase learning outcomes, especially CK, through the creation of a special curriculum for the pandemic.

Keywords: Biology Teachers; Pedagogical; Content Knowledge

1 Introduction

Pedagogical content knowledge (PCK) is a representation of the combination of content knowledge (CK) and pedagogical knowledge (PK) which defines as an understanding of how certain topics, problems or issues are organized, presented, and adapted according to the needs and abilities of students and presented in learning [1]. PCK is also defined as knowledge that is compiled together by subject matter knowledge (SMK), pedagogical knowledge (PK), and knowledge of context (KC) [2]. To put it simply, PCK is a teacher's professional ability in presenting teaching materials in such a way that is adapted to the conditions of students in order for the teaching materials to be easily understood by students. This ability grows alongside a prospective teacher’s experience studying at the Education Personnel Education Institute (LPTK).

The results of previous research [3] shows that there are differences in the growth of PCK as a prospective teacher's knowledge with PCK as a skill. PCK as knowledge is not linear with the increase in the number of semesters taken. On the contrary for PCK as a skill, PCK
increases with the increase in the number of semesters taken. The results of the study are consistent with the result [4] that when the class level of prospective teachers increases, the PCK level of prospective teachers also increases. The results of previous study on PCK [3] also show that the increasing PCK ability of prospective teachers is correlated with training and teaching practice experience as throughout the period of prospective teachers studying at LPTKs. The results of this study are in accordance with the research [5] strengthening the finding that prospective teachers who are undergoing PPL (Field Experience Practice) have better PCK than experienced teachers of more than 15 years and have been certified educators.

Teaching practice exercises for prospective teachers that took place in LPTKs prior to the Covid-19 pandemic consisted of teaching skills practice (PKM) and microteaching. PKM consists of three stages, namely PKM I carried out in semester 3, PKM II carried out in semester 5 and PKM III carried out in semester 7. While microteaching is carried out in semester 6. In PKM I, the prospective teachers are introduced to school environment by observing a school’s situation and culture. On the next stage of PKM II, the teacher candidates make observations in schools about the school administration including teacher administration, curriculum administration and school administration in general. The outcome of PKM II is that prospective teachers are able to design learning implementation plans (RPP). Furthermore, in PKM III the teacher candidates carry out learning practices in schools to experience and apply the necessary skills of teachers in classroom. Meanwhile, the implementation of microteaching (peer teaching) is carried out on campus with of fellow teacher candidates as audiences. Under normal circumstances, the implementation of microteaching and PKM is carried out face-to-face. In such a pattern, students are expected to have an almost perfect PCK and are ready to become teachers, as the results of Abidin's research [3].

The Covid-19 pandemic, however, has changed the pattern of teaching practice exercises, both for microteaching and pre-teacher service. Practitioners are not allowed to hold practical teaching exercises face to face, and instead conducting it online. This change in teaching practice patterns during the Covid-19 pandemic affects the PCK of prospective teachers. Online learning causes prospective teachers to lose the opportunity to train and develop some of the teacher basic skills, namely questioning skills, reinforcement skills, variety skills, explaining skills, opening and closing lessons, skills guiding small group discussions, class management skills, and individual teaching skills. According to [3], prospective teachers conducting teaching practice under normal conditions show low abilities in terms of skills in conducting variations and skills in providing reinforcement. Even at the teacher level, the results show that teachers have weaknesses in terms of the ability to create student-centered learning, the ability to vary learning methods, the ability to conduct classroom conditioning to create an effective learning atmosphere [6]. Based on this situation, this research analyze the changes in the PCK of prospective Biology teachers during the Covid-19 pandemic.

2 Methodology

This study uses a cross sectional quantitative method with a sample of prospective Biology teachers in semesters 3, 5 and 7 using total sampling technique. Prospective teachers for semester 3 are taking Teaching Skills Practice (PKM)1, semester 5 PKM 2 and semester 7 PKM 3.
The instrument used was a CK test sheet with the sub-concept of speciation; PK test sheets with material for learning planning, teaching and learning strategies, educational evaluation, introduction to educational science, educational psychology, curriculum and learning, education administration; PCK test sheets with material for mastering the curriculum of a discipline (curricular knowledge), recognizing learning styles and learning difficulties, assessing students’ conceptions (preconceptions and misconceptions), having learning strategies according to students' topics and conditions, and 5) assessing student learning outcomes; and a concept map test sheet with speciation sub-concept material. Instruments are applied on different days of the same week. The research data were then analyzed using ANOVA test and multiple linear regression test assisted by SPSS 22.

3 Result and Discussion

The pattern of changes in the PCK of prospective biology teachers in learning during a pandemic is seen on the data from the results of content knowledge (CK), pedagogical knowledge (PK), pedagogical content knowledge (PCK) tests, and concept maps. The average CK test results for prospective student teachers in semester 3 > 7 > 5, the average of PK test is semester 5 > 3 > 7, PCK 5 > 3 > 7, and concept maps is 5 > 3 > 7 as shown in Figure 1.

![Figure 1. Average PK, CK, PCK and Concept Map](image)

Based on the average test results shown in Figure 1, the pattern of changes in CK mastery is not linear with the increase in the number of semesters taken. There is an anomaly in CK mastery shown by pre-teacher students in semester 3 having higher CK than pre-teacher students in semester 5 and 7 students. In contrast to the research conducted in normal times before the pandemic [3], the pattern of changes in CK is linear with the increase in the number of semesters taken, namely 8th semester students > 6 > 4. The results of the ANOVA test on the mean CK at a significance level of = 0.05 obtained P-value = 0.202. Thus, P-value > = 0.05 so that H0 is accepted, i.e. there is no significant difference in CK mastery between student teacher candidates in semesters 3, 5 and 7. This is different from the results of research by [7] and [8] which shows that students learning biology online attain very good learning outcomes. Similarly, this result also shows a different outcome with previous study [9] showing that the CK of teacher education students in Germany from the first to the third year is significantly different and as the number of semesters increases, the mastery of CK
increases. Furthermore, based on the results of the regression test for the effect of CK on PCK in the third semester, the significance value = 0.805 > 0.05; semester 5 obtained a significance value = 0.914 > 0.05; and semester 7 obtained Significance = 0.941 > 0.05 so that it is stated that CK semesters 3, 5 and 7 have insignificant effect on PCK. These results are the same as the research [3] stating that CK semesters 4, 6 and 8 have insignificant effect on PCK. Similarly, the results of research [10] and [11] found a low correlation of CK to PCK. However, other researchers show the the effect of CK on PCK as stated by Baki & Arslan [12].

Based on the average test results shown in Figure 1, the pattern changes in PK mastery during the pandemic has a non-linear pattern change with the increase in the number of semesters taken. This result is consistent with the previous study pre-pandemic [3]. The difference, however, appears in the sequence of semester. In learning process during the pandemic, the order of semester is 5 > 3 > 7, meanwhile, in the normal situation pre-pandemic, the semester order is 8 > 4 > 6. This means that the mastery of PK during the pandemic is not in accordance with the learning outcomes as it should be, namely the 7th semester students are better than third and 5th semester students. Furthermore, the results of the ANOVA test on the average PK at the significance level of 0.05 obtained P-value = 0.025. Considering that the P-value is < = 0.05, this means the H0 is rejected, i.e. there is a significant difference in PK mastery between student teacher candidates in semesters 3, 5 and 7; semester 5 obtained a significance value = 0.806 > 0.05; and semester 7 obtained significance = 0.160 > 0.05 implying that PK in semesters 3, 5 and 7 has insignificant effect on PCK. This result is different from previous pre-pandemic study stating that the PK of semester 4 students has an effect on PCK, semester 6 PK has no effect on PCK and semester 8 PK has an effect on PCK [3]. The result showing insignificant effect of PK on PCK in learning during the pandemic indicates that the implementation of online PK course group lectures has limitations in integrating knowledge that can enrich PCK.

In relation to PCK, based on the average test results as listed in Figure 1, the pattern changes in PCK mastery during the pandemic has a non-linear pattern of change with the increase in the number of semesters taken. This is the same as the results of research conducted before the pandemic [3]. The order of semester also shows similar sequence with learning during the pandemic shows the order of semester 5 (level 3) > 3 (level 2) > 7 (level 4) while the normal learning period it has the order of semester 6 (level 3) > 4 (level 2) > 8 (level 4) [3]. Thus, there is insignificant difference in PCK mastery between learning during a pandemic and learning in normal times because the level 3 students before pandemic and during pandemic achieve the highest PCK score. This is in accordance with previous research [13] which shows that pre-teacher students in level 3 have better PCK than students in level 4 and even practicing teachers. Furthermore, the results of the ANOVA test on the average PCK at a significance level of = 0.05 obtained P-value = 0.035. With the P-value < = 0.05, this means that the H0 is rejected, i.e. there is a significant difference in PCK mastery between student teacher candidates in semesters 3, 5 and 7. The average PCK test of each level obtained PCK knowledge of each level was not significantly different.

In addition, based on Figure 1, it can be seen that the pattern of changes in concept map mastery during the pandemic has a non-linear pattern of change with the increase in the number of semesters taken. This shows the similar result with pre-pandemic study but with different order of semester [3]. The order of concept maps mastery in learning during the pandemic is semester 5 (level 3) > 3 (level 2) > 7 (level 4), while in the normal learning period the sequence is semester 8 > 4 > 6. Moreover, the ANOVA test results on the average concept map on significance level = 0.05 obtained P-value = 0.452 which means that the H0 is
accepted, that is, there is no significant difference in concept map mastery between student teacher candidates in semesters 3, 5 and 7.

It is shown that, in the online learning during covid-19 pandemic, students in semester 3 achieve the highest score in both mastery of concept maps and mastery of PCK. This indicates that there is a relationship between PCK and concept map [14], which is explained that teachers who have good PCK have an average number of concepts and the number of links from the concept map they make is higher than teachers who have good CK, experienced teachers (have good PK) and novice teachers. This result is strengthened by study stating that teachers who have a high PCK are better than biologists [15]. The previous result [16], furthermore, shows that after controlling students’ prior knowledge, the online learning environment has a more positive impact on the PCK and PK of prospective teachers than face-to-face learning. However, for CK there is insignificant difference between the two learning environments.

The evidence suggest that LPTKs in developing PCK in learning during the Covid-19 pandemic should pay more attention to the increasing mastery of CK and PK in order to increase the contribution of CK and PK to PCK. After all, good mastery of CK and PK can improve student learning achievement, later when the prospective teacher become a teacher. Additionally, the results show that teachers’ CK affects student achievement [9] and teachers who have insufficient knowledge about the subject are more likely to have insufficient knowledge to help students learning the content. Thus, the development of PK needs to be improved because it shows that even teachers who are equipped with sufficient level of PK through pre-service teacher education programs may still struggle to incorporate PK into their own teaching scenarios [17]. Likewise, the research show that teachers’ mastery of pedagogic competence is lower (68%) than professional competence (91%) [18]. This can be seen more clearly in the results of the 2015 Teacher Competency Examination (UKG) where the average CK score is higher than the PK for teachers at all levels of education in Indonesia. To improve learning outcomes through online learning, more questions, formative assessments, and technology tools should be used to keep students engaged online [19].

4 Conclusion

The pattern of PCK changes during learning during the Covid-19 pandemic, which is not linear with the number of semesters that have been taken by prospective teacher students. It requires LPTK seriousness to provide strategies, approaches, models and appropriate learning methods to increase PCK in accordance with the number of semesters taken. This finding shows that LPTKs can make various efforts to generate teacher candidates with good PCK, who are deemed to be better than teacher candidates with good CK or good PK. This finding also shows that learning during the Covid-19 pandemic is able to equip pre-teacher students’ PCK despite the non-linear increase with the semesters taken, but it is a different cases for CK and PK. In this regard, LPTKs need to find appropriate strategies, approaches and learning models so that they can improve the mastery of CK and PK for prospective teacher students.
References


Condition of Poetry Appreciation Teaching Materials at Kuningan University

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Abstract. The purpose of this study was to reveal the condition of the teaching materials for the Poetry Appreciation course at Kuningan University. The research method used is descriptive qualitative by using interview and observation data collection techniques. Based on the results of interviews and observations, it can be concluded that the teaching materials used in the literature course "Appreciation of Poetry" are books and teaching materials from the internet. The book used is entitled Poetry Appreciation and Theory, Poetry Studies, and Poetry Appreciation Diktat. Sources from the internet are the basic concepts of appreciation, poetry analysis, and reading poetry. The results of the analysis of the RPS show that the books used to support learning are Poetry Appreciation Guidance, Poetry and Teaching Methodology, Poetry Theory, and Appreciation. The material given in the poetry appreciation course includes structural and semiotic analysis of poetry, basic concepts of appreciation, understanding of reading poetry, understanding of reclamation, understanding of musicalization, understanding of dramatization, and understanding of writing poetry. Examples are taken from the internet such as videos reading poetry W.S. Rendra and the musicalization of Ari Reda's poetry. Based on the analysis of learning outcomes, two things were found, firstly, a discrepancy between learning outcomes and the material, and secondly, a discrepancy between learning outcomes and the sourcebook used. The learning achievement in the Poetry Appreciation course is being able to. The material that should be given is poetry reading material, declamation, musicalization, dramatization, and writing poetry. However, the material provided is about the concept of poetry appreciation, definitions, goals, and benefits of poetry appreciation, the appreciation process, stages of appreciation, approaches in appreciating poetry, reading poetry and discussions about poetry, writing poetry, and discussions about writing poetry, learning appreciation, poetry and assessment of learning outcomes, the practice of reading and writing poetry. Second, the discrepancy between learning outcomes and the books used. Learning outcomes can hold reading performances, declamations, dramatizations, and poetry musicals. Meanwhile, the sourcebooks used contain material on how to understand poetry, Indonesian poets, various kinds of poetry, examples of poetry studies, and the history of poets. There is a discrepancy between learning outcomes and the books used. The material in the sourcebook emphasizes more on how to analyze poetry, not doing creative activities by holding reading performances, declamations, musicals, and dramatizations of poetry. I studied more deeply, the books that are used as references are more suitable to be used for poetry anatomy courses. Based on the discussion above, it can be concluded that the condition of the teaching materials in Poetry Appreciation learning at Kuningan University is still inadequate. In terms of content, some of the shortcomings in the teaching materials for the Poetry Appreciation course include: 1) the teaching materials used in the Poetry Appreciation course at Kuningan University are still not following the needs; 2) The teaching materials used do not accommodate the principles of selecting teaching materials which include the principles of relevance, constancy, and adequacy. In line with this, to achieve the learning objectives of Poetry Appreciation at Kuningan
University, the researchers suggest the following. 1) Development of teaching materials based on learning outcomes; 2) Development of contextual-based teaching materials; 3) Development of literary teaching materials that are more directed to skills.

**Keywords:** Poetry; Teaching Material; Creative Activities

1 Introduction

Literary appreciation is very important because literary appreciation can enrich insight and refine feelings. In other words, literary works are useful for life. Horace (65-8-BC: 1) argues that literature is beautiful and meaningful. Literature is a material for reflection and reflection of life because it is a coexistence in life. In line with the above opinion, Welllek and Warren (2013: 22-23) state that the function of literature is as entertainment, as an afterthought, as a discussion of lessons, as a medium of symbolic communication, and as an opener of thinking paradigms.

From the two opinions above, it can be concluded that literature is beautiful and meaningful. It is beautiful because the language used is arranged and arranged as carefully as possible so that it is different from everyday language, and meaningful because the content of the literary work is the fruit of reflection that contains lessons. So, appreciating literature will not only get entertainment but also get valuable lessons about life. The learning is related to the values of virtue, humanity, knowledge, and critical and creative thinking. It is on the basis of these values and valuable lessons that appreciating literature is included in the curriculum and studied at all levels, including universities. By appreciating literature, it is hoped that the goal of national education to create human beings with noble character, knowledge, and skills can be achieved.

One of the achievements of learning special skills in the Indonesian National Qualifications Framework (KKNI) for undergraduate students of the Indonesian Language and Literature Education Study Program is being able to appreciate, express, and create Indonesian literary works orally and in writing (APROBSI, 2014: 10). Appreciating, expressing, and creating means liking, enjoying, expressing, reacting, and creating literary works, be it poetry, prose fiction, or drama. The learning outcomes are structured so that graduates have skills in the field of literature and apply them in literary learning. With competent literary skills, it is hoped that graduates will be able to love, appreciate, and be able to teach and develop Indonesian literary works.

The results of a preliminary study conducted in August 2019 regarding the implementation of literary appreciation learning at the Kuningan University Indonesian Language and Literature Education Study Program found that the literary appreciation learning activities at the Kuningan University were divided into six courses, namely poetry anatomy, poetry appreciation, and fiction prose anatomy, appreciation of prose fiction, anatomy of drama, and appreciation of drama. The anatomy of poetry courses, anatomy of fictional prose, and anatomy of drama are related to the study of poetry, prose fiction, and drama. The studies carried out are in the form of structural, psychological, and sociological studies. Meanwhile, the subject of poetry appreciation, fiction prose appreciation, and drama appreciation are related to creative activities. In the poetry appreciation course, the creative activities carried out are reading, reciting, musicalizing, dramatizing, and writing poetry. In the fiction prose appreciation course, the creative activities carried out are writing fiction prose, reading fiction prose, and dramatizing fiction prose. In the drama appreciation course, the creative activities
carried out are writing drama scripts and performing plays. In this appreciation course (poetry, prose fiction, drama) the form of examination is practice and is held every year. Based on the results of the analysis of student course scores, it was found that the average value of the poetry appreciation course was below the value of drama appreciation and prose fiction appreciation courses.

From the results of the analysis of the value of literary appreciation, it is known that the value of the poetry appreciation course is below the average value of appreciation for prose fiction and drama. This is in line with the results of the interview. The results of the interview stated that the most difficult course in literary appreciation was the poetry appreciation course. The reasons expressed why poetry appreciation is difficult to include the following. First, poetry appreciation is difficult because the character of poetry is relatively different from prose. Second, poetry appreciation is said to be difficult because the process and stages are complex. To appreciate poetry, students must go through a series of interrelated processes, such as reading, analyzing, to producing in other forms. From the results of the interview, it was found that the difficulties of students in appreciating poetry (reading poetry) included setting the tempo, determining the tone, pressure, rhythm, and intonation, as well as training vocals and self-confidence. The third factor that makes appreciation difficult is that there are many learning achievements that students must master in poetry appreciation courses. This can be seen from the results of the analysis of the semester learning plan (RPS). The learning achievements include beautiful reading, reciting, musicalizing, dramatizing, and writing poetry.

In line with the difficulties experienced by students, Kangley (1937: 222-224) stated that the problem of poetry appreciation was caused by two things, namely the selection of poetry and its presentation. These two things are closely related and cannot be separated. Each poem has its own uniqueness, and because it is unique, it requires its own technique for its presentation. Besides Kangley, Bailey (1977: 512-515) states that poetry as one of the literary genres whose language is condensed is relatively more difficult to understand than other genres such as prose and drama. Therefore, in an effort to understand poetry, an in-depth analysis of its elements is needed. Elements of poetry must be considered to find a complete context. In understanding poetry, repeated reading can be an introduction to understanding. If in prose the meaning can be understood and guessed, in poetry this cannot be done. The condensation of words in poetry makes the meaning more difficult to find in its entirety. There are always two meanings in poetry, surface meaning and hidden meaning. Meanwhile, the complexity of the process in appreciating poetry is also expressed by Daswati (2012: 1-2) who states that to be able to read poetry well, the first thing that needs to be done is to understand the meaning of poetry. Daswati's opinion is complemented by Surastina (2016: 23) which states that poetry reading skills are also related to the skills of pronouncing, emphasizing, and processing intonation. In addition to the process and stages, appreciation is also related to attitudes, knowledge, and skills. Prayitno (2013: 2) gives an opinion about the relationship between attitudes, knowledge, and skills in poetry appreciation.

Appreciating poetry (reading aloud, writing, reciting, musicalizing, dramatizing) is closely related to certain skills such as voice processing skills, musical skills, writing skills, and other skills. Poetry writing skills, for example, are closely related to the practice of sharpening feelings, reasoning, and imagination, as well as sensitivity to society, culture, and the environment.

From the opinion above, it can be concluded that the process of appreciating poetry goes through various stages. The first stage is reading repeatedly to understand the contents of the poem. The second stage is to analyze poetry as the basic capital for making the concept of
poetry appreciation. The third stage is to create in other forms according to the concept that has been created. This stage cannot be missed because it will affect the results of the appreciation. The poetry appreciation process also involves three taxonomic domains, namely attitudes, knowledge, and skills. These three domains are interrelated and have an important role in creating a complete appreciation process. The incompleteness of the taxonomy realm will hamper the poetry appreciation process.

On this basis, the researcher tries to reveal the condition of poetry appreciation teaching materials at Kuningan University in terms of learning achievements, student profiles, student poetry appreciation abilities, and the availability of poetry appreciation teaching materials. With this research, it is hoped that the condition of teaching materials will be revealed which will be the basis for developing poetry appreciation teaching materials needed by students of Indonesian Language and Literature Education, Universitas Kuningan.

2 Methodology

The research method used is a survey. To obtain the research data needed, the researcher conducted interviews, observations, and literature studies. Literature and Observation Studies were conducted to analyze teaching materials, learning models, and competencies needed by students in reading poetry as well as observations regarding the conditions of application of poetry appreciation, the availability of teaching materials, and the conditions of existing teaching materials, while interviews were conducted to obtain data on the process of implementing appreciation. existing poetry, analysis of the condition of the model of teaching materials used in learning to read poetry at Uniku, and analysis of the needs of students and lecturers in poetry appreciation courses

3 Result and Discussion

3.1. Result

The condition of teaching materials includes the results of the identification of course learning outcomes, instructional analysis, student profiles, student poetry appreciation abilities, and the availability of poetry appreciation teaching materials at Kuningan University.

3.1.1. Identification of Learning Outcomes

Identification of learning objectives is the stage of knowing and determining the general competencies that will be mastered by students after participating in the learning process. Based on the results of the identification of learning objectives listed in the Curriculum of the Indonesian Language and Literature Education Study Program, FKIP Uniku, it is known that the Graduate Learning Outcomes include attitudes, knowledge and skills.

Graduate Learning Outcomes in the realm of attitude, namely fear of God Almighty and demonstrate religious attitudes, contribute to improving the quality of life in society, nation, state, and progress of change based on Pancasila, and respecting cultural diversity, views, religions, and beliefs, as well as opinions, or someone else's original invention.

In the realm of knowledge, namely mastering the concept of language and literature learning development theory. In the realm of general skills, namely being able to apply logical, critical, systematic, and innovative thinking in the context of the development or
implementation of science and technology that pays attention to and applies humanities values in the field of Indonesian language and literature education. While in the realm of special skills, namely being able to appreciate, express, create Indonesian literary works orally and in writing.

Graduate Learning Outcomes is then further elaborated through Course Learning Outcomes and Course Sub Learning Outcomes. Course Learning Outcomes in the Indonesian Language and Literature Education Study Program, Universitas Kuningan are (1) students are able to explain the concept of poetry appreciation; (2) students are able to explain the types of poetry appreciation; (3) students are able to distinguish the types of poetry appreciation; (4) students are able to master the concept of reading poetry with proper pronunciation, tone, intonation, and tempo and apply them; (5) students are able to master the concept of poetry recitation with proper pronunciation, tone, intonation, and tempo and apply it; (6) students are able to master the concept of musical poetry by referring to the content of the poem and applying it; (7) students are able to master the concept of dramatization of poetry by referring to the content of the poem and applying it; (8) students are able to master the concept of writing poetry by referring to their experiences.

Sub course learning outcomes for Poetry Appreciation course, namely: (1) students are able to explain the meaning of poetry appreciation, types of poetry appreciation activities, and different types of poetry appreciation; (2) students are able to explain the meaning and steps of creative activities to read poetry; (3) students are able to demonstrate basic exercises for reading poetry; (4) students are able to explain the assessment of poetry reading; (5) students are able to read poetry with proper pronunciation, intonation and rhythm; (6) students are able to explain the meaning and steps of poetry reclamation; (7) students are able to explain the exercise and assessment of poetry reclamation; (8) students are able to explain the meaning and types of poetry musicalization; (9) students are able to identify the steps of creative activities of poetry musicalization; (10) students are able to explain the practice and assessment of poetry musicals; (11) students are able to explain the meaning and steps of dramatization of poetry; (12) students are able to explain poetry dramatization exercises and assessments; (13) students are able to explain the meaning and steps of writing poetry; (14) students are able to explain the practice and assessment of writing poetry.

Based on the Graduate Learning Outcomes Study Program, course learning outcomes, and Sub course learning outcomes, it can be concluded that the learning achievements of the poetry appreciation course are mastery of the concept of poetry appreciation, mastery of the concept of creative reading, declamation, musicalization, dramatization, and poetry writing, mastery of reading skills, declamation, musicalization, dramatization , and wrote poetry. Related to this research, learning outcomes will be focused on mastering the concept of poetry appreciation, mastering the concept of reading poetry, and mastering poetry reading skills.

3.1.2. Student Profile

It is important to analyze student profiles to determine the characteristics of students who will use poetry appreciation teaching materials. This is important because the teaching materials to be used must be in accordance with the characteristics of the users. This is in accordance with Vygotsky's opinion which states that meaningful learning, needs to be designed and developed based on the condition of students as learning subjects and the socio-cultural community in which students live (Moll, 1994). Student profile analysis includes the age and social background of students.

There are 60 students in the 3rd semester of the Indonesian Language and Literature Education Study Program, FKIP Kuningan University. A total of 19 students are male, and 41
students are female. Their age range is between 19-21 years. Cognitively, the age range of 19-21 years according to Piaget is in the formal operational stage. This means that at that age, students are able to think abstractly, work effectively and systematically, analyze in combination, think proportionally, and draw generalizations/conclusions. When viewed based on language development, at this stage students are able to use words more effectively, understand metaphors and adult literature, and improve writing skills.

Judging from the social background, on average, students come from rural areas spread over four (4) regencies, namely Kuningan, Majalengka, and Cirebon and Brebes. The average occupation of their parents is farmers (60%), traders (30%), and employees (10%). Based on the results of research (Subiyanto, 2012) it is known that student achievement in rural areas is lower than student achievement in urban areas. The low learning achievement of students in the village environment is influenced by low learning motivation, less family support, and limited facilities and teaching materials.

3.1.3. Student Poetry Appreciation Ability

Based on the results of the initial poetry appreciation test (reading poetry) for 10 (ten) Indonesian Language and Literature Education students, it is known that as many as 10% of students get very good scores, 15% of students get good grades, and 20% of students get enough scores, and 55% of students have low grades. That means, more than half of the students who were tested in the initial test related to poetry appreciation (reading poetry) had poor abilities.

Based on the results of interviews, the problem of low poetry appreciation ability is caused by knowledge factors, technical factors, and appreciation factors. The knowledge factor is related to the ability to understand the content of the poem. In appreciating poetry (reading poetry), understanding the content of poetry is very important so that the message in the poem can be accepted by listeners. The second problem faced is a technical problem in poetry reading. The technical problem relates to the pause, emphasis, and tempo setting in poetry reading. The third problem relates to the spirit and confidence in reading poetry. Confidence becomes so important in reading poetry. Without good self-confidence, it is impossible for a good poetry reading to be.

From the results of the interviews, it is known that students know the field of poetry appreciation (reading poetry) related to the clarity of pronunciation/articulation, vocal strength, and accuracy of intonation and emphasis. Knowledge of vowels, pronunciation/articulation, intonation, and emphasis is obtained by students while in high school.

3.1.4. Availability of Poetry Appreciation Teaching materials

Based on the results of interviews with students and lecturers, it is known that the teaching materials used in poetry appreciation are books and teaching materials from the internet. The books used are entitled Poetry Appreciation and Theory, Poetry Studies, and Poetry Appreciation Diktat. Sources from the internet are the basic concepts of appreciation, poetry analysis, and reading poetry. The results of the analysis of the RPS show that the books used to support learning are Poetry Appreciation Guidance, Poetry and Teaching Methodology, Poetry Theory, and Appreciation. The material given in the poetry appreciation course includes structural and semiotic analysis of poetry, basic concepts of appreciation, understanding of reading poetry, understanding of reclamation, understanding of musicalization, understanding of dramatization, and understanding of writing poetry.
Examples are taken from the internet such as videos reading poetry W.S. Rendra and the musicalization of Ari Reda's poetry.

The material provided is about the concept of poetry appreciation, definition, purpose, and benefits of poetry appreciation, the appreciation process, stages of appreciation, approaches in appreciating poetry, reading poetry and discussing poetry, writing poetry, and discussions about writing poetry, learning poetry appreciation and assessment, learning outcomes, practice reading, and writing poetry. If you look at the learning achievements, there is a lack of material. The materials needed are poetry reading material, declamation, musicalization, dramatization, and writing poetry. The material contains definitions, characteristics and limitations, steps, examples, and assessments. Especially for reading poetry, the shortcomings are in the basic steps and exercises for reading poetry.

In addition, a discrepancy was found between learning outcomes and the sourcebooks used. Learning outcomes can hold reading performances, declamations, dramatizations, and poetry musicals. Meanwhile, the sourcebooks used contain material on how to understand poetry, Indonesian poets, various kinds of poetry, examples of poetry studies, and the history of poets. There is a discrepancy between learning outcomes and the books used. The material in the sourcebook emphasizes more on how to analyze poetry, not doing creative activities by holding reading performances, declamations, musicals, and dramatizations of poetry. I studied more deeply, the books that are used as references are more suitable to be used for poetry anatomy courses. Whereas the results of the preliminary study show that when appreciating poetry (reading poetry) most students have difficulty determining the tempo, stress, tone, rhythm, intonation, as well as exercising self-confidence.

4 Discussion

Regarding the condition of Poetry Appreciation teaching materials at Kuningan University, a general conclusion can be drawn about the condition of Poetry Appreciation teaching materials in Indonesia. This is in line with the research of Puspita, Andayani, Waluyo, and Rohmad (2017: 622-623). The results of their research stated that the survey results of poetry appreciation textbooks used by universities in Central Java were still minimal. The books used in six universities in Central Java are the Study and Appreciation of Poetry, Study of Poetry, Introduction to Poetry, Stylistics, and Discourse on Musicalization.

Poetry appreciation teaching materials circulating in Indonesia focus more on writing skills (study) compared to other creative skills (reading and speaking). Textbooks related to the poetry reading, poetry reclamation, poetry musicalization, and poetry dramatization are still very minimal and need to be developed.

5 Conclusion

Based on the Graduate Learning Outcomes Study Program, course learning outcomes, and Sub course learning outcomes, it can be concluded that the learning achievements of the poetry appreciation course are mastery of the concept of poetry appreciation, mastery of the concept of creative reading, declamation, musicalization, dramatization, and poetry writing, mastery of reading skills, declamation, musicalization, dramatization, and wrote poetry.
Related to this research, learning outcomes will be focused on mastering the concept of poetry appreciation, mastering the concept of reading poetry, and mastering poetry reading skills.

There are 60 students in the 3rd semester of the Indonesian Language and Literature Education Study Program, FKIP Kuningan University. A total of 19 students are male, and 41 students are female. Their age range is between 19-21 years. Judging from the social background, on average, students come from rural areas spread over four (4) regencies, namely Kuningan, Majalengka, and Cirebon and Brebes. The average occupation of their parents is farmers (60%), traders (30%), and employees (10%).

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References

Translation Analysis of Racist Stereotypes by Students in Peterns Russel’s Standup Comedy Entitled Louis Vuitton

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Abstract. The research focus on how three students in translating racist stereotype in Peter Russell’s standup comedy entitled Louis Vuitton, are their translation works equivalence with the source text. Qualitative method is used in this research, and the design of the research is case study. In collecting and analyzing the data the researchers are using focus group discussions in order to find out the translation equivalence of three students’ translation works in translating racist stereotypes. Those three students are selected to translate the standup comedy based on their score in translation and linguistic subjects. The result of the research shows there are twenty lines contain racist stereotypes, and all the three students able in translating almost the entire racist stereotype in Peter Russell’s standup comedy entitled Louis Vuitton, their translation equivalence shows their ability and knowledge in translating words, phrases and sentences that contain racist stereotypes.

Keywords: Translation; racist stereotypes; standup comedy

1 Introduction

Intimidating slurs such as "Hey Ching chong!" and "Hey Nigers!" now commonly heard these days, and those slurs are considered racist acts against ethnic group or race. Racism in is considered an unsolved problem in this world, and it happens in various aspects of our life, such as in news, sports events and even in movies. Racism can be found in various films are usually set against the life of Africa-American people or Asian people or even Jewish people in the United States. According to Hughes and Kroehler in Madula et all [1] racism is the belief that some racial groups are naturally superior and others are inferior, while according to Gidden in Mouka et all[2] states that racism is subsumes everyday practice and behaviours, both verbal and non-verbal, stereotyping, discriminatory practices, institutional systemic policies, or even acts of racial segregation and genocides. Hesse in Marvi[3] stated that racism is not universal category rather it is relatively recent term for the hierarchical and differential work of race structuring social relations in colonial modernity. So it can be concluded racism is a belief of an individual, a group event a nation that racial and ethnical background determined the position or hierarchy in social life.

As it mention before racism can be in the form of act, slurs and stereotype. Stereotype according to or reinforced to people through many different social influences, including but not limited to friends and family, neighbours, Allport in Rosenthal and Overstreet[4]. They
also mention that stereotypes are generalization about the personal attribute or characteristic of a group of people. According to them that stereotypes are learned, and can be both explicitly and implicitly taught teachers, peer groups, as well as larger societal influences. Banaji in Fedor [5] stated that the concept of stereotypes refers to belief, knowledge, expectation of social groups and it has been theorized about as cognitive partner in stereotype-prejudice duo since the 1920s and empirically investigated. So it can be concluded that racist stereotypes are belief, knowledge related to a person, a group or on race.

In this research the writer will focus his research on racist stereotype translation results conducted by three students of English Education Program in University of Kuningan. They translate standup comedy by Peters Russell entitled *Louis Vuitton*. Catford in Nugroho and Shepia [6] stated that translation is the replacement of textual material in one language (SL) by equivalent textual material in another language (TL). It means that the purpose of translation is to make the text transferred accurately and naturally by finding equivalences in the TL. Newmark in Nugroho [7] mention that translation has several meaning; generally translation is giving meaning to a text from one language into another language. The translation result conducted by the students is considered as audiovisual translation. There two techniques used in audiovisual, the first one dubbing and the second one are subtitling. In this research the writer focus on the translation result by the students for the subtitle of the standup comedy conducted by Peters Russell.

The writer expects the result of this research show translation equivalence on students’ translation work in translating racist stereotype that appear in the standup comedy conducted by Peters Russell entitled *Louis Vuitton*. According to Baker in Nugraha et all [8] distinguished translation equivalence into three kinds of equivalence namely grammatical equivalence, textual equivalence, and pragmatic equivalence. Research on the translation of racist words or slurs especially on racist stereotype have not been conducted before. The previous research on racism such as research conducted by Ghasani and Nugroho [9] research focus on the reception of the viewer related the massage of racism in the movie *Get Out*. Another research conducted by Tjhai and Paramita [10] their research focus on viewers’ perception on racism propaganda massages in the movie *8 Mile*. Another research related with racism and translation has been conducted by Mouka, Saridakis and Fotopoulou, their research focus on register shift between source texts (English) and target texts (Greek and Spanish) of racist discourse in film. Another research related with racist stereotypes also conducted by Jeshon [11], in his research he focuses on slur and stereotypes of various ethnics and race in America. All of those researches have not been researched on racism especially on racist stereotype in translation result.

2 Method of Research

Case study is implemented in this research in order to find the translation result conducted by the students in translating stand comedy conducted by Peters Russell. The use of Case Study in this research in order the writer explores in depth a program, event, activity, process, or one or more individuals Stake in Creswell [12]. The study has collected detailed information using a variety of data collection procedures over sustained period of time. The data are taken from translation result conducted by three students in translating standup comedy by Peters Russell, those students are chosen from their grade in two subjects, translations and linguistics. After those data are collected, the writer analyze the data by
forming focus group discussion. Focus group discussion is used to get more insight related to the data which are taken from the students, and to find out translation equivalence in students’ translation work in translating racist stereotypes in Peter Russell’s monologue in his standup comedy. Focus group discussion is a method to collect the data for qualitative research and the data come from exploration of social interaction which is happened in discussion process with the involvement of the informants in it. There are two informants beside the writer in the focus group discussion, they are; Oktoma, and Suryana, both of them have expertise background in English language due their background as lecturers in English Education program in University of Kuningan.

3 Findings and Discussion

Albir [13] concluded in his research that a translator must have competences in several components such as linguistic and extra linguistic knowledge, documentation skills, the ability to use tools, transfer competence. That means beside linguistics a translator requires other competence such as knowledge in culture and history of source language in order to make an equivalence translation works. The translation works which are conducted by three students are considered as an equivalence translation as it suggested by Baker in Nugraha et al [8]. Translation equivalence on students’ translation works in translating racist stereotype can be seen in the first line.

ST : Everybody is cheap. Where Jews at, Jews in the house?
P1 : Semua orang pelit. Mana orang-orang yahudi, apa ada orang yahudi disini?
P2 : Semua orang tuh pelit. Coba mana nih orang yahudi, ada yahudi disini?
P3 : Semua orang itu pelit. Dimana orang yahudi, Yahuudi, kalian ada disini?

From translation result above, it can be seen that students are able to translate racist stereotype such as translating the word cheap instead using Indonesian word; murah or murahan, those three students use word pelit, they know that the word cheap in that line related to next word which are Jews or Indonesian word mean Yahudi. That means the students have knowledge related with the stereotype of Jews in American culture, Jews have a negative stereotypes such as greedy and cheap. Students are able in translating racist stereotype of Jews and Arabs, which can be seen in their translation works below.

ST : All right Arabs, the Jews are in here. Go talk to them
P1 : Oke orang-orang arab, orang yahudi hadir disini. Ngobrol sana
P2 : Nah orang-orang arab, ada orang yahudi tuh. Coba ngobrol deh
P3 : Nah, orang Arab orang yahudi ada disini, sana ngobrol sama mereka

The translation above show that students able to translate racist stereotype of Jews and Arabs, they know that Arab people and Jew people have bad relationship, that can be seen on how the first, second and third participants able to translate on the line “All right Arabs, the Jews are in here. Go talk to them” on translating “Arabs, jews are in here, go to talk them” by the first phrases the students translate “orang-orang Arab Yahudi hadir disini,” “orang-orang Arab ada orang Yahudi tuh,” and “orang Arab orang Yahudi ada disini” they able to translate correctly to capture the stereotype of image that Arab and Jews people never get along in one room. While the next phrase the students translate the “go talk to them” by “ngobrol sana”, “Coba ngobrol deh” and “sana ngobrol sama mereka.” All of them have same meaning, even though there are some words are reduced by the students but those do not change the
meaning of the phrase. The next translation result conducted by the students on the next line show the students’ knowledge related with the stereotypes of Jews and India people.

ST : Jews, I don’t know how you got that title of being cheap, it’s very offensive to Indian people.
P1 : Yahudi, aku gak tahu darimana kalian dapat julukan “orang pelit”, hal itu menyinggung orang-orang india
P2 : Nih orang orang yahudi, Gue gatau elu dapet julukan pelit dari mana, itu lumayan nyeninggung orang orang india
P3 : Orang yahudi, saya gak tahu gimana kalian bisa dikasih label pelit, itu tuh sangat menyeninggung orang-orang India.

Those translation works conducted by the students show the knowledge about the stereotype of Jew people for being cheap, as the students translate the word “cheap” with Indonesian word “pelit” that has the same meaning and class in English language both of them are adjective in both of languages. The other students’ translation work also shows their knowledge related with the stereotype of Jew people, it can be seen in the translation bellow.

ST : People are like, “Jews are cheap,” we are like, no that’s very incorrect.
P1 : Orang-orang bilang “yahudi itu pelit,” dan kami seakan, “enggak, itu sangat salah.”
P2 : Kalau orang orang bilang “Orang yahudi tuh pelit”, kita orang india tuh pasti jawab “Ngga, itu salah si”
P3 : Orang-orang tuh kaya.. “Yahudi itu pelit” kita kaya.. “Gak, itu salah banget sih.”

From the students’ translation above show their knowledge about the stereotype of Jew people as they translate “Jews are cheap” with “ Yahudi itu pelit”, “orang yahudi itu pelit” and “Yahudi itu pelit” which those translation phrase has the same meaning with the English language. The students able to find out perfect word in translating the word “cheap” by using the Indonesian word “pelit”. The students also able in translating racist stereotype toward Indian people that represent by Peters Russel himself, Peters is Indian descendant who live in Canada, these are the students’ translation work in translating Peters’ line in his standup comedy.

ST : I am cheap, Jews are thrifty, big difference.
P1 : Aku pelit, Orang yahudi itu hemat, beda jauh.
P2 : “gue yang pelit mah, “orang yahudi tuh hemat, beda dong jelas”
P3 : Saya pelit, Orang yahudi itu hemat. Beda banget.

From the translation above the students able to translate correctly how Peters represent himself as Indian people who believed that they are “cheaper” than Jews. The students are able to choose appropriate words to compare the stereotypes between two races, such as the use of “pelit” and “hemat” in translating words cheap and thrifty, both of them have the same class as an adjective. The use of “pelit” and “hemat” shows that the students have knowledge on the stereotypes of both race; Indian and Jews who are believe by American people even their own people as in this standup comedy Peters refer this joke to his own people.

Another racist stereotype also shown in Peters Russel’s standup comedy toward other race, such Asian race especially Chinese people, Russel’s line and the translation work conducted by the students can be seen in this line bellow.

ST : You know who’s cheap? Asians, Asians are cheap as shit. Chinese people specifically
P1 : Kalian tahu siapa yang pelit? Orang-orang asia. Mereka pelitnya minta ampun. Orang cina lebih tepatnya
P2 : Tau yang pelit kaya gitu sebenernya siapa? Orang Asia. Mereka tuh gila pelit banget sama pengeluaran. Orang orang china apalagi tuh

The students’ translation above show their knowledge about the stereotypes Asian especially Chinese people as it believes by American people. Their knowledge in racist stereotype can be seen in their translation result such as how they translate “Asian are cheap as shit.” By “Mereka pelitnya minta ampun,””mereka tuh gila pelit banget,” and “Orang Asia pelit banget.” They are able to translate “cheap as shit” it into Indonesian language such as “pelitnya minta ampun,””gila pelit banget” and “pelit banget” with the same degree as in the source text in describing the stereotypes of Asian people especially Chinese people. The students able to translate it because the word “shit” itself is slang word to describe the degree of their cheapness, which is really, really cheap.

From translation works conducted by three students in this translation research show the ability of the students in understanding the cultural background of the source language. The students have ability in finding words, and phrases which are considered as racist stereotypes of a race, in this case Asian people such as Indian, and Chinese people. As it mentioned before, a translator must has knowledge in linguistic and non-linguistic, such as cultural background in this context is racist stereotypes. Racist stereotypes itself is a negative belief toward an individual, group of people, ethnic or race.

4 Conclusion

As the writer mentions before in the previous that a translator must have linguistic and non-linguistic knowledge. Based on the translation analysis by the writer and all the informants in the focus group discussion agree that the students are considered have knowledge related with racist stereotype in the standup comedy. It can be seen on their ability in translating racist stereotypes in standup comedy conducted by Peters Russel entitled Louis Vuitton. All the three students are able to understand words and phrases that contain racist stereotypes toward Jews, Arabs, and Asians especially Chinese people. The students also able to figure out appropriate words and phrases that have the same meanings and degree from source language into target language, it can be seen in how the students are able to translate the word “cheap,” “thrifty” and phrase such as “cheap as shit” into Indonesian language such as “pelit,” “hemat” and “pelitnya minta ampun,” “gila pelit banget” or “ pelit banget.” Those words and phrases are able to capture the racist stereotypes in the source text.

5 Acknowledgement

The writer thanks to Rector of Universitas Kuningan who has been supported this research by funding the writer’s research through internal research funding. The writer also thanks to all three students for their involvement of this translation research, by translating all the materials have been given to them. The writer also tanks to the writer’s associate in this research; Erwin Oktoma, and Yayan Suryana for their input in collecting and analyzing racist stereotypes in students’ translation works.
References


Diversity of Insects in Leweung Buah, Mount Ciremai National Park Area

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Abstract. Insects have both positive and negative sides to humans, both directly and indirectly. This study aims to determine the diversity of insects in Leweung Buah Gunung Ciremai National Park area. Data collection in this study used the sweep net method, food trap and literature study on insect morphology. Data analysis used relative frequency and relative density, while diversity used the Shannon Winner Index and morphological identification using the google lens method, Identification guide for butterflies of West Java: families Papilionidae, Pieridae and Nymphalidae and BugGuide.net 2013, Discoverlife.org. The results showed that Leweung Buah in Gunung Ciremai National Park has 8 orders which include: Araneae, Coleoptera, Diptera, Hemiptera, Hymenoptera, Lepidoptera, Odonata and Phasmatodea. And 39 species with the highest number of species, Lethe confusa godana, and the least Ariadae pravera esra, Cupha clagia clagia and Delias dorylea dorylea. The largest relative density is occupied by these species Idea ieucono javana with a percentage of 16.11% and the lowest is in the Lucilia sericata, Apis cerana and Appias leptis leptis species, for the largest relative frequency it is occupied by these species Lethe confusa godana with a percentage of 13.33%. and the lowest was in the species appias leptis leptis, Ariadae pravera esra and Chersonnesia rahria rahria with a percentage of 1.11%. For the diversity of insects in Leweung Buah, Gunung Ciremai National Park, it is categorized as high and acts as a pollinator that maintains ecosystem stability.

Keywords: diversity, insects, relative density, relative frequency

1. Introduction

Indonesia is a country with a large biodiversity, both flora and fauna, one of which is the diversity of insects which have a total of 250,000 species, or about 15% of the main types of biota known in Indonesia [1].

Insects have both positive and negative sides to humans, both directly and indirectly. For example, insects that are useful as plant pollinators, producers of honey, and natural enemies of pests, as well as insects that have a negative impact such as pests, parasites, and disease carriers [2]. Insect diversity is found in various places, with the lowest diversity found in biomes with extreme environmental conditions such as arid areas and high mountains, while high diversity is found in optimal, fertile, nutrient-rich soils, and mountainous areas [3].

The optimal environment is an environment that is favorable for the growth of insects for both shelter and foraging needs and has environmental factors such as temperature, humidity, wind speed, and optimal light intensity. The optimal temperature for insects is 15-25%, optimal humidity for insects is 50-90%, while wind speed and light intensity have different effects on
each insect, including insects that are inversely proportional to wind speed, i.e., if the wind speed is getting stronger, then the number is getting smaller [4].

Gunung Ciremai National Park has a sustainable ecosystem ranging from lowland rain forest (700-1,000 m asl) mountain rain forest (1,000-2,400 masl) and sub-alpine mountain forest (>2,400 masl) with temperatures around 18°-22 °C [5]. Gunung Ciremai National Park is a potential habitat for insects so that insects are found in almost all ecosystems, the more places with various ecosystems there are various types of insects [6].

Therefore, a study on insect diversity was carried out because this area is one of the mountainous rain forest ecosystems which is an optimal environment for insects and can provide information about what types of insects are present in fruit leweung so that the role of insects in this ecosystem can be known.

2. Methodology

This research was carried out for 1 month, starting in May – June 2021. The location of this research is in Leweung Buah, Gunung Ciremai National Park, Kuningan Regency.

Data collection was carried out using the method:

1. Food Trap

   Food Trap is a trap made of nylon paranet in the form of a tube that is hung and filled with bait in the form of bananas and urine to attract insects which are then separated and then inserted into the plastic sample.

2. Sweep Net

   Sweep net is a trap made of light and strong like gauze, easy to swing and the caught insects can be seen. The captured insects were then collected and separated and then put into plastic samples for identification.
Research data in the form of insects found in all plots at the study site were identified by observing morphological similarities using the identification method [7], Google Lens and BugGuide.net 2013, Discoverlife.org. The identification stage was carried out at the Laboratory of the Faculty of Forestry, Kuningan University. After identification is made in the form of type data that has been collected, it is analyzed tabulated and presented in the form of photos and tables. Further analyzed using the following formula:

1. Absolute Density

   Density shows the number of insects found in the habitat expressed in absolute terms [8].
   
   $$KM = \frac{\text{number of individual insect species caught}}{\text{number of arrests}}$$

2. Relative Density

   Density shows the absolute density of individual species found in the habitat expressed in relative terms [8].
   
   $$KR = \frac{\text{the absolute density of the individual species}}{\text{total density}} \times 100\%$$

3. Absolute Frequency

   Absolute Frequency indicates the number of presence of a particular insect found in the habitat of each observation which is stated absolutely [8].

   $$FM = \frac{\text{number found a type}}{\text{total number of arrests}}$$

4. Relative Frequency

   Frequency indicates the Absolute Density of individual species found in the stated habitat relatively [8].

   $$FR = \frac{\text{absolute frequency}}{\text{absolute frequency amount}} \times 100\%$$

5. Species Diversity Index

   To compare the high and low diversity of insect species, namely the diversity of insect pests and natural enemies, the Shannon-Weiner (H) index is used with the formula:

   $$H' = -\sum p_i \ln p_i$$

   $$P_i = n_i / N$$

   Information :

   $H'$ = Diversity index
   $P_i$ = Comparison of the number of individuals of a species with the whole species
   $n_i$ = Number of species caught
   $N$ = Total number of individuals of all species

   With the diversity index criteria are as follows [3] :

   Jika $H' < 1$ : Means Insect Diversity is Low
   Jika $H' 1-3$ : Means Insect Diversity is Medium
Jika $H' > 3$ : Means Insect Diversity Height

3. Result and Discussion

3.1. Number Of Insects

Based on the results of insect observations in Leweung Buah in the Mount Ciremai National Park area, a total of 39 species and a total of 180 individuals were found.

Table.1 Observation of Insects in Leweung Buah

<table>
<thead>
<tr>
<th>No</th>
<th>Scientific Name</th>
<th>Observation</th>
<th>Number Of Individuals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>Apis cerana</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>Apis dorsata</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Appias leptis leptis</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Ariadinae pravaera esra</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>Chersonesia rhauria rhauria</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>Cicadidae</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>Cupha clagia clagia</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>Cyrestis nivea nivea</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Delias dorylea dorylea</td>
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<td>0</td>
</tr>
<tr>
<td>10</td>
<td>Dischopora nechonechone</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>Eurema blanda blanda</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>Eurema sari sari</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>13</td>
<td>Graphium delesserti delesserti</td>
<td>1</td>
<td>0</td>
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<td>14</td>
<td>Hypolimnas bolina bolina</td>
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<td>0</td>
</tr>
<tr>
<td>15</td>
<td>Idea ieucone javana</td>
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<td>0</td>
</tr>
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<td>Kallima paralecta paralecta</td>
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</tr>
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<td>Kaniska Canace Javanica</td>
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</tr>
<tr>
<td>18</td>
<td>Laba-laba Sp 1</td>
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<td>1</td>
</tr>
<tr>
<td>19</td>
<td>Laba-laba Sp 2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>Lethe confusa godana</td>
<td>25</td>
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<tr>
<td>21</td>
<td>Lucilia sericata</td>
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</tr>
<tr>
<td>26</td>
<td>Ngengat Coklat</td>
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</tr>
<tr>
<td>27</td>
<td>Orthera sabina</td>
<td>0</td>
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</tr>
<tr>
<td>28</td>
<td>Oryctes rhinoceros</td>
<td>5</td>
<td>7</td>
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</tbody>
</table>
29. *Papilio Polythes javanus*  
30. *Phryganistria sarmentosa*  
31. *Sarcophaga*  
32. *Sp 1*  
33. *Taenaris horsfieldi horsfieldi*  
34. *Tanacea palguna palguna*  
35. *Thaumantis odana odana*  
36. *Troides helena-helena*  
37. *Ypthima decora decora*  
38. *Ypthima nigricans*  
39. *Ypthima pandocus pandocus*  

<table>
<thead>
<tr>
<th>No</th>
<th>Order</th>
<th>Scientific Name</th>
<th>Density</th>
<th>Frequency</th>
<th>H'</th>
<th>Role</th>
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</thead>
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<td><em>Apis cerana</em></td>
<td>13,333</td>
<td>7,778</td>
<td>0,269</td>
<td>Honey Producer And Pollinator</td>
</tr>
<tr>
<td>2</td>
<td>Hymenoptera</td>
<td><em>Apis dorsata</em></td>
<td>3,333</td>
<td>4,444</td>
<td>0,113</td>
<td>Honey Producer And Pollinator</td>
</tr>
<tr>
<td>3</td>
<td>Lepidoptera</td>
<td><em>Appias leptis leptis</em></td>
<td>1,111</td>
<td>1,111</td>
<td>0,050</td>
<td>Pollinator</td>
</tr>
<tr>
<td>4</td>
<td>Lepidoptera</td>
<td><em>Ariadae pravera esra</em></td>
<td>0,556</td>
<td>1,111</td>
<td>0,029</td>
<td>Pollinator</td>
</tr>
<tr>
<td>5</td>
<td>Lepidoptera</td>
<td><em>Chersonesia rahria rahria</em></td>
<td>1,111</td>
<td>1,111</td>
<td>0,050</td>
<td>Pollinator</td>
</tr>
<tr>
<td>6</td>
<td>homiptera</td>
<td><em>Cicadidae</em></td>
<td>2,222</td>
<td>2,222</td>
<td>0,085</td>
<td>Pest</td>
</tr>
</tbody>
</table>

Total 180

**3.2. Insect Role**

Insects are a class of a large group of animals in the phylum Arthropoda which have a strong outer covering and grooves to form body segments [9]. Insects have 29 Orders. In addition, Insects have 2 subclasses, namely the Pterygota and Apterygota subclasses. Subclass Pterygota is a subclass whose members have wings such as the Order Isoptera (termites) and the Order Diptera (mosquitoes). While the subclass Apterygota is a group of insects that are not winged, for example the Order Thysanura [10]. In this study, 8 orders have been identified, namely: Araneae, Coleoptra, Diptera, Hemiptera, Hymenoptera, Lepidoptera, Odonata and Phasmatodea. With different roles between species.

Table 2. Results of Insect Identification in Leweung Buah
<table>
<thead>
<tr>
<th>No.</th>
<th>Taxonomy</th>
<th>Species Name</th>
<th>Population</th>
<th>Abundance</th>
<th>Percent</th>
<th>Category</th>
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</thead>
<tbody>
<tr>
<td>7</td>
<td>Lepidoptera</td>
<td><em>Cupha clagia clagia</em></td>
<td>0.556</td>
<td>1,111</td>
<td>0.029</td>
<td>Pollinator</td>
</tr>
<tr>
<td>8</td>
<td>Lepidoptera</td>
<td><em>Cyrestis nivea nivea</em></td>
<td>1,667</td>
<td>2,222</td>
<td>0.068</td>
<td>Pollinator</td>
</tr>
<tr>
<td>9</td>
<td>Lepidoptera</td>
<td><em>Delias dorylea dorylea</em></td>
<td>0.556</td>
<td>1,111</td>
<td>0.029</td>
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</tr>
<tr>
<td>10</td>
<td>Lepidoptera</td>
<td><em>Dischopora necho necho</em></td>
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<td>3,333</td>
<td>0.100</td>
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</tr>
<tr>
<td>11</td>
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<td>1,111</td>
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<tr>
<td>12</td>
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<td><em>Eurema sari sari</em></td>
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<td>2,222</td>
<td>0.050</td>
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<tr>
<td>13</td>
<td>Lepidoptera</td>
<td><em>Graphium delesserti delesserti</em></td>
<td>0.556</td>
<td>1,111</td>
<td>0.029</td>
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<tr>
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<td>15</td>
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<td><em>Idea ieuconoe javana</em></td>
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<td>1,111</td>
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<tr>
<td>17</td>
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<td><em>Kaniska Canace Javanica</em></td>
<td>1,667</td>
<td>1,111</td>
<td>0.068</td>
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<td>18</td>
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<td><em>Laba-laba Sp 1</em></td>
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<td>1,111</td>
<td>0.029</td>
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<td>1,111</td>
<td>0.029</td>
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<td>0.113</td>
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<td>2,222</td>
<td>1,111</td>
<td>0.085</td>
<td>Pollinator</td>
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<td><strong>Values</strong></td>
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<td>26</td>
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<td></td>
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<tr>
<td>27</td>
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<td><em>Ortherum sabina</em></td>
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<td>Predators, Pest Controls and Environmental Indicators</td>
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<td>28</td>
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<td>30</td>
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<td>Dekomposer</td>
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<tr>
<td>32</td>
<td>Diptera</td>
<td><em>Sp 1</em></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Lepidoptera</td>
<td><em>Taenaris horsfieldi horsfieldi</em></td>
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<td></td>
</tr>
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<td>34</td>
<td>Lepidoptera</td>
<td><em>Tanacea palguna palguna</em></td>
<td>0.556, 1,111, 0.029</td>
<td>Pollinator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
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<td>Pollinator</td>
<td></td>
<td></td>
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<tr>
<td>36</td>
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<td><em>Troides helena-helena</em></td>
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<td>Pollinator</td>
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<td></td>
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<tr>
<td>37</td>
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<td><em>Ypthima decora decora</em></td>
<td>2,222, 1,111, 0.085</td>
<td>Pollinator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Lepidoptera</td>
<td><em>Ypthima nigricans</em></td>
<td>1,111, 2,222, 0.050</td>
<td>Pollinator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>Lepidoptera</td>
<td><em>Ypthima pandocus pandocus</em></td>
<td>5,000, 4,444, 0.150</td>
<td>Pollinator</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td>100,000, 100, 3,070</td>
<td></td>
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</table>
Based on the table above, the Lepidoptera Order is the one that is often encountered because the Leweung Buah habitat is at a temperature between 18 ° - 22 ° and is the optimal temperature for the Lepidoptera Order because butterflies and moths are cold blooded animals, their body temperature is influenced by the temperature of their environment. If the air is too hot, the butterfly will seek shelter from the sun, flying in search of humid and cold areas [11]. With the large number of Order Lepidoptera found, the richness of flora will be maintained because almost all or about 90% of the 250,000 plants in their sexual reproduction are very dependent on pollinator insects [12]. The following types of insects are found in Leweung Buah in the Mount Ciremai National Park area:

1. **Laba laba Sp1**

![Laba laba sp1](image)

Based on observations, Laba laba sp1 species has 4 pairs of hairless legs, the sp1 spider species has a black base color with a combination of green patterns with a small body size with a slender body and acts as a predator for animals smaller than it.

2. **Laba laba sp2**

![Laba laba sp2](image)

Laba laba sp2 has 4 pairs of hairless legs with the dominant color being black with a light yellow head with 2 longitudinal stripes on the abdomen. This insect is a predatory insect that preys on animals that are smaller than it.

3. **Oryctes rhinoceros**
Based on observations made by the species *Oryctes rhinoceros*, it has the characteristics of a sturdy body, oval in shape with a relatively small size, black from the head and the body has 1 horn on the head, has 2 pairs of wings, has 3 pairs of legs. Beetle larvae argillaceous not liked the place so can result in damage to the roots, when the adult stage to be a pest for crops and is often a precursor to other pests in crop damage.

4. *(Lucilia sericata)*

Based on the observations made the species *Lucilia sericata* have a size between 10-14 mm, metallic green, has a pair of antenna, compound eyes, this species has a role as decomposers that help cycle nutrients back into the ecosystem.

5. *Cicadidae*

Based on observations made the species *Cicadidae* have a size between 10-14 mm, metallic green, has a pair of antenna, compound eyes, this species has a role as decomposers that help cycle nutrients back into the ecosystem.
Based on observations conducted, this species is the nymph of the species Cicadidae which has characteristic brown feathers on the head and a parasite that take nutrients in the root xylem so that it can cause root damage [20].

6. *Apis Cerana*

![Image of Apis cerana](image1.png)

Figure 6. *Apis cerana*

Based on observations made, the species *Apis cerana* has characteristics of 2 pairs of wings, yellow hairy chest, on the abdomen has a combination of black and yellow colors, has 3 pairs of legs and a pair of antennae. There is a part of this animal's head that acts as a pollinator that helps plants reproduce.

7. *Lethe confusa godana*

![Image of Lethe confusa godana](image2.png)

Figure 7. *Lethe confusa godana*

Based on observations made by the species, *Lethe Confusa Godana* has brownish characteristics, the upper wing has a white line and tends to be curved, has a circular pattern, the hind wings have thin lines, a series of black spots and a white dot in the center which is surrounded by a ring. Thin brown. The antennae, head, neck, and belly are pale brown; the antennae are light brown at the ends. This species has a role as a pollinator that helps pollinate plants.
8. *Mycalesis perseus cepheus*

![Figure 8. Mycalesis perseus cepheus](image)

In the species *Mycalesis perseus cepheus* has characteristics of a faded brown color, there is a black pattern with a white dot in the middle. This species has a role as a pollinator that helps plants in pollination.

9. *Epiphyas postvittana*

![Figure 9. Epiphyas postvittana](image)

Based on observations, *Epiphyas postvittana* species has a pair of antennae with a brownish black dominant color and has a white jagged pattern on its wings. This species has a role as a pollinator that helps pollinate plants.

10. *Taenaris horsfieldii*

![Figure 10. Taenaris horsfieldii](image)
Taenaris horsfieldii species has a pair of antennae with black and white underbelly, has a white wing color combined with gray and has a black circle pattern surrounded by orange, this species acts as a pollinator that helps pollinate plants.

11. Orthorom Sabina

Figure 11. Orthorom Sabina

Based on observations, the species Orthorom Sabina has a dark green thorax with black stripes on the lateral side and black legs. Abdomen slender with black and white, embelan white and has a wing transparent these species act as predators and also as an indicator of the environment because this species will reproduce only in a clean environment [28].

12. Phryganistria sarmentosa

Figure 12. Phryganistria sarmentosa

Based on the results of observations made, the Phryganistria sarmentosa species has a twig-like shape as a protection against predators, has 3 pairs of legs, has 2 pairs of antennae and includes herbivorous insects that help in ecological succession.

3.3. Relative Density

Relative density shows the percentage of density types of the density of the entire species. shows that the highest relative density is occupied by the species Idea ieuconoe javana with the highest relative density of 16.11% because Lepidoptera likes places that have good humidity, one of which is mountains [30]. And the lowest was in species Lucilia sericata, Apis cerana, Appias leptis leptis, Chersonnesia rahria rahria, Cyrestis nivea nivea, Delias dorylea dorylea, Dischopora necho necho, Eurema blanda blanda, Graphium delesserti delesserti, Hypolimnas bolina bolina, Yenaris horsimafieddi, decora horsimafieddi Ypthima nigricans and Ypthima
pandocus pandocus by 0.6%. Observations carried out for 3 days with a total catch of 180 people, the number of insects were observed at one observation to as many as 89 kinds of.

### 3.4. Relatif Frequency

Relative Frequency shows the percentage of times the type of the frequency of all kinds. shows that the highest relative frequency is occupied by species Lethe confusa godana at 13.33% and lowest in the species Appias leptis leptis, Ariadae pravera esra, Chersonnesia rahria rahria, Cupha clagia clagia, Delias dorylea dorylea, Eurema blanda blanda, Graphium delesserti delesserti, Hypolimnas bolina bolina, Idea ieuconoe javana, Canacea Java, Kanalecta paralecta spider Sp 1, Spider Sp 2, Lucilia sericata, Mycalesis horsfieldi horsfieldi, Neptis leocoporus aletophone, Moth, Ortherum Sabina, Phryganistra, Tanacea palguna palguna, Thaumantis odana odana, Troides helena-helena and Ypthima decora decora. As much as 1.11%, observations were carried out for 3 days with a total of 180 individuals catching, the highest number of insects was found in the 1st observation as many as 89 species.

### 3.5. Species Diversity Indeks

Diversity Index (Shannor Weiner) of insects was 3.07. The criteria for diversity index if H' < 1, then diversity is low, H' 1 – 3, then diversity is moderate, and H' > 3, then diversity is high. From these criteria indicate that the insect diversity index in Leweung Buah Gunung Ciremai National Park area has a high diversity value seen from the role of insects which are dominated as pollinators, it will play a role in the balance of the ecosystem in Leweung Buah Gunung Ciremai.

### 4. Conclusion

National Park area. 8 Orders which include: Araneae, Coleoptera, Diptera, Hemiptera, Hymenoptera, Lepidoptera, Odonata and Phasmatodea. And 39 species with the highest number of species, Lethe confusa godana, and the least Ariadae pravera esra, Cupha clagia clagia and Delias dorylea dorylea. The largest relative density is occupied by the species Idea ieuconoe javana with a percentage of 16.11% and the lowest is by species Lucilia sericata, Apis cerana and Appias leptis leptis, for the highest relative frequency it is occupied by the species Lethe confusa godana with a percentage of 13.33%. and the lowest was in the species Appias leptis leptis, Ariadae pravera esra and Chersonnesia rahria rahria with a percentage of 1.11%. For the diversity of insects in Leweung Buah in the Gunung Ciremai National Park Area, the category of High with the dominant role of insects as pollinators will play a role in maintaining the balance in the Leweung Buah Gunung Ciremai National Park Area.

### References


Effect of Operating Expenses of Operating Income, Loan to Deposits Ratio, Non Performing Loan on Profitability with Capital Adequacy Ratio as a Moderating Variable

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Abstract. The purpose of this research was to obtain empirical evidence about Effect of Operating Costs Operating Income, Loan to Deposits Ratio, Non Performing Loan toward Profitability With Capital Adequacy Ratio as the Moderating Variable In Banking Companies Listed On the Indonesia Stock Exchange for the period 2015-2019. The method used in this research is a descriptive analysis method and verification. The population research is 44 banks listed on the Indonesia Stock Exchange. The sampling technique used quota sampling with samples used of 175 financial statements from 35 banks for 5 years. The analysis technique used is panel regression analysis and moderated regression analysis (MRA) with the application e-views 9. The results showed that the Operating Costs Operating Income, Loan to Deposits Ratio, Non Performing Loan simultaneously affect on profitability, and Operating Costs Operating Income has a negative and significant effect on profitability, Loan to Deposits Ratio has a positif and significant effect on profitability, Non Performing Loan has a negative and significant effect on profitability, Capital Adequacy Ratio is able to moderated the effect of Operating Cost to Operating Income on Profitability, Capital Adequacy Ratio is able to moderated the effect of Loan to Deposits Ratio on Profitability, Capital Adequacy Ratio is able to moderated the effect of Non Performing Loan on Profitability.

Keyword: Operating Costs Operating Income; Loan to Deposits Ratio; Non Performing Loan; Profitability and Capital Adequacy Ratio.

1 Introduction

Financial institutions are one of the important aspects in the economy of one of the banks. A bank is a financial institution that has a very important role in the economy of a country. The role of banking has never been spared in encouraging economic growth in Indonesia. Because of the main function of the bank itself as a financial intermediary, namely collecting and channeling public funds that aim to support the implementation of national development in order to increase equitable development. The Bank is also an intermediation institution is certainly one of the trigger factors for economic movements throughout the sector.

The level of good bank health can be seen from the bank's ability to generate profits and improve overall efficiency. Because Bank Indonesia is more concerned with its assessment
based on the size of a bank company's profit or profitability with the Return On Assets (ROA) indicator as measured by the assets of most of its funds collected from public deposits. Profitability is a ratio used to measure a company's ability to profit from its business activities.

This profitability is very important to evaluate the effectiveness and efficiency of the company's management in managing all assets owned by the company. According to (Kasmir 2018:201) Return on Assets (ROA) is a ratio that shows the yield on the amount of assets used in the company. The higher the profitability value of a company shows the greater the company's ability to use its sources of funds derived from internal companies in the form of profits from the company's operations. Profitability in this study is Return On Assets (ROA).

In accordance with the Circular Letter issued by Bank Indonesia namely SE No.13/24/DPNP dated October 25, 2011, the provision for the ideal minimum ROA for banks is 1.5%. This means that if the bank earns a profit below the value set by Bank Indonesia then the bank is still not optimal in managing its assets. The profitability value with the ROA indicator in 44 banking companies listed on the Indonesia Stock Exchange, is still not ideal. Because there are 29 companies whose ROA value is still below 1.5% and the remaining 15 companies are above 1.5%. In the sense that the value of ROA is not in accordance with the provisions of the Bank Indonesia Regulation, where the figure is due to the lack of management role in managing the company to get maximum profit. According to (Wulandari, 2015) He said that factors that affect profitability with the Return On Assets (ROA) indicator are Operating Expenses of Operating Income (BOPO), Liquidity or Loan to Deposits Ratio (LDR), problematic credit with Non Performing Loan (NPL) ratio and capital adequacy ratio (CAR).

The first factor is Operating Expenses of Operating Income (BOPO). According to (Malik, 2017) BOPO is an efficiency ratio used to measure a bank's management ability to control operating costs to its operating income. Where the higher the value of the BOPO ratio, the more inefficient a bank is in carrying out its operational activities. According to research conducted by (Fajari & Sunarto, 2017) BOPO has a negative and significant effect on profitability. This is in line with (Kristina, 2020). While according to (Yusuf, 2017) and (Aprianti, 2019) It shows that BOPO has a positive and significant effect on profitability.

The second factor is the Loan to Deposits Ratio (LDR). According to (Kasmir 2018:225) Loan to Deposits Ratio is a ratio that aims to measure the composition of the amount of credit given compared to the amount of public funds and capital itself used. Credit in the company is the main source of income so the higher the amount of credit it will increase the profits obtained. So that the higher the credit value channeled, the bank will experience an increase in profit and profitability will increase. According to the results of the study (Vifolin et al., 2020) and (Nuryanto et al., 2020) Loan to Deposits Ratio (LDR) has a negative and significant effect on profitability. While according to (Ambarawati & Abundanti, 2018) and (Aprianti, 2019) It shows that the Loan to Deposit Ratio (LDR) has a positive and significant effect on profitability.

The third factor is non-performing loan (NPL). Non Performing Loan according to (Kasmir, 2018a) is credit in which there are obstacles caused by 2 elements, namely from the banking in analyzing and from the customer who intentionally or unintentionally in his obligation not to make payments. The high value of NPL means that the credit quality of a bank is bad which can cause losses. The smaller the credit score that cannot be billed, it will increase the amount of profit that will be obtained. According to (Fajari & Sunarto, 2017) and (Vifolin et al., 2020) NPL has a positive and significant effect on profitability. While the results of the study (Budi, 2020) and (Ardiansyah, 2020) NPL has a negative and insignificant effect on profitability.
The fourth factor is the Capital Adequacy Ratio (CAR). According to the Indonesian Bankers Association (IBI) with banker association for risk management or BARa (2017) capital adequacy ratio (CAR) is a capital adequacy ratio owned by banking companies where this ratio is measured through a comparison between the amount of capital of banking companies with assets weighted by risk or ATMR. According to research (Atmoko et al., 2018) Capital Adequacy Ratio (CAR) is able to moderate the effect of Operating Expenses (BOPO) Non Performing Loan (NPL) and Loan to Deposits Ratio (LDR) on Profitability. This is in line with the research. (Adhim, 2018). While according to (Dahlan et al., 2020) CAR is unable to moderate the effect of BOPO, LDR, NPL on Profitability.

2 Method

The method used in this research is a descriptive analysis method and verification. The population research is 44 banks listed on the Indonesia Stock Exchange. The sampling technique used quota sampling with samples used of 175 financial statements from 35 banks for 5 years. The analysis technique used is panel regression analysis and moderated regression analysis (MRA) with the application e-views 9.

3 Results and Discussions

Table 4.1. Fixed Effect Test Results

<table>
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<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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<td>0.855601</td>
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<td>C</td>
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Source: Output Eviews 9

Table 4.2. Moderated Regression Analysis Test Results

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</table>

Source: Output Eviews 9

3.1. Effect of Operating Expenses of Operating Income (BOPO) on Profitability

The results of hypothesis testing showed that Operating Expenses of Operating Income (BOPO) negatively and significantly affect Profitability with Return On Assets (ROA) as an
indicator on banking companies on the Indonesia Stock Exchange. With significant results, the results of this study can be generalized to all members of the sample. Negative coefficient means that there is a negative relationship between BOPO and profitability, meaning that the decreased value of BOPO, the more profitability value increases. This indicates that the bank is increasingly efficient in the use of resources in the bank's operational activities. Because in carrying out its operational activities, a company must incur various costs. However, not all costs that occur effectively sometimes there are costs incurred but actually the benefits are not there. So that in the end it has an impact on the level of profitability that will be obtained.

The results of this study are in accordance with the signal theory, which states that a company has more information than other parties, in this case it is investors and creditors who cause information asymmetry or information inequality, with the disclosure of information carried out by a company is considered to give signals to the recipient of information. In addition, this research is also in accordance with the theory of agency, where the main principle of this agency theory is to state the existence of a working relationship between the authorizing party that is the investor and the party who receives the authority (agency) that is the manager. Investors or customers want to know things related to the use of company resources. In order not to occur information asymmetry, managers disclose their financial statements to stakeholders in order to set decisions and provide policies properly. The results of this study are in line with the research conducted by (Prasetyo & Darmayanti, 2015), (Muttaqin, 2017), (Stevani & Sudirgo, 2019), (Nuryanto et al., 2020), and (Vifolin et al., 2020) which shows the results that BOPO has a negative and significant effect on profitability.

3.2. Effect of Loan to Deposits Ratio (LDR) on Profitability

Results from hypothesis testing showed that the Loan to Deposits Ratio (LDR) had a positive and significant effect on the profitability of banking companies on the Indonesia Stock Exchange. With significant results, the results of this study can be generalized to all members of the sample. Positive coefficient means that there is a positive relationship between LDR and profitability. This means that the increasing value of LDR will increase the value of profitability. This indicates that the bank company with a high LDR ratio indicates that the bank company has an effective and efficient management performance in terms of credit distribution, thus causing the company's profit or profitability to increase. Judging from the bank's management, LDR is one of the main factors in operational activities in obtaining profits. The better the performance will increase public confidence in the bank. Increasing public confidence can increase the number of LDR ratios collected by a bank, in addition, the public is also encouraged to use bank services and products such as loans or credit. The high ratio of LDR and community contribution to bank products is expected to increase profitability.

Loan to Deposit Ratio is a ratio to measure the composition of the amount of credit given compared to the amount of public funds and capital itself used. In accordance with the agency theory, this theory explains that agency relationships arise when one or more people (principals) hire another person (agent) to carry out activities that then delegate decision-making authority to the agent. In this case it refers to the bank customer as the principal and the banking party as its agent. Where the bank will distribute funds that have been accommodated properly, but if the use of debt fails will be able to cause agency problems. In addition, the results of this study are in accordance with stakeholder theory. The existence of stakeholders is a very important existence for bank companies. This is due to the influence of stakeholders in making investment decisions on the company's performance in obtaining
profits, because the higher the value of LDR will increase the value of the company's profitability. The results of this study are in line with the research conducted by (Agustiningrum, 2017), (Kisman, 2017), (Ambarawati & Abundanti, 2018), (Yusriani, 2018) and (Suardana et al., 2018) which shows results that LDR has a positive and significant effect on profitability.

3.3. The Effect of Non Performing Loans (NPL) on Profitability

Results from hypothesis testing showed that Non Performing Loan (NPL) negatively and significantly affected the profitability of banking companies on the Indonesia Stock Exchange. With significant results, the results can be generalized to all members of the sample. Negative coefficient means that there is a negative relationship between NPL and profitability, meaning that the decrease in the value of NPL, the more profitability will increase. The higher the credit risk experienced by banking companies shows that the quality of credit channeled is poor. Therefore, the bank must bear losses in its operations, so it will affect the decrease in profit or profitability obtained by the bank.

The results of this study are in accordance with the signal theory, based on the bank's signal theory that tends not to disclose performance information means the bank gives a bad signal to interested parties. When a bank's performance is poor, it tends not to disclose much information about its performance in financial statements. It can be concluded that companies that have a high NPL ratio value then the disclosure rate will be low meaning that the company will give a bad signal to stakeholders. In addition to the results of research in accordance with the agency theory, the agency theory assumes that managers as agents of the company know the potential and prospects of the company at a later time compared to the shareholders as principals, Because shareholders do not have enough information to see the agent's kineja so do not know how the action is carried out by the manager. Therefore the manager compiles financial statements that contain financial ratios such as Non Performing Loans. The lower the value of NPL in the financial statements can be used as one of the reference materials to assess the health condition of the company. The results of this study are in line with the research conducted by (Prasetyo & Darmayanti, 2015), (Agustiningrum, 2017), (Adhim, 2018), (Nuryanto et al., 2020), and (Dewi, 2019) which shows the results that NPL has a negative and significant effect on profitability.

3.4. Effect of Operating Expenses of Operating Income (BOPO) on Profitability with Capital Adequacy Ratio as Moderation

Results from moderated regression analysis (MRA) testing showed that the Capital Adequacy Ratio (CAR) was able to mediate bopo's influence on profitability with the ROA indicator. This means that the decrease in the value of the BOPO ratio will increase profitability. This shows that banking companies that can reduce their operating costs, the better the bank's performance, because the company can minimize unsualized expenses so that profitability obtained by banks increases and ultimately has an impact on increasing bank capital.

The results of this research are in accordance with stakeholder theory, stakeholder theory explains that the company is not an entity that only operates for the benefit of the company and is oriented to seek profit only, but must also be able to provide benefits to stakeholders. Low levels of cost efficiency will make management tend to continue to improve their performance and disclose the company's financial statements. The good relationship between the company and stakeholders is something that needs to be considered as a form of certainty for investors that the company will not face problems involving the community due to the
company's activities that can reduce the prosperity of shareholders and can threaten the sustainability of the company. The results of this study are in line with the research conducted by (Atmoko et al., 2018), (Adhim, 2018), and (Haini, 2019) which shows the results that CAR is able to moderate the influence of BOPO on Profitability.

3.5. Effect of Loan to Deposits Ratio (LDR) on Profitability with Capital Adequacy Ratio as Moderation

Results from moderated regression analysis (MRA) testing showed that the Capital Adequacy Ratio (CAR) was able to mediate bopo's influence on profitability with the ROA indicator. This means that the higher the value of the LDR ratio, the more the value of profitability and capital distribution. This shows that effective credit distribution will increase the profit earned so that it will increase also in the distribution of capital. Because how high the capital of a bank shows that the role of the bank as an intermediation institution is successful and with high capital the bank can more freely invest in the form of credit, so that the volume of credit increases which ultimately has an impact on the increasing profitability of the bank.

The results of this study are in accordance with the signal theory, that the higher the liquidity value or LDR ratio indicates the strong financial condition of bank companies, profitability increases because liquidity is the main source of income. This causes the company tends to give a broader signal to show the credibility of the company that is getting stronger so that in the future investors want to invest their capital. In addition, the results of this study are in accordance with the agency theory, that reporting accountability of company activity information to the principal is very important to do because through the report provided by the agent can be used as a basis for evaluating the company's financial performance. Principals can use information provided by agents, especially financial statements, that can be used by interested parties to view the company's financial performance. With a high LDR can improve financial performance in earning profits and will attract investors to invest in the company. The results of this study are in line with the research conducted by (Septiani & Lestari, 2016), (Atmoko et al., 2018), and (Adhim, 2018) which shows the results that CAR is able to moderate the effect of LDR on Profitability.

3.6. Effect of Non Performing Loan (NPL) on Profitability with Capital Adequacy Ratio as Moderation

Results from moderated regression analysis (MRA) tests show that the Capital Adequacy Ratio (CAR) is able to moderate the effect of NPL on profitability with the ROA indicator. This means that the smaller the value of the NPL ratio, the more it increases the profitability of the bank, and of course this has a good impact on the increase in the bank's capital inventory. Because bank capital acts as a buffer to protect banks from various risks in operational activities, especially credit risk so that the lower the risk borne by bank companies and will have an impact on increasing profitability. However, the greater the level of Non Performing Loans indicates that the bank is unprofessional in its credit management. At the same time give an indication that the level of risk on lending to banks is high enough in line with the high non-performing loan (NPL) faced by the bank so that the bank must bear the risk that will reduce the profit obtained and the level of capital distribution.

The results of this study are in accordance with the signal theory, because the signal theory proposes about how a company should signal to users of financial statements. The low value of the NPL ratio will cause the quality of the company's financial reporting to reflect that the company's performance is good. Because when the NPL value is low it will increase
profitability. This is a positive signal that can affect the opinion of interested parties for investment decision making in the future. The results of this study are in line with the research conducted by (Ariwidanta, 2016), (Atmoko et al., 2018), and (Adhim, 2018) which shows the results that CAR is able to moderate the effect of NPL on Profitability.

4 Conclusion

Based on the results of research operational expenses operating income (BOPO), Loan to Deposits Ratio (LDR), and Non Perfroming Loan (NPL) affect profitability together. This means that the change in value in profitability is influenced by changes in the interrelationship between BOPO, LDR, and NPL. Operating Expenses (BOPO) negatively and significantly affect profitability. This means that the decreased the value of BOPO, the more profitability value increases. Loan to Deposits Ratio (LDR) has a positive and significant effect on profitability. This means that the increasing the value of LDR, the more profitability will increase. Non Perfroming Loan (NPL) negatively and significantly affects profitability. This means that the decreased the value of NPL, the more profitability increases. Capital Adequacy Ratio (CAR) is able to moderate bopo's influence on profitability. This means that CAR is able to strengthen BOPO's relationship to profitability. Capital Adequacy Ratio (CAR) is able to moderate the effect of LDR on Profitability. This means that CAR is able to strengthen the LDR relationship to profitability. Capital Adequacy Ratio (CAR) is able to moderate the effect of NPL on Profitability. This means that CAR is able to strengthen the NPL relationship to profitability.

Reference


DEPOSIT TO RATIO, BEBAN OPERASIONAL PENDAPATAN OPERASIONAL DAN BANK SIZE TERHADAP PROFITABILITAS MELALUI CAPITAL ADEQUACY RATIO. 2(2), 71–77.


Development of Mini-Research Based Assessment to Measure Students Competences

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Abstract. The results of previous studies show that mini research learning can improve student competence but there are problems in the assessment process where lecturers have not used appropriate instruments and the instruments used have not comprehensively assessed students' cognitive, affective and psychomotor aspects. Based on these problems, we carry out research on the development of an authentic assessment based on mini research. Methods that use are Research and Development (R&D) with the ADDIE model, analysis, design, development, implementation, and evaluation. The purpose of the research is to produce a mini research-based assessment that can be used by lecturers to conduct authentic assessments to measure student competence comprehensive during the learning process. The results of the expert validation test obtained an average construct validation score of 3.5 (valid), an average content validity score of 3.7 (valid). The results of testing the validity of the instrument using Kaiser-Meyer-Olkin (KMO) on cognitive assessment of 0.79 > 0.5, psychomotor assessment 0.618> 0.5, affective assessment 0.555> 0.5, so it can be concluded that the three types of instruments are valid. The result of the first test student’s competency assessment showed that 56% of students were at the competent level in cognitive competence, 80% of students were at the competent level in psychomotor competence and 83% of students were at the competent level in affective competence. The mini research-based assessment that was developed is appropriate to be used in the learning process to measure student competences

Keywords: assessment; mini research; competences

1 Introduction

The main task of lecturers in the tridharma of education is to plan learning, carry out learning and carry out learning assessments. These three components are an inseparable unit. [1] The assessment process carried out by the lecturer will provide information and feedback whether the planned learning objectives have been achieved or not. [2] Learning assessment must be carried out comprehensively and integrated in the learning process. Assessments carried out by lecturers must also emphasize the process and learning outcomes, thus enabling lecturers to carry out authentic assessments. [3] Authentic assessment assesses all student activities before, during, and after the learning process. Authentic assessment includes several aspects that are assessed, such as cognitive, affective, and psychomotor aspects. [4] Authentic assessment is a process of collecting student learning outcomes starting from the cognitive and performance of students during the
learning process, learning outcomes and assignments expressed by test and non-test scores given by the teacher/lecturer. [5]

The obstacle in implementing learning that occurs in higher education is the lack of implementation of authentic assessments in assessing students during the learning process. The assessment process that is usually carried out by lecturers is limited to the implementation of UTS, UAS and assignments. Based on the results of observations in one study program, 50% of existing lecturers have carried out an assessment of the learning process, but the instruments used are not appropriate, such as not using rubrics that are in accordance with learning outcomes. There are several problems that may be faced by lecturers in conducting the assessment process. First, the lecturers have not been consistent in conducting comprehensive and integrated assessments. Second, lecturers have difficulty in improvising/developing instruments/measuring tools used in assessing students, especially in the aspects of skills and attitudes. Although in order to ensure the quality of learning, at the end of every semester, the activities of lecturers in the implementation of pre-learning have been monitored and evaluated by the leadership, but this has not focused on the implementation of authentic assessments.

The implementation of this authentic assessment should be used by lecturers to assess the learning process carried out by students. So that this authentic assessment in essence must be developed in accordance with the model or learning strategy used. The learning model or strategy must also be in accordance with the concepts and learning objectives to be achieved. [6]

The concepts of lecture material in biology education are generally conceptual and contextual concepts that are suitable for using mini-research-based learning strategies. Mini-research-based learning can develop student competencies in terms of knowledge, skills, and attitudes. An effective assessment must be able to ensure that students have the competencies that have been determined. All lecturers must understand the assessment standards in order to carry out learning assessments based on the same standards. [7]

Based on the background of the problem, we conducted development research to produce a product in the form of an authentic assessment based on mini-research to measure student competence. The purpose of this study, the results of this mini-research-based authentic assessment can be used by lecturers to conduct authentic assessments to measure student competence comprehensively during the lecture process. This becomes very important to implement because the results of the products made will support the performance of lecturers in conducting assessments in accordance with the learning assessment standards set by the Higher Education.

2 Methodology

The research method used in this research is Research and Development (R&D). The stages of the research method, namely the ADDIE model; analysis, design, development, implementation, and evaluation developed by Reiser and Mollenda. [8] The data collected include:

a) Content validation,

The instrument validation test was carried out by experts, one of which was to measure the content validation of mini-research-based assessments. The data obtained were analyzed using the following
formula:
Score = $\sum$ validator answer score
$\sum$ item
b) Construct Validation

In addition to content validation, construct validation of the mini-research-based assessment was also measured using the same formula as content validity. The levels of content and construct validation are described in Table 1.

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ≤ Va &lt; 2</td>
<td>Invalid</td>
</tr>
<tr>
<td>2 ≤ Va &lt; 3</td>
<td>Sufficiently Valid</td>
</tr>
<tr>
<td>3 ≤ Va &lt; 4</td>
<td>Valid</td>
</tr>
</tbody>
</table>

Analysis of small-scale test data, analyzed to see the validity and reliability of the instrument and to see the ability of students. Data validity was measured using Kaiser-Meyer-Olkin (KMO) and reliability data was measured using Crochbach's alpha.

3 Result and Discussion

The expert validation stage is used to determine the feasibility of an authentic assessment instrument that has been developed. This stage is needed to examine that the resulting product has good validity. The feasibility of an authentic assessment instrument is assessed from two aspects, namely the content aspect and the construct aspect. It is hoped that from the assessment of these two aspects, an authentic assessment instrument is obtained, both in terms of content and in terms of constructs. The results of the study began with the results of the validation of 3 experts in the field of evaluation and learning biology to assess the product of a mini research-based learning assessment. The assessment made consisted of cognitive assessment (higher order thinking skills), psychomotor assessment (experimental and presentation skills) and affective assessment (scientific attitude). The results of expert validation consisting of construct validation and content validation are presented in Table 2

<table>
<thead>
<tr>
<th>No.</th>
<th>Validasi</th>
<th>Rata-rata skor</th>
<th>Keterangan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Construct validation</td>
<td>3,</td>
<td>Valid</td>
</tr>
<tr>
<td>2</td>
<td>Content validation</td>
<td>3,</td>
<td>Valid</td>
</tr>
</tbody>
</table>

The assessment validity criteria are said to be valid if the range of values is 3-4. Based on table 2, it is explained that construct validation with an average score of 3.5 (valid) and content validity with an average score of 3.7 (valid). The results of construct and content validation are valid, meaning that the assessment can be used at the small-scale trial stage without revision.

The next stage is a small-scale trial on 30 students who are taking biology courses using mini-research lessons equipped with practicum. The results of testing the validity of the instrument using Kaiser- Meyer-Olkin (KMO) on cognitive assessment of 0.79 > 0.5, psychomotor assessment 0.618> 0.5, affective assessment 0.555> 0.5, so it can be concluded
that the three types of instruments are valid. The result of the reliability test using Crobach's alpha was 0.7 in the high category.

**Table 3. Results of Instrument Validity and Reliability**

<table>
<thead>
<tr>
<th>Instrument</th>
<th>KMO</th>
<th>Validity</th>
<th>Cronbach’ Alfa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive</td>
<td>0.790</td>
<td>KMO &gt; 0.5 = valid</td>
<td>0.764</td>
</tr>
<tr>
<td>Affective</td>
<td>0.618</td>
<td>KMO &gt; 0.5 = valid</td>
<td>0.652</td>
</tr>
<tr>
<td>Psychomotor</td>
<td>0.655</td>
<td>KMO &gt; 0.5 = valid</td>
<td>0.664</td>
</tr>
</tbody>
</table>

The results of the small-scale trial include 3 competencies, namely cognitive, affective, and psychomotor, as follows:

**Table 4. Students Competencies**

<table>
<thead>
<tr>
<th>Competence</th>
<th>Average Score</th>
<th>Level</th>
<th>% of competent students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive</td>
<td>76.34</td>
<td>3.05</td>
<td>Kompeten</td>
</tr>
<tr>
<td>Affective</td>
<td>82.61</td>
<td>3.3</td>
<td>kompeten</td>
</tr>
<tr>
<td>Psychomotor</td>
<td>81.99</td>
<td>3.27</td>
<td>kompeten</td>
</tr>
<tr>
<td>Average</td>
<td>80,3</td>
<td>3,2</td>
<td></td>
</tr>
</tbody>
</table>

Based on table 4, it is explained that the competency levels of Biology Education students are; as many as 56% of students are at the competent level with an average cognitive score of 76.34, 80% of students are at the competent level with an average affective value of 82.61, and as many as 83% of students are at the competent level with an average psychomotor score was 81.99.

In the results of this small trial, the average overall student competency score obtained is 3.2 and the average score is 80.3 or is categorized as competent so that the authentic mini-research-based assessment instrument in the cognitive, affective and psychomotor domains developed is declared very effective. or very good. In the application of an authentic assessment instrument based on a mini-research, there were no obstacles related to its implementation. Student competency assessment using this mini-research-based authentic assessment makes it easier for lecturers to assess and describe the competencies that have been achieved by students, because this authentic assessment is equipped with clear assignments and rubrics. The assessment rubric contains dimensions that contain criteria for each competency that must be achieved, as well as the scale/measurement of the acquisition of these competencies. With the dimensions and scales in the rubric, it will be easier for lecturers to assess student competencies. [9] Authentic assessments accompanied by clear assessment rubrics will help lecturers provide an accurate description of each level of competence that must be achieved by students. [10]

The learning that is applied uses mini research which is identical to one type of inquiry, namely free inquiry. Free inquiry is one of the levels in inquiry learning that encourages students to identify a problem, find a solution to the problem through an experiment. [11] In mini-learning, research can lead to active learning in the classroom accompanied by observation activities, designing experiments to communicating the results of the experiments.
Students will produce knowledge that is truly meaningful so that it will improve their ability to master the learning material. [12]

The application of mini-research learning in several Biology courses can facilitate and improve students' KPS and problem solving abilities. [13] Authentic assessment is a form of assessment that requires students to display attitudes, use the knowledge and skills obtained from mini research-based learning in carrying out tasks in real situations. [14]

Based on Table 4, it can be seen that the affective competence (attitude) of students has a high value between cognitive and psychomotor competencies. This affective competence / scientific attitude is needed by students because it can increase learning motivation so that the expected learning outcomes can be optimal and are closely related to science learning achievements. The lack of positive attitudes that students have can lead to low learning outcomes. [15] The application of authentic assessments can also improve cognitive abilities, scientific thinking, and creative thinking because authentic assessments encourage students to use scientific knowledge in real contexts instead of making/composing something new and unknown to students. [16] Inquiry-based authentic assessment which is in line with mini research in science learning is expected to help teachers assess students in cognitive, affective and psychomotor aspects as well as train students in applying science knowledge in real life.

[17] Improving student learning outcomes because the assessment developed characterizes an inquiry model that is in line with mini research learning that can train active students in the learning process to be challenged to find problems and to be solved by finding solutions to a problem faced in real world contexts. [18]

Through the application of authentic assessment in learning, it can provide opportunities for students to carry out authentic tasks and improve skills and skills that are relevant and useful for their lives. Authentic assignments can shape students to be innovative and creative because they have the opportunity to develop it through learning. [2] Developing skills in carrying out practicals starting from determining problems to making conclusions means also developing investigative and discovery skills which are important for student teacher candidates. [19]

4 Conclusion

In this research, has developed an authentic assessment based on mini research that measures the competence of Biology Education students which include: (1) cognitive competence; (2) affective; (3) psychomotor. This mini research-based authentic assessment was validated by 3 experts and tested on Biology Education lecturers and students. Expert validation and field trials show that the authentic, authentic assessment based on the mini-research that has been developed has met the criteria of being valid, reliable and effective, so that it can be used to measure the competence of Biology Education students which includes cognitive, affective and psychomotor competencies.
References


Using Data Sampling Technique for Improving Classification of Covid-19 and Lung Diseases

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Abstract. The Covid-19 is a virus that has spread around the world and can cause infected respiratory tracts to die. One solution to this problem is to classify the Covid-19 chest X-ray. Among the challenges in this area is improving the classification performance of Covid-19 chest X-rays. Covid-19 chest X-ray and other lung disease chest X-rays have similar colors and patterns, which makes the classification performance not optimal. As a solution to this problem, this study used chest Covid-19 X-ray data and 12 types of other lung diseases chest X-ray data to improve classification performance by applying data sampling techniques. Data sampling techniques included Random Undersampling (RUS), Random Oversampling (ROS), Synthetic Minority Over-sampling Technique (SMOTE), and Tomek Link (T-Link) will be evaluated. This study uses Support Vector Machines (SVM) to classify data and evaluation is based on the highest Area Under Curve (AUC) value and accuracy value. ROS found to be the best data sampling technique with an average increase in AUC and accuracy for all datasets of 31.5% and 3.4%, respectively. As a result, the ROS technique helps classify COVID-19 and other lung diseases more accurately.

Keywords: Lung Diseases; SMOTE; Random Oversampling

1 Introduction

On December 31, 2019, the World Health Organization (WHO) China Country Office reported a case of pneumonia of unknown etiology in Wuhan City, Hubei Province, China. On January 7, 2020, China identified pneumonia of unknown etiology as a new type of coronavirus or Covid-19 [1]. The rapid spread of Covid-19 acute respiratory syndrome is causing a worldwide pandemic. Therefore, many countries have implemented preventative measures to control community spread, such as social distancing, restrictions on non-urgent medical care, and the closing of non-essential businesses. Covid-19 continues to spread despite these efforts, posing a global public health crisis [2].

Due to these challenges, a solution is required to diagnose Covid-19-infected patients by predicting whether they are safe or infected. Chest X-ray data can be used as input data for data classification in one implementation of the solution. A similar implementation was carried out by Bergtholdt et al. (2016) in the manufacture of a lung nodule detection system with classification. The Area Under Curve (AUC) value obtained is 90% [3]. Classification of data in this study will be carried out using the Support Vector Machines (SVM) model. Based on research comparing data classification models, the SVM classification method was selected because its results were superior. The results of the research by Harefa and Pratiwi (2016) related to mammogram images show that SVM has an overall accuracy rate of 93.98% compared to the k-Nearest Neighbor accuracy rate of 63.86% [4].
Classification of patients infected with Covid-19 against healthy patients will have a high accuracy value compared to patients who are infected with other lung diseases [5]. This is due to bias during the classification of fellow lung diseases because there are similarities in color and pattern in the two chest X-ray images. As a result, there is an error in handling patients who have ordinary lung disease but are diagnosed with Covid-19 or vice versa. Moreover, the Covid-19 case began when an unknown pneumonia case was reported in Wuhan, Hubei Province, China. After analyzing the respiratory samples, experts from the Chinese State Disease Center stated that the pneumonia was caused by Covid-19 [6].

In order to overcome these problems, it has been proven that the data sampling technique improves data classification. At the time of collecting chest X-ray images, it is always found that the number of data classes is different from the number of other data classes. This is known as imbalanced data. If you try to balance the number of data classes manually, you will lose data which may be important. However, if the imbalanced data is tried to continue to be classified, it will cause the average misclassification to be higher in the minor class data. The data sampling technique changes the imbalanced data by different procedures to produce a balanced distribution of data. Balanced data can improve the overall performance of the classification process compared to unprocessed data [7].

For this reason, this research was formulated to gain knowledge of what data sampling techniques can improve the classification performance of Covid-19 with other lung diseases. The evaluation results from the comparison of data sampling techniques will be measured based on the AUC and the level of accuracy as an additional parameter.

2 Methodology

2.1 Preparation of Chest X-ray Data

This stage is carried out to prepare the dataset used for data sampling and classification. This study uses chest X-ray data infected with Covid-19 and 12 chest X-ray data infected with other lung diseases. Covid-19 and Viral Pneumonia chest X-ray was sourced from Chowdhury et al. (2020) and Rahman et al. (2020) [8]-[9], Tuberculosis chest X-ray was sourced from Rahman et al. (2020) [10], then Atelectasis, Consolidation, Effusion, Emphysema, Infiltration, Nodule, Pleural Thickening, Pneumothorax, Edema, and Mass chest X-ray was sourced from Wang et al. (2017) [11]. Description of chest X-ray can be seen in Table 1.

<table>
<thead>
<tr>
<th>Chest X-Ray Data of Covid-19 and Lung Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Covid-19 (3616 images)</td>
</tr>
<tr>
<td>Tuberculosis (700 images)</td>
</tr>
<tr>
<td>Viral Pneumonia (1345 images)</td>
</tr>
<tr>
<td>Atelectasis (508 images)</td>
</tr>
<tr>
<td>Consolidation (271 images)</td>
</tr>
</tbody>
</table>
images) appears white or cloudy [15].

**Effusion (644 images)**
Effusion is a condition characterized by the accumulation of fluid in the pleural cavity on the surface of the visceral and parietal pleura. Additionally, pleural effusions contain pus and blood [16].

**Emphysema (127 images)**
Emphysema is an obstructive pulmonary disease that is chronic and progressive, characterized by anatomic abnormalities in the form of widening of the distal air cavities in the terminal bronchioles and damage to the lung parenchyma [17].

**Infiltration (967 images)**
Pulmonary infiltrates are substances denser than air that persist within the parenchyma of the lung, such as pus, blood, or protein. They are more common in febrile neutropenic patients [18].

**Nodule (313 images)**
A lung nodule is defined as a “spot” on the lung that is 3 centimeters (approximately 1.5 inches) in diameter or less. If the abnormality seen on X-ray of the lung is larger than 3 centimeters [19].

**Pleural Thickening (176 images)**
The pleura is a layer that covers the lung tissue. The pleural layer consists of 2 layers, namely the visceral pleural layer which covers and attaches directly to the lung tissue and the parietal pleural layer which adheres to the chest wall [20].

**Pneumothorax (271 images)**
Pneumothorax is the case where an amount of air in the chest increases markedly and a one-way valve is formed leading to a tension pneumothorax. Unless reversed by effective treatment, this situation can progress and cause death [21].

**Edema (118 images)**
Edema is the result of an imbalance in the filtration system between the capillary and interstitial spaces. The kidneys play a key role in regulating extracellular fluid volume by adjusting sodium and water excretion [22].

**Mass (284 images)**
A pulmonary mass is any area of pulmonary opacification that measures more than 30 mm. Spots smaller than 3 cm in diameter are considered lung nodules. The commonest cause of a pulmonary mass is lung cancer [23].

Then, all chest X-ray data were converted to 50 x 50 pixels. The test in this study used 12 datasets in which there were two data classes, namely the chest X-ray data class of patients infected with Covid-19 and the chest X-ray data class of patients infected with lung diseases other than Covid-19. The number of chest X-ray data in the 12 datasets is shown in Table 2. Table 2 shows that the number of data classes in this dataset is imbalanced, so data sampling will be used to balance this dataset.

After the feature extraction is done, the next step is to define a class to each category of image data. The definition of classes to the image data is adjusted to the imbalanced dataset where 0 is for the major class and 1 is for the minor class. The major class is in the Covid-19 chest X-ray data because it has large numbers than other lung disease data. In other words, the Covid-19 X-ray data class is 0 and the other lung disease X-ray data class is 1.

<table>
<thead>
<tr>
<th>Table 2. Total Class Data on Imbalanced Dataset</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Imbalanced Dataset</strong></td>
</tr>
<tr>
<td>Covid-19 &amp; Tuberculosis</td>
</tr>
<tr>
<td>Covid-19 &amp; Viral Pneumonia</td>
</tr>
</tbody>
</table>
2.2. Sampling Data

The explanation of the imbalanced data and the 5 sampling data used are as follows:

- **Data Imbalanced**
  The initial chest X-ray image data in Table 2 shows the existence of unbalanced data where the amount of sample data is not balanced. An imbalanced dataset occurs when there are fewer members of one class than the other, resulting in an unbalanced class distribution. As a result, minor classes are ignored and classification performance is reduced [7].

- **Random Undersampling (RUS)**
  RUS is a non-heuristic method that balances the distribution of classes through random deletion of major classes to obtain a balanced set of instances [7].

- **Random Oversampling (ROS)**
  ROS is a non-heuristic method that balances the distribution of classes by randomly adding data to minor classes [7].

- **Combination of Over-Undersampling (COUS)**
  COUS is a combined technique algorithm by over-sampling the minor class and under-sampling the major class until both classes have the same number of samples [24].

- **Synthetic Minority Over-sampling Technique (SMOTE)**
  The SMOTE technique performs oversampling based on k-NN (k-Nearest Neighbors) of the minor class. SMOTE aims to enrich the minor class boundary by creating artificial examples in the minor class rather than adding to the existing examples to avoid overfitting problems [25].

- **Tomek Link (T-Link)**
  In the dataset, some instances are the nearest neighbor data and are in a different class. This T-Link technique searches for these instances using 1-NN (One-Nearest-Neighbor) in the dataset. To overcome imbalanced, the instance major class is deleted [26].

<table>
<thead>
<tr>
<th>Class</th>
<th>Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Covid-19 &amp; Consolidation</td>
<td>3616</td>
</tr>
<tr>
<td>Covid-19 &amp; Effusion</td>
<td>3616</td>
</tr>
<tr>
<td>Covid-19 &amp; Emphysema</td>
<td>3616</td>
</tr>
<tr>
<td>Thickening</td>
<td>271</td>
</tr>
<tr>
<td>Thickening</td>
<td>271</td>
</tr>
<tr>
<td>Pneumothorax</td>
<td>644</td>
</tr>
<tr>
<td>Covid-19 &amp; Edema</td>
<td>118</td>
</tr>
<tr>
<td>Covid-19 &amp; Mass</td>
<td>284</td>
</tr>
</tbody>
</table>

2.3. Training Data and Test Data

This stage is carried out to create training data and test data used in data classification. Training data or training data is the data used to create a classification model. Test data or testing data is data that will be used to evaluate the classification model and data sampling technique. This study divides the proportion of training data and test data as much as 4:1 from each imbalanced dataset and dataset results from every five samplings. Furthermore, the actual data and the classification results of each dataset are stored into a separate Table for evaluation of the sampling technique.
2.4. Data Classification

Classification of data is carried out after sampling the data. The method chosen for data classification in this study is Support Vector Machines (SVM). SVM is a classification method that is widely used because classification accuracy is strongly influenced by setting kernel parameters and feature selection. SVM groups data by looking for a suitable hyperplane that can separate data based on the highest margin [27].

2.5. Evaluation of Sampling Techniques

Evaluation is done by calculating the value of accuracy and AUC for each data sampling technique. To measure these criteria, predictions will be made using imbalanced data and those that have gone through a sampling process. The results obtained from comparing the prediction results with the actual is a confusion matrix. The results of the confusion matrix were used to calculate the accuracy, specificity, sensitivity, and AUC [28]. The equations that will be used for these criteria are as follows:

\[
\text{Specificity} = \frac{\text{True Negative}}{\text{True Negative} + \text{False Positive}}
\]

\[
\text{Sensitivity} = \frac{\text{True Positive}}{\text{True Positive} + \text{False Negative}}
\]

\[
\text{Accuracy} = \frac{\text{True Positive} + \text{True Negative}}{\text{Length Positive} + \text{Length Negative}}
\]

\[
\text{AUC} = \frac{\text{Sensitivity} + \text{Specificity}}{2}
\]

3 Result and Discussion

By using the SVM algorithm on imbalanced data and 5 sampling data shown in Table 3, a comparison of performance classification accuracy (Acc) and AUC has been obtained. The Viral Pneumonia and Tuberculosis dataset has been able to classify the Covid-19 dataset well, with the AUC value and accuracy exceeding 90%, while the Infiltration, Effusion, Mass, Nodule, Pneumothorax, Atelectasis, Pleural Thickening, Consolidation, Edema, and Emphysema datasets are still in the category classification performance that is not optimal.

<table>
<thead>
<tr>
<th>Dataset</th>
<th>Sampli ng Data</th>
<th>A U C ( (%)</th>
<th>A c c ( % )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Covid-19 &amp; Tuberc ulosis</td>
<td>Imbalan ced</td>
<td>91, 96</td>
<td></td>
</tr>
<tr>
<td>RUS</td>
<td>95, 0, 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROS</td>
<td>99, 2, 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COUS</td>
<td>98, 6, 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Covid-19 &amp; Effusio n</td>
<td>Imbalan ced</td>
<td>74, 91</td>
<td></td>
</tr>
<tr>
<td>RUS</td>
<td>80, 9, 96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROS</td>
<td>96, 0, 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COUS</td>
<td>96, 6, 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consolida tion</td>
<td>Imbalan ced</td>
<td>54, 97</td>
<td></td>
</tr>
<tr>
<td>Effusion</td>
<td>2, 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pleural Thicke ning</td>
<td>73, 73, 4, 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edema</td>
<td>99, 99, 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emphysema</td>
<td>76, 95, 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dataset</td>
<td>SMOTE</td>
<td>T-Link</td>
<td>SMOTE</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------</td>
<td>--------</td>
<td>-------</td>
</tr>
<tr>
<td></td>
<td>99</td>
<td>99</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>93</td>
<td>97</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Imbalan</td>
<td>98</td>
<td>98</td>
</tr>
<tr>
<td></td>
<td>ced</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Ros</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Cousins</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td></td>
<td>SMOTE</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td></td>
<td>T-Link</td>
<td>97</td>
<td>98</td>
</tr>
<tr>
<td></td>
<td>.5</td>
<td>.3</td>
<td>.7</td>
</tr>
<tr>
<td></td>
<td>Increase in Accuracy Value and AUC for each Data Sampling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------</td>
<td>--------</td>
<td>-------</td>
</tr>
<tr>
<td></td>
<td>RUS AUC (%)</td>
<td>RUS Acc (%)</td>
<td>ROS AUC (%)</td>
</tr>
<tr>
<td>Covid-19 &amp; Tuberculosis</td>
<td>3.4</td>
<td>-1.6</td>
<td>7.6</td>
</tr>
<tr>
<td>Covid-19 &amp; Viral Pneumonia</td>
<td>0.3</td>
<td>-0.3</td>
<td>1.7</td>
</tr>
<tr>
<td>Covid-19 &amp; Atelectasis</td>
<td>15.4</td>
<td>-12.5</td>
<td>35.2</td>
</tr>
<tr>
<td>Covid-19 &amp; Consolidation</td>
<td>27.7</td>
<td>-16.3</td>
<td>46.9</td>
</tr>
</tbody>
</table>

Table 4. Increase in Accuracy Value and AUC for each Data Sampling
According to Table 4, the RUS can significantly increase the AUC value for Covid-19 & Emphysema by 31.4% when the dataset includes classification performance that is not optimal. Although the RUS could not increase the accuracy value, it decreased accuracy to -0.3% in the Covid-19 & Viral Pneumonia dataset and -23.9% in the Covid-19 & Pleural Thickening dataset. In 12 datasets using ROS, the average increase in AUC and accuracy was 15% and -13%, respectively.

Using ROS increases AUC value in Covid-19 & Emphysema and Covid-19 & Edema datasets more significantly, as both datasets have the lowest AUC values in the imbalanced data classification. Additionally, the ROS can increase the accuracy of imbalanced data classification by at least 1.1% in the Covid-19 & Viral Pneumonia dataset and 7.3% in the Covid-19 & Atelectasis dataset. The average increase in AUC and accuracy in 12 datasets using ROS was 31.5% and 3.4%, respectively.

The COUS method can increase AUC value more significantly in the Covid-19 & Consolidation, Covid-19 & Emphysema, and Covid-19 & Edema datasets. COUS accuracy has decreased in the Covid-19 & Edema, Covid-19 & Pleural Thickening, and Covid-19 & Mass datasets. The accuracy value for imbalanced data classification can be increased by COUS by a minimum of 0.7% in the Covid-19 & Emphysema dataset and a maximum of 4.9% in the Covid-19 & Infiltration dataset. In 12 datasets using COUS, AUC increased by 21.4% and accuracy increased by 1.5% on average.

SMOTE can significantly increase the AUC value in the Covid-19 & Edema, Covid-19 & Emphysema, Covid-19 & Consolidation, Covid-19 & Pleural Thickening, and Covid-19 & Atelectasis datasets that are classified as data imbalanced with the lowest AUC. SMOTE has decreased accuracy in many datasets. The Covid-19 & Infiltration dataset had a significant increase in accuracy by 4.2%. The average increase in AUC and accuracy for the 12 datasets using the SMOTE was 27.5% and -0.3%, respectively. Tomek Link sampling did not significantly increase accuracy and AUC in 13 datasets using the Tomek Link sampling technique. The average increase in AUC and accuracy is 2.2% and 0%, respectively.
4 Conclusion

Data analysis was performed using imbalanced data and data sampling techniques for chest X-ray data infected with Covid-19 and 12 chest X-ray data infected with other lung diseases. Based on the results of the evaluation, it can be concluded that the ROS technique accurately samples imbalanced data more accurately than other techniques. RUS, ROS, COUS, SMOTE, and T-Link data were sampled, and their average AUC values were 15.0%, 31.5%, 21.4%, 27.5%, and 2.2%, respectively, with ROS having the highest value at 31.5%. ROS can also improve accuracy with imbalanced data by 3.4%. In other words, ROS is the most accurate data sampling technique for improving classification of Covid-19 and Lung Diseases and can reduce misdiagnosis of Covid-19 disease with other lung diseases.

For further research, a larger number of datasets and a larger image size are required in order to identify changes in the evaluation criteria. This should lead to improvements in the performance of data classification. It will also be interesting to compare these 5 sampling techniques with other sampling techniques in order to determine which technique can improving classification of Covid-19 and Lung Diseases.

5 Acknowledgement

Researchers would like to thank the Kementerian Pendidikan Kebudayaan, Riset, dan Teknologi, Direktorat Jenderal Pendidikan Tinggi, Riset, dan Teknologi for providing research funding assistance that supported our research.

References


Implementation of the Greedy Algorithm for Determining KKN (Kuliah Kerja Nyata) Grouping in the Development of the Kuningan University Kkn Online System Service Based on Mobile Applications

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{rio.priantama@uniku.ac.id}

Abstract. KKN (Kuliah Kerja Nyata) is an academic activity in the form of community service programs carried out by students in an interdisciplinary and cross-sectoral manner. Those who have been registered as KKN (Kuliah Kerja Nyata) participants will be divided into several groups where each group is determined based on the criteria of gender and majors. The purpose of this study is to build a system for determining the KKN (Civil Work) group automatically based on gender and majors evenly and optimally. To build a system for determining the KKN (Kuliah Kerja Nyata) class, a greedy algorithm is used. The application of the greedy algorithm is done by dividing the composition of participants into one group based on gender criteria. This system uses PHP as the programming language, Apache as the web server and MYSQL as the database. The results of this study indicate that the Greedy Algorithm can be implemented in an optimal and ideal system for determining groups of KKN participants.

Keywords: Greedy Algorithm; Apache web server; Kuliah Kerja Nyata

1 Introduction

Kuliah Kerja Nyata (KKN) are part of the education system at universities in Indonesia[1] Universitas Kuningan as one of the universities located in the West Java region has established KKN as an intracurricular lecture in the form of community service carried out by students as part of a tri dharma of higher education which is multidisciplinary and cross-sectoral[2]. Universitas Kuningan made this activity aimed at developing students’ sense of sensitivity and social cognition as well as helping the development process, especially in rural areas.

Students who have been registered as KKN participants are divided into groups consisting of various majors and gender distribution to be placed in the border villages of Kuningan Regency [3]. So far, the division of groups is done manually so that there is an imbalance in the proportion of majors and gender in each group. Ideally, a KKN group is a balanced combination of the distribution of majors and different genders with the aim of creating group dynamics through various criteria including participation, communication, collaboration, influence, trust, attachment, empowerment and satisfaction [4]. The division of KKN groups manually at Kuningan University is not optimal to achieve these goals and takes a relatively long time and requires careful planning.
For this reason, an optimization step is needed in the Division of Community Service Groups at Kuningan University. Greedy algorithm is an algorithm that is commonly used to solve optimization problems. The main concept of this algorithm is to take opportunities that exist at that time without paying attention to future consequences, or commonly referred to as the principle of "take what you can get now!"[5]. Every decision taken is expected to be the optimum step in that step, recognized as a local optimum solution, then with each step taken is expected to obtain the optimum solution at the end of the process, namely the global optimum solution [6].

2 Methodology

This article uses an optimization approach using the Greedy Algorithm whose terminology, the Greedy algorithm has the meaning of the word "greedy" or "greedy" to solve the main problem, namely the optimization of the distribution of gender and types of majors and faculties in a KKN group. This algorithm has the principle of "take what you can get now!", in other words, the thing chosen is the best at that time, which has the highest optimization value. The way this Greedy method works is to solve a problem by inputting data with several constraints but one objective function. This problem will be solved by certain steps, so it is necessary to choose several possible solutions. From the set of several solutions, an optimal solution will be obtained, namely a solution that has fulfilled its objective or objective function. However, if the input does not have a limiting function, it does not include a possible solution [7].

The Rapid Application Development (RAD) method is used in this study where data collection through triangulation of data with observations, interviews and literature studies is carried out in the Requirement Planning phase, problem solving in the form of optimizing the distribution of group members in several criteria using a Greedy Algorithm is carried out in the Requirement Planning phase towards Workshop Design phase and system development and implementation are carried out in the Implementation phase (Figure 1).

![Figure 1. RAD Methodology](image-url)
2.1. Group Distribution Randomization Strategy

The distribution of group members with several criteria was carried out through group randomization with weighting of gender, study program and faculty.

a. Group division by gender

Each group consisted of seven students with an ideal male and female composition. The weighting of the sex criteria is assumed to be a sex composition based on the difference in the number between men and women. Basically the number of men and women will determine the number of members in each group based on the available data. Determination of weight based on sex is assumed by the difference in the number of men and women. The details of the weight assumptions obtained from the difference in the total number of men and women are shown in Table 1.

<table>
<thead>
<tr>
<th>Gender Criteria</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Men dan 4 Women</td>
<td>7</td>
</tr>
<tr>
<td>4 Men dan 3 Women</td>
<td>6</td>
</tr>
<tr>
<td>2 Men dan 5 Women</td>
<td>5</td>
</tr>
<tr>
<td>5 Men dan 2 Women</td>
<td>4</td>
</tr>
<tr>
<td>1 Men dan 6 Women</td>
<td>3</td>
</tr>
<tr>
<td>6 Men dan 1 Women</td>
<td>2</td>
</tr>
<tr>
<td>0 Men dan 7 Women</td>
<td>1</td>
</tr>
<tr>
<td>7 Men dan 0 Women</td>
<td>1</td>
</tr>
</tbody>
</table>

b. Group division based on study program and faculty

Each group consists of seven students with different faculties. In this study, it is assumed that faculty weighting is based on differences in faculties and majors in a group. The following is a strategy in determining the weighting criteria based on the faculty:

1) Generate all randomized group data
2) Check the faculty of each group
3) If there are the same faculties in several participants, check the study program.
4) Repeat steps 2) and 3) until all groups have been checked

After determining the strategy in the weighting criteria based on the faculty, then the limits contained in the weighting are determined. If in the group there are no students with the same faculties, the maximum weight will be given, whereas if there are the same faculties or the same majors, the weighting criteria use the Formula 1. For the maximum weight of a group is seven and the minimum weight is one

\[ B = \frac{1}{n} + \left( \frac{n-m}{n^2} \right) \]

(Formula 1)

Information:
B = Student weight
n = number of students with the same faculty
m = number of students with the same study program
c. Normalization of Each Weighting Criteria

The formula used to normalize the value of the weighting criteria can be seen in Formula 2

\[ n = \frac{B - b}{A - B} \]  \hspace{1cm} (Formula 2)

Information:
N = Normalized value of the total weight per criterion (gender / study program)
B = weighted value of each criterion (gender / study program)
A = maximum value of each weight (gender / study program)
B = minimum value of each weight (gender / study program)

d. Average Normalization of Weighting Criteria

Average normalization is used to see the ideal level of a group. Average normalization using the Formula 3

\[ r = \frac{N}{I} \]  \hspace{1cm} (Formula 3)

Information:
R = Average total normalization
N = Total normalization criteria
I = Many criteria

The ideal level of a group is determined by the mean of normalization. Table 2 is an explanation of the criteria for the ideal level of a group

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Normalization Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Ideal</td>
<td>0.9 – 1.00</td>
</tr>
<tr>
<td>Ideal</td>
<td>0.8 – 0.89</td>
</tr>
<tr>
<td>Pretty Ideal</td>
<td>0.7 – 0.79</td>
</tr>
<tr>
<td>Less Ideal</td>
<td>0.6 – 0.69</td>
</tr>
<tr>
<td>Not Ideal</td>
<td>&lt; 0.6</td>
</tr>
</tbody>
</table>

2.2. Black Box & White Box Testing

Black box testing is a test data design method based on software specifications. The test data is generated, executed on the software and then the output of the software is checked to be as expected. White box (glass box) testing is a test that is based on checking the design details, using the control structure of the program design procedurally to divide the test into several test cases [8]
3 Result and Discussion

As mentioned earlier, this study aims to develop the Kuningan University Online KKN system by applying the Greedy algorithm optimization to the optimization of gender distribution as well as majors and faculties in each group. System development is carried out based on the Rapid Application Development (RAD) system development method. There are three phases in RAD that involve the analyzer and the user in the assessment, design, and implementation stages. The three phases are requirements planning, RAD design workshop (RAD design workshop), and implementation [9]

3.1 Requirements Planning

In this stage, the writer met with the KKN committee to identify what information needs were and what problems arise when dividing the KKN groups. This stage requires an active role from both parties, planning will be made into the system.

3.2 Design Workshop

1) Data Flow Diagram

Figure 2. Data Flow Diagram
2) Contexts Diagram
Data Flow Diagram is a network that describes an automatic / computerized system, manualization or a combination of the two, the depiction of which is arranged in the form of a collection of interconnected system components according to the rules of the game [10]

![Figure 3 Context Diagram](image)

3) Entity Relationship Diagram

![Figure 4. Entity Relationship Diagram](image)
3.3. Implementation
After the implementation is done, here are some views that can be delivered as follows:

1) Homepage
The start page that is displayed after successfully logging in as an admin.

![Figure 5. Homepage](image)

2) KKN Schedule Page
This page is a page to see the current or previous KKN schedule, as well as a page to add a KKN schedule, along with the display results on the system

![Figure 6. KKN Schedule Page](image)

3) Student Data Page
This page displays student data as KKN participants

![Figure 7. Student Data Page](image)
4) Advisory Lecturer Page
This page displays Field Supervisor

Figure 8. Advisory Lecturer Page

5) KKN Location Pages
This page displays the KKN location page

Figure 9. KKN Location Pages

6) Group Split Optimization Page
This page displays the process of grouping KKN participants and the distribution of Advisory Lecture (DPL) in each group

Figure 10. Group Split Optimization Page
7) Report Page
Pages containing reports related to KKN

8) Student Grades Page
Page to display KKN scores

9) Certificate Print Page
Page to print KKN certificate
Conclusion

Based on the results of analysis and testing on the group determination system for Real Work Lectures (KKN) using the Greedy Algorithm to determine groups of KKN participants based on gender and study program (case study: Kuningan University), the following conclusions were obtained:

1) The Greedy Algorithm can be implemented into a group determination system for Real Work Lectures (KKN) based on gender and study program so that the composition of the division of participants in one group is evenly divided based on gender and study program.

2) The group testing uses the 2018 KKN participant data with a total of 1390 participants. Based on the results of the KKN participant grouping test using the Greedy Algorithm, the KKN group determination system can group KKN participants optimally and ideally with an ideal average achievement of 0.87 points.

References


Policy Formulation of Regional Regulations Relating to License for the Sales of Beauty Cream in Kuningan Regency Based on Permenkes No. 14 Year 2021 Concerning Standards for Business Activities and Products for the Health Risk-Based Business Operating

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Abstract. Many women are interested in buying cheap beauty products and promising instant results, this then becomes a commodity that used by irresponsible business actors to get the maximum profit, by producing or trading beauty and cosmetic products, not a few of them not eligible for distribution. Therefore, it is necessary to adjust the formulation policy in the formation of regional regulations that will regulate the licensing of beauty cream sales based on the applicable laws and regulations. The results show that in the formulation stage of regional policies regarding licensing of beauty product sales in Kuningan Regency, it is based on the relevant laws and regulations, especially the Consumer Protection Act and Minister of Health Regulation No. 14 of 2021. In addition, it is also necessary to consider the suitability of the community culture, tolerance of law enforcement and the facilities and infrastructure that will be used during policy implementation.

Keywords: Regional Regulation; Health Risk; Law and Regulation

1 Introduction

Along with the times that seem to help determine the ideal figure of a beauty, especially for women, there are many beauty products and beauty support methods on the market with various types of brands, prices and quality. However, women's desire to look beautiful has become a commodity that is used by irresponsible business actors to get the maximum profit, by producing or trading beauty and cosmetic products, many of which do not meet the requirements for circulation [8].

Many women are interested in buying cheap beauty products that promise instant results, even though there is a lot of information showing that there are some harmful substances that can have a negative effect on the skin and body in beauty products with these characteristics. One of the beauty products used by women is beauty cream. Cream is a semi-solid preparation in the form of a thick emulsion containing not less than 60% water, intended for external use consisting of two types of cream, namely: water-oil cream (W/O) and water-oil cream (W/W), which in order to make it, emulsifying agents are generally used in the form of anionic, cationic and nonionic surfactants [1].
With various brands and explanations about the ability of the cream to brighten the face, remove wrinkles, remove acne and acne scars and so on. Generally, beauty creams that are sold at low prices are products that do not have a distribution permit from the Food and Drug Supervisory Agency, even though the cream has a brand or is labeled as a cream used by an artist, it is suspect that the beauty cream is fake or fake cosmetics, even expired [5].

The amount of information that mentions the dangers of fake beauty creams that contain harmful substances is apparently not enough to stop people, especially women, from buying and using these beauty creams. Moreover, sales of beauty creams are now starting to penetrate traditional markets or cosmetic shops in the midst of society.

To overcome the sale of dangerous beauty creams, which do not have a distribution permit, the government has issued new regulations, one of which is Minister of Health Regulation No. 24 of 2021 concerning Standards for Business Activities and Products in the Implementation of Risk-Based Business Licensing in the Health Sector. The Permenkes explains the standard rules that must be met by cosmetic wholesalers, cosmetic retailers, cosmetic shops, cosmetic street vendors and cosmetic shops at the market stalls.

Based on the initial data found by the author, Kuningan Regency until the end of 2020 there were 37 cosmetic shops and 64 cosmetic shops in the market stalls and among them there were 16 cosmetics shops and all cosmetics shops in the market stalls selling unlicensed beauty creams and also selling beauty creams and fake cosmetics. Before Permenkes No. 14 of 2021 was issued, the control of beauty cream and cosmetic traders is based on BPOM regulations only, and after the issuance of Minister of Health Regulation No. 14 of 2021, of course there needs to be an adjustment in licensing for cosmetic wholesalers, cosmetic retailers, cosmetic shops, cosmetic street vendors and cosmetic shops at the market stalls in Kuningan Regency.

The urgency of this licensing adjustment is not only to bring order to the traders, but also to protect the interests of the community, because even though it seems there are "equal benefits" between buyers and consumers, but there are impacts that can harm the community, especially in the health aspect, while one of the rights of consumers is to get protection for the products they buy. Legal protection means recognition, compliance and support for the rights of all individuals, all families and all groups and aspects of their implementation [4]. Meanwhile, the scope of consumer protection includes protection for all losses arising from the use of goods and/or services that need to be provided to consumers because of their weak position [2]. Therefore, there is a need for an assessment of the study of formulation policies on the formation of regional regulations relating to the license to sell beauty creams in Kuningan Regency. 14 of 2021 concerning Standards for Business Activities and Products for Health Sector Risk-Based Business Implementation.

2 Methodology

Research is an attempt to obtain facts, by collecting and analyzing data that is carried out carefully, clearly, and can be accounted for. The research method used in this paper is the research specification, descriptive-analytical in nature, which describes data about an ongoing matter at a certain place and at a certain time where the research is expected to obtain a clear, detailed, and systematic picture of the problem. research, while it is analytically related because the data obtained is analyzed for solving problems in accordance with applicable legal provisions. The approach method used in this research is the Juridical Empirical Approach.
which is used to analyze various laws and regulations. While the empirical approach is used to analyze the law which is seen as patterned community behavior in people's lives who always interact and relate to social aspects.

### 3 Results And Discussion

Someone who uses cosmetic products is certainly because of the attractiveness of the cosmetics he buys, for example the interest in the function of the cosmetic, the practicality of using it, and the impact caused by the use of the cosmetic. Consumers must be selective in choosing cosmetic products so that the negative effects of using cosmetics such as facial skin becomes dull, pale, dry, cracked, and other impacts can be avoided [3].

Beauty cream is one of the products that are in demand by the public, especially women who want their skin to look bright, smooth, free of blemishes and wrinkles. Various ways are done even by using beauty creams and ignoring the safety and health aspects of the skin in connection with beauty creams that do not have a distribution permit from BPOM, which means that the beauty cream can be a fake and dangerous product.

Basically, the most important standard that must be met is that the cosmetic products sold must have a distribution permit/cosmetic notification from BPOM, and also periodically report on traded cosmetics, as well as others. However, what happens is that many cosmetic shops still sell beauty creams and other cosmetics that do not have a distribution permit from BPOM, and even fake creams or cosmetics.

Currently in Kuningan Regency, there are many beauty creams and cosmetics circulating that do not meet the marketing authorization and are dangerous for the health of users because they contain harmful ingredients. So far, the supervision carried out on the circulation of beauty creams is only carried out by BPOM and it turns out that it is deemed ineffective because there are still many cosmetic shops selling these illegal beauty creams and cosmetics. Supervision is not only carried out at shops selling dangerous cosmetic products, but also needs to be investigated to manufacturers of dangerous cosmetic products. If supervision and control is only carried out on sellers and producers still carry out their production, they will never break the chain of distribution of these dangerous cosmetics. Manufacturers have many ways and strategies to circulate their products even though some sellers are disciplined.

The policy formulation stage is the most strategic stage of crime prevention and control through criminal law policies. Strategic because at this stage the legislature has the authority in determining or formulating what actions can be punished which are oriented to the main problems of criminal law, so that crime prevention is not only the task of law enforcement officials, but also the task of the legislative apparatus as regulators [7], in this case is a regional regulation that adjusts to Permenkes No. 14 Year 2021.

At the formulation stage, it is also necessary to consider the suitability of the community culture, the tolerance of law enforcement and the facilities and infrastructure that will be used during policy implementation. One concrete solution that can be taken as a follow-up to the issuance of regional regulations regarding licensing of the sale of beauty creams and cosmetics is the formation of a joint team to eradicate illegal beauty creams and cosmetics which will facilitate coordination between agencies in the law enforcement process.

Thus, the regional regulations that will be formed by the local government of Kuningan Regency must pay attention to internal harmonization with existing regulations, and consider the issuance of permits and supervision for cosmetic shops that sell beauty creams based on
the Consumer Protection Act and Minister of Health Regulation No. 2021. It is hoped that in its implementation, the regional regulations formed are able to accommodate the community's need for the availability of beauty products that are not harmful and can provide optimal results and at affordable prices.

4 Conclusion

In the formulation stage of regional policies regarding licensing of beauty product sales in Kuningan Regency, it is based on the relevant laws and regulations, especially the Consumer Protection Act and Minister of Health Regulation No. 14 of 2021. In addition, it is also necessary to consider the suitability of the community culture, tolerance of law enforcement and the facilities and infrastructure that will be used during policy implementation. It is hoped that in its implementation, the regional regulations that are formed are able to accommodate the needs of the community for the availability of beauty products that are not harmful and can provide optimal results and at affordable prices.

Reference

Network Embeddedness Factor in Farmer Silvicultural System

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Abstract. The decision of farmers to apply the silvicultural system is influenced by socio-economic and cultural factors. Many farmers use simple tree planting and maintenance patterns. Forest farmers have certain limitations in implementing forest plant cultivation systems, these include: 1) land tenure; 2) access to knowledge and 3) access to capital and markets. These limitations are thought to be closely related to the social network factor (network embeddedness). This study aims to reveal the relationship between social networks and the silvicultural system used by forest farmers, including local social networks, markets, capital and knowledge that shape silvicultural practices. The data collection technique used in-depth interviews with farmers, traders, wood sawmill and those involved in the value chain. This study uses a qualitative method using a case study approach. The case study was conducted on the community forest farmers group in Dukuhdalem village, Kuningan District, West Java Indonesia. The results showed that silvicultural practices carried out by farmers were closely related to social networking factors. The form of social networking in the study area is an over-embeddedness pattern where the network structure. This network has an important role in making decisions about silvicultural methods. The “external” social network has not been effective in forming a strong tie due to the “pseudo” relationship between farmers and their external network. The pattern of over-embeddedness network structure has formed a simple silvicultural system which causes the incentives for forest products to be relatively low.

Keywords: Silvicultural System; Farming; Farmers; Forest

1 Introduction

Local people have certain cultivation pattern. This also applies to the pattern of planting and maintaining trees which are generally carried out in a simple manner. Sources of seeds obtained from nature, land preparation is done by burning and slashing, planting by making planting holes where this pattern generally does not have maintenance except cleaning weeds at the beginning of planting. The choice of a silvicultural system in a forest area is highly dependent on the direction and purpose of the stand formation, biophysical factors of the area, technology and knowledge that can be accessed by managers, economic considerations of business and depends on socio-cultural aspect related to its management [1]. People or local communities have diverse silvicultural patterns, although the more general trend of the pattern used is agroforestry. The decision of forest farmers to apply a certain silvicultural system is due to socio-economic and cultural factors that surround it. Forest farmers have certain
limitations in implementing forest plant cultivation systems, these limits include: 1) land tenure limits; 2) limitations on access to knowledge and 3) limitations on access to capital and markets. Therefore, forest farmers tend to adapt the silvicultural system according to their socio-economic and cultural conditions. From the aspect of land tenure system, forest farmers have implemented forestry business through two pattern, namely business on private land (people’s forest) and business on state forest through social forestry programs. These two land tenure pattern have varied plant compositions with different silvicultural system techniques.

Irundu et al [2] stated that today’s, community forests are mostly managed without regard to modern silvicultural techniques systems. The majority of community forests are managed by monoculture or mixed systems, although there are some community forests whose management uses an intercropping system. The understanding of farmers in managing their land, the community forest can become a promising source of income for the livelihood of community forest farmers. Meanwhile, Rizal et al [3] stated that several things became obstacles in optimizing the use of community forest land, including: the lack of public understanding of cultivation techniques such as setting cropping patterns, spacing and choosing plant species. In some places the performance of the folk silvicultural system has not shown optimal results and practices. As studied by Pratama et al [4] stated that the management system in community forest was categorized as moderate and not very good, from the aspects of planning, organization, maintenance, marketing and the overall management system. Social networks and farmers livelihood patterns are thought to have a close relationship that cause the form and pattern of the silvicultural system of community forest cultivation. Social networks can provide sources of knowledge, markets and factors of production such as land and capital. Based on this information, it is necessary to conduct research on the silvicultural system of the people from the perspective of social networks and local livelihood systems. This study aims to reveal information: 1) what are the forms of social networks in forest farming in the study area using an agroforestry pattern; 2) how are social networks related to the silvicultural system used by forest farmers including local social network, markets, capital and knowledge that shape silvicultural practices.

2 Methodology

This study aims to reveal the relationship between social networks and the silvicultural system used by forest farmers, including local social networks, markets, capital and knowledge that shape silvicultural practices. This study have a research question is how are social networks related to the silvicultural system used by forest farmers including local networks, markets, capital and knowledge that shape silvicultural practices. The data collection technique used in-depth interviews with farmers, traders, wood sawmill and those involved in the value chain. This study uses a qualitative method using a case study approach. The case study was conducted on the community forest farmers group in Dukuhdalem village, Kuningan District, West Java, Indonesia.
3 Result and Discussion

In the economy of rural communities, timber has a unique household economic position. Several research in community forest locations, reveal that rural communities, give a position to timber in their household economy as “savings” or assets that can be used for larger purposes in their household needs such as the cost of celebrations/ party for circumcision children and weddings, school fees including registration fees and supporting cost such as uniforms and school supplies, the cost of building a house, cost to buy production equipment or other interest such as buying a motorcycles, as well as costs for other purpose such as investment in agriculture, land purchases and so on. In Dukuhdalem village, there has been a shift in the position of timber in the household economy. Currently, timber is positioned as “daily economy” or income earned to be used for daily/ short-term needs such as family food needs and daily living expenses. Community forest farmers in Dukuhdalem are dominated by farmers who position of timber as an economic support for their daily needs if these daily needs can no longer be met from income from crops, rice fields, income from trading, farm labour income, construction workers, harvesting workers and other income. The positioning of timber as a support for daily economy is influenced by several factors including the area of land ownership, mixed farming patterns (agroforestry), tree regeneration systems. Dukuhdalem farmers generally have narrow agricultural land consisting of rice fields and land (gardens). Not all farmers own paddy fields, but most of the farmers own land which is planted with secondary crops, fruit crops and perennials (timber).

Silviculture is an activity related to the control of the formation, growth, composition and quality of forest vegetation in accordance with its management objectives, thus silviculture is based on a basic science that studies the interaction of plants with their environment or silvica, so that the treatments given in silvicultural practice will always following basic principles that are universal while the silvicultural treatment itself can be local [5]. Agroforestry systems are also included in the silvicultural system. Matthews [6] mentions that the agroforestry system is a variant of clear-cutting with artificial regeneration assisted by deliberately planted agricultural/ animal fodder crops. According to Nugroho, Siswahyono, Hidayat [1] in Indonesia this system has been implemented since the Dutch Colonial era where agricultural crops were planted at the time of planting teak to eliminate weed growth.
At the study site, the silvicultural system applied was simple. The cultivation pattern uses an agroforestry system with natural regeneration techniques, without intensive maintenance. With narrow land ownership with mixed farming/agroforestry patterns, the number of tree in the garden is relatively small in the pattern of intercropping systems for crops and fruit crops. With this condition, tree with various ages are positioned as an economic support for daily needs because the number of tree harvested each year is only small, especially for farmers who use selective logging patterns. This type of farmer sells of tree to “middlemen” for two to four of tree with the highest age variation having the largest diameter class in the garden unit. The price obtained varies depending on the size of the diameter of the tree that is sold, ranging from IDR100,000 to IDR150,000 per tree which is sold using an above-ground sales system. This sales system puts the burden of harvesting and transportation on wood traders/middlemen. Although the price is sold at a relatively low price, the proceeds from the sale of this wood have an important meaning for the survival of farmers in fulfilling their daily household needs.

Dukuhdalem forest farmers do not have much “outside” social interaction. Like most small-scale farmers, Dukuhdalem forest farmers rarely have a wider outreach network. They only rely on social relations around them for both socio-cultural interests and economic activities such as production, distribution and consumption. This small land farmer, does not invest much time in developing outward relationship. This small land farmer, does not invest much time in developing outward relationships. Their time has been spent on life fulfilment activities which are mostly spent in the garden. For the purpose of trading garden products, they rely on “inside” social networks that have strong ties due to kinship lines or “close neighbours” including their relationship with local middlemen. There is no patron who dominates the circulation of farm products as is generally the case in rural communities because many farmers also work as intermediary traders where they buy garden products and resell them to larger middlemen. Almost half of the Dukuhdalem farmers are trading garden products. This relatively large number makes the pattern of patronage not applicable in the trading system of agricultural products. Farmers as producers and at the same time as traders in large number make the trading pattern “unbinding”. Farmers have many trade channels to their internal relations (trader farmers) around them. This trade relationship mainly accrues in agricultural commodities in the garden system, including bananas, cassava, taro, chilies and other secondary crops. Meanwhile, the timber sales pattern generally uses an “external” network that has weak ties because it has no kinship or “close neighbour”. This external network consists of traders or middlemen from outside the village as well as middlemen who have sawmills in Dukuhdalem village, which are mostly owned by entrepreneurs outside the village. As described by Granovetter [7] in [8] in his explanation of the act of embeddedness in relations at the micro level, that action is embedded in concrete personal relationships so that the network exists in the structure of relationships embedded in the actors.

Dukuhdalem farmers do not have many external networks that influence their community forest farming practices, so the silviculture they apply is relatively simple. Although these farmers are accompanied by NGO’s and facilitated by the West Java provincial government to obtain timber legality verification system (SVLK) certification, this network is temporary and is “elitist” in nature where the process of network formation is only at the level of the head and administrator of the farmer group. After obtaining the SVLK certificate, social relations from this network are no longer intensive and even disappear. So that farmers social network with NGO’s/Provincial Forestry Service are temporary in nature and have not increased the knowledge of farmers in community forest farming.
The practice of tree silviculture is not influenced by external networks but internal networks in the form of networks between neighbours that have strong ties. A strong network of neighbours has an influence on community forest farming practices. For example, the decision to select a new crop species such as the Sengon Solomon species which is spread among farmers as a result of social relations within from one farmer spreads to other farmers. The application of agroforestry community forest cultivation patterns is influenced by this internal network so that it becomes a common practice applied by community forest farmers in Dukuhdalem. The application of natural regeneration systems, non intensive maintenance pattern, agroforestry land processing and timber product regulation system based on needs (cutting by household needs) are farming practices that result from internal relationship between farmers that form a system of local knowledge and habits. The knowledge system originating from this internal network is a collection of strong ties that are connected to each other and form a network pattern of over-embeddedness.

Granovetter and Swedberg [8] classifies two forms of social networks, namely relational embeddedness and structural embeddedness. Relational embeddedness is an economic act that is socially situated and embedded in ongoing personal social networks among actors. Relational embeddedness refers to the pattern of relationships between individuals (dyadic personal relationship) [9]. The concept of being socially situated has the meaning that economic action occurs in economic activity related to other actors. For example, economic action in customer relationship between sellers and buyers is a form of relational...
embeddedness. In customer relationships, interpersonal relationships occur between sellers and buyers that involve various socio-cultural, religious and political aspects of their lives. Customer relationships occur because of asymmetric information (information imbalance) between sellers and buyers so that buyers need to do a clientization, which is a reciprocal process in a symmetrical, egalitarian and oppositional relationship [10]. While structural embeddedness he defined as the relationship between this dyadic group with individual or a wider group. The wider network of relationship can be institutions or social structures. In economic activities, we can see structural embeddedness between producers and consumers in buying and selling activities. If the consumer or buyer wants to get goods from the producer or seller then he must issue an amount agreed upon by both parties. If a group has both forms of social network then the group is not only able to disseminate economic information but also form a social and cultural structure which in turn is seen as having a strategic position in economic exchange.

At Dukuhdalem, relational embeddedness (dyadic relationship) plays an important role in forming the structure of the network (Structural Embeddedness). This Structural Embeddedness will form a network structure that has a pattern of being over-embedded. In the farmers' silvicultural practice, relational embeddedness forms a pattern of over embeddedness where strong ties dominate in the process of social exchange. No new network (weak tie) was formed in forest silvicultural practices and timber trade. Farmers have an local network with strong ties that are dominant and form a pattern of over embeddedness. Networks with over embeddedness patterns affect how silviculture is applied among them. The structure of over embeddedness causes farmers' silvicultural knowledge and practice to not develop much. This also applies in the trading network, so that farmers do not have incentives for their certified forest products (SVLK).

4 Conclusion

The form of social networking in the study area is an over-embeddedness pattern where the network structure has an important role in making decisions about silvicultural methods. The “external” social network has not been effective in forming a strong tie due to the “pseudo” relationship between farmers and their external network. The pattern of over-embeddedness network structure has formed a simple silvicultural system which causes the incentives for forest products to be relatively low.

References


The Influence of Understanding Information Literacy on Handling the Spread of Hoax News on the Internet Among Students at Universitas Kuningan

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Abstract. This research is entitled "The Influence of Understanding Information Literacy on Handling the Spread of Hoax News on the Internet among Students at Universitas Kuningan". This study aims to determine the effect of understanding digital information literacy on the spread of hoax news on the internet among students of Indonesian Language and Literature Education, Universitas Kuningan. The research period is from May-September 2021. The theory used in this research is the theory of information literacy put forward by Zuwroski, digital literacy put forward by Gilster, the internet, and information or hoax news. The research methodology used in this study is a correlational research method which aims to calculate the correlation between understanding digital information literacy and handling hoax news on the internet. The population in this study amounted to 250 people and the samples taken were 95 people. Data collection techniques using questionnaires and interviews. Analysis of research data using single table analysis, cross table analysis, and hypothesis testing with the rank order correlation coefficient formula by Spearman using the Statistical Product and System Solution (SPSS) application. From the results of this study obtained r of 0.239 which indicates Ho has a significance value less than 0.05. So Ho is rejected. This shows that understanding digital information literacy has a low relationship with handling the spread of hoax news. However, there is still a relationship between understanding digital information literacy and handling the spread of hoax news on the internet among Indonesian Language and Literature Education Students, Universitas Kuningan.

Keywords: information literacy; digital literacy; digital information literacy; hoax news

1 Introduction

Life in the modern era has shifted human communication patterns from traditional to digital. If in the past, communication between humans was carried out in a classic way, such as face to face, by letter, or telephone, now people have used a communication technology called the internet or what is known as social media. Internet in modern human life has made communication between humans more efficient and effective. No wonder if the activity of communicating via the internet has given rise to analogies in society such as "the far becomes close, the close becomes far" or "closes the far and distances the near". These words are an illustration of how the internet has rapidly changed the pattern of communication between humans in the past, which previously seemed impossible to be completely possible.
According to the survey results of the Indonesian Internet Service Providers Association (APJII) that: Internet users in Indonesia in 2016 amounted to 51.5% or as many as 132.7 million people from the total population of Indonesia, which is actually 252.6 million people. The most internet users are on the island of Java with a total of 86,339,350 users or about 65% of the total users in Indonesia. Internet users in general are dominated by male sex as much as 52.5% and women by 47.5% of the total internet users in Indonesia.

Internet users in Indonesia from year to year have increased sharply. This is known from the 2017 APJII survey, namely, from the 262 million Indonesian population in 2017, there were 143, 26 million internet users. This means that this is 54.8 internet users from the entire population of Indonesia.

According to APJII, the largest internet users in Indonesia based on age distribution are in the age range of 19 to 34 years. A total of 49.52% of users, came from among young people. Most likely, the group of students as the most internet users are in this age range.
Indeed, according to the APJII survey in 2016 it was found that the highest internet users in Indonesia, 89% were in the student group. Therefore, it is certain that in the following years, the most active internet users are in the student group compared to other age categories.

This proves that the campus world is the largest user of internet technology. We can understand this because students for all their activities and interests depend a lot on the internet. They access more information from the internet. Another reason is that they are a critical age group for social media information and are a group that is very responsive to updating information on social media.
Apart from being a source of information and knowledge, the internet can have a negative impact on any user, including negative impacts among students through various negative content. One of the negative content that is currently rife is the spread of hoaxes on social media. Hoaxes spread without knowing who the victims are from children to the elderly. Maybe they often read hoaxes on social media. However, the groups that are most responsive to the spread of hoaxes are those from the critical thinking group, namely students.

Based on a survey conducted by the Indonesian Telematics Society (Masteli) on 7-9 February 2017 to 1,116 respondents in Indonesia that hoaxes are often accepted by the Indonesian people; 44.3% every day, 17.2% more than once a day, 29.8% once a week, and 8.7% once a month (https://tirto.id).

Students at the age of maturity can at least understand the spread and acceptance of hoaxes on the internet wisely. However, from the maturity of attitudes and thoughts, it is feared that they will not be able to understand hoaxes that can mislead their way of thinking. The influence of misleading hoaxes can sometimes lead internet users to take legal action, it can even lead to the safety of the user or the public.

Unfortunately, there is currently no firm sanction from the government for the perpetrators of spreading hoaxes on the internet. There is a possibility that the government will find it difficult to ensnare the hoax spreaders, because they cannot be detected who the main perpetrators are. They are like invisible ghosts, they can even move freely on social media in seconds such as logging into Google, Facebook, WhatsApp, Line, Twitter, Instagram, YouTube, and others.

The Law of the Republic of Indonesia Number 11 of 2008 concerning Information and Electronic Transactions (UU ITE) has not been socialized to the maximum by the government, related agencies or institutions, and the community in our homeland. This is because there is still a lack of counseling and training on how to prevent hoaxes on the internet to the public through the ITE Law. In fact, this effort aims to make the public,
including students, as the largest internet users, so that they do not easily believe and fall into negative things on social media.

Apart from socializing the ITE Law, the latest hoax can be handled through digital information literacy learning. Digital information literacy is expected by the public to be information literate. The student group as the group that uses the internet the most is the right target for the implementation of information literacy learning. As critical intellectuals, it is natural for them to easily understand digital information literacy.

Internet is basically a part of information literacy. Meanwhile, information literacy gives birth to other types of literacy which include image literacy, media literacy, computer literacy, digital literacy, and network literacy (Eisenberg, Lowe, and Spitzer, 2004). In this case, the internet is a form of digital information literacy. Digital information literacy or digital literacy is already part of the basic needs of the community whose functions and benefits are quite large.

Regarding the scope of digital information literacy in society, the Minister of Communication and Informatics Rudiantara said that apart from families, the parties who are the main gates for digital literacy are schools, communities, and other digital community groups (https://lifestyle.kompas.com). In this case, the campus is also one part of the main gate of digital literacy. The entire academic community, especially students, based on the IPJII survey, it is confirmed that they are internet users. Therefore, for the problem of hoaxes among students, the lecturers are part of the responsibility for handling it.

Departing from the thoughts stated above, it becomes important to capture students' abilities in understanding the components of information literacy with the ability to handle the spread of hoax information among students. How did the students who receive hoax news actually respond when they first received the information? Do students question the truth of the information, compare the information with the reality around them, and evaluate the information? Then do students use the information they find legally and ethically? Therefore, this study will look at the ability and understanding of students' information or hoax news through information literacy theory. Based on this description, researchers are interested in raising the theme of understanding information literacy for students of the Indonesian Language and Literature Education Study Program at Kuningan University towards the spread of hoax news on the internet.

Based on the background of the problem that has been described, the researchers formulate the problem as follows:

1. How is the understanding of digital information literacy for students of the Indonesian Language and Literature Education Study Program at Kuningan University towards hoax news on the internet?
2. Is there a relationship between the understanding of digital information literacy of students of the Indonesian Language and Literature Education Study Program at Kuningan University and the spread of hoax news on the internet?
3. Is there an influence between the understanding of digital information literacy of students of the Indonesian Language and Literature Education Study Program at Kuningan University on the spread of hoax news on the internet?
2 Methods

The research method used in this study is the correlational method. This method aims to examine the extent to which variations in one factor are related to variations in other factors (Rakhmat, 2004: 27). The correlational method aims to find a relationship between understanding of information literacy and the spread of hoax news on the internet among students of the Indonesian Language and Literature Education Study Program, Universitas Kuningan.

According to Kriyantono (2012: 56) in general quantitative research has the following characteristics:

1. Research relationship with subject: distant. Researchers assume that reality is separate and external to itself, therefore there must be a distance to be objective.
2. Research aims to test the theory or hypothesis, support or reject the theory. Data is only as a means of confirming theory or theory is proven by data. If the analysis finds rejection of the hypothesis or theory, usually the researcher does not immediately reject the hypothesis and theory but is tested first.
3. Research must be generalizable, because it requires a representative sample of the entire population, operationalization of concepts and valid and reliable measuring tools.
4. National-empirical research procedures, meaning that research departs from the concepts or theories that underlie it. This concept or theory will be proven by the data collected in the field.

3 Results and Discussions

This research was conducted at the University of Kuningan, namely the students of the Indonesian Language and Literature Education Study Program. The number of respondents was 96 people who were selected purposively. Researchers conducted several stages of research in data collection and processing, in order to obtain the following results.

3.1. Understanding Digital Information Literacy

Understanding digital information literacy is a combination of information literacy and digital literacy. Information literacy describes the ability of the skills and techniques possessed by someone who is information literate to take advantage of a number of information facilities. Meanwhile, the means of information that can be utilized by humans are very diverse, both in printed and electronic forms. Information facilities in printed form are books, magazines, newspapers, tabloids, journals, bulletins, etc. Meanwhile, in electronic form, namely television, radio, film, internet.

Meanwhile, digital literacy is the ability to use technology and information from digital devices effectively and efficiently in various contexts in academics, careers, and everyday life (Gilster in Riel, et. al., 2012). The understanding that is measured in this study is the ability of digital information literacy in terms of critical thinking skills, the ability to understand online security, the ability to understand the flow of information, and the ability to communicate.
Table 4.1. Critical Thinking Ability

<table>
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<tr>
<th>Information</th>
<th>Frequency</th>
<th>Percentage (%)</th>
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<td>16.8</td>
</tr>
<tr>
<td>Agree</td>
<td>47</td>
<td>48.9</td>
</tr>
<tr>
<td>Disagree</td>
<td>24</td>
<td>25.5</td>
</tr>
<tr>
<td>Do not agree</td>
<td>6</td>
<td>5.6</td>
</tr>
<tr>
<td>Strongly Disagree</td>
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<td>3.2</td>
</tr>
<tr>
<td><strong>96</strong></td>
<td><strong>100</strong></td>
<td></td>
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Table 4.2. Ability to Understand Online Security

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<tr>
<th>Information</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>78</td>
<td>81.7</td>
</tr>
<tr>
<td>No</td>
<td>18</td>
<td>18.3</td>
</tr>
<tr>
<td><strong>96</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.3. Ability to Understand Information Flow

<table>
<thead>
<tr>
<th>Information</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>71</td>
<td>74</td>
</tr>
<tr>
<td>No</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td><strong>96</strong></td>
<td><strong>100</strong></td>
<td></td>
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</tbody>
</table>

Table 4.4. Communicating Ability

<table>
<thead>
<tr>
<th>Information</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>75</td>
<td>78</td>
</tr>
<tr>
<td>No</td>
<td>21</td>
<td>22</td>
</tr>
<tr>
<td><strong>96</strong></td>
<td><strong>100</strong></td>
<td></td>
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</tbody>
</table>

3.2. Spreading Hoax News on the Internet

Hoax is a false news or attempt to deceive or trick the reader or listener to believe something with the specific purpose and intent of the perpetrators of spreading the news. To measure the variable of spreading hoax news on Instagram social media to selected respondents, the researchers used 3 indicators, namely, knowledge of hoax news, motivation to spread hoax news, and perpetrators. The points studied are as follows.

1. Know the characteristics of hoax news on the internet.
2. Distinguish between hoax and non-hoax news on the internet.
3. Hoax news has a negative impact.
4. Spreading hoaxes to get attention.
5. Spreading hoaxes so that their existence is acknowledged.
6. Spreading hoaxes to know other people’s reactions.
7. Find the accounts of hoax spreaders on the internet.
8. Knowing the accounts of hoax spreaders on the internet.
9. Spreading hoaxes intentionally.

3.3. Hypothesis testing
This hypothesis testing aims to determine whether the hypothesis in this study can be accepted or rejected. This hypothesis includes the independent variable (X), namely the understanding of digital information literacy of students of the Indonesian Language and Literature Education Study Program, Universitas Kuningan and the dependent variable (Y) namely the distribution of hoax news on the internet. By performing Spearman analysis through SPSS software, the following results are obtained:

<table>
<thead>
<tr>
<th>Understanding I</th>
<th>Correlation</th>
<th>Understanding Information Literacy</th>
<th>1.000</th>
<th>Spreading Hoax News on the Internet</th>
<th>.222 *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ent Correlation</td>
<td>Spearman n's rho</td>
<td>n Coeffici</td>
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<tr>
<td>Sig. (2-tailed)</td>
<td>.</td>
<td>.039</td>
<td></td>
<td></td>
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<tr>
<td>N</td>
<td>96</td>
<td>96</td>
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<tr>
<th>Spreading Hoax News on the Internet</th>
<th>Correlation</th>
<th>Understanding Information Literacy</th>
<th>1.000</th>
<th>Ent Correlation</th>
<th>Spearman n's rho</th>
<th>n Coeffici</th>
<th>.222 *</th>
<th>1.000</th>
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<tbody>
<tr>
<td>Ent Correlation</td>
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<td>Sig. (2-tailed)</td>
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<td>96</td>
</tr>
</tbody>
</table>

* Correlation is significant at the 0.05 level (2-tailed).

Based on the results of the correlation in the table above, Ho is rejected if <0.05. The significance value from the table above is 0.02 then <0.05 so Ho is rejected. With so Ha is received, then there is a relationship between the understanding of literacy media recently with the spread of news hoaxes in social Instagram on the students of the University of North Sumatra. To view the high and low correlation (degree of relationship) used a scale of Guilford or kuofisien association, as follow:

- < 0.20 = very low relationship;
- 0.20 – 0.40 = low but definite relationship;
- 0.41 – 0.70 = a significant relationship;
0.71 – 0.90 = high relationship;  
> 0.91 = very high relationship

Based on the results of the Spearman correlation in the table above, it can be seen that the Spearman correlation coefficient (rho) is 0.239. By using the Guilford scale, the result of 0.239 indicates a low but definite relationship. Significance

Correlation results can be seen based on the comparison of the probability value and the sig */** (flag of significant) is given SPSS Statistic 22. If probability > 0.05 then H0 is rejected, if probability < 0.05 then H0 is accepted.

Based on the analysis above, it can be concluded that the results of the hypothesis test of understanding new media literacy on the spread of hoax news on social media Instagram among University of North Sumatra students with a value of 0.239. Known correlation significance of the smaller probability of 0.05 (0.02 > 0.05) and the mark **/* (flag of significant) were given SPSS that show significant results. Thus it can be concluded that the research hypothesis is accepted and the relationship is significant. This shows that understanding of information literacy affects the level of hoax news spread on the internet to students of the Indonesian Language and Literature Education Study Program, Universitas Kuningan.

4 Conclusions

Based on the findings of the research and discussion, the researchers concluded the following things.

1. Understanding of digital information literacy of students of the Indonesian Language and Literature Education Study Program, Universitas Kuningan towards hoax news on the internet in terms of critical thinking skills, as many as 16.8% of students are very capable of critical thinking, 48.9% of students are able to think critically, 25.5% of students less able to think critically, 5.6% of students cannot think critically, and 3.2% of students are very incapable of critical thinking. Then the ability to understand online security, as many as 81.7% of students are able to understand online security and as many as 18.3% of students are not able to understand online security. The next criterion is the ability to understand the flow of information, as many as 74% of students are able to understand the flow of information and as many as 26% of students are not able to understand the flow of information. Furthermore, regarding communication skills, as many as 78% of students are able to communicate and as many as 22% of students are less able to communicate.

2. Based on the results of the research and the results of the calculation of the hypothesis test, a correlation coefficient is obtained which shows that there is a relationship between the understanding of information literacy of PBSI students at Kuningan University and the spread of hoax news on the internet on a low but definite scale. Information literacy skills can prevent PBSI Universitas Kuningan students as internet users from spreading hoax news by rethinking the consequences or impacts that will arise due to hoax news that can harm other parties and themselves.
3. Understanding of digital information literacy has a low relationship with handling the spread of hoax news. However, there is still a relationship between understanding digital information literacy and handling the spread of hoax news on the internet among Indonesian Language and Literature Education Students, Universitas Kuningan.

References

Implementation of the Waterfall Model for the Development of the Independent and Pinunjul Posyandu Application (Si Ayu Maju) in Kuningan Regency

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Abstract. Posyandu is one of the health services, the development of infants and toddlers is very important to continue to be monitored. Monitoring the growth and development of infants and toddlers is carried out through monthly services at the posyandu. Posyandu in the city of Kuningan, precisely in the village of Gandasoli, all Posyandu activities still use the manual system. The manual system in question is that in posyandu service activities, posyandu officers record the presence of infants and toddlers, record data, and record infant and toddler weight in the form of paper records. As a result of the manual system, the work of posyandu officers is very slow, and the risk of posyandu data will be lost or data redundancy will occur so that the resulting data is less accurate and takes a long time to search for data. Software Engineering Process (Software Process) is a statistic that has the objective of developing or modifying software [1]. Process Engineering is a solution in solving work process problems by utilizing advances in technology and information. An effective and efficient selection system development method is needed in the engineering process, so that user needs can be immediately met. The waterfall method is a method of working in sequential and systematic phases [2]. This method was chosen because it has an ordered process, so that work can be scheduled properly and easily, and is very suitable for system development with low complexity (predictability).

Keywords: Waterfall Model; Posyandu Application; Toddler

1 Introduction

Information systems as part of the development of information technology are needed to help organizational performance. Organizing information that is carried out regularly, clearly, precisely, and quickly can be presented in a report, of course, greatly supports the smooth operation of the organization's operations and makes the right decisions.

Posyandu is one of the health services, the development of infants and toddlers is very important to continue to be monitored. Monitoring the growth and development of infants and toddlers is carried out through monthly services at the posyandu, posyandu cadres will record the results of weighing children at the posyandu, children's height, immunizations that babies and toddlers have received and what services babies and toddlers have received.
Posyandu in the city of Kuningan, precisely in the village of Gandasoli, all Posyandu activities still use the manual system. The manual system in question is that in posyandu service activities, posyandu officers record the presence of infants and toddlers, record data, and record infant and toddler weight in the form of paper records.

The result of a manual system greatly slows down the work of posyandu officers, and the risk of posyandu data being lost or data redundancy occurs so that the resulting data is less accurate and takes a long time to search for data.

Software Engineering Process (Software Process) is a set of activities that have the aim of developing or changing software [1]. Process Engineering is a solution in solving work process problems by utilizing advances in technology and information. It is necessary to select an effective and efficient system development method in the engineering process, so that user needs can be met immediately. The waterfall method is a work method that emphasizes sequential and systematic phases [2]. Another reference states that the Waterfall Model or so-called classic Life Cycle is a classical model that is systematic, sequential in building software. At this stage, project initiation will be carried out, such as analyzing existing problems and the objectives to be achieved. [3]

The application of the waterfall model in the independent and pinunjul posyandu application engineering is due to the sequential and systematic engineering process, so that at the time of development it can be adjusted based on user needs.

2 Methodology

2.1. Software Engineering Process

Software Engineering Process (Software Process) is a set of activities that have the aim of developing or changing software. [1]

The software engineering process is carried out during software development, starting from analysis, planning, implementation and testing. The development process can be done repeatedly, until the software meets the needs of the customer or user.

The stages of good software engineering are indispensable in building software that meets user needs.

In general, the software process consists of:

1. Specific Collection (Specification)
   Knowing what a software system should and can do and the limitations of software development.

2. Development (Development)
   Software development to produce software systems.

3. Validation
   Checking whether the software meets the customer's wishes (customer)

4. Evolution
   Change the software to meet changing customer needs (customer) platform upgrade.

2.2. System Analysis and Design

System Analysis is to define the requirements related to the system to be developed. The final stage/output of the system design analysis is a document that describes the information system requirements specification or SRS (Software Requirement Specification). The analysis
stage is carried out before the system design process, where the system design process is a system design process using a structured approach or an object-oriented approach. The system analysis process is an activity to look at the system that is already running, see the weaknesses and strengths of the system and then document the needs that will be met/proposed in the new system.

2.3. Data Collection Techniques
Data collection techniques are defined as procedures for collecting, measuring, and analyzing accurate insights for research using standard validated techniques. Data collection techniques in system analysis can be done in various ways including:
1. Interview Techniques
   Interview is a technique of analyzing data which is done by asking questions directly to respondents or sources. In the interview, there is an instrument, namely a description of the research which is presented in the form of a list of questions.
2. Observation Techniques
   Observation is a data technique that is carried out in a way that you want to research or through experiments (experiments). The method of observation is usually in the form of observations in the form of an instrument checklist. Observation is widely used in qualitative research methods.
3. Questionnaire Technique
   Questionnaire is a data collection technique that is done by giving a set of written questions to respondents.

2.4. Waterfall Model
According to Rosa and Salahuddin (2015: 28) the waterfall SDLC model is often also called a linear sequential model or classical life cycle. The waterfall model provides a sequential or sequential software life flow approach starting from the analysis, design, coding, testing, and support stages. [4] Here is a picture of the waterfall model:

![Figure 1. Waterfall Model According to Rosa and Salahuddin (2015:28)](image)

1. Analysis
   The process of gathering requirements is carried out intensively to specify software requirements so that users can understand what kind of software is needed by the user.
2. Design
Software design is a multi-step process that focuses on the design of a software program including data structures, software architecture, interface representations, and coding procedures. This stage translates software requirements from the requirements analysis stage to a design representation so that it can be implemented into a program at a later stage.

3. Coding
The design must be translated into a software program. The result of this stage is a computer program in accordance with the design that has been made at the design stage.

4. Testing
Testing focuses on the software logically and functionally and ensures that all parts have been tested. This is done to minimize errors and ensure that the output produced is as desired.

Advantages and Disadvantages of the Waterfall Model:

a. Excess
   1. Has a sequential process, from analysis to support
   2. Each process has its own specifications, so that a system can be developed according to what is desired (right on target)
   3. Each process cannot overlap each other.

b. Weakness
   1. The process carried out tends to be long and also long.
   2. The cost of using the method tends to be expensive.
   3. Requires a lot of research and also supporting research to develop a system using the waterfall method.

3 Result and Discussion

3.1. Waterfall Model Implementation
This study applies the waterfall model as software engineering for the development of the Mandiri Posyandu and Pinunjul (Si Ayu Maju) Applications in Kuningan Regency. The results of the application of the waterfall model According to Rosa and Salahuddin (2015: 28) described by the system design model are as follows:

1. Analysis Stage
   In this stage, analyze and identify user needs in developing the Mandiri and Pinunjul Posyandu application systems which are divided into two parts, namely data requirements and tool requirements to be used.
   Data requirements are adjusted to the information needs to be displayed, namely the system must be able to display data:
   a. Maternal health records
   b. Child Immunization Data
   c. Child's Kms Data
   d. Family planning data
   e. Posyandu activity report.
   From this data, it is developed and used as a form in the system.

2. Design Stage
   a. Modeling stages
Data modeling in this study uses Data Flow Diagrams (DFD) to describe user interactions with the system and process flow as shown in Figure 2 below.

Figure 2. Context Diagram

Figure 2 is a context diagram proposed by the researcher, and explains that there are 5 users who can access the system, each user has its own function, namely:

1) District Admin: Functions to add district admins, sub-district admins, village admins and view monthly and annual reports.

2) District Admin: Serves to add village admins and can also view reports.

3) Village Admin: Serves to add master data for activities such as data on family heads and family members, village admins can also add posyandu admins and can view reports on posyandu activities in the village.

4) Posyandu Admin: Serves to add master data for pregnant women at the posyandu, complete the posyandu profile, add posyandu cadres and can view reports on activities at the posyandu.

5) Cadre: Serves to record every activity that has been carried out at the posyandu such as health records for pregnant women, child immunizations, child KMS, and family planning.

The interaction between the user and the independent posyandu and pinunjul application systems can be seen in Figure 3. How the user interacts and the information obtained from the system. Users are divided into 2, namely users from the center (District Admins, District Admins, Village Admins) and users from posyandu (Posyandu Admins, cadres). Users from the center can add users, view reports on posyandu activities and add master data for family heads and family members in each village. Meanwhile, third-party users can collect data on pregnant women per posyandu, complete posyandu profiles, collect data on cadres and record posyandu activities..
Figure 3. Data Flow Diagram of Posyandu and Pinunjul Application Systems

b. Interface Design Stages
In the design section of this system, the author divides the design into several parts which will be described as follows:
1) Login Form
This login form is used by the central admin, and posyandu users. In other words, this form is used to determine the priority of the user based on the priority of the entered user identity. The results of this form will also be used to determine access rights.

2) Registration Form
This registration form is used by the central admin. This form is used to register users with lower levels, such as, district admins registering sub-district admins and village admins, sub-district admins can register village admins, and village admins can register posyandu admins.

3) Data Input / Data Collection Form
This form can be seen and used by central admin users, but not all central admins can use this form, this form is only used by village admins for data collection of family heads and family members or Master Data. Not just anyone can enter data so that the truth of the data and data security can be maintained.

4) Report
This form is used to print data on posyandu activities in Kuningan district, each central admin level has its own print category, such as district admins can print for district, sub-district, and village levels, but for admin levels such as district admins, and village admins can only print print based on the category level, namely for sub-districts it can only print posyandu activities at the sub-district level, and the same for villages can only print reports on activities in that village.

3. Coding Stages
At this stage, the design must be translated into a software program. The result of this stage is a computer program in accordance with the design that has been made at the design stage. The tool requirements are the requirements used in the system creation process consisting of the need for design tools, Programming Languages, Databases and Reporting tools.
4. Testing Stages

Testing focused on software in this study was tested in terms of logical and functional and ensured that all parts have been tested. This is done to minimize errors and ensure that the output produced is as desired. Researchers conducted testing by directly testing the system that had been built into the object of research so that the deficiencies in the system built could be immediately noted and carried out the repair process in accordance with the waterfall model applied in this study.

4 Conclusion

Based on the field research that the author did, the author in general can conclude the following:
1. User needs in implementing the waterfall model for developing independent and pinunji posyandu applications such as posyandu data processing, inputting data for pregnant women, family identity data and so on can be analyzed from the beginning with data collection techniques by observation and interviews.
2. The design stages in the waterfall model in this study, are described by the D-Context and DFD models to facilitate the next stage, namely the coding stage.
3. Testing the system with the waterfall model in this study was carried out directly to the object of research and users, to find out firsthand the suitability of system development with user needs.

References

Mythological Study on a Collection of Folk Stories in Kuningan West Java

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Abstract. This research is about the study of mythology in a collection of folklore in Kuningan. The focus of this research is intrinsic elements and types of myths were found in fairy tales or folklores in Kuningan, West Java. The purpose of this study is to describe the intrinsic elements contained in folklores in Kuningan. The intrinsic elements are themes, characters and dispositions, setting, plot, and mandate. In addition, the purpose of this research is to describe the types of myths were found in folklores in Kuningan. The method in this study is qualitative descriptive method. The technique on this research is documentation in the form of folklores in Kuningan was derived from various sources such as village’s official website, interviews, and youtube about folklore in Kuningan. The steps taken by the researcher in analyzing the data are, (1) collecting data by means of documentation and interviews (2) identifying the data, (3) classifying the data, (4) analyzing the data, and (5) describe conclusions. The results of the study contained 20 folklores in Kuningan which contained myths. (1) the intrinsic elements contained in folklore include themes, in general the themes of 20 folk tales are about the origin of naming a village or place, about prohibitions or taboos and myths of beliefs found in a village or area, myths of gods and divine beings. Characters and dispositions in folklore are many figures of kings or sacred people and the characters or characters are told indirectly by the author of the character, namely brave, wise, generous and willing to sacrifice for the benefit of the people. The setting in the story is the setting of the place, the setting of the time, and the setting of the atmosphere. The background is the names of villages, wilderness, and the names of tourist attractions. The time setting is in the past, day, night, years, in ancient times, then, the next day. The background of the atmosphere is sad, happy, excited. The plot or plot in advanced, close and single plot folklore, there is a strong relationship between one event and other events in the story compiling as a whole. The message in the story is that you have to fight in life, you have to help or help other people/society. (2) There are three types of myths in folklore in Kuningan, namely the type of myth of the origin of naming a village or tourist spot, the second is the myth of divine beings, especially sacred people, the third is the myth of prohibition and belief. The most dominant myth is the origin of naming a place.

Keywords: Mythology; Collection of Folklore; Kuningan West Java

1 Preliminary

Literature is a work of art whose medium uses language, in the world of literature it is not only in written form, we know the term oral literature. In general, oral/folk literature contains beliefs, views of life, ways of thinking, and national cultural values. Thus, from oral/folk literature it can be seen how the beliefs of the people at that time such as the belief in the
existence of magical objects, magical powers, the belief in the existence of spirits or spirits that were everywhere. The problems expressed in oral/folk literature are generally problems of past lives and events that are expected to occur in accordance with the thoughts, feelings, ideals of the community, and not events that actually happened. Then, the influence of foreign cultures contained in literature is limited. What stands out is only Hindu culture. Then, there are also those who turn to Islam (Supriatin, 2010).

According to Vansina in Suwardi Endraswara (2018: 1) oral literature is part of the oral tradition or which is usually developed in oral culture in the form of messages, stories, testimonies, or those passed down orally from one generation to another.

Oral literature is inseparable from folklore, which is a traditional culture that is owned by a certain group and has been spread from generation to generation (Supriatin, 2018: 1).

Folklore is part of the culture that has developed in society and has been handed down from time immemorial, both in oral form and examples accompanied by gestures or reminders, folklore is also known as fairy tales.

According to Yowono (in Gusal 2007: 27) fairy tales are stories about something that doesn’t make sense, doesn’t really happen, and is fantastical or imaginary. The definition of fairy tales is a story or story that is the result of human imagination or imagination, even though the elements of the fantasy come from what is in everyday human life (Ahimsa-Putra, 2006: 77).

Folklore arises because of an important event in the past that developed orally from one community to another. Folklore is divided into four types, namely myth, legend, fable, and sage. Myths are stories or tales related to local people’s beliefs about the existence of spirits, spirits, or gods. Legends are tales about strange or miraculous natural events. Fable that is fairy tales about animal life are told like human life, and sage is a fairy tale that contains courage.

Folklore contains many things that are occult, unreasonable and even mythical. According to Sukatman (in Cahyanti 2011:10) based on existing literary forms, myths in Indonesia are spread and passed down in hybrid form (combined) with other very diverse forms of tradition, and not only in the form of myths (belief tales). The forms of oral tradition in question are for example (1) sage, (2) myth, (3) fable, (4) legend, (5) fairy tale, (6) epic, (7) folk belief, (8) fiber, (9) poetry and folk songs, (10) traditional expressions (proverbs), (11) mantras, (12) traditional questions (riddles). The myths that develop in society are usually called myths, people really believe in the supernatural things that happen in mythical stories.

According to Iswidayati (2007: 180) myth (Roland Barthes) is defined as mythological speech not only in the form of oral speech, but speech that can be in the form of writing, photography, films, scientific reports, sports, performances, advertisements, paintings, basically everything that has a mode of representation and has a meaning that cannot necessarily be captured directly, for example to capture the meaning of a painting requires interpretation. Myths contain the subconscious desire of humans to express, explain, and answer various symptoms and events that occur around them. Myths are made for the benefit of humans which in their development then form traditions that apply and sometimes even need to be enforced (Suryani, 2019).

Myths consciously or unconsciously can determine the human perspective in understanding and interpreting their own lives. Myths developed in primitive societies as a means to store knowledge of those who had not been able to express it with nature in written form. At that time humans also could not use their logic perfectly so that whatever happens in human life is usually associated with mystical or supernatural things, one of which has to do with myths that develop in society.
The term mythology has been used since the 15th century, meaning the science that explains myth. Mythology comes from Greek consisting of two words muthos which means an art, and logos which means a word, word, story or convincing argument (Pusposari, 2011: 7). Myth is also a sacred story that serves to explain the belief system of society in a culture. Myths that develop in society are a way of thinking of a culture about something, a way of understanding something. One way to preserve the history of the people who were not familiar with writing is by making mythical stories. That is why, in history, the phenomena of various mythological traditions that are inconsistent can continue to coexist with each other without any theoretical integration (Suprijono, 2013).

Myths also tell the adventures of the gods, their love stories, their kinship, their war stories, and so on (Andini, 2018). Myth forms an esoteric knowledge that contains magical religious power. If people know the origins of objects, such as animals, plants and so on, it means that they gain magical power over these objects so that they can control, improve, or reproduce them according to what they want (Saputra, 2018).

Myths have characteristics: the community that owns it believes the story really happened, the time the story takes place in the distant past (remote past), the place where the story takes place in another world (different world), the community that owns it considers it a sacred story (sacred), and the main character is not human (non-human) (Bascom in Soedjijono, 2018).

Many myths or myths have developed in Indonesian society, including Kuningan. Kuningan is one of the s located in West Java, many myths develop in the Kuningan community which are believed to be true, for example there is a Balong Dalem folklore about which tells about the beginning of the formation of the cai marriage tradition which is the belief of the people of Kuningan, especially the village of Babakan Mulya, Jalaksana. In the cai marriage tradition, the process of merging two springs from Cibulan and Balong Dalem is believed to bring rain. Besides

There are still many myths that develop in Kuningan so it is interesting to study and research further.

2 Myth Types

Myths are often associated with belief in supernatural powers or mystical realms. This belief is accepted passively and massively, meaning that myths are believed for granted and get their legitimacy from the audience. There are several types of myths, namely (1) cosmogony myths, (2) origin myths, (3) myths about gods and divine beings, (4) androgynous myths, (5) myths of the end of the world.

2.1. The Myth of Cosmogony

The cosmogony myth tells the story of the universe as a whole. There are two kinds of cosmogony myths, the first is the cosmogical myth which tells of the creation of the universe which did not exist in any form before the creation.

There are three main types of myths of this second form of cosmogony, namely:

(1) The myths that tell of the creation of the world by cosmogonic dives.

(2) Myths that tell the story of creation as a result of the disintegration of an indivisible primordial unity. There are two most important variants, namely, first the myths that describe a husband and wife couple, for example the occurrence of the separation of heaven and earth.
Myths which tell that the act of creation occurs due to the slaughter of primordial creatures or sea ghosts.

2.2. The Myth of Origin
The origin myth is a myth that tells the origin of everything, the origin of humans, animals, plants, objects, islands, holy places, institutions, etc.

2.3. Myths About Gods and Divine Beings
Myths about supreme gods tell of the creation of the world, life, and humans.

2.4. Androgynous Myths
Androgyny is an archaic and universal formulation to express something as a whole the coexistence of contradictory things (Pusposari, 2014:46).

2.5. Myth of the End of the World
The myth of the end of the world in general has the view that the end of the world has happened in the past, but will repeat itself in the future.

According to Pusposari (2014: 48) basically all myths about the end of the world contain an understanding that this world is undergoing progressive degradation and therefore needs to be ended in order to be re-created. The destruction and creation of the world follows a cosmogony pattern of returning to a state of chaos which is followed by re-creation. The newly created world is one that is pure, fresh, and full of power. In other words a new world was created for the first time.

The structure of the folk story consists of themes, characters and dispositions, setting, plot/plot, mandate, point of view, and style of language. Theme is an interesting subject in a story that is used as a source of ideas. The plot of a story must be coherent, between one event and another, between the events that are told first and those that are later, there is a relationship, there is a mutual relationship. The relationship between these events should be clear, logical, recognizable when the relationship is separated from its place in the story text which may be at the beginning, middle, or end (Wulandari, 2017).

Characters are humans who exist in fictional stories, fictional individuals who experience events or behave in various events. Setting is all information about time, space, atmosphere and social environment contained in the story. The message can be conveyed implicitly and explicitly. Implicit or hidden, namely in moral teaching, it can be implied in the character's behavior, in a series of dialogues or character conversations. The mandate contained explicitly is that it is conveyed by prohibitions, calls, suggestions, advice, warning suggestions, and regarding the ideas that underlie a story (Kartika Sari, 2020).

3 Research Methods
The research method used is descriptive qualitative to describe the myths in folklore by involving the cultural environment of the folklore created. The research data is in the form of a collection of folk tales in Kuningan which were collected from various villages. The source of research data is in the form of folk tales told by village elders in Kuningan. Techniques for obtaining documentation data in the form of folk stories from various sources including the village's official website, recordings of interviews with village elders, from youtube about
village history in the . The steps taken by the researcher in analyzing the data are, (1) collecting data by means of documentation and interviews (2) identifying the data, (3) classifying the data, (4) analyzing the data, and (5) drawing conclusions.

4 Results and Discussion

4.1. Research Results

4.1.1. Intrinsic elements in folklore in Kuningan

1) Theme

Broadly speaking, the folk tales of Kuningan have various themes, among others, about the origin of place names as many as 10 stories, the Myth of Gods and Divine Creatures as many as findings, and belief in the myth of prohibition as many as findings. The most common theme is about the origin, there are 9 stories, namely (1) the origin of CiBreath Village tells about the origin of the naming of CiBreath Village, (2) Maleber Village tells about the origin of Maleber Village naming, (3) The Beauty Story of Nyi Ratna Herang tells about the origins of naming Ciherang Village, (4) the myth of the Bangkong waterfall tells about the origin of the naming of the Bangkong waterfall, (5) Mount Saeti Saves the History of the Knights telling about the origin of the naming of Selajambe Village, (6) the history of Putri Palutungan waterfall tells about the origin of place names and myths, (7) the origin of Cimenga Village tells about the history of naming a place, (8) the origin of Ciniru Village tells about the history of naming places, (9) The legend of Bunigelis Village tells about the history of naming a place, (10) The history of Jalaksana Village tells about the origin of the naming of Jalaksana Village.

While the theme of the myth of gods and divine beings there are 5 findings, namely (1) The story of Arya Kamuning at the Foot of Mount Ciremai tells about the struggle of Arya Kamuning in helping his people in dealing with food shortages, (2) The mystery of the Darma Reservoir and the White Eel Demon. the white eel stealth, (3) The legend of Si Windu the White Horse Brass tells the story of Telling the story of Si Windu the White Horse and Ewangga who are brave and have supernatural powers, (4) Badugang Jaya tells about the supernatural power of Badugang Jaya, (5) The fairy tale of Kertayasa Village tells the story Nyimas Darmawati.

Furthermore, the theme of the myths and prohibitions there are 6 findings, namely (1) the legends and myths behind the beauty of Talaga Remis telling about the myth of the formation of Talaga Remis, (2) Myth of the Legend of the Fish of the God of Cibulan Kuningan Telling about myths or beliefs in Cibulan tourist attractions, (3) The tale of Kampung Peundeuy tells about the belief in myths in the village of Peundeuy, (4) The origin of Lebakherang Village tells about the myth in Lebakherang Village, (5) The origin of the Ciawitali Hamlet, Cimenga Village, Darma tells about the belief in myths.

2) Character and Disposition

The characters in folklore in Kuningan are mostly leaders, holy people, and village elders. For characterization, most of the folklores of Kuningan are described by the author indirectly because the sources describe the actions, behavior, or reactions of the characters to an event to represent the character of each character. The character of a leader who is brave, firm, authoritative, helpful, generous, and wise.
3) Background
The background elements contained in the folklore of Kuningan are mostly located in areas that become the object of the story of the origin of the name of a place, mostly a village such as Jalaksana Village, Maleber Village, Kertayasa Village or Ciniru Village as well as tourist attractions in Kuningan such as Darma reservoir, Talaga Remis, Bangkong waterfall, Putri waterfall, Cibulan. A time in the past, with a sad, excited, and happy background.

4) Plot
Most of the plots used are forward, single, and closely related. In general, folklore in Kuningan is told from beginning to end, the storyline is only one or single plot and the story is solid or called a tight plot.

5) Message
From the folk tales of Kuningan, the messages that can be drawn are mostly about nature conservation, persistence in business, and the struggle to uphold a principle. The wisdom and courage and firmness of the leaders, the struggle of the leaders in the welfare of their people.

4.1.2. Types of myths found in Kuningan
Of the five types that exist in theory, there are only two types found in folklore in Kuningan, namely the mythical type of the origin of place names, there are ten which belong to the mythical type of the origin of place names, there are five types of myths of gods and divine beings and there are five types of forbidden myths or beliefs. In theory, there is no type of prohibition myth or belief, but in this study a new type of myth was found, namely the myth of prohibiting doing something and people's belief in something mystical.

5 Discussion
From the results of the analysis of Mythological Studies on Folklore in Kuningan, namely the first content element, the theme generally tells about the origin of a village or tourist spot, tells of ancient magic people or tells of myths or prohibitions on a village or place and if there are residents Those who violate it will cause disaster for the violators so that people believe and do not dare to violate the prohibition.

The figures are average leaders or rulers as well as sacred people so that their characters are very strong including brave, firm, high social spirit, generous, wise, and willing to sacrifice for the interests of their people or for the welfare and progress of a region.

In general, there are three settings, namely the setting of place, time and atmosphere, for the background where there are many names of villages or places of worship, the setting of many times in the past as before, the background of the atmosphere is sad, happy, and enthusiastic.

The plot of folklore in Kuningan in general has a forward plot from beginning to end, a close and single plot, the story is only a series of events and the story is solid. The mandate gives many messages to readers that a leader must be brave, firm, responsible, generous, hold principles, be willing to sacrifice for the people and be wise in deciding something or doing something.
6 Conclusion

In accordance with the formulation of the problem there are two conclusions in this study, namely:

1. Intrinsic elements in folklore in Kuningan
   There are ten intrinsic elements, the most dominant theme of origin of a place, five themes about divine beings and five themes about myths and prohibitions. Leaders and holy people with brave, firm, self-sacrificing, and wise characters. The setting of a village and tourist spot, the background of the past, the setting of a sad and happy atmosphere. The forward, single and close plot of the story from beginning to end is only one series of events. The mandate is more aimed at leaders to be firm, brave, sacrifice for the people and be wise.

2. Types of myths in folklore in Kuningan
   There are three myths, namely the myth of the origin of a place, the myth of divine beings and the myth of prohibition or belief, the dominant myth is the origin of a place, especially tourist attractions and the naming of a village.

References


The Effect of Forests on Insect Diversity on Agricultural Land in Karangsari Village

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{ai.nurlaila@uniku.ac.id}

Abstract. Agricultural land in Karangsari Village is close to the Mount Ciremai National Park (MCNP) conservation area. Vegetable production fluctuates every season, its can be caused by the presence of insects, both pollinators, pests and predators. The purpose of the study was to determine the effect of the forest on the diversity of insects. Exploration method was used to identify insect species by installing traps using a swip net, pit fall trap, and yellow trap at 5 horticultural land locations with an interval of 100 m. Each observation point was repeated 3 times in the form of an observation path. The distance between the observation lines is 100 m. Observations and trapping were carried out for 7 consecutive days. The results of the study found 10 orders and 57 species with a value of $H' = 3.42$. There are 10 orders and fifty seven (57) species insects are found. The total number of individuals is five hundred and seventy three (573) with Value of $H'= 3.285$ (High diversity). There is no correlation between the distance of forest and agricultural land on insect diversity (sig.=0.376), while in the number of species to the population there is a significant correlation (sig.= 0.01)

Keywords: agricultural, diversity, forest, insects, populations

1 Introduction

Agricultural land in Karangsari Village is close to the Mount Ciremai National Park (TNGC) conservation area. However, vegetable production fluctuates every season. One of the causes of ups and downs in vegetable production is the presence of insects, both pollinating insects (pollinators) and insects that are pests and predators. Based on this, it is necessary to conduct research on the influence of the forest on the presence of insects in that location.

Insects have an important role in human life, especially in agriculture. The anthropocentric view of insects often sees insects as a group of organisms that do more harm than good to human life. In fact, directly or indirectly insects play a role in the life of other living things, both beneficial and harmful. Insects that are beneficial for example as plant pollinators, producers of honey, and also as natural enemies of insect pests, while insects that harm humans such as insect pests, parasites, transmitting diseases and so on. The presence of insects in an agricultural habitat is influenced by several factors, including cultivation techniques, monoculture and polyculture [1], use of insecticides and the presence of natural habitats [2]. Natural habitat around agricultural land is defined as an area that has a minimum area of 0.5 ha in which there are various types of annual plants and is not used for plant cultivation [3].
Forests are the natural habitat of insects. Natural habitats can provide important resources for insects, providing resources, such as food, alternative hosts, and shelter. However, the richness and abundance of insect species in an agricultural habitat is influenced by the distance of the natural habitat from agricultural land [4]. Several studies have shown that the diversity and abundance of insects is higher in forest ecosystems or agricultural land adjacent to forest areas compared to monoculture farms. The close proximity of natural habitats from agricultural land can increase the diversity and species richness of flower-visiting insects [5][6]. In addition, land use types, seasonal differences, and regional differences also affect insect diversity [7].

The purpose of this study was to determine the diversity of insects on agricultural land adjacent to the forest area (TNGC) and to determine the relationship between the distance of agricultural land and forest to insect diversity.

2 Methodology

The research was carried out in August – September 2020 on the agricultural land of the Karangsari Village community, Darma District, Kuningan Regency with an agricultural area of 203.9 ha. The tools used are: thermometer, insect trap (yellow trap, light trap, and swip net), GPS, plastic container, stationery, and tallysheet.

The research method used is an exploratory method, by installing traps at 5 points of horticultural land locations with an interval of 100 m. Each observation point was repeated 3 times in the form of an observation path. The distance between the observation lines is 100 m. Thus there are a total of 15 observation points. Daytime observations were carried out at 09.00-10.00 WIB and 17.00-18.00 WIB using a swip net, pit fall trap, and yellow trap. For the night, light traps are installed throughout the night starting at 18.00 WIB. Observations and trapping were carried out for 7 consecutive days. The insects found were identified by observing morphological similarities using the identification methods Borror [8], Suin [9], BugGuide.net 2013, and Discoverlife.org. The identification stage was carried out in the laboratory of the Faculty of Forestry, Universitas Kuningan. The variables observed were insect species, number of species, functional groups and total population.

Species diversity was determined by calculating the diversity index using the Shanon Wiener H' formula referring to [10], with the formula:

$$H' = \sum_{i=1}^{N} p_i \ln p_i$$

Information:
H' = index of species diversity
S = number of species
pi = total sample proportion calculated from the i-th species = \( \frac{ni}{N} \)

Product Moment Pearson correlation analysis was used to determine the relationship between the distance of agricultural land and forest to insect diversity.
### 3 Results and Discussion

#### 3.1 Diversity of Insects

The types of insects found were classified into 10 orders with a total of 50 species and a total number of 573 individuals (Table 1). Functionally, the insects found were classified into 6 groups, namely: pests, soil fertilizers, natural enemies, pollinators, decomposers, and neutrals. Meanwhile, 4 individual insects were not identified so that the functional group could not be identified. According to their functional groups in the ecosystem, the most common insects found were pests, natural enemies, pollinators, decomposers, neutrals and soil fertilizers, respectively (Figure 1).

<table>
<thead>
<tr>
<th>No.</th>
<th>Order</th>
<th>Local name</th>
<th>Scientific name</th>
<th>$\sum$ Individual</th>
<th>Functional group</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Coleoptera</td>
<td>Kumbang daun</td>
<td><em>Aulacophora</em></td>
<td>1</td>
<td>Pest</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kumbang kotoran</td>
<td><em>Canthidium</em></td>
<td>2</td>
<td>Soil fertilizer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kumbang macan</td>
<td><em>Cicindela aurulenta</em></td>
<td>1</td>
<td>Natural enemies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kumbang boleng</td>
<td><em>Cylas formicarius</em></td>
<td>4</td>
<td>Pest</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kumbang klik</td>
<td><em>Elateridae</em></td>
<td>6</td>
<td>Pest</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kumbang lembing</td>
<td><em>Heteroneda reticulata</em></td>
<td>5</td>
<td>Natural enemies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kumbang lembing</td>
<td><em>Henosepilachna</em></td>
<td>12</td>
<td>Natural enemies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tomcat</td>
<td><em>Paederus litoralis</em></td>
<td>2</td>
<td>Natural enemies</td>
</tr>
<tr>
<td>2</td>
<td>Dermaptera</td>
<td>Earwig hitam</td>
<td><em>Chelisoches morio</em></td>
<td>3</td>
<td>Natural enemies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Earwig</td>
<td><em>Labidura riparia</em></td>
<td>61</td>
<td>Natural enemies</td>
</tr>
<tr>
<td>3</td>
<td>Diptera</td>
<td>Lalat kosmopolitan</td>
<td><em>Dolichopus urbanus</em></td>
<td>14</td>
<td>Natural enemies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lalat tentara hitam</td>
<td><em>Hermetia illucents</em></td>
<td>15</td>
<td>Decomposer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lalat bangau</td>
<td><em>Neprostoma flavipalpis</em></td>
<td>1</td>
<td>Neutral</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lalat daging</td>
<td><em>Sarcophaga carnaria</em></td>
<td>5</td>
<td>Neutral</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lalat bunga</td>
<td><em>Syrphus ribesii</em></td>
<td>4</td>
<td>Pollinator</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lalat perampok</td>
<td><em>Zosteria sp</em></td>
<td>4</td>
<td>Natural enemies</td>
</tr>
<tr>
<td>4</td>
<td>Hemiptera</td>
<td>Kepik sejati</td>
<td><em>Deraeocoris</em></td>
<td>10</td>
<td>Pest</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Serangga benih</td>
<td><em>Kleidocerys resedae</em></td>
<td>17</td>
<td>Pest</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Walang sangit</td>
<td><em>Leptocoris acuta</em></td>
<td>8</td>
<td>Pest</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kepik hijau</td>
<td><em>Nezara viridula</em></td>
<td>5</td>
<td>Pest</td>
</tr>
<tr>
<td>Serangga berpunggung patah</td>
<td>Taylorilygus apicalis</td>
<td>20</td>
<td>Pest</td>
<td></td>
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<tr>
<td>-----------------------------</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>5 Hymenoptera</td>
<td>Tawon laba laba</td>
<td>Pompilidae</td>
<td>3</td>
<td>Pollinator</td>
<td></td>
</tr>
<tr>
<td>Lebah</td>
<td>Campsomeris plumipes fossulana</td>
<td>17</td>
<td>Pollinator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tawon ikhneumon</td>
<td>Netelia ephippiata</td>
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<td>Natural enemies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semut perangkap rahang</td>
<td>Odontomachus sp</td>
<td>4</td>
<td>Natural enemies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semut</td>
<td>Pachycondyla sp</td>
<td>13</td>
<td>Natural enemies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tawon mason</td>
<td>Pison spinolae</td>
<td>54</td>
<td>Pollinator</td>
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<td></td>
</tr>
<tr>
<td>Tawon predator asia</td>
<td>Vespa velutina</td>
<td>9</td>
<td>Natural enemies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tawon parasitoid</td>
<td>Xanthocryptus novezealandicus</td>
<td>9</td>
<td>Natural enemies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lebah kayu</td>
<td>Xylocopa</td>
<td>2</td>
<td>Pollinator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Lepidoptera</td>
<td>Ngengat</td>
<td>Anisota virginiensis</td>
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<td>Pest</td>
<td></td>
</tr>
<tr>
<td>Ngengat</td>
<td>Arna pseudoconspersa</td>
<td>2</td>
<td>Pest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skipper</td>
<td>Erynnis tages</td>
<td>12</td>
<td>Pollinator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ngengat bertanduk panjang</td>
<td>Lecithoceridae</td>
<td>1</td>
<td>Pest</td>
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</tr>
<tr>
<td>Ngengat putih marsin</td>
<td>Nyctemera adversata</td>
<td>3</td>
<td>Pest</td>
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</tr>
<tr>
<td>Ngengat tineid</td>
<td>Tineola sp</td>
<td>58</td>
<td>Pest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kupu kupu</td>
<td>Vanessa sp</td>
<td>2</td>
<td>Pollinator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belalang sempah coklat</td>
<td>Archimantis latistyla</td>
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<td>Natural enemies</td>
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<td>7 Mantodea</td>
<td>Belalang sempah</td>
<td>Hierodula patellifera</td>
<td>1</td>
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<td></td>
</tr>
<tr>
<td>Lacewing mata emas</td>
<td>Chrysopa oculata</td>
<td>66</td>
<td>Natural enemies</td>
<td></td>
<td></td>
</tr>
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<td>8 Neuroptera</td>
<td>Capung</td>
<td>Orthetrum sabina</td>
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<td>Natural enemies</td>
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<td>9 Odonata</td>
<td>Belalang pocong</td>
<td>Atractomorpha crenulata</td>
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<td>Pest</td>
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<tr>
<td>Belalang padi</td>
<td>Dichromorpha viridis</td>
<td>10</td>
<td>Pest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Orthoptera</td>
<td>Belalang kembara</td>
<td>Locusta migratoria</td>
<td>1</td>
<td>Pest</td>
<td></td>
</tr>
<tr>
<td>Jangkrik semak</td>
<td>Meconema meridionale</td>
<td>6</td>
<td>Pest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belalang kayu</td>
<td>Melanoplus cinereus</td>
<td>1</td>
<td>Pest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kriket pohon</td>
<td>Neoxabea sp</td>
<td>5</td>
<td>Pest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belalang antena pendek</td>
<td>Pezotettix giornae</td>
<td>1</td>
<td>Pest</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The number of insect pests found can be caused by the use of inappropriate or excessive insecticides in crop cultivation practices. The use of insecticides, especially at sublethal doses, can have an impact on insect pest resurgence [11].

![Figure 1. functional Group of Insect](image-url)

The diversity of insects in all ranges of distances from agricultural land to forests is included in the high category ($H'$>3). The highest diversity of insects was found at a distance of 400 m ($H'$=3.682) and the lowest diversity was found at a distance of 500 m ($H'$=3.175). This is thought to be caused by differences in vegetation where the vegetation at a distance of 400 m is planted with coffee, wildflowers and chili plants. Meanwhile, at a distance of 500 m, the vegetation is dominated by non-flowering weeds and weeds. Vegetation, TSP concentration in the air, canopy cover, light intensity, and wind speed are the factors that most influence the presence of insects [12]. In addition, this difference can be caused by differences in climate, season, altitude, and type of food [13]. At the time the research was carried out, the temperature ranged from 19-21°C with humidity 88-90%, thus making insects feel comfortable. At a higher temperature of 24.75°C and humidity of 79.14%, insect diversity is in the moderate category [14].
Table 2. The Diversity Index of Insects

<table>
<thead>
<tr>
<th>Distance (m)</th>
<th>Shannon-Wiener Diversity Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>3,189</td>
</tr>
<tr>
<td>200</td>
<td>3,551</td>
</tr>
<tr>
<td>300</td>
<td>3,506</td>
</tr>
<tr>
<td>400</td>
<td>3,682</td>
</tr>
<tr>
<td>500</td>
<td>3,175</td>
</tr>
</tbody>
</table>

From these criteria, it shows that the insect diversity index at each distance and on the agricultural land of the Karangsari Village community has a high diversity value. The greater the number of species and the more evenly the distribution of species in abundance, the higher the diversity of the community. In a community with high diversity, a population of a particular species cannot be dominant [15]

3.2. The Effect of Forests on the Presence of Insects on Agricultural Land

The results showed that there was no correlation between the distance between forest and agricultural land on the number of species (sig.=0.1), the number of individuals (sig.=0.078), and insect diversity (sig.=0.736). A significant correlation occurred in the number of species to the number of individuals (sig.=0.001). This can be caused because the distance interval used in the observation is too close. So that at the furthest distance (500 m), the insects found are relatively the same type. [5] classifies close distances to natural habitats (less than 200 m) and far from natural habitats (more than 1000 m). The results showed that the difference in the distance between natural habitat and agricultural land affected the diversity of flower-visiting insect species, but had no effect on their abundance. This is in accordance with research [16] which states that the number of individual pollinating insects visiting strawberry and tomato plants decreases as the distance from the forest boundary increases.

The theoretical and practical implications of the research are as follows: 1) Selection of the right method to reduce the pest population, namely by reducing the use of unwise insecticides because it causes the natural enemies of pests to decrease while the pests themselves increase or resurgence, namely, the emergence of a population explosion of a certain pest after receiving treatment. Pesticides [17], 2) For methods of developing pollinator insect conservation, namely by increasing the number and abundance of flowering plants as a source of food, maintaining suitable habitats that are able to provide nesting places and availability of feed throughout the year [18].

4 Conclusion

1. There are 10 orders and fifty seven (57) species insects are found. The total number of individuals is five hundred and seventy three (573) with Value of $H' = 3.285$ (High diversity)

2. There is no correlation between the distance of forest and agricultural land on insect diversity (sig.=0.376), while in the number of species to the population there is a significant correlation (sig.= 0.01)
References


Analysis of Middle School Students' Covariational Reasoning Skills in Modeling Function Charts Based on Self-Efficacy

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Abstract. In covariational reasoning there are five levels, namely, level 1 (L1) Coordination, level 2 (L2) Direction, level 3 (L3) Quantitative coordination, level 4 (L4) Average rate, and level 5 (L5) The momentary rate r. Low reasoning ability is influenced by several factors including self-efficacy. This study aims to describe students' covariational skills in modeling graphs of functions based on self-efficacy. This research is a type of research with qualitative descriptive approach with case study research design. The research subject consisted of 30 students who were grade VIII SMP Negeri 2 KUNINGAN. Data collection techniques used are tests, observations, interviews and documentation. Student writing test results are analyzed based on the framework of Carlson et al and strengthened by observations and interviews. The results showed that subjects with high self-efficacy as many as two students (6.67%), subjects with self-efficacy were quite high as many as 23 students (76.67%), subjects with moderate self-efficacy as many as two students (6.67%), and subjects with self-efficacy quite low as many as three students (10%). The subjects interviewed and observed as many as eight students, with two of each self-efficacy category found in the study. Subjects with high self-efficacy categories were able to reach the highest level of covariational reasoning ability of level 5 with SMFTA differences linking quantity processes with equation analytics while SZK connected quantity processes with direct analytics. Subjects with a high self-efficacy category there are students who are able to reach level 4 and there are students who are able to reach level 3. Subjects with moderate self-efficacy categories were only able to achieve level 3 of covariational reasoning ability, and subjects with moderately low self-efficacy categories were only able to achieve level 2 of covariational reasoning abilities.

Keywords: Covariational Reasoning; Graphs of Functions; Self-Efficacy.

1 Preliminary

Mathematics is a solid foundation, because there is no single branch of science that does not involve mathematics. This can be understood because in addition to the knowledge of mathematics itself, mathematics also provides language, processes, and theories that give science into a form and power (Ramdani, 2006). Mathematics is useful for other sciences such as chemistry, physics, architecture, pharmacy, geography and economics. This shows that mathematics is very important, so mathematics must be studied at every level of education.
The implementation of mathematics education in Indonesia is regulated in the curriculum. The curriculum mandates that one of the important aspects in mathematics learning is the development of students' reasoning abilities. Reasoning ability is considered important, but in fact the reasoning ability of students in Indonesia is still relatively low this is explained by the results of research conducted by TIMSS (Trend in International Mathematics and Science Study) in 2015 that Indonesia is ranked 43 out of 49 countries in reasoning ability (Frey, 2018).

Reasoning is a process of thinking activity to draw a conclusion in the form of knowledge based on information that has the value of truth so as to acquire a new knowledge. Adamura and Susanti (2018) define reasoning as the process of thinking in order to make a new statement true based on some statements whose truth has been proven or assumed before. According to Purbaningrum (2020) Reasoning is one of the mathematical power that must be possessed by students and is a mental process in developing the mind from several facts.

Mathematical reasoning skills are necessary either in understanding mathematics or in everyday life. In understanding mathematics the ability of mathematical reasoning is very important in understanding mathematical concepts or solving mathematical problems. Reasoning is needed to determine whether a mathematical argument is right or wrong to construct a mathematical argument (Kusumawardani et al., 2018). The importance of mathematical reasoning is also contained in Permendiknas Number 22 of 2006 on Standard Content of Mathematics Subjects. Based on research Sofyana & Kusuma (2018) said students who have mathematical reasoning skills will be easy in studying a problem faced with the information obtained.

One of the mathematical reasoning abilities is the ability of covariational reasoning. Covariational reasoning is a cognitive activity that coordinates the change of two different quantities that have a particular relationship or relationship by paying attention to the process of change. Carlson et al (2002) stated that "we define covariational reasoning to be the cognitive activities involved in coordinating two varying quantities while attending to the ways in which they change in relation to each other". Covariational reasoning refers more to the ability to form a picture of two varying quantities and coordinate their changes in relation to each other. Covariational reasoning also emphasizes more on the relationship between two structured quantities that can be expressed algebraically, visually in graphs, or in real situations (Sumarsida, 2018).

This covariational reasoning is very important for students because usually learning about the concept of function uses a correspondence approach that teaches students with the definition of theory only but with this covariational reasoning ability can make students better understand the concept of function so that it is not only pegged by theoretical definitions, so that when students face problems covariation students can solve them well.

The function of mathematics learning is the study that studies the relationship between two sets, namely domains and kodomain, so that members of x domains there is one pair with members of y kodomain. The concept of function is also inseparable from the phenomena that occur in our lives such as the relationship of distance and time, the number and price of goods, and many others (Istiqomah, 2015). The concept of function can be learned from a variety of different points of view. Such views can be influenced by different approaches in function learning (Umah, 2016).

One approach in the learning of function concepts is the correspondence approach and the covariation approach. The correspondence approach is based on the theoretical definition of a set, while the covariation approach refers to the ability to form a picture of two varying quantities and coordinate their changes in relation to each other. The covariation approach
emphasizes the expression of "relationships" between two structured quantities that can be expressed algebraically, visually in graphs, or in real-world situations (Umah, 2016). The covariation approach is not only limited to rules, procedural, but also provides experience of reasoning abilities.

Covariational reasoning ability is a result of learning or learning achievement and according to Januriastuti (2017) states that factors that affect student learning outcomes there are 2, namely internal factors and external factors for internal factors including intelligence level, learning motivation, physical condition and health of students, how to learn and self-efficacy. Self-efficacy is a belief in one's ability to organize, perform and accomplish work. Self-Efficacy is a person's belief in his ability to organize and implement an action to achieve the results set (Bandura, 2010). Self-efficacy is a person's view of his or her ability to organize and determine a job (Hendriana & Kadarisma, 2019).

Based on the above statement can be concluded that covariational reasoning is important for students because in understanding the concept of function is not enough if only through correspondence approach or understanding theoretically but also coupled with the approach of covariation and also considering the relationship between reasoning ability and self-efficacy then this research was conducted aimed to describe the ability of covariational reasoning of junior high school students in the Model function graphs based on self-efficacy.

2 Research Methods

This research is a type of research with a qualitative descriptive approach with case study research design. The data retrieval technique used in this study is using purposive sampling techniques. The subjects of this study were 8 students from 30 participants of SMP Negeri 2 KUNINGAN who represented the criteria for self-efficacy obtained from the 30 participants. The instruments used in this study are self-efficacy tests in the form of questionnaires, tests of covariational reasoning ability in the form of descriptions, interviews, and observations. The data analysis techniques used in this study are in the form of data reduction, presentation of data and withdrawal of conclusions. The test of the validity of the data used is the triangulation of the technique.

<table>
<thead>
<tr>
<th>Interval</th>
<th>Criteria</th>
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<tr>
<td>91-100</td>
<td>Very High</td>
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<tr>
<td>78-90</td>
<td>Quite High</td>
</tr>
<tr>
<td>65-77</td>
<td>High</td>
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<tr>
<td>52-64</td>
<td>Normal</td>
</tr>
<tr>
<td>39-51</td>
<td>Quite Low</td>
</tr>
<tr>
<td>26-38</td>
<td>Low</td>
</tr>
<tr>
<td>14-25</td>
<td>Very Low</td>
</tr>
</tbody>
</table>

Based on Table 1 explained that in determining the criteria of self-efficacy if the student's grades are at intervals 14-25 then it can be said to have very low self-efficacy, if it is at intervals 26-38 then it can be said to have low self-efficacy. If it is at intervals 65-77 then it can be said to have high self-efficacy, if it is at intervals 78-90 then it can be said to have a high enough self-efficacy, if it is at the interval of 91-100 then it can be said to have very high self-efficacy.
Figure 1 showed that of the 30 subjects studied, 6.67% of students had high self-efficacy, 76.67% of subjects who had high self-efficacy, 6.67% of students who had moderate self-efficacy, and 10% of students who had moderate self-efficacy. The subjects selected for observation and interview were only 8 students because in this study only got four categories of self-efficacy so it was taken 2 students with the highest grades from each category of self-efficacy.

Covariational Reasoning Abilities of Subjects with High Self-Efficacy

1. Subject MFTA

The subject has met levels 1 and level 2 because on the answer sheet MFTA students are able to label the axis then explain the relationship of the two variables and are able to construct a straight line that decreases and is strengthened in the explanation of the answer point b where the subject explains the direction of the graph down.
The subject has met level 3 because on the answer sheet MFTA students can determine the initial volume before the leak and after the leak and place that volume point on the graph then connect it to the line.

The subject has met level 4 because on the answer sheet MFTA students can determine the water coming out of the toren every second, and students are able to create or plan a coordinate point in detail. Then the subject creates a line segment.
The subject has reached level 5 because on the answer sheet MFTA students realize and explain that the volume of water will decrease until it finally stops coming out, and students make a turn line even though the turn line the subject makes is not smooth.

2. Subject ZK
The subject has met levels 1 and 2 because on the answer sheet the subject is able to label the axis then explain the relationship of both variables and the ZK subject is able to construct a descending line and is strengthened in the explanation of the answer point b where the subject explains the direction of the graph decreases.

The subject has met levels 3 and 4 because because ZK can know the initial volume before the leak and after the leak then place the volume point on the graph then connect it to the line and ZK can determine the water coming out of the toren every second, and are able to create or plan a coordinate point in detail. Then the subject creates a line segment.

The subject has met level 5 because the subject realizes and explains that the volume of water will decrease until it finally stops coming out, and the subject makes a turn line even though the turn line the subject makes is not smooth.
Covariational Reasoning Abilities of Subjects with Quite High Self-Efficacy

1. Subject EA

The subject has met levels 1 and 2 because on the answer sheet the subject is able to label the axis and explain the relationship of the two variables then the subject is able to construct a straight line that decreases and is strengthened in the explanation of the answer point b where the subject explains the direction of the graph decreases.

The subject has met levels 3 and 4 because the subject can tell the initial volume before the leak and after the leak then place the volume point on the graph then connect it to the line. The subject can determine the water coming out of the toren every second, and the subject is able to create or plan a coordinate point in detail. Then the subject creates a line segment.

Ea students do not meet on indicator 5 (AM5) because the subject does not make a turn line and the subject explains on the point b answer sheet that the water rate from start to stop...
leak is 116 liters per second. This indicates the absence of a change in the speed of water coming out from the beginning to the end of the leak.

2. Subject IRM

![Graph of water leak analysis]

The subject has met level 1 because on the answer sheet the subject is able to label the axis and explain the relationship of the two variables. The subject has met level 2 because the subject is able to construct a straight line that decreases and is strengthened in the explanation of the answer point b where the subject explains the direction of the graph decreases. The subject has met level 3 because the IRM student can tell the initial volume before the leak and after the leak and place that volume point on the graph then connect it to the line. The IRM subject did not meet indicator 4 (AM4) he was unable to calculate the amount of water coming out every second and had no awareness of the change in the speed of water coming out of the toren. so the subject does not meet on the 4th indicator of covariational reasoning ability.

Covariational Reasoning Abilities of Subjects with Normal Self-Efficacy

1. Subject ABW

![Graph of water leak analysis]

The subject has met levels 1 and 2 because on the answer sheet the subject is able to label the axis and explain the relationship of the two variables then the ABW subject is able to construct a straight line that decreases and is strengthened on the explanation of the answer point b where the subject describes the graph down.
The subject has met level 3 because the subject can tell the initial volume before the leak and after the leak and place that volume point on the graph then connect it to the line. The ABW subject did not meet indicator 4 (AM4) he was unable to calculate the amount of water coming out every second and had no awareness of the change in the speed of water coming out of the toren, so the subject does not meet on the 4th indicator of covariational reasoning ability.
2. Subject ET

The subject has been able to meet levels 1 and 2 because on the answer sheet the subject is able to label the axes and explain the relationship of the two variables then the subject is able to construct a straight line that decreases and is strengthened in the explanation of the answer point b where the subject explains the direction of the graph down.

The subject has been able to reach level 3 because the subject can tell the initial volume before the leak and after the leak and place that volume point on the graph then connect it to the line. The ET subject did not meet indicator 4 (AM4) he was unable to calculate the amount of water coming out every second and had no awareness of the change in the speed of water coming out of the toren, so the subject does not meet on the 4th indicator of covariational reasoning ability.
Covariational Reasoning Abilities of Subjects with Quite Low Self-Efficacy

1. Subject AHN

The subject has been able to meet levels 1 and level 2 because on the answer sheet the subject is able to label the axis and explain the relationship of the two variables then the subject is able to construct a straight line that decreases and is strengthened in the explanation of the answer point b where the subject explains the volume of water on the toren will decrease so that the direction of the graph drops down. The subject of AHN does not meet the indicator 3 (AM3) he is only able to calculate the initial volume and on the answer sheet he constructs a straight line intersecting with the x-axis this describes the subject assuming the water in the toren will run out, and the subject cannot calculate the water coming out every second.

2. Subject NTH

The subject has met levels 1 and level 2 because on the answer sheet the subject is able to label the axis and explain the relationship of the two variables then the subject is able to construct a straight line that decreases and is strengthened in the explanation of the answer point b where the subject explains that the direction of the graph is down. The NTH subject
does not meet the indicator 3 (AM3) he is only able to calculate the initial volume and on the answer sheet the subject yes constructs a straight line intersecting with the x-axis this describes the subject assuming the water in the toren will run out, and the subject cannot calculate the water coming out every second.

3 Discussion

The results of the self-efficacy test that there are 4 categories of self-efficacy include high self-efficacy, high self-efficacy, moderate self-efficacy, and self-efficacy is quite low, students who have high self-efficacy as many as 2 students (6.67%), students who have high self-efficacy as many as 23 students (76.67%), students who have moderate self-efficacy as many as 2 students (6.67%), and students who have low self-efficacy as many as 3 students (10%). Based on these percentages illustrate that students with high self-efficacy are most among other categories.

The results of the covariational reasoning ability test that there are students with level 5 covariational reasoning skills as many as 2 level 4 students as many as 1 student, level 3 as many as 7 students and level 2 as many as 2 students. Based on the exposure of the results of the test of covariational reasoning ability that there are subjects who are able to meet level 5 of covariational reasoning, this is in line with previous research conducted by Hidayanto et al. and also research conducted by Sandie & Desy Sufita that there are subjects who are able to reach level 5 covariational reasoning. But unlike the research conducted by Subanji (2006), Ifnanna Fitrotul Aadiati and Zeytun & Cetinkaya, where the subjects studied were only able to reach level 3 covariational reasoning abilities.

From the results of the study illustrates that there is a relationship between self-efficacy and covariational reasoning ability this is in line with the research of Audita Profitasari, Prasetyo Budi Darmono, and Isnaeni Maryam about the relationship of reasoning skills with self-efficacy, and in line with the research of Aprisal & Sartika Arifin that there is a relationship between mathematic covariational reasoning ability with self-efficacy because the reasoning ability of students in accordance with trust. themselves. Here is a discussion of subjects from all categories of self-efficacy found by researchers.

MFTA and ZK students with high self-efficacy are able to meet all indicators of covariational reasoning ability, both able to determine the initial volume and volume after the leak, then construct the graph downhill by making coordinate points of each change in the volume of water on the toren in detail, although in different ways then connect it to the line and make an inflection point on the graph it makes. MFTA and ZK students are also aware of the changes in water coming out of the toren, MFTA subjects connect the quantity process with analytical equations, it can be seen that the subject determines the water that comes out every second using straight line equations while ZK subjects connect the quantity process with direct analysis, it can be seen the subject in determining the water that comes out every second directly reduces the initial volume by the final volume then divides it by 13.

EA and IRM students with self-efficacy are quite high although in the same category but have different covariational reasoning abilities. EA student is able to meet 4 of 5 indicators of covariational reasoning ability, he is able to determine the initial volume and volume after the leak then construct the graph downhill by making a coordinate point of each change in the volume of water on the detailed toren then connecting it with a straight line. But the EA student was unaware of the change in the speed of the water coming out of the toren and did not create a turn line on the graph he made. For IRM students able to meet 3 of the 5
indicators of covariational reasoning ability, he was only able to determine the initial volume and volume after the leak then constructed the graph down by connecting the coordinate point of the initial volume with the volume after the leak. He does not determine the water that comes out every second, because of ignorance of how.

ABW and ET students with moderate self-efficacy are only able to meet 3 of the 5 indicators of covariational reasoning ability, both are only able to determine the initial volume and after the leak then construct the graph downhill by connecting the coordinate points of the volume. NTH and ANH subjects with low self-efficacy were only able to meet 2 of the 5 indicators of covariational reasoning ability, both of which only determine the initial volume then construct the graph down.

In this case it can be seen the subject linking quantities based on a discrete perspective (Clement, 1989; Johnson, 2012), and there are two thought processes that can be concluded, namely linking quantity processes with direct analytics and with equation analytics (Syarifuddin et al., 2020). In distinguishing the level of covariational reasoning ability, students with higher reasoning abilities were able to demonstrate an understanding of variations in quantity values. For example, students can understand the changes in water that come out continuously due to torn leaks and plan for changes in quantity by making the values of the water volume decrease and then making a turning line. This is in line with Thompson and Carlson (2017) saying that "To distinguish higher levels (e.g., smooth continuous variation) from lower levels (e.g., gross variation) of variational reasoning, students should demonstrate that they could conceive of variation in values of a quantity, rather than just a more general variation in some quantity". This means effective covariational reasoning for understanding function as a representation of relationships in dynamic problem situations where multiple quantities vary simultaneously (Carlson et al., 2002; Carlson, Smith, & Persson, 2003; Saldanha & Thompson, 1998; Thompson, 1994a, 1994b).

4 Conclusion

Based on the problem questions presented and the purpose of the research in Chapter I, the results and discussions in Chapter IV, obtained the following conclusions:

1. Results of self-efficacy analysis
   Based on the results of self-efficacy analysis, 30 participants obtained subjects with high self-efficacy as many as 2 students (6.67%), subjects with high self-efficacy as many as 23 students (76.67%), subjects with moderate self-efficacy as many as 2 students (6.67%) and subjects with moderate self-efficacy as much as 3 students (10%).

2. Analysis results in covariational reasoning ability
   Based on an analysis of covariational reasoning abilities from 4 categories of self-efficacy obtained:
   a) Students with high self-efficacy categories are able to meet all indicators of covariational reasoning ability so that it can be said that subjects with high self-efficacy categories have level 5 covariational reasoning abilities.
   b) Students with a high enough self-efficacy category are able to meet 3 of the 5 indicators of covariational reasoning ability and there are students able to meet 4 of 5 indicators of covariational reasoning ability.
   c) Students with the category of self-efficacy are being able to meet 3 of the 5 indicators of covariational reasoning ability so that it can be said that subjects with the category of self-efficacy are having level 3 covariational reasoning skills.
d) Students with a low enough self-efficacy category are able to meet 2 of the 5 indicators of covariational reasoning ability so that it can be said that subjects with a low enough self-efficacy category have level 2 covariational reasoning abilities.

5 Suggestion

Based on this study some suggestions can be written including the following:

a) For other researchers, if you want to do similar research to further increase the number of participants, doing internal validity this will make the validity more tested.

b) In pandemic conditions, to find research data must be really helped by teachers who work in the school, because the learning facilities of each student are different there are those who can follow online learning activities there are not.

c) For other researchers, if you want to do similar research to conduct covariational reasoning research on different materials.

References


Competitive Advantage of Mail & Package Courier Service Products Pt Pos Indonesia (Persero) Kuningan Post Office 45500

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Abstract. This study aims to determine the factors that influence competitive advantage in the mail and package courier service products of PT Pos Indonesia (Persero) Kantor Kuningan. In order to achieve this goal, the implementation of quantitative analysis methods with primary data sources in the form of respondents' answers and secondary data analysis sourced from PT Pos Indonesia (Persero) Kuningan Post Office in the form of data on the number of production of mail and package deliveries, financial reports, and reports on handling customer complaints. The population in this study were customers of the Kuningan Post Office users of mail and package delivery services. The sampling technique used was a statistical purposive sampling approach. Based on the results of data analysis and processing, there are results that the competitive advantage of the mail and package courier service products of PT Pos Indonesia (Persero) Kantor Kuningan in this study was formed based on the variables of product leadership, operational excellence, and customer intimacy and had a simultaneous and significant influence on competitive advantage.

Keywords: Service Product; Competitive Advantage; Customer Complaints

1 Introduction

Superior companies are companies that have a competitive advantage where these advantages are built by the existence of superior resources within the business organization. Seeing the fierce increasing competition between companies, companies should have a strategy to win the competition, namely by focusing on and relying on the basis of competitive advantage which includes three value disciplines including Product Leadership, Operational excellence, and customer intimacy. This will provide an advantage for a company compared to its competitors. (Treacy & Wiersema in Tjiptono 2008:210).

Courier service is one of the goods delivery activities that are carried out directly to move an item from one place to another, this service is quite an opportunity for business people. Currently, courier service actors have mushroomed starting from online and offline couriers, if you look at the history that the first courier service in Indonesia, which was founded in 1746 until now and faithfully serves the Indonesian people, is PT Pos Indonesia (Persero), which currently has has more than 4,400 service points spread throughout Indonesia, one of which is located in Kuningan Regency which provides mail and package delivery services with coverage throughout Indonesia.
The current condition of the courier service business is growing rapidly, the competitors of PT Pos Indonesia (Persero) including PT. Tiki Lintas Nugraha Ekakurir (better known as JNE), J&T Express, Sicepat, Tiki, Dakota, SAP Express, and other companies. Courier services exist in Indonesia which in terms of service quality offer mail and package delivery services with fast delivery times, competitive prices, and well-maintained shipment security and a guarantee for loss or damage. Diugwu (2011) states that the increasing number of companies that offer similar goods and services to consumers, the competition will increase, the increasing competition will actually provide benefits in the form of creating a company advantage compared to its competitors or competitive advantage.

Based on data collected over the last 4 years starting from January 2018 to September 2021, the revenue performance of sending letters and packages through the Kuningan Post Office is not so encouraging, this is in the accounting report for the performance of the Kuningan Post Office which explains in 2019 the performance mail and package delivery had revenue growth of 1.89% when compared to 2018, in 2020 the performance of mail and package delivery had a revenue growth of 5.45% when compared to 2019, and in 2020 the performance of mail and parcel delivery the package has a revenue growth of -24.85% SD data September 2021 when compared to 2020. According to CNBC Indonesia's records, logistics has become one of the industries that have contributed positively over the last 10 years with a growth range of 1-10% per year. This condition certainly needs to be carefully resolved so that the level of users of the Kuningan Post Office mail & package service can increase for the coming years.

Previous research conducted by Verveire et al. (2012) and Sinambela (2014) found that customer intimacy has a positive and significant effect on competitive advantage. Alan et.al., (2011), explained that operational excellence is one element of business excellence in conducting competition. Brown et.al., (2010) show that there is a relationship between good strategic processes and operational performance to achieve competitive advantage. Zubi et.al., (2016), The best service strategy is an implicit factor of operational excellence. In a study conducted by Chan et al. (2014) explains that product excellence and product innovation can provide the best performance for the company's sustainability to win the competition. Bellini et al (2018) The achievement of competitive advantage is influenced by product leadership factors, maintaining good relationships with customers, and good operational processes. That's what is able to make a business survive in a sustainable and profitable manner. Hartini et al (2013) stated that operational excellence is needed to achieve the best performance in the company.

The solution that can be done is to identify and evaluate factors internally and externally for users of mail and package delivery services in Kuningan Regency. However, this research is limited to research on internal factors in order to increase the competitive advantage of mail and package products at the Kuningan Post Office which is formed based on product leadership, operational excellence, and customer intimacy variables. Lopez-Santos et al. (2020) revealed that as a result of globalization, technological innovation and a chaotic business environment as well as dramatic competition cause actions and reactions between companies to occur quickly, therefore competitive advantage is very important to note.

This study aims to analyze the variables of product leadership, operational excellence, and customer intimacy as forming factors for competitive advantage. With this research, it is expected to be able to answer the company's needs to win the competition and be able to become a conceptual basis for company leaders, especially at the Kuningan Post Office.
2 Methodology

This study uses quantitative methods. Wollenschlager (2011) in quantitative research, researchers look for facts and phenomena, first developing hypotheses for use in certain populations and samples, collecting data using research instruments, statistical testing, and drawing general conclusions.

This research begins by analyzing data to identify and compose the variables of competitive advantage, product leadership, operational excellence, customer intimacy at the Kuningan Post Office courier service company. After the variables were identified and dimensions and indicators were obtained to measure the variables, it was continued by making a research questionnaire. Based on these results, the adjustment of variables and indicators was poured into a questionnaire questionnaire containing 20 question items with a measurement scale using a Likert scale: 1 = Strongly Disagree; 2 = Disagree; 3 = Doubtful; 4 = Agree and 5 = Strongly Agree. The measurement scale is then adapted into the descriptive analysis criteria table to make it easier to describe the research variables. The criteria in question are as follows:

<table>
<thead>
<tr>
<th>Category</th>
<th>Skor</th>
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<tbody>
<tr>
<td></td>
<td>1.00 – 1.79</td>
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<tr>
<td></td>
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<td>3.40 – 4.19</td>
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<td></td>
<td>4.20 – 5.00</td>
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This research is outlined in the form of a framework of thinking and hypotheses as shown in Figure 1.1 below:

![Diagram](image-url)
The research conducted by the author highlights the variables of Product Leadership (X1), Operational Excellence (X2), Customer Intimacy (X3), and Competitive Advantage as variables (Y), as well as their influence between these variables. It can be seen that there are 4 types of hypotheses used in this study. Based on theoretical studies, the research hypotheses are as follows:

a. Product Leadership against Competitive Advantage (X1 against Y)
   1. The null hypothesis (Ho): states that there is no significant effect between Product Leadership on Competitive Advantage.
   2. Working hypothesis (Ha): states that there is a significant influence between Product Leadership on Competitive Advantage.

b. Operational Excellence against Competitive Advantage (X2 against Y)
   1. The null hypothesis (Ho): states that there is no significant effect between Operational Excellence on Competitive Advantage.
   2. Working hypothesis (Ha): states that there is a significant effect between Operational Excellence on Competitive Advantage.

c. Customer Intimacy against Competitive Advantage (X2 against Y)
   1. The null hypothesis (Ho): states that there is no significant effect between Customer Intimacy on Competitive Advantage.
   2. Working hypothesis (Ha): states that there is a significant influence between Customer Intimacy on Competitive Advantage.

d. Product Leadership, Operational Excellence, Customer Intimacy against Competitive Advantage (X1, X2, X3 against Y)
   1. Zero hypothesis (Ho): simultaneously states that there is no significant effect between Product Leadership, Operational Excellence, Customer Intimacy on Competitive Advantage.
   2. Working hypothesis (Ha): Simultaneously states that there is a significant influence between Product Leadership, Operational Excellence, Customer Intimacy on Competitive Advantage.

The research population is all users of mail and package product courier services at the Kuningan Post Office, amounting to 2,837 active customers. The sampling technique used was purposive sampling. Sugiyono (2019:133) suggests that the purposive sampling technique is a sampling technique with certain considerations. The considerations used are samples taken from Kuningan Post Office customers who have used mail and package delivery service products more than 2 times. Ferdinand (2014) recommends that quantitative research with a proper number of samples is 100 people. So the number of samples used in this study were 100 respondents.

The data analysis technique in this study uses multiple linear regression analysis and path analysis with the help of the IBM SPSS 26 application. (Sugiyono, 2019:147) Multiple linear regression analysis is a linear relationship between two or more independent variables (X1, X2,....Xn) with the dependent variable (Y). This analysis is to determine the direction of the relationship between the independent variable and the dependent variable whether each independent variable is positively or negatively related and to predict the value of the dependent variable if the value of the independent variable increases or decreases. The data used is interval or ratio scale. Multiple linear regression equation as follows:
\[ Y' = a + b_1X_1 + b_2X_2 + b_3X_3 + \ldots + b_nX_n \]

**Information:**

- \( Y' \) = Variabel dependen
- \( X_1, X_2, X_3 \) = Variabel independen
- \( a \) = Konstanta
- \( b \) = Koefisien regresi

The design of hypothesis testing is used to determine the correlation of the four variables studied. Sugiyono (2017: 184) The stages in this hypothesis testing design begin with the determination of the null hypothesis (Ho) and the alternative hypothesis (Ha), the selection of statistical tests, the calculation of statistical values and the determination of the significant level. This hypothesis test includes Partial Hypothesis Testing (t-test) where the results of the t-count hypothesis are compared with t-table with the following conditions:

a. If \( t \text{ count} > t \text{ table at } 5\% \) then \( H_0 \) is rejected and \( Ha \) is accepted (influential)

b. If \( t \text{ count} < t \text{ table at } 5\% \) then \( H_0 \) is accepted and \( Ha \) is rejected (no effect)

Meanwhile, decision making based on probability or significance (sig) refers to the following provisions:

a. If the probability value (sig) > 0.05 then \( H_0 \) is rejected and \( Ha \) is accepted (significantly affected)

b. If the probability value (sig) < 0.05 then \( H_0 \) is accepted and \( Ha \) is rejected (no significant effect)

Simultaneous Hypothesis Testing (f test). The test compares f arithmetic with f table with the following conditions:

a. If \( f \text{ count} > f \text{ table} \) then \( Ho \) is rejected and \( Ha \) is accepted (influential)

b. If \( f \text{ count} < f \text{ table} \) then \( Ho \) is accepted and \( Ho \) is rejected (no effect)

Penetapan hipotesis nol (Ho) dan hipotesis alternatif (Ha) sebagai berikut:

**Ho:** \( \rho = 0 \) Product Leadership, Operational Excellence, Customer Intimacy affect Competitive Advantage.

**Ha:** \( \rho \neq 0 \) Product Leadership, Operational Excellence, Customer Intimacy have no effect on Competitive Advantage

### 3 Result and Discussion

Based on the data collected in this study, there were 100 respondents who gave statements in the questionnaire given by the researcher. The results of the description analysis of the product leadership, operational excellence, customer intimacy, and competitive advantage variables are as follows:
Diagram 1.2 shows that 25% of respondents give a 4-point assessment of the Product Leadership variable and if you compare it with the interpretation scale of the average score, that number is in the range of 3.40 - 4.19 or is in the good category.

Diagram 1.3 shows that 42% of respondents give a 4-point rating to the Operational Excellence variable and if you compare it with the interpretation scale of the average score, the number is in the range of 3.40 - 4.19 or is in the good category.
Diagram 1.4 shows that 25% of respondents give a 3 point assessment of the Customer Intimacy variable and if you compare it with the interpretation scale of the average score, that number is in the range of 2.60 - 3.39 or is in the sufficient category. The attention of the management of the Kuningan 4550 Post Office to be able to further foster good relations with customers who use mail and package courier services.

Diagram 1.5 shows that 26% of respondents gave an assessment of 3.60 points on the Competitive Advantage variable and if you compare it with the interpretation scale of the average score, the number is in the range 3.40 - 4.19 or is in the good category.
Furthermore, to answer the pre-determined hypothesis to determine the effect on the variables of product leadership, operational excellence, customer intimacy, and competitive advantage, the researcher conducted data analysis using multiple linear regression method and path analysis using the help of the IBM SPSS 26 application. The following:

<table>
<thead>
<tr>
<th>Table 1.2. Multiple Regression t Test Results (Coefficients*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
</tr>
<tr>
<td>--------------------</td>
</tr>
<tr>
<td>1 (Constant)</td>
</tr>
<tr>
<td>Product Leadership</td>
</tr>
<tr>
<td>Operational Excellence</td>
</tr>
<tr>
<td>Customer Intimacy</td>
</tr>
</tbody>
</table>

*a. Dependent Variable: Competitive Advantage*

Answering the hypothesis of the effect of the Product Leadership (X1) variable on Competitive Advantage (Y) there are t-test results based on Table 1.2, the t-test value is 0.863 and the significance level is 0.3902, it can be concluded that the t-count value < t table 0.863 < 1.660 and the probability value (sig) > 0.05 it can be concluded that the Product Leadership variable does not have a significant effect on Competitive Advantage.

Answering the hypothesis of the effect of the Operational Excellence (X2) variable on Competitive Advantage (Y) there are t-test results based on Table 1.2, the t-test value is 2.907 and the significance level is 0.005, so it can be concluded that the t-count value > t table 2.907 > 1.660 and the probability value (sig) < 0.05 it can be concluded that the Operational Excellence variable has a significant influence on Competitive Advantage.

Answering the hypothesis of the influence of the Customer Intimacy (X3) variable on Competitive Advantage (Y) there are t-test results based on Table 1.2, the t-test value is 3.828 and the significance level is 0.000, it can be concluded that the t-count value > t table 3.828 > 1.660 and the probability value (sig) < 0.05 it can be concluded that the Customer Intimacy variable has a significant influence on Competitive Advantage.

Answering the hypothesis of product leadership, operational excellence, customer intimacy on competitive advantage (X1, X2, X3 against Y) there are the following results:

<table>
<thead>
<tr>
<th>Table 1.3. Multiple Regression f Test Results (ANOVA*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
</tr>
<tr>
<td>--------------------</td>
</tr>
<tr>
<td>Regression</td>
</tr>
<tr>
<td>Residual</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

*a. Dependent Variable: Competitive Advantage
b. Predictors: (Constant), Customer Intimacy, Operational Excellence, Product Leadership*

Based on Table 1.3, the F test value is 50.324 and the significance level is 0.000, it can be concluded that the F value > F table 50.324 > 2.700 and the probability value (sig) < 0.05, it can be concluded that the product leadership, operational excellence, customer intimacy variables have an influence simultaneously and significantly on the competitive advantage variable (X1, X2, X3 simultaneous and significant effect on Y).
Table 1.4. Multiple Regression Test Results (Model Summary$^b$)

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.782$^a$</td>
<td>0.611</td>
<td>0.599</td>
<td>1.43842</td>
</tr>
</tbody>
</table>

$^a$ Predictors: (Constant), Customer Intimacy, Operational Excellence, Product Leadership

$^b$ Dependent Variable: Competitive Advantage

Based on table 1.4 the results of calculations using the SPSS program show that the coefficient of determination (R) is 0.782 and the value of R Square is 0.611, it can be explained that the competitive advantage variable is influenced by 61.10% by the product leadership, operational excellence variable, customer intimacy while the remaining 38.90% is influenced by other variables not examined in this study.

4 Conclusion

Based on the results of this study, it can be concluded that currently customers value operational excellence and customer intimacy variables more than product leadership variables when using mail and package service products, especially at the Kuningan Post Office. Leadership does not have a significant effect on Competitive Advantage, while the Operational Excellence and Customer Intimacy variables have a simultaneous and significant effect on Competitive Advantage. The results of further research explain that product leadership, operational excellence, customer intimacy variables simultaneously and significantly affect the competitive advantage variable by 61.10% while the remaining 38.90% is influenced by other factors not examined in this study.

Suggestions for the future, companies should pay more attention to and improve the performance of the Product Leadership variable indicator which currently does not have a partial and significant effect on the Competitive Advantage variable. If not taken seriously, it can certainly affect the competitive advantage of mail and package courier service products at the Kuningan Post Office. Competitive advantage can be achieved optimally when the variables of product leadership, operational excellence, customer intimacy can be achieved as well as possible.

References


The Analysis of the Mathematical Creative Thinking Process in Terms of Gender Based on Wallas' Theory

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Abstract. The purpose of this study is to find out the process of creative mathematical thinking skills in terms of gender based on Wallas’s Theory which has four steps such as preparation, incubation, illumination and verification. This study employed a qualitative descriptive approach. This study involved 6 students with 3 male students and 3 female students which have highest scores of creative thinking skill tests at SMA Negeri 3 Kuningan, the subject was chosen with purposive sampling technique. The instrument of this study was observation, interview, and documentation of test reports. The data analysis technique used was analyzing the instruments to draw conclusion. The data verification tested with time and technique triangulation. The study reveals that (1) The process of creative mathematical thinking skill of male students requires shorter time on preparation, tend to remain for a second on incubation for understanding and exploring the problem, figure out the ideas for solving the problem on illumination. However, the male student’s writings and explanations are undirected and unsystematic. On verification, the male students can be able to solve the problem with another way. However, when the harder questions are given to them, it took long enough time to finish. (2) The process of creative mathematical thinking skill of female students on preparation requires longer time to understanding the problem, however the female students can understand the problem effectively. On incubation, the female students also tend to remain for understanding and exploring the problem. However, the female students can explain and figure out the ideas to solve the problem systematically and understandably. On verification, the female students can also be able to solve the problem with another way. However, they can not figure out another way if the question is more difficult.

Keywords: Creative; Mathematical thinking skills; Gender; Wallas’s Theory

1 Introduction

Mathematics as a basic science plays an important role in the development of science and technology. Mathematics is one of the subjects taught at every type and level of education, both general education and vocational education, ranging from basic education to tertiary education. The purpose of studying mathematics is that students are expected to be able to think logically, analytically, critically and creatively and are expected to be able to solve all the problems they face, both problems related to mathematics lessons, and those related to everyday life. Creative
thinking is one of the abilities that must be developed through education in schools, one of which is in learning mathematics. This is in accordance with the objectives of learning mathematics, so that students have the ability to think logically, analytically, systematically, critically, and creatively, as well as the ability to work together. (Kemendikbud, 2006). Creative thinking is defined by Bart et al. (2015) as the ability to understand problems, make assumptions, generate new ideas, and communicate results. Kargar et al. (2013) thinking processes involve the ability to generate original ideas, to understand new and unexpected relationships, or to construct unique and improved orders between seemingly unrelated factors. Based on the opinion above, it can be concluded that creative thinking is an ability to understand new problems that have never been passed and deal with them with new ideas as well.

Anwar (2016) suggests that one of the factors that influence creative thinking is gender. In line with that Widyastuti et al. (2018) suggests that gender factors affect students' mathematical creative thinking skills. Based on research from Subarina (2013), "Gender is what distinguishes one individual from another". Gender is influenced by social and cultural factors from birth. Several studies show that the learning outcomes of male students are better than female students. This is in line with Wulandari (2011), who said that "weak women's ability to work on abstract problems, so they are considered weak and less able to learn mathematics".

A study conducted by Effendi et al (2017) about the creative thinking ability of junior high school students in solving statistical problems is still in the low category. Therefore, based on the results of observations and several other researchers, it can be concluded that students' creative thinking skills are low. Based on the results of observations made at SMAN 2

Kuningan in class XI MIPA 1 by giving questions on the material of transformation geometry with indicators of creative thinking fluency and flexibility there are differences between the thinking processes of men and women, although in terms of the results are the same but in the way they answer different. One of the answers from two students is shown in the following picture.

![Picture 1. Results of the preliminary study of female student](image)

Based on image 1 the answers of female students above are in the process of answering students' questions in the preparation, incubation, illumination and verification stages. The steps in the process of female students understanding the questions, making statements to make it easier to answer the questions given, linking the understanding of the previously known material and getting solutions to answer the questions.
Research Method

This study uses a qualitative research method with a descriptive approach. Sampling in this study was done by grouping according to gender. The subject of this research is aimed at the students of class XI MIPA 6 SMA Negeri 3 Kuningan which the number of students is 37 consisting of 29 female students and 8 male students. Subject selection by purposive sampling where the procedure for selecting subjects in this study by giving tests to all students of class XI MIPA 6 SMA. After obtaining valid question data, a test was conducted on 6 selected subjects, namely 3 men and 3 women who got the highest score on the test results of creative thinking indicator questions. The subjects in this study were class XI MIPA 6. The selection of subjects in this study took into account several criteria. Data collection techniques in this study include observation, creative thinking tests, interviews and documentation.
3.1. Test Result Subject BN (male)

Picture 3. BN answer Phase I

Picture 4. BN answer Phase II

Picture 5. BN answer Phase III
The creative thinking process of the BN subject (male) at the time of preparation, the subject can understand the problem by taking quite a while to understand the question, although sometimes the subject does not write down every step in a structured and systematic way, but the subject has a plan before taking action. This shows that the subject can look at the problem, identify the problem and formulate the problem well. This is in accordance with the opinion (Nurrahmah, 2015) that students with high abilities tend to be able to understand questions well in a short time. This is also in line with the opinion (Sari et al., 2017) which suggests that male students at the preparation stage of students identify the problems asked well, students choose the information needed and information that is not needed in solving problems correctly.

In the incubation stage, the subject stops for a moment, he tends to see, read and understand the questions, to remember the practice questions and formulas that he had previously received by moving his feet because doing so helps the brain's performance to think more easily, puts forward logic to solve problems. solve the problem. The silent expression of understanding the problem is the first step where the subject allows the mind to rest and moves the limbs intentionally or reflex movements are things that are done to try to come up with ideas. This is in accordance with the opinion (Amalia et al., 2015) which suggests that students at the incubation stage are the stage when students have the potential to come up with many ideas. (Sari et al., 2017) also suggested that students at the incubation stage are the stage when students develop a relationship between ideas and solutions from the ideas they have previously received.

In the illumination stage, the subject can find a solution to the problem and explain each step even though and in explaining the subject is good in delivering because he has good communication. This is in line with Saefudin (2012) who concluded that when applying ideas, students with high mathematical abilities did not make mistakes in solving problems, and felt challenged to solve problems in various ways and answers. (Arifin & Bharata, 2017) Also suggested that male students are very able to convey ideas and are able to communicate well what they have been doing.

The subject verification stage is able to apply other methods that are different from the way used by the teacher. This is in line with Saefudin (2012) that students who have high mathematical abilities are more creative, innovative, full of inspiration and unique ideas, but the subject does not re-examine the results of his answers, meaning that the subject is very confident in his work but lacks confidence in the results. this is in line (Asalah et al., 2018) by suggesting that male students who have high abilities are flexible in their lives, meaning that these students are not doing things sequentially, but they are good when given a teacher's question which he suddenly immediately works on.

Based on the explanation above, it can be concluded that there is a match between stage I and stage II and stage III. At the preparatory stage, the tendency of male students to quickly understand problems because male mathematical abilities are greater so that they quickly understand mathematical problems, students are also able to understand information related to explaining what is known and asked, but students sometimes write down what is asked on the answer sheet. Students can make plans first before solving a problem. At the incubation stage, students tend to stop in the process of working on them to explore questions and come up with ideas to solve related problems. At the Illumination stage students can find ideas correctly and correctly. At the verification stage students can apply other methods and the results are correct, but in doing so they do not have time to re-check the results of their answers.
3.2. Test Result Subject NL (male)

Picture 6. NL answer phase I

Picture 7. NL answer phase II
The creative thinking process of the NL subject (male) at the preparation stage can understand the problem by requiring quite a bit of time to understand the question, although sometimes the subject does not write down every step in a structured and systematic way, but the subject and has a plan before taking action. This shows that the subject can look at the problem, identify the problem and formulate the problem well. This is in accordance with the opinion (Nurrahmah, 2015) that students with high abilities tend to be able to understand questions well in a short time. This is also in line with the opinion (Sari et al., 2017) which suggests that male students at the preparation stage of students identify the problems asked well, students choose the information needed and information that is not needed in solving problems correctly.

In the incubation stage, the subject stops, he tends to see, read, understand the problem, and write down the formulas in advance so that when the working process does not forget the formulas and know the direction of solving the problem. Silent expressions, writing down formulas that the subject knows, understanding the matter of playing a pen and limbs tend to have a lot of movement, to remember the practice questions and formulas that he has received before are the first steps where the subject allows the mind to rest and try to come up with ideas. This is in accordance with the opinion (Amalia et al., 2015) which suggests that students at the incubation stage are the stage when students have the potential to come up with many ideas. However, in stage III (question 3) the subject did not stop for a moment, he tended to see, read and understand the problem, and immediately worked on the problem because the teacher had ordered him to come forward so that the learning was meaningful and easy. In line with that (Asalah et al., 2018) suggests that students with high mathematical abilities like to plan their work and work on plans that have been made previously.

In the illumination stage, the subject is able to find a solution to the problem and explain each step, although at the time of explaining the subject still stammers due to his low communication skills. This is in line with Saefudin (2012) who concluded that when applying ideas, students with high mathematical abilities did not make mistakes in solving problems, and felt challenged to solve problems in various ways and answers. Nugraha & Pujaistuti, (2019) also concluded that the overall mathematical communication ability of female students was higher than male students.

The verification stage of the subject is able to apply other methods but when given a question that is a little difficult and according to him it is strange to what he has found before,
the subject cannot apply other methods, meaning that the subject is lacking in developing his ideas, the subject re-examines the results of his answer, meaning that this subject is detailed in solving the problem, but less confident with the results of the answers at stage I (question 1). This is in line with suggesting (Arifin & Bharata, 2017) that male students finished working on the questions, male students checked and recalculated what they had done whether it was right or wrong, so that students were fairly thorough in working on the questions. male students tend to be less in developing their ideas.

Based on the explanation above, it can be concluded that there is a match between stage I and stage II and stage III. At the preparation stage students are quite fast in understanding the related questions, students are also able to understand and write down related information in a structured manner and tend to make plans first before solving a problem. However, in stage II (question 2), the subject is less fast in understanding the questions, he tends to understand more about the types of questions that use examples compared to story questions. At the incubation stage, students tend to stop for a moment to explore the problem by writing down formulas so that the process does not forget the formula and focus on the subject and try to solve the problems given. At the Illumination stage students are able to find solutions to problems but in explaining students are less clear because their language communication skills are lacking or students tend to be rigid. At the verification stage students are able to apply other methods, but when given questions that are a little difficult, students cannot apply other methods, meaning that students are lacking in developing their ideas, students re-examine the results of their answers, meaning that these students are detailed in solving problems and tend to feel confident with the results of their answers.

3.3. Test Result Subject IN (male)

![Picture 9. IN answer phase I](image-url)
The creative thinking process of the subject IN (male) at the preparation stage, the subject in understanding the problem tends to be quite long, but can look at the problem by re-explaining the problem given by using his own language, can mention what elements are known, understand what is being asked and have a plan before acting, this shows that the subject can examine the problem, identify the problem and formulate the problem well even though it requires extra understanding. This is also in line with the opinion of Wulantina, Kusmayadi, and Riyadi (2015) who concluded that students with high abilities at the student preparation stage identify the problems asked properly, students choose the information needed and information that is not needed in solving problems correctly.

In the incubation stage, the IN subject paused for a moment playing the question paper, placing his thumb on his chin. In addition, when working on questions, they tend to be more relaxed by listening to music to understand the questions and remember the formula for the questions. Silent expression, playing with paper and placing the thumb on the chin is the first step where the subject allows the mind to rest and try to come up with ideas. This is in accordance with the opinion (Amalia et al., 2015) which suggests that students at the incubation stage are the stage when students have the potential to come up with many ideas. In line with that (Sari et al., 2017) also suggests that students are in the incubation stage. This is the stage when students develop a relationship between ideas and solutions from the ideas that they have gotten before.
In the illumination stage, the subject is able to find a solution to the problem and explain each step, although at the time of explaining the subject still stammers due to his low communication skills. This is in line with Saefudin (2012) who concluded that when applying ideas, students with high mathematical abilities did not make mistakes in solving problems, and felt challenged to solve problems in various ways and answers. Nugraha & Pujiastuti (2019) also concluded that the overall mathematical communication ability of female students was higher than that of male students.

In the verification stage, the subject is able to apply other methods, but when he is given a question that is a little difficult and he thinks it is strange from what he has found before, the subject cannot apply another method, meaning that the subject is lacking in developing his ideas, but the subject does not re-examine the results of his answer, meaning that the subject is very confident. This is in line (Asalah et al., 2018) by suggesting that male students who have high abilities are flexible in their lives, meaning that these students in doing things are not sequential, but good. when given a teacher's question suddenly he immediately worked on it. Based on the explanation above, it can be concluded that there is a match between stage I and stage II and stage III. At the stage of preparation for old students in understanding related questions, students are also able to understand and write down related information in a structured manner and tend to make plans first before solving a problem. At the incubation stage students tend to buy time because the subject had stopped to refresh their brains by taking a long time after which students tried to solve the related problems. At the illumination stage students are able to find solutions to the problem with students being able to build problem solutions by explaining and finding solutions to related problems appropriately. At the verification stage students can apply other methods, but the subject does not re-examine the results of his answers, but is less confident with the results of his answers.

### 3.4. Test Result Subject SL (female)

**Picture 12. SL answer phase I**
It can be concluded that the creative thinking process of the subject who has the initials SL (female) in the preparation stage, the subject can understand the problem by taking quite a while to understand the problem, although sometimes the subject does not write down every step in a structured and systematic way, but the subject and has a plan beforehand before acting. This shows that the subject can look at the problem, identify the problem and formulate the problem well. This is in accordance with the opinion (Nurrahmah, 2015) that students with high abilities tend to be able to understand questions well in a short time. This is also in line with the opinion of Wulantina, Kusmayadi, and Riyadi (2015) who concluded that students with high abilities at the student preparation stage identify the problems asked properly, students choose the information needed and information that is not needed in solving problems correctly.

In the incubation stage, the SL subject did not have time to stop for stage I (question 1), the subject tended to immediately work on and explore it. Although in the thought process the subject usually plays with a pen/pencil or doodles in a book to make sure the steps in answering the question are correct, this is in line with that (Asalah et al., 2018) suggesting that students with high math skills like to plan. their work and work on pre-made plans. However, at stage
II (question 2) and stage III (question 3) the subject paused, the subject tended to be in the process of thinking usually by playing with pens/pencils or doodles in books, twirling pens or playing writing instruments, playing with fingers, tapping the pen to the forehead and trying to choose the right formula/method to be used in solving the problem. Silent expressions, playing with a pen/pencil and tapping the pen to the forehead are the first steps where the subject allows the mind to rest and try to come up with ideas. This is in accordance with the opinion (Amalia et al., 2015) which suggests that students at the incubation stage are the stage when students have the potential to come up with many ideas.

In the illumination stage, the subject of SL can find a solution to the problem and explain each step although and in explaining the subject is good in delivering because he has good communication. This is in line with Saefudin (2012) who concluded that when applying ideas, students with high mathematical abilities did not make mistakes in solving problems, and felt challenged to solve problems in various ways and answers. (Arifin & Bharata, 2017) Also stated that female students are very able to convey ideas and are able to communicate well what they have been doing. Both in the form of female students' writings that are fairly clear and the delivery of the subject when interviewed.

The subject verification stage is able to apply other methods that are different from the way used by the teacher. This is in line with Saefudin (2012) that students who have high math skills are more creative, innovative, full of inspiration and unique ideas. the subject re-examines the results of the answer, meaning that this subject is detailed in solving the problem but lacks confidence in the results of the answer. This is in line with the opinion (Arifin & Bharata, 2017) which suggests that female students check and recalculate what the female students have done whether it is right or wrong, so that the subject is fairly thorough in working on the questions.

Based on the explanation above, it can be concluded that the subject of SL, namely female students, has a match between stage I and stage II and stage III. At the preparatory stage, the subject tends to be quite quick to understand the problem because the subject has high mathematical ability so that he/she quickly understands mathematical problems, students are also able to understand information related to explaining what is known and asked, write down related information in a structured manner and tend to make plans before completing a problem. At the incubation stage, female subjects tend not to stop for a moment, she immediately works on the problem. At the illumination stage students are able to find solutions and explain related problems in a clear and structured manner. At the verification stage, students are able to apply other methods, the subject re-examines the results of his answers, meaning that the subject is detailed in solving a problem and the subject is less confident with the results of the answer.

3.5. Test Result Subject FA (female)
Picture 15. FA answer phase I

Picture 16. FA answer phase II

Picture 17. FA answer phase III
1) The creative thinking process of the subject who has the initials FA (female) at the preparation stage, the subject in understanding the problem tends to be quite long, but in stage II (question 2) the subject only reads 1 time to understand the question, can look at the problem by explaining back from the problem given using their own language, can state what elements are known and asked and have a plan before acting, and admit to having received this type of question while still in junior high school, this shows that the subject can look at problems, identify problems and formulate problems well. This is also in line with the opinion of Wulantina, Kusmayadi, and Riyadi (2015) who concluded that students with high abilities at the student preparation stage identify the problems asked properly, students choose the information needed and information that is not needed in solving problems correctly. In the incubation stage, the subject stopped for stage I (question 1) and stage III (question 3) the subject tended to stop for a moment silently looking at the question, put his hand on his chin and made scribbles in the book to remember the practice questions he had. Silent expression, putting a hand on the chin and making scribbles in a book are the first steps where the subject allows the mind to rest and try to come up with ideas. This is in accordance with the opinion (Amalia et al., 2015) which suggests that students at the incubation stage are the stage when students have the potential to come up with many ideas. However, the subject at stage II (question 2) did not have time to stop, the subject immediately worked on it and studied it, this is in line with that (Asalah et al., 2018) suggesting that students with high mathematical abilities like to plan their work and work on the plans that have been made.

In the illumination stage, the subject of SL can find a solution to the problem and explain each step although and in explaining the subject is good in delivering because he has good communication. This is in line with Saefudin (2012) who concluded that when applying ideas, students with high mathematical abilities did not make mistakes in solving problems, and felt challenged to solve problems in various ways and answers. (Arifin & Bharata, 2017) Also stated that female students are very able to convey ideas and are able to communicate well what they have been doing. Both in the form of female students' writings that are fairly clear and the delivery of the subject when interviewed.

The subject verification stage is able to apply other methods that are different from the way used by the teacher. This is in line with Saefudin (2012) that students who have high math skills are more creative, innovative, full of inspiration and unique ideas. the subject re-examines the results of the answer, meaning that this subject is detailed in solving the problem but lacks confidence in the results of the answer. This is in line with the opinion (Arifin & Bharata, 2017) which suggests that female students check and recalculate what the female students have done whether it is right or wrong, so that the subject is fairly thorough in working on the questions.

Based on the explanation above, it can be concluded that the subject of FA, namely female students, has a match between stage I and stage II and stage III. At the preparatory stage, the female subject tends to be old in understanding problems, is able to understand and write down related information in a structured manner and tends to make plans first before solving a problem. At the incubation stage, female subjects tend to stop for a moment to refresh their brains. At the illumination stage, the subject is able to find solutions and explain related problems in a clear and structured manner. At the verification stage students are able to apply other methods but when given questions that are a little difficult students cannot apply other methods, meaning that students are lacking in developing their ideas, the subject re-examines the results of their answers, meaning that students are detailed in solving a problem and students are less confident with the results of their answers.
3.6. Test Result Subject SN (female)

Picture 18. SN answer phase I

Picture 19. SN answer phase II

Picture 20. SN answer phase III
The creative thinking process of subjects who have the initials SN (female). In the preparatory stage, the subject in understanding the problem tends to be quite long, but can look at the problem by explaining again from the problem given by using his own language, being able to mention what elements are known, understand what is being asked and have a plan before acting, this shows that the subject can look at problems, identify problems and formulate problems well even though it requires extra understanding. This is also in line with the opinion of Wulantina, Kusmayadi, and Riyadi (2015) who concluded that students with high abilities at the student preparation stage identify the problems asked properly, students choose the information needed and information that is not needed in solving problems correctly.

In the incubation stage, the subject of SN paused to see and read the questions over and over again, playing with a pencil, moving his hands, holding his chin to remember the practice questions and formulas he had previously received. However, the subject works on and explores it, the subject tries hard to organize concepts or facts to find further ideas. Silent expressions, playing with a pencil and holding the chin are the first steps where the subject allows the mind to rest and try to come up with ideas. This is in accordance with the opinion (Amalia et al., 2015) which suggests that students at the incubation stage are the stage when students have the potential to come up with many ideas. In line with that (Sari et al., 2017) also suggests that students are in the incubation stage. This is the stage when students develop a relationship between ideas and solutions from the ideas that they have gotten before.

In the illumination stage, the subject of SN can find a solution to the problem and explain each step even though and in explaining the subject is good in the presenter because he has good communication. This is in line with Saefudin (2012) who concluded that when applying ideas, students with high mathematical abilities did not make mistakes in solving problems, and felt challenged to solve problems in various ways and answers. (Arifin & Bharata, 2017) Also stated that female students are very able to convey ideas and are able to communicate well what they have been doing. Both in the form of female students’ writings that are fairly clear and the delivery of the subject when interviewed.

The verification stage of the subject is able to not apply other methods when given a question that is a little difficult and according to him it is strange from what he has ever found, meaning that the subject is less in developing his ideas, the subject re-examines the results of his answer, meaning that this subject is detailed in solving the problem but lacks confidence in the results. The answer. This is in line with the opinion (Arifin & Bharata, 2017) which suggests that female students check and recalculate what the female students have done whether it is right or wrong, so that the subject is fairly thorough in working on the questions.

Based on the explanation above, it can be concluded that the subject of SN, namely female students, is in conformity between stage I and stage II and stage III. At the stage of preparation for old students in understanding related questions, students are also able to understand and write down related information in a structured manner and tend to make plans first before solving a problem. At the incubation stage students tend to buy time because the subject had stopped to refresh their brains by taking a long time after which students tried to solve the related problems. At the illumination stage students are able to find solutions to the problem with students being able to build problem solutions by explaining and finding solutions to related problems appropriately. At the verification stage students cannot apply other methods, and students also re-examine the results of their answers, but are less confident with the results of their answers.
4 Discussion

There is a not too significant difference between the creative thinking process of male subjects and female subjects based on Wallas theory. These differences at the preparation stage of male students in understanding the questions require quite a bit of time, while female students in understanding the questions take a long time, this is in line with the opinion of Ellot, et al (Suendang, 2017) that the mathematical ability of male students male students are greater than female students. In line with this (Nurrahmah, 2015) that high-ability students tend to be able to understand questions well in a short time. So it can be said that male subjects tend to be faster in understanding math problems than female subjects. male subjects did not write down what was known and asked on the answer sheet, while women wrote down what was known and asked in the answers, this is in line with the opinion of Susanti & Maharani (2016), this is because female students are more thorough and diligent in writing while men are lazy so that in writing is not structured, this is also in line with the opinion of Gallagher et al. (Zhu, 2007) that women are more likely to adhere to procedures learned in class to solve problems, so they are less likely to use shortcuts and estimation techniques to solve unfamiliar and complex problems quickly.

At the incubation stage, the subject tends to stop for a moment to understand and explore questions such as playing a pen, writing down formulas related to the problem, playing a question paper, putting his thumb on his chin, scribbling in a book to remember the practice questions that have been obtained, playing with his fingers, tapping the pen to the forehead and reading the question over and over again to understand the problem. This is in line with (Amalia et al., 2015) which suggests that students at the incubation stage are the stage when students have the potential to come up with many ideas.

At the illumination stage, the male subject was able to find and explain the solution idea but it was not sequential and not in accordance with the procedure and in explaining was still confused, while the female student was the opposite. This is in line with Saefudin (2012) who concluded that when applying ideas, students with high mathematical abilities did not make mistakes in solving problems, and felt challenged to solve problems in various ways and answers. (Arifin & Bharata, 2017) Also stated that female students are very able to convey ideas and are able to communicate well what they have been doing.

At the verification stage, male students cannot re-examine the results of their answers, this is in line (Asalah et al., 2018) by suggesting that male students who have high abilities are flexible in their lives, meaning that these students do not do something sequentially, but it is good when the teacher is given a question which he suddenly immediately starts working on. while female students re-examine the results of their answers. This is in line with the opinion (Arifin & Bharata, 2017) which suggests that female students check and recalculate what the female students have done whether it is right or wrong, so that the subject is fairly thorough in working on the questions.
5 Conclusion and Suggestion

   At the stage of preparation, the subject takes time to understand the problem because in reading, the subject immediately explores, writes down related information even though it does not write in a structured manner and tends to make plans before solving a problem. At the incubation stage, the subject tends to pause to understand and explore problems such as moving your feet, playing with a pen, writing down formulas related to the problem, playing question papers, putting your thumb on your chin and limbs tend to have a lot of movement to make them more relaxed in thinking. At the stage of illumination, the subject can find ideas for completion, but in writing it is not coherent and unsystematic and in explaining is still stammering. At the verification stage, the subject is able to apply other methods, but when given a question that is a little difficult, the subject takes a long time to apply another method, meaning that students are lacking in developing their ideas and the subject does not re-examine the results of the answer, because the subject feels confident in the process.

b. Creative Thinking Process of Female Subjects
   At the preparation stage the subject takes a long time to understand the problem but the subject is able to understand the problem, write down related information in a structured manner and tends to make plans first before solving a problem. At the incubation stage, the subject tends to stop for a moment to understand the problem, such as playing a pen/pencil or scribbling in a book to remember the practice questions that have been obtained, playing with fingers, tapping the pen to the forehead, holding the chin and reading questions over and over to understand. the matter. At the Illumination stage, the subject can explain and find the solution idea coherently from beginning to end and explain the solution to the problem correctly. At the verification stage, students are able to apply other methods, but when given questions that are a little difficult, students cannot apply other methods, meaning that the subject is lacking in developing ideas, the subject can re-examine the results of his answers by re-examining the completion steps in a coherent manner from beginning to end or matching. solutions between one way and another. This means that this student is detailed in solving.

1. Differences in Creative Thinking Processes in terms of Gender Based on Wallas Theory.
   The difference in the creative thinking process of male subjects and female subjects based on Wallas' theory is not very significant. These differences include: (1) At the preparation stage, male and female subjects understand the questions quickly, while female subjects take a long time to understand questions, (2) At the incubation stage, male and female subjects pause for a moment. to leave themselves from the problem by resting and contemplating, (3) At the Illumination stage, male subjects can find and explain the idea of a solution coherently but in explaining are still confused, while female students are the opposite. (4) the verification stage of male and female subjects sometimes feel confident with the results of their answers.

   There are several suggestions that can be submitted by researchers based on the results of research that has been done as follows:
1. Teachers must know and be aware of the differences in the creative thinking process of each of their students, both male and female. One way is to provide questions that stimulate students to think creatively or choose the right learning model, for example the student centered learning model so that students are more active and creative.

2. For researchers who want to conduct similar research related to the creative thinking process, this research can be used as input for conducting similar studies with the same point of view or other reviewing points of view and it is hoped that they can develop research, namely researching more subjects so that the results of the research can be obtained. better and wider in scope.

References


Phytochemical Analyses of Rosemary (*Rosmarinus Officinalis*) and Its Effects on the Growth of *Propionibacterium Acnes* in Mueller Hinton Broth (Mhb) Media

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**Abstract.** *Rosemary (Rosmarinus officinalis)* is a plant originating from the Mediterranean region and indicated as having antibacterial activity. The purpose of this study was to evaluate the potential phytochemical substances of *rosemary* in inhibiting the activity of *Propionibacterium acnes* bacteria using microdilution method and the identification of compounds that have activity as antibacterial use bioautography method. Every extract and fraction tested using microdilution method with a concentration of 1024 μg/mL against *Propionibacterium acnes*. Results showed that the extracts contain phytochemical substances known as alkaloids, flavonoids, saponin, phenol, and triterpenoids. The value of the minimum inhibitory concentration (MIC) against *Propionibacterium acne* bacteria contained in the ethyl acetate fraction with MIC 512 μg/ml. Thin layer chromatography (TLC) monitoring with silica gel stationary phase GF 254 and chloroform phase methanol was done in the proportion of 9:1. The antibacterial activity test by bioautography method showed that there were spots on chromatogram of TLC resulting in inhibition zone with Rf value of 0.2, and with the appearance of AlCl₃ showed patches of greenish yellow color in a λ366 nm UV lamp on the Rf. Presumably the antibacterial active compound for *Propionibacterium acne* from the ethyl acetate fraction is a flavonoid group compound. The result of non-parametric statistic test of Kruskal-Wallis followed by Post Hoc test of Mann Whitney obtained conclusion that there was no significant difference between control and ethyl acetate fraction at concentration of 512 acetate fraction at concentration of 512 μg/ml.

**Keywords:** *Rosmarinus officinalis*; phytochemicals *Propionibacterium acnes*; microdilution; minimum inhibitory concentration (MIC)

1 Introduction

Originally grown in Mediterranean, Rosemary (*Rosmarinus officinalis*) has been used traditionally as stimulant and mild analgesics. Raskovic *et al.* (2014) reported the uses of this plant to cure headache, circulation problems, menstrual cycle problem, and inflammation. One of bacteria that causes acne is *Propionibacterium* acnes, the anaerobic positive gram bacteria which is tolerant to the air (Brook, *et al.*, 2007). New study of Rosemary had been...
focused on antibacterial, antifungal, anticancer, antioxidant and insecticide (Jiang, et al., 2011).

Phytochemicals are natural substances derived from plants which worked against diseases or specifically protect ones from diseases (Singh, et al. 2014). The analyses of phytochemicals of rosemary therefore is necessary to be done to reveal their effects on the growth of *Propionibacterium acnes*.

The aims of this study were to analyze phytochemical substances in rosemary (*Rosmarinus officinalis*) extracts and to determine potential substances that inhibit the growth of *Propionibacterium acnes*. The hypothesis was stated as there is phytochemical compound of *Rosmarinus officinalis* that inhibits the growth of *Propionibacterium acnes*.

### 2 Methodology

This is an experimental qualitative study using rosemary extracts prepared from processes included extraction, maceration, filtration, and dilution. Fractionation yields three fractions (water fractions, ethyl acetate fractions, and n-hexane fractions. Experimental solutions was made based on (b/v) by diluting each thick extract in DMSO 1% solution (CLSI., 2009).

The next procedures are preparing Mueller Hinton Broth (MHB) media, McFarland 0.5 standard, and bacterial suspension. Positive tetracycline control was made by weighing 10.24 mg of tetracycline which ten be diluted in 1 ml DMSO and added by 4 ml aqua pro injection.

Phytochemical analyses were done for alkaloids, flavonoids, tannins, saponins, triterpenoids, steroids, and phenols. Antibacterial activity was tested for its minimum inhibitory concentration by using broth microdilution method (Swanson, 2003).

Data were collected and analyzed by using Kruskal Wallis Nonparametric test (Stephanie, 2014). After that, Post Hoc test Mann Whitney was used according to Lund and Lund (2018). The data then was processed by SPSS 23.0 for Windows (Stephanie, 2014).

### 3 Result and Discussion

<table>
<thead>
<tr>
<th>Table 1. Characterization of <em>Rosmarinus officinalis</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Characterization</td>
</tr>
<tr>
<td>Dried shrink</td>
</tr>
<tr>
<td>Water content</td>
</tr>
</tbody>
</table>

Water content determination is used to give minimum limitation of water content in samples. According to MMI standard, the water content should be less than 10% (Ministry of Health Dept. of the Republic of Indonesia, 1995). Water content measured in this study was less than 10%, therefore it is acceptable according to the standard of MMI. Dried shrink determination is used to know the number of water loss through evaporation.
Phytochemical screening (Farnsworth, 1966) was done to determine groups of substances in rosemary extracts. Extraction method was used by using maceration. Maceration was done using 96% of ethanol in 3X24 hour at room temperature. The filtrate then was evaporated at 50 °C using a rotary evaporator. This temperature is suitable to be used to avoid destruction or chemical modification of simplicial compounds. Based on the work of Intan et al. (2017), extraction conditions are important to maximize extraction yields and enrich the phenolic components. Several factors need to be considered when employing extraction techniques including the solvent types and ratios, extraction temperatures, extraction times, and solid to liquid ratios to ensure a complete extraction of the compounds of interest, while avoiding chemical modification (Intan et al., 2017).

Evaporation was done to yield thick extracts which then be weighed. Ethanol 96% was chosen for nontoxic property and for having boiling point which is lower than water. This leads to faster extraction. Ethanol has good extraction capability for almost all chemicals which has low molecular weight such as secondary metabolites (CLSI, 2009). Maceration was done for 3X24 hours at room temperature. The filtrate was evaporated using rotary evaporator at 50 °C, and finally redissolved in ethanol for further analyses. Thick extract as final products were then weighed. It can be seen that the extracts contain alkaloids, flavonoids, saponins, triterpenoids, and phenols.

Evaporation yields 16.5% *Rosmarinus officinalis* crude extracts, while fractions result is shown in Table 3 below.

**Table 2. Phytochemical screening in *Rosmarinus officinalis***

<table>
<thead>
<tr>
<th>Group of Substances</th>
<th>Results in Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaloids</td>
<td>+</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>+</td>
</tr>
<tr>
<td>Tannins</td>
<td>-</td>
</tr>
<tr>
<td>Saponins</td>
<td>+</td>
</tr>
<tr>
<td>Triterpenoids</td>
<td>-</td>
</tr>
<tr>
<td>Steroids</td>
<td>+</td>
</tr>
<tr>
<td>Phenols</td>
<td>+</td>
</tr>
</tbody>
</table>

Note:
+ : contains the tested substances
- : absents the tested substances

**Table 3. Fractions Results**

<table>
<thead>
<tr>
<th>Fractions</th>
<th>Results (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-Hexane</td>
<td>3,25</td>
</tr>
<tr>
<td>Ethyl Acetate</td>
<td>2,60</td>
</tr>
<tr>
<td>Water</td>
<td>21,54</td>
</tr>
</tbody>
</table>

The crude extract must be processed (by purification and fractionation). Fractionation was done by using liquid-liquid extract method (CLSI, 2009). The substances were separated based on their polarity. This was supported by the work of Letricia et al. (2013) that fractionation and purification is needed to analyze bioactive compounds in crude extracts of samples.
Antibacterial activity test was done using microdilution method. The concept of this method is based on the work of Jorgensen et al. (2011) which used two different laboratory standard tests to ensure that the antibiotics exceed standards for purity and effectiveness against bacteria. Broth microdilution method, the most popular method, is used because of its accuracy and clear results. Broth microdilution test involves the use of small volumes of broth dispensed in sterile microdilution plates with conical bottom wells. Each well should contain 0.1 ml of broth (Jorgensen et al., 2011).

Microdilution technique was used to determine minimum inhibitory concentration antibacterial in Rosmarinus officinalis extracts, n-hexane, ethyl acetate, and water fractions using antibiotics comparison, tetracycline, with its concentration of 1024 $\mu g/ml$. This was done on sterile microplates for each bacteria examined to avoid contamination among them. MHB media was used for its specific in bacterial isolation which increases aerobic bacterial growth or facultative organisms. This is supported by Sagar (2018) which stated that Mueller Hinton Broth is used for determining minimal inhibitory concentrations (MICs) of bacterial growth.

Table 4. Microdilution of Fractions

<table>
<thead>
<tr>
<th></th>
<th>K(−)</th>
<th>K(+)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
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<tr>
<td>4</td>
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<td>5</td>
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<td>6</td>
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<td>10</td>
<td></td>
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<tr>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- - + + + + + + + + + + + + A
- - + + + + + + + + + + + + B
- - + + + + + + + + - - - - C
- - + + + + + + + + - - - - D
- - + + + + + + + + + + + + E
- - + + + + + + + + + + + + F
- - + + - - - - - - - - - - G
- - + - - - - - - - - - - - - H
Mueller Hinton medium is recommended by FDA (FDA, 2001), World Health Organization and NCCLS for testing most commonly encountered aerobic and facultative anaerobic bacteria in food and clinical material. The medium shows good batch-to-batch reproducibility, it is low in sulfonamide, trimethoprim, and tetracycline inhibitors and yields satisfactory growth of most non-fastidious pathogens. Beef infusion and Casein provide nitrogenous compounds, vitamins, carbon, sulphur and amino acids in Mueller Hinton media. Starch is added to absorb any toxic metabolites produced. This method was supported by Mário et al. (2017) that broth microdilution is a method currently available for the identification and antimicrobial susceptibility testing.

<table>
<thead>
<tr>
<th>Fraction</th>
<th>MIC (µg/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-heksan</td>
<td>&gt; 1024</td>
</tr>
<tr>
<td>Etil asetat</td>
<td>512</td>
</tr>
<tr>
<td>Water</td>
<td>&gt; 1024</td>
</tr>
</tbody>
</table>

Note: MIC: Minimum Inhibitory Concentration

The results of antibacterial test by microdilution method showed that rosemary extracts have minimum inhibitory concentration of 512 µg/ml towards Propionibacterium acnes. MHB has been endorsed by the Clinical and Laboratory Standards Institute (CLSI), the global nonprofit organization that ensures quality in healthcare testing, as the appropriate media for routine bacterial antibiotic susceptibility determination, with updated cutoff standards (CLSI, 2015; Victor, 2017).

After testing antibacterial activity, bioautography test was followed to predict substances in the fraction extracts. Observation to identify substances in the rosemary extracts and the fractions (Rozman and Jersék, 2009) was done initially to stick a plate on an agar surface using stationary phase of silica gel GF254 and moving chloroform-methanol ratio of 9:1.
Antibacterial activity test using bioautography; A: Rosemary extracts; B: Ethyl acetate fractions

The result shows that ethyl acetate fraction has antibacterial activity for Propionibacterium acnes. Rf value in clear zone of ethyl acetate fractions toward the bacteria is 0.2. This Rf value then was matched with ethyl acetate observation using Thin Layer Chromatography (TLC) method, continued by spot identification using 10% of H2SO4 in methanol, 10% of FeCl3 and 5% of AlCl3 as spots viewer. This was done to determine the active substances as antibacterial from the fractions. 10% of H2SO4 is used as universal spot viewer that can show all components of substances. By using 5% of AlCl3 under UV rays of λ 366 nm it can be seen that the spots fluorescens in yellow-green color which shows the flavonoids content. Meanwhile, the plate that has been sprayed by 10% of FeCl3 shows black spots that indicate phenolic compounds.

The Rf values from bioautography is then compared with Rf values from the observations and spot viewer spraying. Active compounds on ethyl acetate fractions towards Propionibacterium acnes have an Rf value of 0.2 and is almost similar with compound spots which is positive to AlCl3. From the results it can be determined that the antibacterial active compounds toward Propionibacterium acnes in ethyl acetate fractions is flavonoids (Yang, et al., 2009). Secondary metabolites activity such as flavonoids, tannins, alkaloids, terpenoids
and phenolic compounds have antibacterial activities toward gram positive bacteria (Cushine and Lamb, 2005).

Table 6. Kruskal-Wallis Test Result

<table>
<thead>
<tr>
<th>Test Statistics&lt;sup&gt;a,b&lt;/sup&gt;</th>
<th>konsentrasi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>6.136</td>
</tr>
<tr>
<td>df</td>
<td>2</td>
</tr>
<tr>
<td>Asymp. Sig.</td>
<td>.047</td>
</tr>
</tbody>
</table>

Non-parametric test of Kruskal-Wallis in Table 5 has done to determine if there are statistically significant differences between two or more groups of an independent variable on continuous or ordinal dependent variable. It can be seen from Table 5 that non-parametric statistical test reveals p value of 0.047 (p<0.05). This means that there is a significant difference among three groups of fractions obtained from rosemary extracts.

Table 7. Mann-Whitney Post Hoc Test Result

<table>
<thead>
<tr>
<th>Test Statistics&lt;sup&gt;a&lt;/sup&gt;</th>
<th>konsentrasi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann-Whitney U</td>
<td>.000</td>
</tr>
<tr>
<td>Wilcoxon W</td>
<td>1.000</td>
</tr>
<tr>
<td>Z</td>
<td>-1.225</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.221</td>
</tr>
<tr>
<td>Exact Sig. [2*(1-tailed Sig.)]</td>
<td>.667&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Mann Whitney post hoc test in Table 6 has done. The test is used to compare whether there is a difference in the dependent variable for two independent groups. Table 6 shows Asymp. sig. 0.221 (> 0.05). This means that there is no significant difference between ethyl acetate fractions and control in minimum inhibitory concentration of 512 μg/ml. The fact that ethyl acetate is able to control bacterial growth is supported by Jean et al (2012) which clearly mentioned that the ethyl acetate extract possesses antioxidant and antimicrobial principles. These results provide promising baseline information for the potential use of rosemary extracts in the treatment of infections associated with the studied microorganisms.

4 Conclusion

It can be concluded from the study that:

1. *Rosmarinus officinalis* extracts have capability to inhibit *Propionibacterium acnes*. This inhibitory was found in ethyl acetate fractions with minimum inhibitory concentration is 512μg/ml.
2. Bioautography of ethyl acetate actively inhibits *Propionibacterium acnes* with stationary phase of silica gel G F254 and moving phase of chloroform-methanol.
with Rf value of 0.2 on spots viewer of AlCl3. It can be assumed that active antibacterial phytochemical compounds toward ethyl acetate fractions are flavonoids.

References


The Effect of Snake and Ladder Media on Students's Understanding of Mathematical Concepts

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Abstract. The problem behind this research is the low ability to understand mathematical concepts of students at SD Negeri 1 Karangmangu, Kramatmulya District, Kuningan Regency. This is indicated by the number of students who have not reached the KKM. This study aims to determine the differences and increase in students’ ability to understand mathematical concepts between students who use snakes and ladders media (experimental class) and classes that use picture media (control class). This research method uses a quasi-experimental design with non-equivalent control group design. The variable of this research is the variable X of the snake and ladder media and the variable Y is the understanding of mathematical concepts. The subjects in this study were the fifth grade students of SD Negeri 1. Karangmangu, totaling 26 students. The data collection in this study was a test in the form of an essay. The results showed that there were differences in students' understanding of mathematical concepts in the experimental class using snakes and ladders media and the control class using image media. And there is an increase (gain) understanding of students' mathematical concepts in the experimental class using snakes and ladders educational media and the control class using image learning media. This is shown from the results of hypothesis testing Tcount > Ttable. This shows that the snake and ladder media has an effect on students' understanding of mathematical concepts. The main suggestion is for teachers to use game-based media so that students are more motivated to learn mathematics. One of the media used is the snake and ladder media. The results showed that there were differences in students' understanding of mathematical concepts in the experimental class using snakes and ladders media and the control class using image media. And there is an increase in students' understanding of mathematical concepts in the experimental class using snakes and ladders education media and the control class using image learning media. This is shown from the results of hypothesis testing Tcount > Ttable. This shows that the snake and ladder media has an effect on students' understanding of mathematical concepts. The main suggestion is for teachers to use game-based media so that students are more motivated to learn mathematics. One of the media used is the snake and ladder media.

Keywords: Snakes and Ladders Media; Understanding of Mathematical Concepts; Mathematics
1 Introduction

Mathematics as one of the fields of study taught in formal educational institutions is an important part of efforts to improve the quality of education. Mathematics is a subject that deals with many concepts. Concepts in mathematics are related to one another. The interrelationships between one material concept and another are evidence of the importance of understanding mathematical concepts.

But in reality, it shows that students' understanding of concepts is still very low. This is because there are still many students' assumptions that are less positive about mathematics according to Achmad Gilang Fahrudin (Widari, 2013: 190). Understanding the concept is a very important part in learning mathematics, because with a mature understanding, students can solve a problem and are able to apply the learning to the real world. F. Widodo (2014) explains that concept understanding is the ability to understand abstract ideas and basic objects that students learn and associate relevant mathematical notations and symbols with mathematical ideas and then combine them into a series of logical reasoning. Based on cognitive learning theory, learning with understanding is more permanent and more likely to be transferred, compared to learning using formulas. The continuous learning process and student attitudes like this in learning mathematics have an impact on student learning outcomes.

Difficulties in mathematics tend to be the same, students find it difficult to remember and understand the teacher's explanations, so the teacher often repeats the explanation so that students who have difficulty learning mathematics can understand the material. Factors that influence the difficulty of learning mathematics shown by students with learning difficulties include low interest and motivation in learning mathematics. The low interest and motivation of students can be seen from students who think that mathematics is a difficult subject to learn. Students are also not active in participating in the mathematics learning process given by the teacher. Students often do not pay attention to the teacher when the teacher explains the material, draws, and is busy by himself. Another factor is the family that has not been optimally supported, which is characterized by not teaching or involving children in extra hours. The busyness of parents also results in a lack of attention and supervision from parents. In addition, the lack of mathematics learning media used by teachers makes it more difficult for students to learn mathematics. (Widya Officer, 2017).

The results of interviews that have been conducted in class V SD Negeri 1 Karangmangu that the main problem is that students lack understanding of students' concepts in solving problems given by the teacher, besides that the learning media used is less varied so that it affects student learning.

<table>
<thead>
<tr>
<th>Class</th>
<th>The number of students</th>
<th>KKM &lt;73</th>
<th>%</th>
<th>KKM &gt;73</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>15</td>
<td>8</td>
<td>53%</td>
<td>7</td>
<td>47%</td>
</tr>
</tbody>
</table>
Based on the table above shows the low learning outcomes of fifth grade students at SD Negeri 1 Karangmangu 15 fifth grade students, 8 students or 53% have not reached the Minimum Completeness Criteria (KKM) and as many as 7 students or 47% have reached the Minimum Completeness Criteria (KKM). While at SD Negeri Cikaso, out of 11 students, 6 students or 54% of students have not reached the Minimum Completeness Criteria (KKM) and as many as 5 students or 46% have reached the Minimum Completeness Criteria (KKM).

The above is due to several factors, one of which is that students have difficulty understanding a concept that makes it difficult for students to understand the material and solve problems given by the teacher.

To overcome this problem, the researchers chose to use interactive and interesting learning media in the form of board games that were adapted to the material and needs of students. By using the media, students will more easily understand the concepts being studied, because learning involves physically and mentally with activities of seeing, touching, and manipulating teaching aids with the characteristics of elementary school students who have a strong curiosity and are interested in exploring the situation around them by using the media. feelings of pleasure and joy. As explained by Joni Purwono, et al (2014) mentioning that learning media has an important role in supporting the quality of the teaching and learning process, the media can also make lessons more interesting and fun.

One of the media used by researchers is snake ladder education media. Setiawan E, et al (Melsi, 2015: 10) Snakes and Ladders is a board game for children played by 2 or more people. The game board is divided into small squares and in some of the boxes are drawn a number of "ladders" or "snakes" that connect with other squares.

Snakes and ladders education media is expected to be useful to help improve students' understanding of concepts. Snakes and ladders game products are able to actively involve at least the senses of sight and hearing and explore the cognitive and competence side of children, namely through text, images and sounds so that they attract children's attention to continue the game. (Syumarlin, 2013).

The purpose of this game of snakes and ladders is to provide learning motivation to students so that they always study or repeat the material that has been previously studied which will later be tested through games so that it feels fun for students.

With snake and ladder educational media students can play while learning, besides that it can stimulate the development of students' thinking power, and students are trained to learn to work together with their friends.

So it is hoped that the use of snakes and ladders media can help students in solving problems in identifying building material.

Snakes and ladders game is a game that is liked by elementary school students. Learning mathematics with snakes and ladders games can motivate students to continue learning to develop their abilities by actively involving students in learning, and also with snakes and ladders games students are able to understand the concepts of mathematics well. Learning by playing can provide opportunities for students to explore, find out for themselves, practice and get countless various concepts and understandings, this is where the learning process occurs, the teacher is not only limited to transferring knowledge but also guiding students to be skilled in finding knowledge concepts with their own experience. through an inspiring and fun learning atmosphere.

As stated by the results of research conducted by Rahina (2017) which states that learning media in the form of a snake and ladder game is an effective medium to increase students’
absorption and understanding. Then also the results of a study conducted by Putri ZF, (2017) which states that learning mathematics with the snake and ladder game media can motivate students to continue learning to develop their abilities by actively involving students in learning.

2 Research Methods

The type of experimental research method used is quasi-experimental or quasi-experimental which is an experimental method that does not allow researchers to fully control the variables and experimental conditions. According to Sugiyono (2017: 114) Quasi Experimental research can be interpreted as a research method used to find the effect of certain treatments on others in uncontrolled conditions (as is).

The research design used in this study is the experimental design "Non-equivalent control group (comparison group/pretest-posttest) design". The pretest aims to determine the students' initial ability to understand mathematical concepts, while the posttest aims to determine the level of understanding of students' mathematical concepts after using snake and ladder educational media. The research design can be described as follows:

<table>
<thead>
<tr>
<th>Table 2. Research design Non Equivalent Control Group Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>B</td>
</tr>
</tbody>
</table>

2.1. Place and Time of Research

This research was conducted at SD Negeri 1 Karangmangu which is located at Jalan Karangmangu Village, Kramatmulya District, Kuningan Regency, even semester, April 2020/2021 academic year with the material of building space. The time and research activities can be seen in the table below:

2.2. Research Subject

This research was conducted at SD Negeri 1 Karangmangu, Kramatmulya District, Kuningan Regency. The subjects to be studied were all fifth grade students of SD Negeri 1 Karangmangu as group A and class V of SD Negeri Cikaso as group B. For group A at SD Negeri 1 Karangmangu and Group B at SD Negeri Cikaso. In this study, no sampling technique was used because the sample studied was the entirety of the existing population or called a census. Because the total population is only 26 students from 2 classes. Group A amounted to 15 students who received treatment using snake ladder educational media as an experimental class, and group B totaling 11 students did not use snake ladder education media as a control class.
2.3. Research Variable

Research variable is an attribute, nature or value of people, objects or activities that have certain variations that are determined by researchers to be studied and then conclusions are drawn. This study consisted of one independent variable (Independent Variable) namely the snake and ladder educational game and one dependent variable (Dependent Variable) namely students' understanding of mathematical concepts (Y).

2.4. Data Collection Technique

According to Arikunto (2015: 56) the test is to suggest that the test is a tool or procedure used to find out or measure something in learning, with the methods and rules that have been determined. The test aims to determine the extent of students' abilities in the initial test or before treatment, as well as to determine the ability of students after treatment. The test technique used in this research is a description test of 20 questions that can be used to measure students' understanding of mathematical concepts. The test in this study was conducted twice, namely: pretest and posttest.

1. Pretest is a test that is given before giving treatment. The pretest was carried out with the aim of knowing the initial abilities possessed by students before being given treatment. The data obtained from this pretest is data on the initial ability to understand mathematical concepts before using snakes and ladders educational media.

2. Posttest is a test that is given after the end of the treatment. The posttest aims to determine the students' understanding of mathematical concepts after using the snake and ladder educational media.

3 Research Result

3.1. Description of Initial Ability (Pretest)

The pretest (initial test) was carried out at the beginning of learning which was used as a measuring tool to know the understanding of the concept of fifth grade students at SD Negeri 1. Karangmangu. This is done to see students' understanding before the learning process by using snake and ladder media. From the results of the pretest (initial test) the experimental class and the control class obtained the following data:

<table>
<thead>
<tr>
<th>Class</th>
<th>N</th>
<th>Total Value</th>
<th>Min Value</th>
<th>Max Value</th>
<th>Average</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>15</td>
<td>504</td>
<td>25</td>
<td>40</td>
<td>33.6</td>
<td>4.33</td>
</tr>
<tr>
<td>Control</td>
<td>11</td>
<td>383</td>
<td>30</td>
<td>40</td>
<td>34.81</td>
<td>3.91</td>
</tr>
</tbody>
</table>

Table 3. Pretest Experiment Class and Control Class
3.2. **Final Ability Description (Posttest)**

After the learning process was carried out in the experimental class using snakes and ladders media and the control class with picture media, a final test (Posttest) was carried out to determine whether there was an effect of the treatment given on the students' conceptual understanding. From the posttest results for the experimental class and the control class, the following data were obtained:

<table>
<thead>
<tr>
<th>Class</th>
<th>N</th>
<th>Total Value</th>
<th>Min Value</th>
<th>Max Value</th>
<th>Average</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>15</td>
<td>1053</td>
<td>62</td>
<td>83</td>
<td>70.2</td>
<td>7.29</td>
</tr>
<tr>
<td>Control</td>
<td>11</td>
<td>504</td>
<td>40</td>
<td>52</td>
<td>45.82</td>
<td>4.95</td>
</tr>
</tbody>
</table>

3.3. **Description of Gain**

The calculation of the gain test was carried out to determine the increase in students' conceptual understanding by using snake and ladder media in the experimental class and
drawing media in the control class. The following table contains a description of the gain of the experimental class and the control class:

### Table 5. Gain of Experiment Class and Control Class

<table>
<thead>
<tr>
<th>Class</th>
<th>Pretest</th>
<th>Posttest</th>
<th>N-gain</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>33.6</td>
<td>70.2</td>
<td>0.55</td>
<td>Currently</td>
</tr>
<tr>
<td>Control</td>
<td>34.81</td>
<td>45.82</td>
<td>0.17</td>
<td>Low</td>
</tr>
</tbody>
</table>

![GAIN](image)

**Figure 3.** Experiment Class and Control Class Gain Results

### 3.4. Research Result Data Analysis

This research was conducted at SD Negeri 1 Karangmangu, Kuningan District, Kuningan Regency. This research was conducted by conducting the learning process in two classes, namely group A and group B. Group A was an experimental class that was treated with snakes and ladders media and group B was a class that was treated with image media. After getting the results of the pre-test (initial test) and post-test (final test) from the experimental class and the control class. Furthermore, data analysis is carried out with the following steps: Normality test.

The normality test for the distribution of the experimental class and control class data is calculated using the Chi-Square test which is presented in table 6 below:

### Table 6. Pretest and Posttest Data Normality Test Results

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Experiment Pretest</th>
<th>Posttest</th>
<th>Control Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>33.6</td>
<td>70.2</td>
<td>34.81</td>
<td>45.82</td>
</tr>
<tr>
<td>elementary school</td>
<td>4.33</td>
<td>7.29</td>
<td>3.91</td>
<td>4.95</td>
</tr>
<tr>
<td>X²count</td>
<td>4,853</td>
<td>4,403</td>
<td>1,821</td>
<td>5,441</td>
</tr>
</tbody>
</table>
x²table           | 5,991              |          |                 |          |
Based on the results of the normality test calculation, it is known that $X^2_{\text{count}} < X^2_{\text{table}} = 0.05$. This means that the pretest and posttest data in the experimental class and control class are normally distributed.

### 3.5. Homogeneity Test (F Test)

Homogeneity test was conducted to determine whether the data obtained from the two groups had homogeneous variance or not. The results of the homogeneity test of the pretest and posttest of the two groups can be seen in table 7.

**Table 7. Results of Homogeneity Test of Pretest and Posttest Data**

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Experiment</td>
<td>Control</td>
</tr>
<tr>
<td>variance</td>
<td>18.75</td>
<td>15.29</td>
</tr>
<tr>
<td>$F_{\text{count}}$</td>
<td>1.23</td>
<td>2.19</td>
</tr>
<tr>
<td>$F_{\text{table}}$</td>
<td>4.26</td>
<td>4.26</td>
</tr>
<tr>
<td>$n_1$</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>$n_2$</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td><strong>Ket</strong></td>
<td><strong>HOMOGENEOUS</strong></td>
<td><strong>HOMOGENEOUS</strong></td>
</tr>
</tbody>
</table>

Based on the results of the calculation of the homogeneity test using the F test, it is obtained that $F_{\text{count}} < F_{\text{table}}$. From the calculation results, it is obtained that the pretest $F_{\text{count}}$ is 1.23, while the $F_{\text{count}}$ Posttest is 2.19. This means that $F_{\text{count}} < F_{\text{table}}$ means the value of the experimental class and control class is homogeneous.

### 3.6. Hypothesis testing

**T-Test Final Test (Posttest) Experiment Class and Control Class**

**Table 8. Hypothesis Test Results Final Test (Posttest)**

<table>
<thead>
<tr>
<th>Class</th>
<th>The number of students</th>
<th>Average</th>
<th>Variance</th>
<th>$t_{\text{count}}$</th>
<th>$t_{\text{table}}$</th>
<th>Note.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>15</td>
<td>71.67</td>
<td>53.09</td>
<td>14.01</td>
<td>1.71</td>
<td>$H_0$ rejected</td>
</tr>
<tr>
<td>Control</td>
<td>11</td>
<td>45.64</td>
<td>24.54</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From the calculation results obtained $t_{\text{count}} = 14.01$ while $a = 0.05$ and $d_b = 24$, obtained $t_{\text{table}} = t_{0.05(24)} = 1.71$, so $t_{\text{count}} (14.01) > t_{\text{table}} (1.71)$ and it can be said that $H_0$ is rejected. It can be concluded that there are differences in students' understanding of concepts between students who get snakes and ladders media and students who get picture media.
4 Discussion

This study started from giving pretest questions to the experimental class and the control class. The results of the initial ability test for the experimental class were obtained with a total score of 504 with an average value of 33.6 with the lowest score of 25 and the highest score of 40. While the test results initial ability for the control class with a total of 383 with an average score of 34.81 with the lowest score of 30 and the highest score of 40.

After giving the pretest questions, then giving treatment or material to the experimental and control classes, giving this treatment 3 times in meetings for the two classes. Furthermore, the researcher gave a final ability test (posttest) to the experimental class and control class, for the experimental class a total score of 1053 was obtained with an average value of 70.2 with the lowest score of 60 and the highest score of 83. While the results of the final ability test of the control class obtained a total score of 504 with an average score of 45.82 with the lowest score of 40 and the highest score of 52.

From these data, normality test was carried out in the experimental class and the control class. For the results of the initial ability test (pretest) of 4.853 and 4.403. This value is smaller than the $x^2$ table at $a = 0.05$ which is 5.991 so it can be said that the pretest data in the two research groups are normally distributed. While the results of the final ability test (posttest) were 1.821 and 5.441. This value is smaller than the value of $x^2$ table at $a = 0.05$, which is 5.991 so it can be said that the final ability test data (posttest) in the two research groups is normally distributed.

Furthermore, the results of the homogeneity test for the initial ability test (pretest) obtained the results of $F_{count}$ of 1.23 while $F_{table}$= 4.26. Based on this, it can be said that the pretest value data in the experimental class and control class are homogeneous because the results of $F_{count}$ (1,23)<$F_{table}$ (4,26). While the results of the homogeneity test for the final ability test (posttest) obtained the results of $F_{count}$ of 2.19 while $F_{table}$= 4.26. Based on this, it can be said that the posttest value data in the experimental class and control class are homogeneous because the results of $F_{count}$ (2,19) < $F_{table}$ (4,26).

Based on the results obtained, the average value is not much different between the experimental class and the control class, which has normal distributed data and homogeneous data. This shows the average value of the final ability (posttest) between the experimental class and the control class, learning using snakes and ladders media further improves students' understanding of mathematical concepts.

Furthermore, the results of the homogeneity test for the initial ability test (pretest) obtained the results of $F_{count}$ of 1.23 while $F_{table}$= 4.26. Based on this, it can be said that the pretest value data in the experimental class and control class are homogeneous because the results of $F_{count}$ (1,23)<$F_{table}$ (4,26). While the results of the homogeneity test for the final ability test (posttest) obtained the results of $F_{count}$ of 2.19 while $F_{table}$= 4.26. Based on this, it can be said that the posttest value data in the experimental class and control class are homogeneous because the results of $F_{count}$ (2,19) < $F_{table}$ (4,26).

Based on the results obtained, the average value is not much different between the experimental class and the control class, which has normal distributed data and homogeneous data. This shows the average value of the final ability (posttest) between the experimental class and the control class, learning using snakes and ladders media further improves students' understanding of mathematical concepts.
Then the researcher continued with hypothesis testing, the first hypothesis testing was to answer the hypothesis whether there were differences in students' understanding of mathematical concepts between those who used snakes and ladders media and students who used picture media. The results of hypothesis analysis using the t-test in the final test obtained the results $t_{count} (14.01) > t_{table} (1.71)$, so it can be concluded that there is a difference between the level of understanding of students' mathematical concepts (posttest) in the experimental class using snake and ladder media and control class that uses image media.

This can happen because students in the experimental class are given treatment with the application of snake and ladder media so that they are more enthusiastic and enthusiastic in learning. In addition, students can play while learning and they are trained to learn to work together with their friends so that students are more active in learning. This snake and ladder game helps students to remember what they have learned before so they can understand and understand better. As stated by Nachiappan (2014) there are several functions of the game of snakes and ladders, snakes and ladders can be a tool to build interactive communication between players. In addition, snakes and ladders can be filled with a variety of educational and entertaining materials.

This statement is reinforced by the results of a study conducted by Putri ZF, (2017) which states that learning mathematics with the snake and ladder game media can motivate students to continue learning to develop their abilities by actively involving students in learning. Teachers are not only limited to transferring knowledge but also guiding students to be skilled in finding counting concepts with their own experience.

Furthermore, in the submission of the second hypothesis, namely knowing the difference in increasing students' understanding of mathematical concepts, both from the experimental class and the control class. The experimental class uses snakes and ladders media while the control class uses image media, to calculate the difference in the increase using the t-test the results obtained are $t_{count} (3.8) > t_{table} (1.71)$, thus there are differences in the increase in students' understanding of mathematical concepts using snake and ladder media using image media, so that the snake and ladder model is more effectively used in improving students' understanding of mathematical concepts.

Differences in improving learning outcomes can occur because the use of game-based learning media can make the learning process more enjoyable, through playing activities while learning students can also gain the ability to understand learning material scientifically without coercion. In addition to having the potential for learning and entertainment, snake and ladder learning media can also encourage interaction between others, so that it will make students more involved in their learning process. The snake and ladder game strategy as described by Said and Andin Budimanjaya (2015) is a type of attractive game that involves children playing an active role in snakes and ladders. The strong interaction pattern of students' activities when playing the game of snakes and ladders in learning activities causes this game to be very liked by students.

The results of this study are in line with previous research conducted by Sunarti, Amril M, Rian Vebrianto (2020) with the research title: "Development of Science Learning Media Snakes and Ladders to Support Understanding Science Learning Concepts in Elementary Schools". The results of the research can be concluded that the snake and ladder science learning media can improve students' understanding of learning concepts.

In this study, it was proven that the snake and ladder media can improve students' understanding of mathematical concepts. However, the research process does not always run smoothly, in the research process researchers find obstacles or problems faced, namely in making learning media an attractive design is needed so that in this case the creativity of
researchers is needed. In addition, the learning process using snake and ladder media requires a lot of time while the time provided by the school is very limited.

5 Conclusions And Suggestions

Conclusion

The learning activities for class V Mathematics subject matter using snakes and ladders media at SDN 1 Karangmangu even semester 2020/2021 were successfully carried out and the results were satisfactory in increasing students' understanding of concepts. Based on the results of data analysis that has been carried out, the authors can draw the following conclusions:

1. There are differences in students' understanding of mathematical concepts in the experimental class using snake and ladder media and the control class using image learning media.
2. There is an increase in students' understanding of mathematical concepts in the experimental class using snake and ladder media and the control class using image learning media.

Based on the results of the discussion, it can be concluded that using the snake and ladder media can have an influence on students' understanding of mathematical concepts.

6 Suggestion

The teacher in using the snake and ladder media teacher can set the steps and rules in playing the snake and ladder well. It is intended that the game of snakes and ladders can run well so that students are able to work independently and increase their knowledge. Furthermore, so that the game runs smoothly, the teacher also needs to make sure that the students have really mastered the rules of the game before the game starts. For further researchers, the use of snakes and ladders media can be developed in various other relevant learning materials as well as into the realm of other learning outcomes. If other researchers want to do the same, researchers can develop this snake and ladder learning media with different rules and designs or adapted to the material to be given.

References


Analysis of Potential Development of Ecotourism Pemandian Alam Lau Kulap in Telagah Village, Sei Bingai District, Langkat Regency

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Abstract. Langkat Regency has many eco-tourism potentials from the available natural raciness. One of them is the Pemandian Alam Lau Kulap located in Telagah Village, Sei Bingai District, Langkat Regency, a tour that uses nature as a tourist facility, the Lau Kulap River. Ecotourism is a form of tourism that is closely related to the principle of conservation. The utilisation of natural areas in eco-tourism uses a conservation and utilisation approach. The data collection of this paper is by conducting literature studies, field observations, interviews with the community, tourists and stakeholders. Analysis of the data used in this study is the analysis of internal and external factors and SWOT analysis. Based on the EFE (External Factor Evaluation) matrix, the total score obtained is 3.73; this shows that the Pemandian Alam Lau Kulap stakeholders and managers responded indifferently to the eco-tourism development strategy. A total score of 3.79 is obtained from the IFE matrix. The total score shows that the stakeholders respond well to internal environmental conditions better than external environmental conditions. The development of the ecotourism potential of the Pemandian Alam Lau Kulap Ecotourism with the SWOT analysis method can be seen that the development of ecotourism is very potent with the value of the ecotourism feasibility level of 93.74% and is in the category of feasible to be developed.

Keywords: Tourism; Ecotourism; Internal and External Factors; SWOT Analysis

1 Introduction

Indonesia has a very wide landscape and is supported by diverse natural resources that can be processed and used as tourism. Indonesia has various kinds of tourism potential, both natural and cultural, for Indonesia has various tribes, customs, and cultures due to Indonesia's geographical location as a tropical country that produces natural beauty and animals (Yoeti, 2008). The tourism sector plays a major role in developing Indonesian tourism that can be relied upon to improve people's welfare and national development. In the field of tourism, Indonesia's face will be determined by the ability of its people to provide services for tourism components, like attractions, transportation, accommodation, information and competitive promotion.

National development explained that tourism aims to promote the national and regional economy, which means that the promotion of tourism activities will increase the economic activity of the community and at the same time play a role in efforts to increase the welfare
and income of the community. The participation of the private sector and the government in implementing tourism development needs to be further enhanced and developed in a climate of healthy competition and on a commitment to mutual benefit and mutual support (Sembiring et al., 2004).

Eco-tourism is about creating and satisfying a desire for nature, about exploiting tourism's potential for conservation and development, and about preventing its negative impacts on ecology, culture and beauty (Western 1993, in Asmin 2017). Fandeli (1999) defines eco-tourism as responsible travel to natural areas that protect the environment and improve the well-being of local people.

North Sumatra has large and diverse tourism potential. Tourism in North Sumatra is currently developing its natural potential, the example we can see in Langkat Regency. Langkat Regency has a beautiful natural panorama, varieties of fauna and flora that can enchant tourists. A tourist attraction in Langkat Regency that is currently undergoing development and receiving attention from the public is the Pemandian Alam Lau Kulap located in Telagah Village, Sei Bingai District, Langkat Regency, North Sumatra Province.

Pemandian Alam Lau Kulap offered a swimming pool facility whose water comes directly from the Lau Kulap river itself without any chlorine mixing, and tourists can also enjoy the Lau Kulap river water itself. Around the natural baths, Lau Kulap is surrounded by gorgeous looking forests as another plus. The tourist area at the Lau Kulap River has a length of ± 1 Km and a width of ± 8 m. The facilities offered at Pemandian Alam Lau Kulap Ecotourism include a resting place/lesehan, a canteen, a prayer room and a dressing room/bathroom. The Lau Kulap swimming pool is across the Lau Kulap River, and we need to cross a bamboo suspension bridge to reach it. Of course, this makes the natural atmosphere presented more accessible to tourists.

The potential of ecotourism is an effort to utilise the potential of tourism, especially the potential of ecotourism for the benefit of environmental conservation and community welfare. The concept of eco-tourism management is generally similar to managing activities related to the utilisation of natural potential. The staff of this place often face classic problems such as the weakness in monitoring environmental quality, the condition of facilities and infrastructure and the lack of human resources ability to maintain existing environmental resources (Mardiastuti, 2000).

Fandeli (2001) mentions that in eco-tourism activities, there are elements that support these eco-tourism activities, namely:

1. Eco-tourism support for nature conservation
   a. Eco-tourism pays attention to the quality of nature's carrying capacity and is environmentally friendly.
   b. Eco-tourism is one of the integrated development and conservation programs, between natural resource conservation efforts with economic development and sustainable community empowerment.
   c. The existence of ecotourism can increase the status of an area as a protected natural area.
   d. Eco-tourism is an alternative that can increase public, private and community participation in conserving natural resources and biodiversity.
   e. Eco-tourism activities make contributions to and for the conservation of natural resources and biodiversity. Eco-tourism minimises negative impacts on the quality and quantity of biodiversity caused by mass or conventional tourism activities.

2. Eco-tourism can provide support for community empowerment
a. Eco-tourism respects the potential of local resources, thereby preventing changes in the community's land ownership and social and cultural structures.
b. Community-based ecotourism activities, thus making the community the main owner, actor and beneficiary.
c. The attractiveness of ecotourism activities rests on the wealth of natural resources and biodiversity, so that eco-tourism activities are expected to increase community participation in efforts to conserve natural resources and biodiversity.
d. The community is strived to have confidence that ecotourism is an alternative to increasing income.

3. Eco-tourism can support sustainable economic development
a. Ecotourism opens job opportunities for local people to become direct economic actors.
b. Ecotourism is one of the sources of regional income in the context of regional autonomy.
c. Ecotourism is an activity that values and utilises local potential and resources.
d. Because it requires community participation support, ecotourism can be pursued as a sustainable and integrated economic effort with the conservation of natural resources and biodiversity.

Nature tourism can not be separated from the impact on humans and nature itself, which is positive or negative. This is also inseparable from Pemandian Alam Lau Kulap Ecotourism, which positively and negatively impacts the environment and society.

One of the positive impacts of the Pemandian Alam Lau Kulap is that it can increase people's income and open business opportunities for the community. There are also negative impacts by it, like, waste or food waste that is thrown into the river to contaminate river water, erosion caused by the construction of facilities along the river. Therefore, it is necessary to analyse the potential development of Pemandian Alam Lau Kulap tourism object.

2 Methodology

This research used a descriptive method by interviewing questionnaires, direct observations (field observations) and literature studies to collect the necessary data. The types of data used are primary data and secondary data. Primary data was obtained through direct observation and data collection at the research site through direct field observations (observations), interviews, and discussions with the community and local government. Meanwhile, secondary data was gained from local government reports, the Central Bureau of Statistics (BPS) of the sub-districts in the district/city and other literature studies.

The data was processed and analysed using SWOT analysis by looking at internal environmental factors (strengths and weaknesses) and external environmental factors (opportunities and threats). External and internal factors, in this case, were used to analyse more deeply the SWOT of eco-tourism development at the research site. It is necessary to know the external and internal factors that affect eco-tourism. The SWOT analysis approach was carried out by comparing opportunities and threats (external factors) and strengths and weaknesses (internal factors) to conclude an appropriate strategy and direction for eco-tourism development in Telagah Village, Sei Bingai District, Langkat Regency, North Sumatra Province. The SWOT analysis matrix used in this study is listed in Table 1.
Table 1. SWOT analysis matrix

<table>
<thead>
<tr>
<th>External Factors</th>
<th>Internal Factors</th>
<th>Strength (S)</th>
<th>Weakness (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opportunity (O)</td>
<td>SO</td>
<td>WO</td>
<td></td>
</tr>
<tr>
<td>Threats (T)</td>
<td>ST</td>
<td>WT</td>
<td></td>
</tr>
</tbody>
</table>

The results of the questionnaire were analysed by giving value and rating to each criterion; namely, each factor (opportunity and strength) was given a scale starting from 4 (very good), 3 (good), 2 (not good), and 1 (very bad). Good) (Sihite et al. 2018). Meanwhile, the threat and weakness rating is given a value of -4 to -1 (Rangkuty, 2006). The IFAS and EFAS matrix models are listed in Table 2 and Table 3.

Table 2. Matrix of Internal Strategic Factor Analysis Summary (IFAS)

<table>
<thead>
<tr>
<th>Internal Strategy Factors</th>
<th>Value</th>
<th>Rating</th>
<th>Score (Value x Rating)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opportunity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1 (100%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Matrix of External Strategic Factor Analysis Summary (EFAS)

<table>
<thead>
<tr>
<th>External Strategy Factors</th>
<th>Value</th>
<th>Rating</th>
<th>Score (Value x Rating)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opportunity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1 (100%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3 Result and Discussion

Pemandian Alam Lau Kulap is one of the tours located in Telagah Village, Sei Bingai District, Langkat Regency, North Sumatra Province with coordinates; LU: 03°18′43.26″/ BT: 098°23′47.70″. The area of Telagah Village is 53.36 Km2 with a population of 2,961 people (BPS Kabupaten Langkat, 2020).

3.1. Interview Results with Respondents

The values of external environmental factors and internal factors of Pemandian Alam Lau Kulap Ecotourism were determined jointly through interviews with the local government, managers, and the community and visitors using SWOT analysis. Distributing questionnaires
was carried out through a direct observation process to respondents who met the sampling criteria, the number of questionnaires collected reached 100%. After the data and information were collected, the data classification process (tabulation) can be carried out. The results of the interviews conducted can be seen in the following table:

<table>
<thead>
<tr>
<th>Age</th>
<th>Total Respondents</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 17 years</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>17 – 20 years</td>
<td>49</td>
<td>49</td>
</tr>
<tr>
<td>20 – 30 years</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>30 – 40 years</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>&gt; 40 years</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Tourists over the age of 60 like cultural and nature-based tourist attractions such as enjoying traditional cultural performances, visiting destinations with flora and fauna attractions such as botanical gardens, parks, conservation areas, etc. (Sudarsono, et al., 2020). The largest number of respondents are aged 17 - 20 years, which is 49 people (49%), and respondents with age > 40 years are 36 people (36%). According to Ismayanti (2010), teenagers or young tourists are those aged 12 to 25 years. This shows that Pemandian Alam Lau Kulap is enjoyed by young tourists and tourists over the age of 40 for the scenery it provides.

<table>
<thead>
<tr>
<th>Level of education</th>
<th>Total Respondents</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>junior high school</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>senior High School</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>Bachelor</td>
<td>37</td>
<td>37</td>
</tr>
<tr>
<td>Master</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Based on the grouping of respondents based on education level, it can be seen that high school graduates are the most respondents with 45 people (45%) and bachelor graduates as many as 37 people (37%). In terms of education owned by tourists can be seen areas of interest to visit. Elementary, Diploma and Bachelor graduates prefer to visit special interest tourist destinations. Junior high school graduates prefer to visit nature-based or natural-based tourist destinations, while Vocational High School or High School graduates prefer nature-based and cultural-based destinations. The postgraduate education category prefers to visit destinations with cultural attractiveness characteristics (Sudarsono, et al., 2020).
Table 6. Profile of Respondents Based on Distance

<table>
<thead>
<tr>
<th>Distance</th>
<th>Total Respondents</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5 km</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5 – 10 km</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10 – 15 km</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15 – 20 km</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>&gt; 20 km</td>
<td>65</td>
<td>65</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

The grouping of respondents according to the distance travelled by visitors appears that the majority of visitors have a distance of > 20 km, which is 65 people and is followed by visitors who have a distance of 15 - 20 km, which is 35 people. The number of visitors to the Pemandian Alam Lau Kulap came from travelling more than one hour to two hours because the distance is not too far. This adds to the community's interest to visit the Pemandian Alam Lau Kulap Ecotourism.

Table 7. Profile of Respondents Based on Facilities

<table>
<thead>
<tr>
<th>Facility</th>
<th>Total Respondents</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incomplete</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Less complete</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Quite complete</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Complete</td>
<td>34</td>
<td>34</td>
</tr>
<tr>
<td>Perfect</td>
<td>66</td>
<td>66</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Tourist facilities are the spearhead of the tourism business, which can be interpreted as a business that directly or indirectly provides services to tourists in a tourist destination where its existence is very dependent on the existence of activities (Sarim and Wiyana, 2017). Based on the grouping of respondents based on facilities, it can be seen that the majority of respondents stated that the facilities at the Pemandian Alam Lau Kulap are perfect with 66 people and followed by respondents who feel complete with existing facilities, which are 34 people. Based on observations in the field that the facilities are complete, such as clean water for rinsing, parking lots, prayer rooms, souvenir shops, huts, places to eat/restaurants, and bathrooms.

3.2. SWOT Strategy Data Analysis

The SWOT matrix systematically identifies various factors to formulate a strategy that sees everything from the environment outside the organisation. This matrix is based on a logic that can maximise strengths and opportunities while minimising weaknesses and threats. The SWOT is in Table 8.
<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Tourist Attractions</strong></td>
<td><strong>1. Tourism Marketing Is Not Optimal</strong></td>
</tr>
<tr>
<td><strong>2. Availability of Sufficient Facilities and Infrastructure</strong></td>
<td><strong>2. Government Institutions Are Not Optimally Developing Tourism</strong></td>
</tr>
<tr>
<td><strong>3. Tourism Facilities</strong></td>
<td><strong>3. Private Institutions Related to Tourism Management Have Not Been Involved</strong></td>
</tr>
<tr>
<td><strong>4. Convenient and Beautiful Tourist Locations</strong></td>
<td><strong>4. Tourist locations that are quite far from the division of zones near tourism</strong></td>
</tr>
<tr>
<td><strong>5. Affordable Entrance Fee</strong></td>
<td><strong>5. Local customs/customs are less visible at tourist sites</strong></td>
</tr>
</tbody>
</table>

**Opportunities**

1. The interest of local and international communities to travel is increasing
2. Green tourism that provides purity, relaxation and beauty
3. Opportunity to become a family tourist spot
4. Opportunity to attract young tourists who tend to be active on social media
5. Positive public perception and can create job opportunities

**Strategies S-O**

1. Local governments and management institutions need to manage Pemandian Alam Lau Kulap Ecotourism following the eco-tourism concept that is educative and maintains a sustainable environment (S1, S2, S3, S4, O1, O2, O4, O5)
2. Expanding the market by conducting optimal marketing and product diversification. (S4, S5, O4, O5)

**Threats**

1. Political stability
2. Tourist locations that tourists do not widely know
3. Competitors by similar tourist destinations
4. Illegal logging
5. Poaching

**Strategies S-T**

1. Using tourist attractions and competitive advantages in Pemandian Alam Lau Kulap to increase the number of visitors and market value (S1, S5, T1, T2, T3)
2. Diversify products and maintain the Pemandian Alam Lau Kulap forest area so that it can be preserved and maintained (S1, S3, S4, T3, T4, T5)

**Strategies W-O**

1. The government and management institutions need to convey the value of the benefits obtained through social media marketing, mouth to mouth, and create photogenic eco-tourism concepts for young people so that natural baths can be promoted through social media (W1, W2, W3, W4, O1, O2, O3, O4)
2. Exploring the potential of eco-tourism with a traditional/customary approach and developing product diversification related to flora, fauna, and other facilities. (W3, W4, W5, O3, O4, O5)

**Strategies W-T**

Government agencies and managers are more focused on marketing the value of benefits to visitors and can use visitors as marketers of Pemandian Alam Lau Kulap by facilitating good forest environmental areas to be uploaded to social media such as Instagram, WhatsApp, Facebook, etc. (W3, W4, T2, T3)
Based on the SWOT matrix on the development of Pemandian Alam Lau Kulap Ecotourism in Telagah Village, it can be seen that three competitive strategies are suitable for the development of Pemandian Alam Lau Kulap ecotourism, namely:

a. Market Penetration (Market Penetration). Based on the SWOT matrix above, what can be categorised into this strategy are SO-1, WO-2, ST-1 and WT-1 strategies.
b. Market development (Market Development). Based on the SWOT matrix above, what can be categorised into this strategy are SO-2 and WO-1 strategies.
c. Product Diversification (Product Diversification). Based on the SWOT matrix above, what can be categorised into this strategy are ST-2 and WT-1 strategies.

The SWOT analysis in formulating the strategy is composed of two matrices, the EFE (External Factor Evaluation) matrix and the IFE (Internal Factor Evaluation) matrix. They are carried out according to the needs and actual environmental conditions of the Pemandian Alam Lau Kulap Ecotourism, as listed in Table 9 and Table 10.

Table 9. EFE (External Factor Evaluation) Matrix Pemandian Alam Lau Kulap Ecotourism

<table>
<thead>
<tr>
<th>External Factors</th>
<th>Value</th>
<th>Rating</th>
<th>B *R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opportunities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The interest of local and international communities to travel is increasing</td>
<td>0.2</td>
<td>4</td>
<td>0.8</td>
</tr>
<tr>
<td>Green tourism that provides purity, relaxation and beauty</td>
<td>0.2</td>
<td>4</td>
<td>0.8</td>
</tr>
<tr>
<td>Opportunity to become a family vacation spot</td>
<td>0.11</td>
<td>4</td>
<td>0.44</td>
</tr>
<tr>
<td>Opportunity to attract young tourists who tend to be active on social media</td>
<td>0.11</td>
<td>4</td>
<td>0.44</td>
</tr>
<tr>
<td>Positive public perception and can create job opportunities</td>
<td>0.08</td>
<td>4</td>
<td>0.32</td>
</tr>
<tr>
<td>Threats</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Political stability</td>
<td>0.04</td>
<td>3</td>
<td>0.08</td>
</tr>
<tr>
<td>Tourist locations that tourists do not widely know</td>
<td>0.1</td>
<td>4</td>
<td>0.4</td>
</tr>
<tr>
<td>Competitors by similar tourist destinations</td>
<td>0.07</td>
<td>3</td>
<td>0.21</td>
</tr>
<tr>
<td>Illegal logging</td>
<td>0.04</td>
<td>3</td>
<td>0.12</td>
</tr>
<tr>
<td>Illegal hunting</td>
<td>0.04</td>
<td>3</td>
<td>0.12</td>
</tr>
<tr>
<td>Total Score</td>
<td>1</td>
<td></td>
<td>3.73</td>
</tr>
</tbody>
</table>

Description of the value (rating):
1 = less organizational response
2 = mediocre organizational response
3 = organizational response above average
4 = high organizational response

Table 10. Matrix of IFE (Internal Factor Evaluation) Pemandian Alam Lau Kulap Ecotourism

<table>
<thead>
<tr>
<th>External Factors</th>
<th>Value</th>
<th>Rating</th>
<th>B *R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strengths</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tourist attraction</td>
<td>0.21</td>
<td>4</td>
<td>0.84</td>
</tr>
<tr>
<td>Availability of Adequate Facilities and Infrastructure</td>
<td>0.14</td>
<td>4</td>
<td>0.56</td>
</tr>
<tr>
<td>Tourism Facilities</td>
<td>0.12</td>
<td>4</td>
<td>0.48</td>
</tr>
<tr>
<td>External Factors</td>
<td>Value</td>
<td>Rating</td>
<td>B ×R</td>
</tr>
<tr>
<td>------------------</td>
<td>-------</td>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td>Comfortable and Beautiful Tourist Locations</td>
<td>0,1</td>
<td>4</td>
<td>0.4</td>
</tr>
<tr>
<td>Affordable Admission Fee</td>
<td>0,1</td>
<td>4</td>
<td>0.4</td>
</tr>
</tbody>
</table>

**Weaknesses**
- Tourism Marketing Not Optimal | 0,09 | 2 | 0.08 |
- Government Institutions Are Not Optimally Developing Tourism | 0,08 | 4 | 0.4 |
- Private Institutions Related to Tourism Management Have Not Been Involved | 0,07 | 3 | 0.21 |
- Tourist Locations That Are Quite Far From The Division Of Zones Near Tourism | 0,05 | 3 | 0.12 |
- Local Customs Are Less Visible At Tourist Locations | 0,04 | 3 | 0.12 |

**Total Score**

| | 1 | 3.79 |

**Description of the value (rating):**
1 = less organizational response  
2 = mediocre organizational response  
3 = organizational response above average  
4 = high organizational response

Based on the external and internal environment analysis using the EFE matrix and the IFE matrix, the score for the EFE matrix is 3.73, while the score for the IFE matrix is 3.79.

After the SWOT analysis has been carried out and the ecotourism development strategy has been obtained, an analysis of the feasibility level of the Pemandian Alam Lau Kulap Ecotourism in Telagah Village will be carried out for the strategy to be carried out. This analysis was conducted by direct observation and interviews with key informants and related stakeholders. The components assessed are the attractiveness of tourist sites, accessibility to tourist sites, accommodation around tourist sites (at the closest distance to tourist sites), and supporting facilities/infrastructure, as listed in Table 11.

<table>
<thead>
<tr>
<th>No</th>
<th>Criteria</th>
<th>Value</th>
<th>Mark (*)</th>
<th>Score (**)</th>
<th>Max Score (***</th>
<th>Index (****)</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Attractiveness</td>
<td>6</td>
<td>165</td>
<td>990</td>
<td>1080</td>
<td>91.66</td>
<td>Good</td>
</tr>
<tr>
<td>2</td>
<td>Accessibility</td>
<td>5</td>
<td>100</td>
<td>500</td>
<td>600</td>
<td>83.33</td>
<td>Good</td>
</tr>
<tr>
<td>3</td>
<td>Accommodation</td>
<td>3</td>
<td>60</td>
<td>180</td>
<td>180</td>
<td>100</td>
<td>Good</td>
</tr>
<tr>
<td>4</td>
<td>Facilities and infrastructure</td>
<td>3</td>
<td>100</td>
<td>300</td>
<td>300</td>
<td>100</td>
<td>Good</td>
</tr>
</tbody>
</table>

| Eligibility Level | 93.74 | Worth Developed |

**Description:**
* The results of the assessment of tourist objects and attractions  
** Multiplication between weight and value  
*** Highest score for each criterion  
**** Eligibility index of score comparison with the highest score in percentage %
Based on the interviews conducted, the feasibility level of Pemandian Alam Lau Kulap Ecotourism is very feasible to be developed as a tourist attraction with an index value of 93.74%. In line with Sihite et.al (2018) which states that the feasibility level is >66.6%, it can be stated that Pemandian Alam Lau Kulap Ecotourism is feasible to be developed with the strategy described above.

4 Conclusion

a. Based on the EFE (External Factor Evaluation) matrix, the total score owned by Pemandian Alam Lau Kulap Ecotourism is 3.73. The total score shows that in the ecotourism development strategy, the Pemandian Alam Lau Kulap are responded to normally by stakeholders and managers. Based on the IFE matrix, the total score of Pemandian Alam Lau Kulap Ecotourism is 3.79. The total score shows that the Pemandian Alam Lau Kulap Ecotourism stakeholders respond well to internal environmental conditions, better than external environmental conditions.

b. Based on the analysis of the feasibility level of tourism, the total index score for Pemandian Alam Lau Kulap Ecotourism in Telagah Village is 93.74%. It can be categorised that the development of Pemandian Alam Lau Kulap Ecotourism is feasible to be developed. From the total score, it can be said that the feasibility of Pemandian Alam Lau Kulap Ecotourism in Telagah Village has the advantage of a good position in the components of attractiveness, accessibility, facilities and infrastructure, and accommodation.

References

The Tendency of Accounting Fraud in the Village Government

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Abstract. This study aims to analyze the effect of compensation suitability, internal control, ethical culture, transparency and compliance with accounting rules toward the tendency of accounting fraud in the Village in Karangsembung Subdistrict, Lemahabang Subdistrict, Astanajapura Subdistrict, and Gegesik Subdistrict in Cirebon Regency. The research method uses descriptive methods and verification methods. The population in this study were 184 respondents. The sample of this study used the slovin calculation formula and was taken by means of stratified random sampling as many as 126 respondents. Statistical analysis used is multiple regression. The results of the study found that compensation suitability had a significant negative toward the tendency of accounting fraud, internal control had a significant negative effect on the tendency of accounting fraud, ethical culture had negative effect toward the tendency of accounting fraud, transparency and compliance with accounting rules had a negative effect to the tendency of accounting fraud.

Keywords: Compensation Suitability; Internal Control; Ethical Culture; Transparency; Compliance With Accounting Rules; The Tendency Of Accounting Fraud

1 Introduction

The passing of Law No. 6 of 2014 on Villages, provides opportunities for the village government in equitable development, developing its potential, and prospering the village community. Every village has the right of autonomy to organize its government. Each village gets a large enough allocation of funds for development. The funds received by the village can minimize the national development gap between the city and village areas, as well as prosper the poor people who are mostly in the village. But this goal is not in line with the situation on the ground, this is indicated by many cases of corruption involving the village government.

One of the current problems is the many irregularities in the use of Village Funds carried out by village government officials. Indonesia Corruption Watch data shows there were 46 cases of corruption in the village budget sector out of 271 corruption cases during 2019. Corruption of the village budget is recorded to give the state losses up to Rp 32.3 billion. (Source: https://nasional.kompas.com). Likewise, the problem of problems in one of the districts in west Java, there are several cases of fraud committed by village government officials.

Several factors that influence Accounting Fraud Tendencies have been carried out in previous research including Wilopo (2009), examining factors on the Effectiveness of
Internal Control, Compensation Conformity, Adherence to Accounting Rules, Information Asymmetry, and Management Morality. Rahmaidha (2016), factors studied include: Effectiveness of Internal Control, Adherence to Accounting Rules and Job Satisfaction. Delfi et al, (2014) factors studied include Effectiveness of Internal Control and Compensation Suitability. Lailiyah (2016), examines the factors of Compensation Conformity, Procedural Justice, Law Enforcement/Regulation, Effectiveness of Internal Control, Ethical Culture of Management, and Organizational Commitment. Meliany & Hernawati (2013) factors studied include: Effectiveness of Internal Control, Compensation Suitability, Information Asymmetry, Adherence to Accounting Rules, and Management Morality. Based on previous research, the factors studied in this study include: Compensation Suitability, Effectiveness of Internal Controls, Ethical Culture of Organization, and Adherence to Accounting Rules. The reason for this study only takes four factors that influence accounting fraud because the results of previous studies that vary make researchers want to examine the influence of these four factors on accounting fraud tendencies.

The tendency of accounting fraud can be minimized by providing appropriate compensation to employees, conducting effective internal controls, establishing an ethical culture in the organization, and implementing the observance of accounting rules. This is a development of the fraud diamond theory. The pressure element is indicated by the conformity of compensation, opportunity is indicated by the effectiveness of internal control, rationalization (rationalization) indicated by the ethical culture of the organization, and capability (capability) indicated by the observance of accounting rules.

Since the village fund, every village head and village device gets a steady income, allowances, and other receipts every month. Regulations on compensation received by the village government show that the welfare of village employees begins to be considered by the state in hopes of providing maximum service to the village community. Compensation received appropriately will make a person feel satisfied with his work and not cheat to maximize personal profit. While the provision of compensation that is not appropriate can trigger the act of accounting fraud tendency because the compensation provided is not balanced with the work done. Compensation can determine the employee's work motivation in his performance because it is related to the welfare of the employee's life. If the employee feels the compensation received is appropriate and welfare is met then the tendency to commit accounting fraud is small. Research conducted by Satriawan et al. (2016) Radhiah (2016) shows that with the conformity of compensation received by employees, employees or employees can complete the work well and on time. Research Indriastuti et al, (2016) mentioned that the compensation conformity negatively affects the tendency of accounting fraud which means that the higher the attention of the agency for the suitability of compensation received by its employees, the lower the level of tendency for accounting fraud.

Effective internal control in an agency is expected to reduce actions that deviate from the rules that apply for personal gain. A deviant act can be an accounting fraud. Accounting fraud that occurs is generally related to corruption. The tendency of accounting fraud can occur if internal controls in the agency do not run effectively. Because internal control does not work effectively resulting in the opening of opportunities for someone to commit acts of accounting fraud. To avoid this, agencies can increase the effectiveness of internal controls. If the internal control of an organization is weak then the possibility of error and fraud (fraud) is very large, conversely if internal control is strong then the possibility of errors and fraud can be minimized. Research Thoyibatun (2012), Rahmaidha (2016), and Lailiyah (2016). The effectiveness of Internal Control can be used to prevent and reduce the tendency of
accounting fraud that occurs in management, this shows that the more effective Internal Control in management, the lower the tendency of accounting fraud.

Organizational culture is a pattern of attitudes and behaviors expected of each individual group of organizational members, which as a whole will form an organizational culture that is in line with the goals and philosophies of the organization concerned. The village government is an organization that is steeped in local culture and wisdom. Unlike other organizations or other local governments. A good culture in the organization will create behavior in a member of the organization. If in an organization fraud is a natural or common thing then everyone in the organization will tend to commit fraud (fraud). The results of research Rae an Subramaniam (2008) employees / members of organizations in an ethical environment tend to follow the rules and behavior is morally acceptable. So that if there has been an ethical culture in an agency it can affect employees to commit fraud, which means that the better the organizational culture, the more fraudulent tendencies can be reduced. Adinda & Ikhsan (2015), said the organizational culture negatively affects the tendency of fraud (fraud).

Accountability is the accountability of the village government apparatus in managing village finances that must be informed to the community. Accountable financial management can minimize the occurrence of investment carried out by the village government apparatus so as to reduce fraud in the management of village funds. Saputra et al. (2019) research found that accountability can prevent fraud in management and villages. Research conducted by Adhivinna and Agustin (2021) revealed that accountability has a positive effect on the potential fraud of village funds.

Government Regulation No. 24 of 2005 in Thoyibatun (2009) explains that the rules used in accounting activities are financial accounting standards, while the Observance of Accounting Rules is the level of conformity of organizational asset management procedures, the implementation of accounting procedures and the presentation of financial statements and all supporting evidence, with rules that have been set by bpk or government accounting standards. Institution must comply with all guidelines in measuring and presenting financial statements based on applicable accounting standards so that opportunities for employees to commit accounting fraud are getting smaller. Conversely, if the agency does not comply with accounting standards in measuring and presenting financial statements, the chances of employees committing accounting fraud are higher. The observance of accounting rules affects activities related to accounting, if it runs well and smoothly will be able to produce accurate information for interested parties. Rahmaidha (2016) and Lailiyah (2016), the observance of accounting rules can be used to prevent and reduce the tendency of accounting fraud, this shows that the more obedient management to accounting rules, the lower the tendency of accounting fraud

2 Research Methodology

This study uses descriptive and verifiative methods. The population of this study is the entire village government in Karangsembung Subdistrict, Lemahabang Subdistrict, Astanajapura Subdistrict, and Gegesik Subdistrict in Cirebon Regency as many as 46 villages with the analysis unit of the Village Head, Village Secretary, Financial Kaur, and Chairman of the Village Consultative Agency (BPD) as many as 4 people so that the total analysis unit as much as 46 x 4 = 184 respondents. Determination of sample size using the formula slovin
obtained as much as 126 responde. Sampling method using proportionate stratified random sampling.

Measuring tools are used to determine compensation conformity data (variable X1), effectiveness of internal controls (variable X2), ethical culture of organization (variable X3), accountability (variable x4), adherence to accounting rules (variable X5) and accounting fraud tendency (variable Y) using the Likert scale. This scale is used to measure the attitudes, opinions, and perceptions of a person or group of people regarding social phenomena. Data collection techniques by spreading questionnaires / questionnaires to respondents. Technical data analysis using multiple regressions.

3 Results And Discussions

Table 1. Validity Test Results

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Source: SPSS output data

Based on the table above shows that all the values of statement items for each variable show greater than the table r 0.147. Thus, the statement items for each variable are declared valid.

Table 2. Reliability Test Results

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Source: SPSS output data
Based on the table above it is seen that the reliability test results for each variable show greater than 0.7 so it is concluded that each variable meets the reliable criteria.

Table 3. Multiple Regression

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<td>-.525</td>
<td>.600</td>
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<td>AC</td>
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<td>.145</td>
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<td>.056</td>
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Coefficient of determination

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<td>Adjusted R Square</td>
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<td>Test Fit Model</td>
<td>6.858</td>
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</table>

Fstatistic

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</table>

Source: SPSS output data

The results of statistical calculations obtained an Adjusted R Square coefficient of determination of 0.376, meaning that 37.6 percent of the variation in variable changes in accounting fraud trends can be explained by variations in changes in compensation suitability, internal control, ethical culture, transparency and compliance of accounting rules while 62.4 percent can be explained by other variables that are not studied.

The statistical calculation results obtained a compensation conformity significance value of 0.000 smaller than the alpha value of 0.05 with the calculated t having a negative coefficient direction. Thus H0 was rejected and Ha was accepted, meaning that the suitability of compensation had a significant negative effect on the tendency of accounting fraud.

The statistical calculation results obtained an internal control significance value of 0.024 smaller than the alpha value of 0.05 with the calculated t having a negative coefficient direction. Thus H0 is rejected and Ha is accepted, meaning that internal control has a significant negative effect on the tendency of accounting fraud.

The statistical calculation results obtained an ethical cultural significance value of 0.600 greater than the alpha value of 0.05 with t calculated to have a negative coefficient direction. So H0 was rejected and Ha was accepted, meaning that the ethical culture negatively influenced the tendency of accounting fraud.

The statistical calculation results obtained a value of accountability significance of 0.145 greater than the alpha value of 0.05 with t calculated has a negative coefficient direction. So H0 was rejected and Ha was accepted, meaning that accountability negatively affects the tendency of accounting fraud.

The statistical calculation results obtained a compensation conformity significance value of 0.562 greater than the alpha value of 0.05 with the calculated t having a negative coefficient direction. So H0 was rejected and Ha was accepted, meaning that compliance with accounting rules negatively affects the tendency of accounting fraud.
4 Discussion

The suitability of compensation has a negative and significant effect on the tendency of accounting fraud. This means that the more appropriate compensation given to the village government apparatus, the less it will reduce the tendency of accounting fraud. Appropriate compensation can minimize the occurrence of the tendency of accounting fraud because an employee will be satisfied with the rewards that have been given by the organization. However, the compensation provided is still considered less because it is influenced by pressure and opportunity factors that can cause someone to commit fraud. Research Indriastuti et al., (2017) and Lu & Abeysekera, (2014) mentioned that the suitability of compensation negatively affects the tendency of accounting fraud which means that the higher the attention of the agency for the suitability of compensation received by its employees, the lower the level of tendency for accounting fraud.

Internal controls negatively and significantly affect the tendency of accounting fraud. This means that the better the internal controls applied by the village government, the better in minimizing the occurrence of accounting fraud tendencies. The village government apparatus must carry out procedures in carrying out duties and managing village finances so that acts of abuse of authority can be minimized. In addition, effective internal controls can reduce the chances or opportunities that village government officials have for accounting fraud. Research Rahmaidha (2016) and Lailiyah (2016) Internal Control can be used to prevent and reduce the tendency of accounting fraud that occurs in organizations.

The ethical culture of the organization partially negatively affects the tendency of accounting fraud. This means that the better the village government apparatus implements an ethical culture, the lower the tendency for accounting fraud. The ethical culture run by the village government apparatus will make the atmosphere conducive in carrying out the work. In addition, the village head has a role in carrying out an ethical culture. But on the contrary, if the village head abuses his authority by committing acts of fraud, then this will be followed by his subordinates so as to trigger an unethical culture. Research conducted by Adinda & Ikhsan (2015), said organizational culture negatively affects the tendency of fraud (fraud).

Accountability negatively affects the tendency of accounting fraud. This means that the more accountable the village's financial reporting, the lower the tendency for accounting fraud. The village government is required to be accountable and transparent in managing village finances.

Compliance with accounting rules negatively affects the tendency of accounting fraud. This means that the more obedient to accounting rules, the less the tendency of accounting fraud. The effect of the observance of accounting rules on the tendency of accounting fraud is caused by pressure factors experienced by employees in an agency. Pressure to achieve a predetermined target management can make someone do everything such as manipulation, falsification of documents and all accounting fraud to achieve those targets. Research by Rahmaidha (2016), and Lailiyah (2016) suggested that compliance with accounting rules negatively affects the tendency of accounting fraud. Compliance with accounting rules can be used to prevent and reduce the tendency of accounting fraud. Compliance accounting rules can be used to prevent and reduce the tendency of accounting fraud, this shows that the more obedient management to accounting rules, the lower the tendency of accounting fraud.

5 Conclusion
The results found that compensation conformity, internal control, ethical culture, transparency and compliance of accounting rules negatively affect the tendency of accounting fraud. Appropriate compensation can minimize the tendency for accounting fraud. The village government apparatus must implement good internal control in managing the organization. In addition, to minimize the act of fraudulent tendencies must follow an ethical culture by the village government apparatus so that it will make the atmosphere conducive in carrying out work and disclose information on village financial statements transparently.

References

KECURANGAN AKUNTANSI (Studi Kasus Pada PT. POS Indonesia KCU Kota Pekanbaru). *Jurnal Online Mahasiswa Fakultas Ekonomi Universitas Riau*, 3(1), 1279–1293.


Abstract. This research is motivated by the existence of a process of learning activities that are not as usual. Teachers and students conduct online or online learning activities. People consider online learning has not helped in children's education, especially in character education. This study aims to describe the character education carried out by teachers in distance learning. The research method used is descriptive qualitative, using data analysis techniques in the form of data reduction, data presentation, and conclusions. The results of the research at SD Negeri 5 Purwawinangun are: It turns out that the teacher has implemented character education in online learning, of the 9 characters studied 3 character values that are carried out are religious, responsibility and integrity.

Keywords: Character values; Online Learning; Education

1 Background

"The Facts Behind Indonesian Children: Indonesia is in an Emergency on Character Education" an article title raised by BEM REMA UPI in October 2019. This article reminds all parties to refocus on joint efforts in the nation’s character building movement which was declared by the 6th President of the Republic of Indonesia. This national character development movement is a form of concern for leaders about the fate of their nation in the future because the future of a nation is largely determined by the quality of its human resources, especially the young generation of the nation's successors. The Central Bureau of Criminal Statistics recorded 269,324 incidents in 2019 although this figure was claimed to be a decrease, but on August 31, 2020, KPAI recorded a large number of cases involving children. These cases show how alarming the moral behavior of the next generation of this nation is. Therefore, the character education movement really becomes a joint homework for all parties, parents at home, teachers in schools, the community as well as the government as the highest policy maker. Commissioner of the Indonesian Child Protection Commission (KPAI) Susanto said, the number of crimes and criminal acts committed by children must be seen as a whole, either as victims or perpetrators. Children as perpetrators of crime are more influenced by unfriendly environmental factors, the influence of the media or the treatment of their friends around them.

But unfortunately the character education movement is still mostly only charged to formal educational institutions, such as schools. Meanwhile, parents at home, the community in the surrounding environment and the government do not seem to be present to take part in taking their respective roles so that it seems as if the teacher in the school is the only foundation in
the character education efforts of students. This is increasingly difficult to do when the Covid-19 pandemic begins to enter Indonesia in early 2020. As an effort to prevent the spread of the coronavirus, the government imposes travel restrictions, quarantines, enforces curfews, postpones and cancels events, and closes facilities including the teaching and learning process in schools.

Nadim Anwar Makarim as Minister of Education and Culture issued Circular No. 4 of 2020 concerning Implementation of Internal Education Regarding learning from home during the Corona Virus Disease (Covid-19) emergency, stating that online or distance learning is implemented to provide a meaningful learning experience for students, without being burdened with the demands of completing all curriculum achievements for grade promotion and graduation. And recommends for areas that have been doing learning from home to ensure that teachers also teach from home to maintain the safety of the teachers. However, in reality online learning is a challenge for teachers, both in the process of delivering learning materials and in achieving optimal learning outcomes, including in student character education efforts.

Chaeruman (2021) reveals that character, character, morals, character are built through internalization (modeling/guidance). Internalization is done through interaction. On the other hand, a person's pattern of interacting has changed from one era to another. Widyaiswara LPMP Jambi (2020) also explained that distance learning programs can be carried out in three modes, namely online or online learning, offline/offline learning, and combined learning (a combination of online and offline). Online and offline learning can be done with two methods, namely synchronous and asynchronous.

The results of the initial data collection showed that 102 public elementary school teachers in Kuningan Regency who became resource persons for 100 teachers stated that character education was still carried out online and offline through messages in the WA Group, home visits or face to face in turns and 2 teachers stated that character education was difficult to do because of the limited ability to control students.

Society considers online learning has not helped in children's education. They regard face-to-face or classrooms as real school or education. In this online learning, more emphasis is placed on character education by parents. However, in this online learning, it is feared that character education has not been fully implemented because teachers cannot guide directly and parents are tired of work and do not have time to guide children's character education.

From the phenomenon above, the researcher will take a study entitled Character Education in Online Learning (Qualitative Descriptive Studies in Class V of SD Negeri 5 Purwawinangun, Kuningan District, Kuningan Regency, for the 2020/2021 Academic Year).

2 Research Methods

The research method that will be used is descriptive qualitative method. According to Prabowo and S. Heriyanto (2013) qualitative descriptive is a method of data processing by analyzing factors related to the object of research by presenting data in more depth to the object of research. This research will be carried out at the State Elementary School 5 Purwawinangun, Kuningan District. In this study, the subjects of the study were the fifth grade teachers and the fifth grade students' parents.

Primary data is directly obtained from the first data source at the research location or research object (Bungin, 2017:132). Data taken from observations on the implementation of
online learning and interviews with class V teachers and parents of class V students. Secondary data and data sources are data obtained from second sources or secondary sources of the data we need (Bungin, 2017:132). One of the data obtained is through documentation in the form of text, photos, and sound recordings.

The data collection technique is the method taken to obtain data/facts that occur in the research subject to obtain valid data. Data collection techniques in this study were carried out through the methods of observation, interviews, and documentation. Data analysis has been started since formulating and explaining the problem, before going into the field, and continuing until the writing of research results (Sugiyono, 2010:33). The data analysis includes data reduction, data presentation, and conclusions. The validity of the data is an important concept that is influenced by the concepts of validity (validity) and constraints (reliability).

3 Results And Discussion

The results of observations made during online learning in class V SD Negeri 5 Purwawinangun. The observations were carried out on Monday, May 24, 2021 to Saturday, May 29, 2021 through the whatsapp group application to see the online learning process of teachers to students. Researchers made observations about the process of implementing character education in online learning carried out by teachers. The following is an explanation of the implementation of character education in online learning in class V:

a. Religious
The implementation of religious character education in online learning identified two activities that were observed. First, the teacher greeted the students, but only 2 students answered the greeting in writing. Sometimes the teacher even when conveying information or starting learning forgets to greet students first. There are some students or parents of students who greet first when they want to ask questions or want to send assignments, but the rest of the students only send assignments directly. Second, the teacher asks students to pray before studying, it turns out that in online learning at SD Negeri 5 Purwawinangun there is no teacher asking students to pray before starting learning, or giving advice for praying five times a day and so on.

b. Discipline
The implementation of discipline character education in online learning is checking student attendance. In fact, there is no format for checking student attendance.

c. Responsibility
The implementation of responsible character education in online learning is that the teacher asks students to do assignments. On the facts on the ground in the whatsapp group, the teacher asks students to do the assignments in the theme book and the results are photographed and sent to the group.

d. Mutual cooperation
The implementation of mutual cooperation character education in online learning is that the teacher asks students to discuss with friends in completing assignments. In fact, at that time there was no teacher's order for group work. However, after interviewing the parents, sometimes the children join the group work because on their own initiative, there are also those who do not participate in the group work and they
can only do it themselves. Because during online learning there are no orders from the teacher for group work.

e. Creative
   The implementation of creative character education in online learning is listed in the book theme 1 sub-theme 1, namely the teacher asks students to draw animals. However, in the field, there is no teacher’s order to give free drawing assignments to students.

f. Nationalism
   The implementation of nationalism character education in online learning is the teacher sings the national anthem through voice notes. On the facts on the ground in the class V whatsapp group there is no activity in the observed aspects.

g. Independent
   The implementation of independent character education in online learning is that the teacher asks students to do their own work and takes a photo of the assignment to the teacher in the whatsapp group. However, on the facts in the field there is no activity in the observed aspects.

h. Integrity
   The implementation of integrity character education in online learning is online, where the teacher asks students to be honest in mid-semester test activities. In fact, there is no activity in the observed aspects.

i. Care
   The implementation of character education cares about online learning, namely the teacher gives a mandate to students to help parents. After observation in the field through the whatsapp group there was no mandate from the teacher to direct students to help parents or other mandates. However, the facts on the ground, the teacher did not convey the message.

From the explanation of the observations above, it can be concluded that of the 9 character values, the character values applied in class V are religious, responsibility and integrity.

3.1. Description of Class V Teacher Interview Results

The researcher conducted interviews with the fifth grade teacher at SD Negeri 5 Purwawinangun, namely Nining Satrini, S.Pd. The interview was held on Saturday, May 31, 2021, by asking 9 questions. The interview resulted in answers, such as the following:

Based on the results of the interview, namely regarding the application used during learning (Interview, May 31, 2021)

“In this online learning, the mother uses the WA (Whatsapp) group. And mother uses you tube to convey learning to students, sends a video link and then asks students to open the video link for students to watch.”

The results of the next interview are about how to find out the character of students through online learning (Interview, May 31, 2021)

“Mother knows the student's character through the results of student work, the results of online learning are sent via private chat. Every student when sending learning outcomes must have a file, when online learning is limited in time according to face-to-face learning when given an assignment it will be seen that there are children who are diligent and punctual in carrying out tasks according to the specified time, there are also children who are late in sending assignments. the night of sending, there are also children who do not send
assignments at all. Mother even asked for assignments via WhatsApp to one of the children, she just ignored it.”

Interview results regarding the model/method that grade 5 teachers use in delivering learning and character education during online learning (Interview, May 31, 2021)

“For the model/method that you use, it's just a question and answer session, because you just ask the students to do the assignment. If you don't understand, you ask the students to ask questions.”

Interview results regarding the timing of the online learning implementation (Interview, May 31, 2021)

“Online learning is carried out every day according to school hours such as the task of entering every day.”

Interview results regarding obstacles during online learning (Interview, 31 May 2021)

“There are so many, especially online, that sometimes use network internet because of the signal or quota, and each student's parents' economic level is not the same. Sometimes there are children who have cellphones, there are children who don't have cellphones, there are parents who don't have cellphones. So there are so many obstacles, there are also quotas running out, sometimes children don't hold cellphones and borrow cellphones from their parents to go to work, sometimes children want to do or send their cellphone assignments by their father or brought by their mother. Sometimes their children have a lot of cellphones fighting over with other siblings.”

The results of the interview regarding what the fifth grade teacher said in online learning (Interview, May 31, 2021)

“Students are asked to study the material, then they will be given assignments. If you don't understand, you can ask your mother, it's not the same as face-to-face learning, it's very far away because of technological limitations such as the internet, if you use the youtube application, it costs a lot of quota, so it's a pity. That's why I think again what is important is that learning is achieved and children learn.”

Results of interviews regarding communication with parents of fifth graders (Interview, 31 May 2021)

“Yes, if you ask someone who doesn't understand the information conveyed.”

Interview results regarding the cultivation of character education in online learning (Interview, May 31, 2021)

“There are, such as “do well”, “study well”, “don't forget to pray”, “don't forget to have a good relationship with your parents”

Interview results regarding the effectiveness of online learning in delivering character education (Interview, 31 May 2021)

“According to my mother, it is lacking, especially in instilling character education, it is rather difficult and communication is very limited, it is better to learn face to face in doing assignments, students can be on time in doing their work, but now in online learning there are children who have many reasons for not having their cellphones and so on. However, there are children who are diligent in being punctual, for example collecting assignments until 12 o'clock, after that there are children who are collected before 12 o'clock, there are also those who are late more than the allotted time, and some do not collect at all. In this online learning there is finally a lot of wisdom.”

From the explanation above, it can be concluded that the implementation of character education in online learning uses the WhatsApp group application which is used to communicate with students about learning, accept assignments from students, and be used as a forum for questions and answers if students do not
understand the information conveyed by the teacher in online learning. The implementation is carried out every day according to face-to-face lesson hours. The child's character can be seen from student learning outcomes seen from collecting assignments, responding to teacher questions in the whatsapp group, the teacher says that he can distinguish children who are diligent in collecting assignments and those who are not. However, there are also obstacles from these students when online learning takes place, namely from the old internet network, the student quota is running out, the economic level is lacking so that there are students or their parents who don't have cellphones, there are students who borrow their parents' cellphones so that the time for using cellphones is very limited so students are late in getting information from whatsapp groups or late in sending assignments. With these many obstacles, the teacher finally gives wisdom to students, namely in collecting assignments, this is because it is difficult for teachers to condition students because of the limitations of students having cellphones, so the online learning that researchers see at SD Negeri 5 Purwawinangun, especially in class V, is very less effective because of technological limitations, economics, and coordinating students to be present on time in online learning and doing assignments, the absence of advice is in the form of efforts to instill character education in students.

3.2. Description of Student Parents Interview Results

Interviews with parents of students were conducted to 10 people, namely by asking 9 questions to find out the characters applied by students in everyday life which is a manifestation of the teacher instilling character education in online learning, the character values studied in this study were 9 characters, namely:

3.1.1. Always absent attendance on time

Based on the results of interviews with parents of students, there are some parents who are absent on time for online learning. This is based on the results of interviews with parents of students, namely Mrs. I as follows:

"He always does."

As for the results of interviews with parents, namely Mr. AS, who said that it was difficult to be on time in online learning because the information sent by the teacher was erratic so that it was impossible for children to open WhatsApp groups at any time so that parents were often reminded. This is based on the results of interviews with parents of students, namely Mr. AS as follows:

"It's very difficult to be online, ma'am, because when there is WhatsApp, the child is woken up, sometimes playing, sometimes sleeping. How do you realize it, ma'am, but if there is whatsapp, I will definitely remind you, ma'am. I don't think it's conducive, ma'am."

In line with the opinion above from the results of parent interviews, namely Mrs. EN, she said that the school did not provide an absent format so that students opened WhatsApp groups uncertainly. This is based on the results of interviews with parents of students, namely Mrs. EN as follows:

"If there is no format for absenteeism from the school, so only when there is a schedule for children to come in, just enter like that, ma'am, not given from the teacher."

3.1.2. Always carry out the duties of the teacher

The results of interviews with parents of students most of the students carry out the duties of the teacher. Based on the results of interviews with parents of students, namely Mrs. R as follows:
"Alhamdulillah always work ma'am, the task of the teacher is important"

The results of interviews with one of the parents said that they liked to carry out assignments from the teacher but were late in sending assignments, besides that their children were naughty so that the parents' decision to send their children to boarding schools but the children remained in school because they had discussed with the fifth grade teacher. This is based on the results of interviews with the parents of the students, namely Ibu I as follows:

"Yes, ma'am, but she is often late in sending assignments and her child is a bit naughty, ma'am, that's why my child is sent to a boarding school, ma'am."

The results of an interview with one of the parents said that he liked to carry out the duties of the teacher and was guided by his parents. This is based on the results of interviews with parents of students, namely Mrs. EN as follows:

"Yes, she likes working, ma'am, when she has done it, she usually takes a photo and then sends it to her teacher."

3.1.3. Participate in group work in completing school assignments

The results of interviews with parents of students, most of the students took part in group work, but because they were ordered by class V teachers. This is based on the results of interviews with parents of students, namely Mr. T as follows:

"God willing, join the group work."

In addition to the interview description above, there are also other similar results of interviews with parents, namely Mrs. EN as follows:

"Yes, when his mother asked for group work, I told my son to follow him."

In addition, the results of interviews with parents of students there is one student who has never participated in group work. This is based on the results of interviews with parents of students, namely Mrs. I as follows:

"I've never participated in group work, because at that time my son went to Bandung for one week."

The results of interviews with parents showed that students took the initiative to work in groups with their classmates and were accompanied by boarding schools. This is based on the results of interviews with parents of students, namely Mr. AS as follows:

"Yes, ma'am, I like group work, because my son is staying at a boarding school, ma'am and there are friends too, so he is often invited to work in groups, Mrs. Sometimes I like the initiative as well as working together."

3.1.4. Adding ideas for drawing free themes

The results of interviews with parents of students only a small number of students who add ideas in drawing free themes. This is based on the results of interviews with parents of students, namely Mrs. R as follows:

"Like ma'am."

There are also students who are lazy, have no enthusiasm for learning and want to continue to be accompanied by their parents. This is based on the results of interviews with parents of students, namely Mrs. I as follows:

"The child tends to be lazy at home, ma'am, there is no enthusiasm, ma'am, so I must continue to be accompanied by me."

The results of interviews with other parents of students are that sometimes, some do not add ideas to draw free themes at all. This is based on the results of interviews with parents of students, namely Mr. AS as follows:
"I didn't see my son drawing, ma'am, I was just writing and doing my homework. Most of the time, I just do math and science lessons, ma'am."

The results of interviews with other students' parents said to draw parents looking for references on the internet because the child was still in the learning phase and was shown an example of a drawing and the child followed. However, in drawing according to the idea, the parents said that their child had not yet reached that phase. This is based on the results of interviews with parents of students, namely Mrs. EN as follows:

"When it comes to drawing, children like to look for references on the internet, ma'am because maybe children are still learning to draw, so it's a bit difficult. I usually show some pictures on google and then children usually imitate, if you want to draw according to your own ideas, it's not there, ma'am."

a. Do the five daily prayers

The results of interviews with parents of students that most students perform the five daily prayers. This is based on the results of interviews with parents of students, namely Mrs. I as follows:

"Yes ma'am, thank God I always do."

The result of an interview with one of the students is that there are also students whose prayers need to be guided by their parents. This is based on the results of interviews with parents of students, namely Mrs. EN as follows:

"When it comes to doing work, I always tell him to pray five times a day, even though the reading may not be smooth, but I always support my child to pray five times a day but I am still trained and guided by me, the most important thing is that the child is on time first to perform the five daily prayers. It's a bit difficult to tell him to pray five times, sometimes his son obeys while being annoyed, ma'am, but I still try to pray five times, ma'am."

b. Get along with friends of different skin color, different religion, or different ethnicity

The results of interviews with parents of students all said that they got along well with friends, did not discriminate against friends, hung out a lot so they had many friends. This is based on the results of interviews with parents of students, namely Mr. AS as follows:

"Alhamdulillah, the harmony does not discriminate, Mrs. the child is good, her friends are also many."

c. At home cleaning your own bed

d. The results of interviews with parents of students there are those who like to make their own beds, there is even a division by their parents to clean the house. This is based on interviews with parents of students, namely Mr. I as follows:

"When you are at home, you have got your respective tasks, some are mopping, sweeping, there is a schedule so you already know their respective duties."

The results of interviews with other parents were that they rarely made their own bed, some had to be forced to do it because their parents were told to make their own bed. This is based on interviews with parents of students, namely Mrs. N as follows:

"Yes, ma'am, sometimes if you are asked to do it, it's a boy, ma'am."

e. Give appropriate change after shopping from the shop

The results of interviews with parents that most of their children are always honest in giving appropriate change after shopping from the shop. This is based on interviews with parents of students, namely Mrs. E as follows:

"Yes, ma'am, thank God. I like to be returned with the right amount of money, I have never used it for snacks, if you like snacks, let me first, ma'am."
The result of an interview with one of the people is that there is a child who has never been asked to shop at a shop. This is based on interviews with parents of students, namely Mrs. I as follows:
"I've never been told to go shopping at the shop, ma'am."

f. Always help parents when they are in trouble
The results of interviews with parents that most of their children help because they are told by their parents but regardless of being forced or not, students still want to help their parents when they are in trouble. This is based on interviews with parents of students, namely Mr. T as follows:
"If you are asked to help, God willing."
In line with the above opinion there are also students who are already accustomed to helping their parents. This is based on interviews with parents of students, namely Mrs. R as follows:
"Always ma'am, right in front of me I like to trade, ma'am, so I like to help me trade."

4 Discussion
Based on the results of the research obtained regarding "Implementation of Character Education in Online Learning". The discussion in this study was carried out to answer research questions or the formulation of the problem in research, namely "How is the implementation of student character education in online learning in class V SD Negeri 5 Purwawinangun Kuningan District Kuningan Regency Academic Year 2020/2021?". The purpose of this research is to describe the general description of the implementation of student character education in online learning in class V SD Negeri 5 Purwawinangun.

From the research findings, it turns out that from 9 character values, there are 3 character values applied by teachers in online learning, namely religious and responsible. As explained above that (1) Religious, the teacher greets students, (2) Responsibility, the teacher gives assignments to students to do. In line with interviews with teachers, namely that in the implementation of online learning at SD Negeri 5 Purwawinangun the teacher only asked students to study the material and then gave assignments, after that the teacher gave the opportunity to ask students if there were assignments that were not understood. In line with the theory from Chapter II, according to Aceputdin (2017), he stated that although 18 values have been formulated to form the nation's character, but the education unit can determine its development priorities to continue the precondition values that have been developed. The selection of these values departs from the interests and conditions of each educational unit, which is carried out through context analysis, so that in its implementation it is possible that there are differences in the types of character values developed between one school and one another. The implementation of character values that will be developed can be started from the character values that will be developed starting from the essential values, and easy to implement, such as: clean, neat, comfortable, disciplined, polite and courteous. which is done through context analysis, so that in its implementation it is possible that there are differences in the types of character values developed between one school and one region with another. The implementation of character values that will be developed can be started from the character values that will be developed, starting from the essential values, and easy to implement, such as: clean, neat, comfortable, disciplined, polite and courteous. which is done through context analysis, so that in its implementation it is possible that there are differences
in the types of character values developed between one school and one region with another. The implementation of character values that will be developed can be started from the character values that will be developed starting from the essential values, and easy to implement, such as: clean, neat, comfortable, disciplined, polite and courteous.

From the research results, there are many obstacles in the process of implementing online learning, namely:

1. Not all students hold cellphones, because from the interviews there are parents who do not allow their children to hold cellphones. There is also because parents cannot afford to buy their children a cellphone. There are also students who can't take long to use whatsapp groups because most students borrow cellphones from their parents or siblings so students can't access group whatsapp on time. This is in line with the opinion of Mardiana (2021: 60) who said that not all students take part in learning because they still use their parents’ cellphones so they have to wait for their parents to come home from work, and are also constrained by weak network connections.

2. Due to the limited internet quota, in practice the teacher cannot ask students to access the internet like you tube to support learning. This is in line with Sari's opinion (2015: 27-28) which states that the lack of online learning is that it is difficult for children to focus on learning because the atmosphere is not conducive and the limited internet or wifi quota becomes access to online learning and there are disturbances from several other things.

3. Lack of interaction between teachers and students, from the results of interviews with teachers that communication between teachers and students is very limited. Students do not like to respond to what is said by the teacher in the whatsapp group, therefore the teacher only conveys assignments or videos of material that must be studied. This is in line with the opinion of Hadisi & Muna (2015:131) which states that online learning results in a lack of interaction between teachers and students and even between students themselves. This lack of interaction can slow down the form of values in the teaching and learning process. Online learning that is currently being carried out is something new that is felt by both teachers and students.

4. Teachers only focus on curriculum achievement, in previous interviews with teachers, they only wanted to complete the demands of the curriculum without seeing or inserting a character value that should be a good example for students.

5. Limited time, in interviews with teachers, the teacher is not able to freely convey a lot about the material or character education that must be instilled. Because learning time remains the same as face-to-face learning, plus teachers are not ready for online learning so that time is only used to collect and ask for assignments.

Therefore, online learning must have guidance from parents at home, based on the results of research with parents, it turns out that parents of students guide their children when learning online or at home. Because the form of learning can be from daily activities. In character education, the most important thing is when students can apply a lesson in everyday life. Parents of SD Negeri 5 Purwawinangun students always guide their children, especially in daily life and pay attention to their children when learning online. Parents must provide habits that children can do at home such as five daily prayers, cleaning the bed in accordance with the division of tasks that have been given by parents. This is one of the character building for students, agree with previous research, namely according to Zahara (2020) namely integration through daily activities in the form of giving examples such as reprimands, advice, environmental conditioning that supports character education. reinforced
by the opinion of the theory of CHAPTER II, namely according to Matta (2003:67-70) explaining several rules of character formation as follows: (1) The rule of stages, meaning that the process of change, improvement and development must be carried out gradually. Children cannot change suddenly but go through stages that must be passed patiently, so that the orientation is not on results but on process, (2) Sustainability rules, meaning that there needs to be continuous practice. Because a continuous process will shape the sense and color of one's thinking which will eventually become a habit and so on will become a strong child's personal character, (3) The momentum rule, which means using various momentum events for the function of education and training. For example, using the month of Ramadan to develop patience, strong will and generosity, (4) Intrinsic motivation rules, meaning that children's character will be formed strongly and perfectly if driven by their own desires not coercion from others, (5) Guiding rules, it means needing the help of others to achieve better results than doing it alone. Character formation cannot be done without a teacher, in addition to monitoring and evaluating children's development, the teacher also functions as an adhesive element.

During the research in the field, there were no obstacles that occurred, everything went smoothly. From teachers and parents students work well together. All research was carried out, starting from observations, interviews and documentation, everything went well. Therefore, the results of research from SD Negeri 5 Purwawinangun, especially in class V, regarding the implementation of online learning are in accordance with the conditions in the school. That the implementation of online learning at SD Negeri 5 Purwawinangun, especially in grade 5, has not been effective and not maximal in providing learning, especially in providing character education. Because during online learning through whatsapp groups there is no learning, the teacher only gives assignments to students what to do and then the teacher asks for the results of their assignments to be photographed, so in the whatsapp group the teacher only provides information and is in the form of giving assignments. There is no good learning activity in instilling character education. Because online learning should still provide learning for students, even though students are seen and controlled by parents in terms of character education, not all parents understand how to instill character education in students, teachers should instill character education in students so that students can get used to it. When in online learning or when he is with his family at home or in his environment. This is reinforced by previous research according to Santika (2020) which suggests that character education improves and strengthens the role of families, educational units, communities, and the government to participate and be responsible for developing the potential of citizens and building the nation towards an advanced, independent, and prosperous nation. Therefore, it is expected that parents and teachers should establish good communication and cooperation so that students can form characters that can become their identity. Agree with previous research that is according to Mutmainah (2021) suggests that there is cooperation with parents of students and schools when implementing online learning. The existence of communication is so that parents can know their children during online learning and can provide understanding or direction to their children.

The solution for online learning at SD Negeri 5 Purwawinangun in the implementation of character education in online learning is that parents must be involved not only teachers, because time with teachers during online learning is very limited in instilling character education in students. The role of parents is needed with this online learning, as parents must be able to guide their children when they are at home, especially in character education. Parents must always direct, familiarize, and guide children in building character values. Therefore parents and teachers need communication so that they can be in line in instilling
character values in students. Build communication with the teacher to see the child's development. Teachers and parents must build good communication in order to direct and inform students together. The hope for class V teachers is that teachers must be able to build a fun learning atmosphere for students in online learning, namely the existence of learning methods/models that can help make the learning atmosphere fun.

5 Conclusion

From the results of the research and discussion, it can be concluded that at SD Negeri 5 Purwawinangun, it turns out that teachers have implemented character education in online learning, of the 9 characters studied, 3 character values were implemented, namely religious, responsibility and integrity. The first is the value of religious character by the teacher, namely greeting before sending information. Second, the value of the character of the responsibility that the teacher does is giving assignments to students to do. Third, the value of integrity character, namely the teacher asks students to be honest in carrying out activities in the middle of the semester exam.

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Development of Interactive E-Modules (e-MI) through The Canva App in Biology Learning

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Abstract. This study aims to produce an interactive e-module (e-MI) on carbohydrate material biochemistry course with good validity, practicality, and effectiveness. The research method used in this research is Research and Development (R&D) with ADDIE approach design (Analyze, Design, Development, Implementation, Evaluation). The results of this study are e-MI products based on the validation results of content experts by 84.25% and media experts by 77.98%, showing valid criteria in the aspects of content feasibility and practicality. While the results of user trials of 81.34% indicate practical criteria in the practical aspect of using interactive e-modules (e-MI), and a percentage of 82.65% shows very effective criteria in terms of the effectiveness of using e-MI. So the results of this study recommend using this interactive e-module (e-MI) for learning activities, especially in the Biochemistry course of carbohydrate material.

Keywords: Biology Education; Interactive E-Modules; ADDIE Model

1 Introduction

Modules are learning resources commonly used by lecturers. The module is a planned learning device used to help students learn independently [1]. Modules widely used by lecturers are printed and can be used directly by students alone to understand the material. The printed form module is certainly not practical if applied to online learning today. Independent learning is needed in the current online learning process where lecturers cannot fully monitor the student learning process. Digital learning is a form of learning that supports students to learn independently and helps students during online learning [2]. Modules that are part of digital learning and developed using computer technology are called Electronic Modules (E-Modules) [3]. E-Module is an alternative learning resource that can be used during online learning. Innovation in the development of electronic modules is needed to support 21st-century learning [4] and the existence of Z-generation. This technology generation is intelligent and desires to direct themselves [5]. E-Modules support students to learn independently and can be done by developing digital learning materials that utilize technology [6]. E-Modul is a set of non-printed learning media arranged systematically and can be used to learn independently according to their learning style to solve problems in their way [7].

E-Modules can solve problems related to the quality of learning because it facilitates communication between students and lecturers, lecture materials, and fellow students in unlimited situations, conditions, places, and times [8]. This is why e-Modules can be used
during face-to-face learning and online learning because they can be used not only during lecture hours but also outside lecture hours [9].

Biochemistry courses are subjects considered difficult by most students [10]. The majority of students are not yet capable of integrating concepts [11], so to understand complex biochemical materials, learning resources such as e-Modules are needed that are easy for students to use during online learning because they can be accessed using laptops or cell phones. This e-module contains teaching materials consisting of interactive animation, audio, navigation, links, and videos. Interactive E-Module (e-MI) helps students engage the senses of hearing and sight, making it easier for them to remember the information and understand it and will affect long-term memory [12]. This e-MI development uses the Canva application, which students can use via laptops and smartphones. In addition, the E-Module, which is equipped with pictures, videos, animations, questions, and initial guidelines for practicum activities, is expected to help students learn independently to achieve concepts [3].

2 Methodology

The research method used in this research is Research and Development (R&D) with ADDIE approach design (Analyze, Design, Development, Implementation, Evaluation) [13]. According to Lodico, the design of this development approach consists of five stages, namely: a) analysis; b) design; c) development; d) implementation; and e) evaluation [14]. Visually, this ADDIE stage can be seen in Figure 1.

![Figure 1. ADDIE Development Approach Design](image)

The stages carried out in research with the design of the ADDIE development approach are as follows:

a. **Analyze**

At this stage, the main activity is to analyze the need to develop new learning tools, namely the Interactive e-Module (e-MI), and analyze the feasibility and requirements for developing new learning tools.

b. **Design**

In designing new teaching resources/materials (e-MI), the design stage is similar to creating e-MI products. This activity is a systematic process containing the content and construction of the Interactive e-Module (e-MI), starting from setting learning objectives, designing scenarios or teaching and learning activities, and designing learning materials and
evaluation tools for learning outcomes that exist e-MI along with the e-mail design. MI, applications used and features in e-MI also layout on flash video products, etc. This e-MI product design is still conceptual and will underlie the following development process.

c. Development

The development in the ADDIE design contains activities for realizing the e-MI product design. A conceptual framework and construction of e-MI implementation have been prepared in the design stage. The conceptual framework is recognized as a product ready to be implemented at the development stage.

d. Implementation

At this stage, the e-MI product design and methods developed are implemented. During implementation, the e-MI design developed is applied to actual conditions. At this stage, the results of the development are involved, namely assessed by experts (Judgement experts) and users (students) to determine their effect on the quality of learning which includes components of content feasibility and design feasibility, including aspects of validation and aspects of practicality and effectiveness of e-MI products. The application is carried out in small groups to get input from users and experts/judges to improve product drafts.

e. Evaluation

After implementation, the design of the interactive e-module (e-MI) product developed is applied to actual conditions, namely large-scale trials on users, namely students. The evaluation was conducted to provide feedback on implementing the Interactive e-Module product.

3 Result and Discussion

3.1. Analysis and Design Stage

Based on the needs analysis in the Biochemistry course, especially on Carbohydrates, students still have difficulty understanding the abstract structure of carbohydrates. Online learning reinforces this difficulty, so videos and simulations are needed to help students understand and reach concepts.

3.2. Development Stage

The results at the analysis and design stages obtained material developed in the carbohydrate chapter. Next is the preparation of points that will be elaborated, such as materials, questions, videos, hyperlinks, simulations, and references, all of which will be outlined through the Canva application.

3.3. Implementation Stage

The results of the development then enter the implementation stage by content experts and media experts by getting some input from content experts, including a) the characteristics of the e-module are raised; b) using image comparisons between contextual and chemical structures; c) addition of examples of questions; d) in the introduction, a brief description and purpose of the e-module should be added. Meanwhile, inputs from media experts include: a) Images that are too small and text that exceeds the background object; 2) The table of contents should be directly directed to the page with one click; 3) quiz sheets should use google form; 4) the video displayed should contain a homemade video; 5) Designs and images should be free of license.

The validation of content/teaching materials experts on the Development of Interactive E-Modules in Biology Learning was carried out by two experts in biology learning. The
assessment was carried out to analyze the quality of the Interactive e-Module in every aspect assessed and justify the feasibility of the Interactive e-Module product. The results of validating each aspect of the quality of the Interactive e-Module are presented in Figure 2.

Based on the data from the expert validation of teaching materials above, it can be seen that the feasibility of content and presentation in the Development of Interactive E-Modules in Biology Learning, in general, is in the valid category with a percentage of 83.34% and 82.95%. In comparison, the language feasibility aspect is very valid in the category with 86.46%.

Validation of media experts on the Development of Interactive E-Modules in Biology Learning was carried out by an IT/Media expert. The assessment was carried out to analyze the quality of the Interactive e-Module in each assessed aspect and justify the feasibility of the Interactive e-Module product. The results of validating each aspect of the quality of the Interactive e-Module media are presented in Figure 3.
Based on the data from the validation results of media experts above, it can be seen that the screen design display, ease of use, consistency, usefulness, and graphics in the Development of Interactive E-Modules in Biology Learning are generally in the valid category.

Figures 2 and 3 show that the e-module (e-MI) developed is valid. This indicates that the e-MI produced follows the theory and focuses on content, display design, language use, and product components related to each other [15]. In line with the opinion, which states that if the data produced by a product is valid, it can be said that the product provides an overview of the development objectives appropriately and the following reality and is used [16]. Content validity is an essential part of module development. This is because the content in the module becomes a reference in the learning process where invalid content can lead to a wrong understanding of the material [8]. The language aspect has very valid criteria, this aspect is the most crucial aspect in the preparation of e-MI where the thing that needs to be considered in the practice of e-MI is accuracy in sentence arrangement so that the module is communicatively structured and easy to use as a study guide [17]. The conclusion of the validator states that e-MI is feasible to use.

After being validated by experts and revised according to the suggestions from the validator, the researcher then conducted a small-scale trial to see the practicality and effectiveness based on student responses to the use of e-MI. The test results obtained 81.34% for the practicality aspect in the practical use category. E-Modules are suitable for being used as alternative (functional) learning materials that can help learn. This is very time efficient because students can read e-modules (e-MI) anywhere and anytime [18]. The effectiveness aspect of using e-MI is based on student independence in learning. The percentage of 82.65% for the effectiveness aspect is in the very effective category used by students. Based on the results, it can be stated that e-MI is very effectively used to support student independence in learning. The development of e-MI as an alternative learning media can support independent learning where interactive e-modules can make students learn independently [19]. The results of the implementation phase show that e-MI is ready to be used and feasible to be tested on a large scale which is part of the evaluation phase.

4 Conclusion

The results of this study are an interactive e-module (e-MI) product which is based on the validation results of content experts covering aspects of the feasibility of content, presentation, and language in the Development of Interactive E-Modules in Biology Learning reaching 84.25% and based on media expert validation which includes screen design display, ease of use, consistency, usability, and graphics in the Development of Interactive E-Modules in Biology Learning reached 77.98%, both validation results indicate valid and practical criteria in terms of content feasibility and practicality. While the results of user trials of 81.34% indicate practical criteria in the practical aspect of using interactive e-modules (e-MI), and a percentage of 82.65% shows very effective criteria in terms of the effectiveness of using e-MI. So the results of this study recommend using this interactive e-module (e-MI) for learning activities, especially in the Biochemistry course of carbohydrate material.
References


Problems, Motivation and Success of Women Entrepreneurs: a Study on the MSME Sector in Kuningan Regency, West Java During the Pandemic

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Abstract. This study aims to provide an overview of the problems, motivations and successes measured by the marketing performance of women entrepreneurs of SMEs in Kuningan Regency, West Java in dealing with the ongoing pandemic situation. Women entrepreneurs grow to be part of the development of MSMEs in Indonesia. The number of women entrepreneurs is almost equal to the number of men entrepreneurs, so they also have the same contribution to economic growth and employment. However, most women entrepreneurs have faced obstacles such as multiple responsibilities, from the business on the one hand and the family and household on the other. This study uses primary data from questionnaires distributed to 100 women entrepreneurs of MSMEs and the data collected is 93 respondents. Using multiple regression analysis with regression test, hypothesis testing with t test and F test, and determination test. The test results show that the variables of technology, customer orientation, competitor orientation, and motivation have a positive and significant impact on competitive advantage which is a proxy for the success of women entrepreneurs of SMEs.

Keyword: Women Entrepreneur; MSME; Competitive Advantage

1 Background

Micro, small and medium enterprises in Indonesia play a very important role in the economy. According to data from the Ministry of Cooperatives and MSMEs in 2019, MSME players continued to increase from 57.9 million in 2014 to 67.4 million businesses. This number is predicted to increase in 2020 during the Covid-19 pandemic in Indonesia. West Java is the third province in Indonesia with the highest number of MSMEs after East Java and DKI Jakarta. The UNPAD Research Institute stated that during the Covid-19 pandemic as many as 47 MSMEs had stopped operating. The remaining 30% experienced a decrease in income of up to 30%. As the key to increasing growth, job creation and poverty alleviation, MSMEs account for 99% of all businesses in Indonesia. Absorbs 89% of the private sector workforce and contributes 57% to GDP (Japhta et al. 2016).

In Kuningan district, MSME actors grow in various business sectors based on nature, trade, processing and handicraft industries. In general, the type of business carried out is still in the processing of natural products such as plantation, agriculture, animal husbandry and fishery products. The description of Kuningan Regency GRDP based on business fields is shown in table 1.
Table 1. GRDP of Kuningan Regency in 2016-2019

<table>
<thead>
<tr>
<th>GRDP by Business Field</th>
<th>Current Price (Billion Rupiah)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2016</td>
</tr>
<tr>
<td>Agriculture, Forestry and Fisheries</td>
<td>4439.44</td>
</tr>
<tr>
<td>Mining and excavation</td>
<td>307.91</td>
</tr>
<tr>
<td>Processing industry</td>
<td>439.42</td>
</tr>
<tr>
<td>Electricity and Gas Supply</td>
<td>15.86</td>
</tr>
<tr>
<td>Construction</td>
<td>1612.94</td>
</tr>
<tr>
<td>Wholesale and Retail Trade, Car and Motorcycle Repair</td>
<td>2800.77</td>
</tr>
<tr>
<td>Transportation and Warehousing</td>
<td>2862.98</td>
</tr>
<tr>
<td>Provision of accommodation and food and drink</td>
<td>326.65</td>
</tr>
<tr>
<td>Information and Communication</td>
<td>660.71</td>
</tr>
<tr>
<td>Financial Services and Insurance</td>
<td>1040.88</td>
</tr>
<tr>
<td>Real Estate</td>
<td>482.82</td>
</tr>
<tr>
<td>Company Services</td>
<td>73.01</td>
</tr>
<tr>
<td>Government Administration, Defense and Social Security Mandatory</td>
<td>799.5</td>
</tr>
<tr>
<td>Education Services</td>
<td>1835.06</td>
</tr>
<tr>
<td>Health Services and Social Activities</td>
<td>287.54</td>
</tr>
<tr>
<td>Other Services</td>
<td>561.65</td>
</tr>
</tbody>
</table>

Source: Kuningan dalam angka tahun 2020

Table 1 shows that the provision of accommodation and food and drink in Kuningan district is still low compared to other types of businesses. Whereas as a tourist destination, support for the provision of accommodation and food and drink is very much needed. Therefore, it is necessary to pay attention to business actors in this sector. Based on data from the Kuningan Regency Cooperatives and SMEs Office in 2019, the distribution of the number of food business actors is shown in table 2.

Table 2. SMEs in the food and beverage sector

<table>
<thead>
<tr>
<th>No</th>
<th>Type of business</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dry and wet cakes</td>
<td>102</td>
</tr>
<tr>
<td>2</td>
<td>Various Chips</td>
<td>55</td>
</tr>
<tr>
<td>3</td>
<td>Tape Ketan</td>
<td>35</td>
</tr>
</tbody>
</table>
Outside of the production and trade sectors, in Kuningan Regency there is also a creative economy sector that is still not properly recorded and developed. The creative economy is unique because if other sectors must be supported by capital first, then the creative economy sector begins with creativity and innovation. There are seventeen sub-sectors of the creative economy, namely: applications, games, architecture, interior design, product design, visual communication design, film and video animation, photography, handicrafts, performing arts, culinary, music, publishing, fine arts, tv and radio. Almost all creative economy actors in Kuningan Regency are MSMEs.

Women entrepreneurs grow to be part of the development of MSMEs in Indonesia. The number of women entrepreneurs is almost equal to the number of men entrepreneurs, so they also have the same contribution to economic growth and employment. However, most women entrepreneurs have faced obstacles such as multiple responsibilities, from business on the one hand and family and household on the other (Japhta et al. 2016; Das 2000). In addition, there are obstacles related to access to finance needed for business development. Women entrepreneurs have problems related to regulation, access and use of financing from formal institutions such as banks. Lack of property ownership, lack of previous business experience, limited mobility and greater dependence on husband and family are some of the factors that hinder the growth and development of women-owned SMEs (Japhta et al. 2016).

Many factors influence the success of women entrepreneurs such as personality characteristics and parenting patterns (Boz and Ergeneli 2014), Individual & Social Characteristics, Marketing & Business Support, Efficient Management, and Customer Engagement (Arshad et al. 2019), family and social support (Powell and Eddleston 2013), Information and Communication Technology (Chatterjee, Dutta Gupta, and Upadhyay 2020; Hashim, Razak, and Amir 2011; Hussain and Chen 2018). These factors are different from the challenges faced by Entrepreneurs.

The participation of women in the business sector from time to time continues to increase. If in 2012 the involvement of women in the field of entrepreneurship was 58 percent. Bank Indonesia data states, the total Micro, Small and Medium Enterprises (MSMEs) in 2018 reached 57.83 million with more than 60% managed by women (the number of female MSME actors in Indonesia reached 37 million). The percentage of Indonesian men who are entrepreneurs is 14 percent of the total adult male population. Meanwhile, in the women's group, the percentage of entrepreneurs is slightly higher, at 14.1 percent. Women are considered more daring to open new businesses compared to men, as reported by Antara News Agency, 16/12/2019.

The government has made efforts to realize gender equality and justice in the life of society and the state through several policies and programs. However, in practice there are still many obstacles and challenges. Gender equity is more defined as equal conditions for men and
women to obtain opportunities and their rights as human beings to play a role and participate in all fields. While gender equality is a process and fair treatment of women and men, so that in carrying out state and social life, there is no standardization of roles, double burdens, subordination, marginalization, and violence against women and men (Human Development). Based on Gender 2013, Ministry of PPA and BPS).

Furthermore, this research will contribute to strengthening MSME actors in running their business. Information and Communication Technology has provided various opportunities for the development of women entrepreneurs. It is a powerful catalyst for women's political and social empowerment and the promotion of gender equality. IT has redefined women's traditional roles and the widespread use of technology has benefited women on a large scale. Women are increasingly adopting ICT for various business-related tasks such as preparing letters and memos, generating reports, data storage and retrieval, budgeting, planning and analysis of problems and alternatives. ICTs have become a dominant force in women's development as they provide and encourage communications that enhance the exchange of relevant information for marketing, purchasing and also knowledge creation and dissemination.

The difficult situation faced by women entrepreneurs during the pandemic, makes them overwhelmed in running their businesses. As is the case in many other countries, Indonesian women tend to own small businesses. In applying the national definition of SMEs, the survey found that 52.9% of micro enterprises, 50.6% of small enterprises and 34.0% of medium enterprises in urban areas are owned by women. Assuming that this proportion does not change over the 2013-2015 period, women-owned small businesses contributed IDR 443 trillion (USD 36.5 billion) and women-owned medium enterprises of IDR 421 trillion (USD 34.6 billion) to Indonesia's GDP in 2013, or 9.1% overall.

This study will examine the problems faced related to technology, customer and competitor orientation, motivation and success as measured by the competitive advantage achieved by female MSME actors. This study provides an overview of the influence of problem factors, motivational factors on the competitive advantage of women entrepreneurs in Kuningan district, West Java.

2 Overview of Theories

a. Entrepreneurship

Entrepreneurs are globally recognized as the best important for the economy because many of its main activities act as the engine of the economy, enacting and empowering all monetary actions. Entrepreneurs are catalytic agents for the expansion and promotion of economic activity in every sphere of economic life of a country by introducing new combinations, improvising on existing productive resources and simultaneously creating jobs for the community.

Women entrepreneurs in ASEAN countries are on the rise and a lot of research is being carried out in ASEAN countries to find out the motives behind the success of women entrepreneurs. An empirical study in Singapore revealed the reasons that inspired women to own a business and found a higher need for achievement, a higher need for dominance and a moderate need for affiliation and autonomy were among the success factors.

b. Determinants of entrepreneurship and gender differences
It has been mentioned previously that the factors that influence the entrepreneurship of women entrepreneurs are more than that of men's entrepreneurship. Factors that influence are economic factors, social factors, technological factors. New technologies have the potential to lead to the development of new products and services, creating opportunities to start new companies. In addition, new information and communication technologies lead to reduced transaction costs and lower minimum efficiencies across many industries, enabling small firms to compete in both new and established industries. Therefore, it can be said that small companies benefit from technological developments, either directly (producing new products) or indirectly (taking advantage of new production or communication techniques).

Studies refer mainly to the 1980s and earlier when per capita income levels were relatively low. The negative effects may reflect the exploitation of economies of scale when the technological environment is relatively stable. Other more recent studies have reported a positive relationship between per capita income and entrepreneurship since the 1970s. From a given level of economic development onwards, an increase in wealth tends to be accompanied by technological developments and an increase in the size of the service sector, developments which - in turn - positively influence entrepreneurship. A higher number of women in the workforce is likely to be accompanied by a lower rate of self-employment (as a percentage of the workforce), as women are less likely to become self-employed than men. Gender is a strong predictor of nascent entrepreneurship at the micro level, with men more likely to have the intention to start a business than women. Countries with a higher number of women in the workforce are characterized by lower rates of self-employment, self-employment as a percentage of the workforce. However, the level of entrepreneurial activity used in this paper is scaled on a population.

3 Hypothesis

H1: Technology has a positive effect on the competitive advantage of women entrepreneurs
H2: Customer orientation has a positive effect on the competitive advantage of women entrepreneurs
H3: Competitor orientation has a positive effect on the competitive advantage of women entrepreneurs
H4: Business motivation has a positive effect on the competitive advantage of women entrepreneurs
This research will be conducted using a questionnaire to reach women entrepreneurs in West Java through Google Form. Then the data entered will be sorted based on the completeness of the answers. It is hoped that from the distribution of this questionnaire, at least 100 women entrepreneurs in Kuningan Regency, West Java can participate.

The variables used in this study are Customer Orientation, Competitor Orientation which is a proxy for the problem and Business Motivation as an independent variable. As the dependent variable is Competitive Advantage as a proxy for Business Success.

The results of the verification of respondents’ responses were a total of 93 respondents who met the completeness of the data. The data was processed using multiple regression analysis and partial hypothesis testing with t-test and joint hypothesis testing using the F-test.

5 Results and Discussion

There are quite a lot of micro and small business actors in Kuningan Regency and they are spread in various industrial and trade sectors. Table 3 shows the distribution by sub-district of the number of micro and small business actors based on the results of the 2014 SUSENAS (BPS Kuningan 2020).

The descriptive statistics of the data are shown in table 3 below:

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>93</td>
<td>21.00</td>
<td>30.00</td>
<td>27.6882</td>
<td>2.47148</td>
</tr>
<tr>
<td>Customer</td>
<td>93</td>
<td>19.00</td>
<td>40.00</td>
<td>34.1075</td>
<td>5.54911</td>
</tr>
<tr>
<td>Competitor</td>
<td>93</td>
<td>8.00</td>
<td>30.00</td>
<td>23.4516</td>
<td>5.14257</td>
</tr>
<tr>
<td>Motivation</td>
<td>93</td>
<td>149.00</td>
<td>197.00</td>
<td>171.192</td>
<td>13.60248</td>
</tr>
</tbody>
</table>
Based on the data in the statistical descriptive table, the number of respondents is 93 people with an average score of answers on the Technology variable 27.6882, the Customer Orientation variable an average of 34.1075, the Competitor Orientation variable an average of 23.4516, the Business Motivation variable an average of 171.19 and the average Competitive Advantage variable is 53.3763.

The correlation between the variables shows the level of the relationship is not too high so it can be concluded that there are no symptoms of multicollinearity between the independent variables in this study.

Table 4, Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>Technology</th>
<th>Customer</th>
<th>Competitor</th>
<th>Motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer</td>
<td>.595 **</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competitor</td>
<td>.259 *</td>
<td>.619 **</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Motivation</td>
<td>.596 **</td>
<td>.723 **</td>
<td>.544 **</td>
<td>1</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).
* . Correlation is significant at the 0.05 level (2-tailed).

Furthermore, from the results of data processing using SPSS 20 software, the results are as in the following table:

Table 5, Multiple Regression Coefficient and t Test

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.136</td>
<td>.370</td>
<td>.284</td>
<td>3.072</td>
</tr>
<tr>
<td></td>
<td>.437</td>
<td>.207</td>
<td>.245</td>
<td>2.111</td>
</tr>
<tr>
<td></td>
<td>.364</td>
<td>.176</td>
<td>.189</td>
<td>2.065</td>
</tr>
<tr>
<td></td>
<td>.157</td>
<td>.078</td>
<td>.216</td>
<td>2.005</td>
</tr>
</tbody>
</table>

The form of the multiple regression equation:

\[ Y = -28.360 + 1.136 X_1 + 0.437 X_2 + 0.364 X_3 + 0.157 X_4 \]

Y = Competitive Advantage
X1 = Technology
X2 = Customer Orientation
X3 = Competitor Orientation
X4 = Effort motivation
It can be explained that when \( X_1, X_2, X_3 \) and \( X_4 \) are worth 0 then the value of Competitive Advantage is -28,360 which means that they do not have a competitive advantage. The value of the coefficient on each variable indicates the magnitude of the change in competitive advantage if the variable changes by one unit. These results also indicate a positive influence of each variable on competitive advantage.

The results of hypothesis testing indicate that all hypotheses can be proven that technology has a positive effect on competitive advantage. This is in line with the results of research conducted by Chatterjee et al. (2020) which states that technology has a significant effect on entrepreneurial orientation.

Customer orientation which is also a factor that can increase the competitive advantage of MSME business actors shows positive and significant results. This is in accordance with the results of research conducted by Arshad et al. (2019) which examines the factors that contribute to the success of women entrepreneurs in Malaysia. One of the contributing factors is *Customer Engagement*.

Competitor orientation shows positive and significant results on the competitive advantage of women entrepreneurs in Kuningan district. Competition between business actors also occurs in the micro and small business sector. Increased family welfare is a factor that encourages the number of women entrepreneurs in the MSME sector. Women entrepreneurs face different challenges from male entrepreneurs because there is a factor in taking care of the family which is an important role for women. However, women entrepreneurs in Kuningan Regency are also able to manage their business by being aware of business competition.

Business motivation also shows positive and significant results on the competitive advantage of women entrepreneurs in Kuningan Regency. This means that the higher the motivation to do business, the more it will encourage women MSME entrepreneurs to increase their business competitive advantage.

**Table 6, F Test and Coefficient of Determination**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>F</strong></td>
<td>30.913</td>
</tr>
<tr>
<td><strong>Sig.</strong></td>
<td>.000*</td>
</tr>
<tr>
<td><strong>Adjusted r square</strong></td>
<td>0.565</td>
</tr>
</tbody>
</table>

The results of the hypothesis test of the joint effect of the independent variable on the dependent variable show that together the four independent variables have a significant effect on the competitive advantage variable. The results of the determination test strengthen the positive influence of the four variables as indicated by the adjusted \( r \) squared value of 0.565, which means that 56.5% change in competitive advantage is determined by the four independent variables, namely technology, customer orientation, competitor orientation, and business motivation.

### 6 Conclusion

This study aims to analyze the relationship between problems, motivation and success of women entrepreneurs in Kuningan Regency, West Java. Problems are proxied by understanding social media technology, customer orientation, competitor orientation, business motivation and competitive advantage as proxies for success.
The results showed that all of the research hypotheses were supported. Variables of technology, customer orientation, competitor orientation and motivation to try have a positive and significant impact on the competitive advantage of women entrepreneurs. Further research is open to further examine the success factors of women entrepreneurs in managing and developing their businesses.

References:


Implementation of ORB and Freak Algorithm in English Applications for Learning Objects Around

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Abstract. Nowadays children's interest in learning English is still low, so it is necessary to provide interesting and innovative learning media. Learning English can be started by studying the objects around them with a method that does not make children glued to their gadgets. This study aims to create an English learning application that can introduce, add, and memorize the vocabulary of surrounding objects for children but involves the role of a more mature person. The Rational Unified Process is used as a system development method in this research. RUP consists of perspective and core processes as well as a lifecycle phase. The aspect that is the focus of this research is the object guessing feature by applying the ORB algorithm and the Freak algorithm in matching images in the form of a quiz. The ORB algorithm is used for keypoint detection in an image. Freak binary algorithm descriptor that uses pattern sampling and method of selection pairs used by BRISK. Optimizing the role of parents in this quiz is in adding objects to the quiz. The results of this study are an android-based application consisting of aspects of recognizing existing objects such as dictionaries and aspects of practice in the form of guessing objects that are around. in the form of a quiz. This quiz is completely controlled by an older person. The hope is that there is an active role for parents or people who are more mature in the learning process and not make children passive.

Keyword: English; children; Freak; ORB; android apps

1 Introduction

Learning foreign languages, especially English for children, needs to be done to compete globally in the future. In early childhood, learning English includes all language competencies, namely listening, speaking, reading and writing [1]. English language skills cannot be separated from vocabulary, the more vocabulary an individual has, the easier it will be to learn a language.

Nowadays the role of parents is very minimal in the learning and teaching process, especially in online or independent learning at home. It should be realized that in the teaching and learning process parents have roles including assisting, establishing communication, supervising, encouraging and motivating and directing. [2]. This is due to several factors including the presence of smartphones with various technologies in them. The presence of smartphones indirectly triggers various views, including the need for the role of parents in the teaching and learning process so that the role taken by parents is only limited to facilitating their children.
Concentration is an important factor related to the ability to focus on the material and the learning process itself. If the child/student cannot concentrate in learning, then the child does not enjoy the learning process that is being carried out [3]. One way for children to enjoy learning is to prepare interesting learning media, namely image media. Picture media can improve student learning outcomes [4]. The image itself does not necessarily visualize something that cannot be seen or is difficult to see, so it is better if the object is taken in a real environment with the help of existing devices and processed to be an interesting and innovative learning media. Processing of images taken in a real environment and matched to existing data requires image processing. Digital image processing (Digital Image Processing) is a discipline that studies image processing techniques. The image referred to here is a still image (photo) and moving image (derived from a webcam). [5]

An important step in recognizing images is the search for the feature/keypoint detector and its descriptor. Image texture consists of dots that have unique characteristics that are considered capable of being used as differentiators [6]

### 2 Methodology

The methodology used in this research is divided into 3 stages, namely identification and analysis of problems, data collection, and problem solving with software development using the Rational Unified Process (RUP).

#### 2.1. Problem identification and analysis

The problem identification process consists of 3 steps, namely finding problems that will occur and being appointed as research topics and analyzing these problems to find the main source of the problems that occur so that solutions can be found.

#### 2.2. Data Collection

The data collection process consisted of observations on existing applications and literature studies on previous research. The research that is used as a reference is research on the design of Balinese carving recognition applications using the ORB method [7] and testing the temple site image detection algorithm on the android application [6]. Based on these two studies, it can be concluded that the use of ORB and Freak algorithms produces the best combination for matching applications on Android.

#### 2.3. Solution to problem

ORB is a fairly fast BRIEF-based binary descriptor. ORB has good resistance to noise and rotational invariant properties. ORB performance results in 2 times efficiency compared to SIFT in various situations. The ORB algorithm is a combination of two popular techniques, namely, FAST (Features for Accelerated Segment Test) and BRIEF (Binary Robust Independent Elementary Features) for keypoint descriptors [8]. The implementation steps of ORB are:

1) Calculate the moment invariant on the keypoint with the formula:
\[ m_{pq} = \sum x^p y^q I(x, y) \quad \dots \quad (1) \]

2) Determination of the centroid moment and angle with the formula:
\[ C = \frac{m_{10}}{m_{00}}, \frac{m_{01}}{m_{00}}, \quad \dots \quad (2) \]

3) Calculating patch Orientation angle
\[ \theta = \arctan2(m_{10}, m_{01}) \quad \dots \quad (3) \]

4) Generating descriptor value
\[ r(p; x, y) = f(x) \begin{cases} 1, & \frac{p(x) - p(y)}{p(x) + p(y)} > \frac{1}{2} \\ 0, & \frac{p(x) - p(y)}{p(x) + p(y)} \leq \frac{1}{2} \end{cases} \] ...4

Freak is one of the binary descriptor algorithms that have similarities with the BRISK and ORB algorithms which consist of 3 constituent components, namely sample patterns, orientation compensation and sampling pairs. The pattern of this algorithm is to check all pairs and for each pair \((p1, p2)\). If the intensity at point \(p1\) is greater than the intensity at point \(p2\) then we write 1 in the binary string and vice versa. The freak algorithm uses a cascade approach to speed up matching two descriptors, where only the first 128 bits will be compared if the distance is smaller than the threshold then the process continues to compare the next 128 bits. This mechanism can result in faster matching so that in the first 128 bit comparison it can discard more than 90% of the non-matching candidates.

2.4. Software Development

![Rational Unified Process (RUP)](image)

The development of English learning applications uses the Rational Unified Process (RUP) development methodology. RUP is a system development methodology consisting of 2 dimensions, namely horizontal and vertical dimensions with iterations in each process. The following explanation is an explanation of the dimensions of the RUP:

a. The horizontal axis on the RUP represents time and aspects of the process life cycle. This dimension represents the dynamic aspect of the process which consists of phases, iterations and milestones. The phases in this dimension consist of inception, elaboration, construction and transition, each of which allows iteration to occur.

b. The vertical axis represents core process disciplines, which group activities logically by nature [9]. Activities in this dimension consist of core processes and supporting processes

Each phase has a different workflow according to needs. In addition, because the project is made on an independent scale or small group, the workflow support is not used. The iteration is carried out at each phase of the horizontal dimension to ensure that the application is made according to the needs.

3 Result and Discussion

Based on the results of the problem identification, it was found that there was a need for an English learning application that was not only used independently by children but needed assistance and management by their parents by applying the concept of exploring the surrounding environment. It is hoped that with this application the role of parents in the
independent learning process at home will be more optimal. RUP is a methodology used in application development by applying the ORB algorithm as keypoint detection and Freak as an algorithm for binary descriptors. It aims to create an image processing-based application to match image data taken by children with images taken by parents as an exercise to increase English vocabulary.

Berikut adalah tahapan yang dilaksanakan dalam penelitian ini:

1) The inception phase consists of identification of business processes and analysis of user requirements. This phase resulted in several things including: The application made has a simple dictionary feature, and quizzes as an exercise. Children are required to capture pictures around them to guess the name of the object in English. Quiz created is multiple choice
   a. The question management process can only be done by parents or older adults by first registering and verifying the account via email
   b. Entities or users of this application consist of 2, namely children and parents.
   c. To use this application, you need an Android smartphone that has a camera of at least 2 MP with the lollipop operating system
   d. The test plan is only carried out internally using blackbox testing

2) Elaboration Phase
   a. In this phase, the design of the application is generated. The design tool used is using UML diagrams with the software used is Star UML. The UML is an industry-standard language that allows us to clearly communicate requirements, architectures and designs [10]. Here is the use of the application that was made

   ![Figure 2. Use Case](image)

   b. The application made consists of various features including viewing information, viewing simple dictionaries and playing quizzes, as well as features for parents for managing questions in the application database. In this phase, it is expected that the design has reached 70-80% which if needed will be iterated if there is a change
   c. Algorithm Implementation
      The ORB algorithm used has several stages, namely as follows:
      1) The process of changing the image to grayscale
      2) Determine the Ip value, where Ip = 100 and the threshold value where the value is set to 25
3) Comparing Ip with points around with a radius of 3 using formula 1, so that Ip is compared with I₁, I₅, I₉, I₁₃ if the conditions are met proceed to the next stage if not then testing is carried out on all points I₂, I₃, I₄, I₆, I₇, I₈, I₁₀, I₁₁, I₁₂, I₁₄, I₁₅, I₁₆ with radius 3.

\[
I_n = \begin{cases} 
ln \leq Ip - t \text{ (darker)} \\
Ip - t < ln < Ip = t \text{ (similar)} \\
Ip + t \leq ln \text{ (brighter)} 
\end{cases} \quad \ldots(1)
\]

- The results of the calculations can be seen in table 1

<table>
<thead>
<tr>
<th>In</th>
<th>Intensitas</th>
<th>hasil Uji</th>
<th>In</th>
<th>Intensitas</th>
<th>hasil Uji</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>230</td>
<td>brighter</td>
<td>9</td>
<td>71</td>
<td>Darker</td>
</tr>
<tr>
<td>2</td>
<td>225</td>
<td>brighter</td>
<td>10</td>
<td>80</td>
<td>Similar</td>
</tr>
<tr>
<td>3</td>
<td>214</td>
<td>brighter</td>
<td>11</td>
<td>183</td>
<td>brighter</td>
</tr>
<tr>
<td>4</td>
<td>202</td>
<td>brighter</td>
<td>12</td>
<td>210</td>
<td>brighter</td>
</tr>
<tr>
<td>5</td>
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<td>brighter</td>
<td>13</td>
<td>215</td>
<td>brighter</td>
</tr>
<tr>
<td>6</td>
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<td>brighter</td>
<td>14</td>
<td>209</td>
<td>brighter</td>
</tr>
<tr>
<td>7</td>
<td>130</td>
<td>brighter</td>
<td>15</td>
<td>221</td>
<td>brighter</td>
</tr>
<tr>
<td>8</td>
<td>70</td>
<td>darker</td>
<td>16</td>
<td>221</td>
<td>brighter</td>
</tr>
</tbody>
</table>

- Results of grayscale values around the test point and conversion to binary

<table>
<thead>
<tr>
<th>Nilai grayscale titik uji</th>
<th>Konversi ke citra biner</th>
</tr>
</thead>
<tbody>
<tr>
<td>223 228 221 225 214 236 238</td>
<td>1 1 1 1 1 1 1 1 1 1 1 1 1</td>
</tr>
<tr>
<td>219 221 224 221 223 214 224</td>
<td>1 1 1 1 1 1 1 1 1 1 1 1</td>
</tr>
<tr>
<td>209 200 190 150 180 210 202</td>
<td>1 1 1 1 1 1 1 1 1 1 1 1 1</td>
</tr>
<tr>
<td>215 150 160 100 170 200 180</td>
<td>1 1 1 1 1 1 1 1 1 1 1 1 1</td>
</tr>
<tr>
<td>210 140 71 70 65 201 170</td>
<td>1 1 0 0 0 0 0 1 1 1 1 1</td>
</tr>
<tr>
<td>200 183 73 72 73 130 190</td>
<td>1 1 0 0 0 0 0 1 1 1 1 1</td>
</tr>
<tr>
<td>190 170 74 71 70 65 180</td>
<td>1 1 0 0 0 0 0 0 0 1 1 1 1</td>
</tr>
</tbody>
</table>

4) Calculating the moment invariant value at keypoint

<table>
<thead>
<tr>
<th>Indeks</th>
<th>Jumlah baris</th>
<th>Jumlah Kolom</th>
<th>M₀₀</th>
<th>M₀₁</th>
<th>M₁₀</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 1 1 1 1 1 1 1 7</td>
<td>7 7 7 7 7 7 7 7 7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1 1 1 1 1 1 1 1 7</td>
<td>7 7 14 12 12 12 12 12 12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1 1 1 1 1 1 1 1 7</td>
<td>4 7 21 21 21 21 21 21 21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1 1 1 1 1 1 1 1 7</td>
<td>4 7 28 16 16 16 16 16 16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1 1 0 0 0 1 1 4 4</td>
<td>4 4 20 20 20 20 20 20 20</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1 1 0 0 0 0 1 3 7</td>
<td>7 3 21 49 49 49 49 49 49</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| | 129 | 148 |
5) Centroid Value

\[ C = \begin{pmatrix} 129 \\ 148 \end{pmatrix}, \frac{38}{38} \]

So that the value of the centroid (3.39), (3.89), then obtained the corner angle is

\[ \theta = \arctan2\left(\frac{3.39}{3.89}\right) = 1.724^\circ \]

6) ORB algorithm results with matching feature to see provisional results

![Figure 3. Matching using the ORB Algorithm](image_url)

7) Ignore point 6 because the matching process will use the Freak algorithm as a binary descriptor by iterating over all values. So that the most suitable value for the image above is obtained

3) Construction Phase

The activity at this stage is how to change the design into an application using certain software. The software used to make this application is to use Unity and the library uses OpenCV.

The application that was created was named GO-English which stands for Guess Object in English. The features of the application made consist of the Guess menu, scores, dictionaries, and information. The Guess menu is a quiz menu where players have to look for objects that are around to take pictures then the ORB and Freak algorithms will match them with the database. If the parent's access rights have entered the image, a multiple choice question will appear.

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The application that was created was named GO-English which stands for Guess Object in English. The features of the application made consist of the Guess menu, scores, dictionaries, and information. The Guess menu is a quiz menu where players have to look for objects that are around to take pictures then the ORB and Freak algorithms will match them with the database. If the parent's access rights have entered the image, a multiple choice question will appear.
In question management, parents are required to register first and verify registration. The verification process is carried out using email, where the application will send a link for verification in the registered email. Users are required to capture an image of an existing object and then give it a name using English. After that the user is required to fill in the wrong answer as a distraction for the child.

To play this quiz, users, namely children, are required to look for objects around them to take pictures. If the image has been entered into the database, a question and answer option will appear for the object name in English. If the answer choice is correct, the application will display a notification that the selected answer is correct and will be counted. If the answer is wrong, a notification will appear that the answer is wrong and will not get a value. The display of the application made can be seen in the image below.
Testing of the developed software is carried out using black box testing and focuses on the registration and login features for parent users and object scan features for child users. Testing for registration is done by creating true and false scenarios to be input into the application and seeing the results if they are appropriate then the application is declared successful otherwise the repair process will be carried out.

4) Transition Phase

In the last stage, the horizontal dimension of the RUP software development method focuses on how to document and deliver applications to consumers. The applications created will be entered into the Playstore so that they can be used by the general public. However, before publishing, it is necessary to make a manual book regarding the use of applications carried out in this phase.

4 Conclusion

Based on the description above, it can be concluded that the application made is in accordance with the specifications that have been previously set. This application is expected to improve the function and role of parents in the independent learning process at home. Children as users become more interested in exploring the vocabulary of objects around them with the support of their parents, so that English is no longer a boring language to learn.

References


Design and Build Zakat Website Application Based on QR Code Using Cipher Block Chaining Algorithm

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Abstract. Zakat is a certain part of the property that must be issued by every Muslim if it has reached the specified conditions. As one of the pillars of Islam, Zakat is paid to be given to those who are entitled to receive it. Zakat is managed by an official body established by the government, namely the National Amil Zakat Agency (BAZNAS). BAZNAS was formed by the government based on the Decree of the President of the Republic of Indonesia No. 8 of 2001 which has the task and function of collecting zakat, infaq and alms at the national level. BAZNAS has an extensive network spread across 34 provinces and in 463 regencies and cities throughout Indonesia. BAZNAS Majalengka is one part of the central BAZNAS network that is always committed to managing and collecting zakat, infaq and alms from the community. BAZNAS Majalengka in the process of collecting zakat, infaq and alms is still using the direct transaction method. The direct transaction method has several problems including the giver and recipient of zakat having to meet in person, the recording process must be done in detail, limited distance and time, and the recording process has not been digitally computerized. A website-based application is needed that can make it easier for everyone to make zakat transactions to BAZNAS Majalengka. With this application, it is expected to increase zakat income to BAZNAS Majalengka and can facilitate zakat giving transactions. This application is designed using the Rational Unified Process (RUP) system development method. The RUP method consists of four stages, namely: Inception, Elaboration, Construction, and Transition. In the transaction process for giving zakat, a QR Code is used by applying the Cipher Block Chaining algorithm. The result of this research is a website application for giving zakat.

Keywords: Zakat; QR Code; Ciper Block Chaining; Baznas; RUP

1 Introduction

BAZNAS Majalengka is one part of the central BAZNAS network that is always committed to managing and collecting zakat, infaq and alms from the community. BAZNAS Majalengka in the process of collecting zakat, infaq and alms is still using the direct transaction method. The direct transaction method has several problems including the giver and recipient of zakat having to meet in person, the recording process must be done in detail, limited in distance and time, and the recording process has not been digitally computerized. A website-based application is needed that can make it easier for everyone to make zakat transactions to BAZNAS Majalengka. With this application, it is expected to increase zakat income to BAZNAS Majalengka and can facilitate zakat giving transactions.
To facilitate the transaction process for giving zakat through the website media, transaction facilities using a QR-Code are needed. QR Codes are used to encode and decode data at a rapid rate. Using camera phones to read two dimensional barcodes for various purposes is currently a popular topic in both research and in practical applications. But until now, the information provided by QR Codes was solely static[1]. Quick response (QR) codes are barcodes comprising white and black blocks, which have been widely adopted in mobile applications such as communication, payment, etc, with the pervasive built-in cameras on smartphones[2].

Many researches on the use of QR Codes have been carried out including by Fong with the title Smart City Bus Application with Quick Response (QR) Code Payment. the results of his research represent the results of a system and acceptance Smart City Bus Application testing, Android application specifically providing access to public bus transportation information such as display bus route, bus live location, login bus notification, bus fare calculation and payment using QR code[3]. In addition, pradipta de also conducted research on QR codes with the title An Assessment of QR Code as a User Interface Enabler for Mobile Payment Apps on Smartphones with research results with 48 users to identify the answer to two different questions: (a) how do users with text-based UIs that are more familiar with the new QR code-based UIs perform? (b) not lacking experience with smartphone use acts as an entry barrier for apps designed for smartphones? Users show a significant improvement in completing tasks for the same task when using QR Code based UI versus text based UI on smartphones. User response under various smartphone experience is not affected when using QR code based applications[4].

In this study, our goal is to build a QR Code-based zakat web application using the Cipher Block Chaining algorithm that can facilitate zakat giving transactions. The Cipher Block Chaining (CBC) algorithm is the application of a feedback mechanism to a block of bits where the results of the previous block encryption are fed back into the current block encryption process. The trick, the current plaintext block is XORed first with the previously encrypted ciphertext block, then the XOR results are entered into the encryption function. With the CBC algorithm, each ciphertext block depends not only on its plaintext block but also on all previous plaintext blocks[5].

2 Methodology

In this paper used a methodology consisting of three methods, namely data collection methods, system development methods and problem solving methods. Data collection methods are methods or techniques that can be used by researchers to collect data. The data collection method in this study used the observation method, interview method, and literature study method.
The observation method was carried out by direct observation to the research location at BAZNAS Majalengka to find out the activities and workflow that took place. In the observation method obtained data related to the process of zakat management activities that have not used a website-based application. The interview method is a data collection method used to obtain information directly from the source. Interview activities were carried out with the leadership of BAZNAS Majalengka in order to explore information and problems. The literature study method is a data collection technique by collecting relevant information and obtained from books or journals that are related to BAZNAS, QR Code and encryption and decryption systems on the Cipher Block Chaining algorithm.

The system development method used in this paper uses the Rational Unified Process (RUP) method. Rational Unified Process is a software engineering method developed by collecting various best practices in the software development industry[6]. The RUP model is very good for the Unified Modeling Language (UML)-based software development process. This is because the RUP method uses Object Oriented Programming (OOP) methods in dividing step by step and iterating between the components involved.

The activities carried out in the RUP methodology are creating and maintaining models. The RUPalso includes a discussion of the UML implementation. So that we can distinguish RUP is a process or stage that is done in software engineering, while UML is a standard language used to describe, describe, build, and document the devices used in building software[7].

The RUP method consists of four stages, namely Inception, Elaboration, Construction, and Transition. The following is an explanation of the system development using the Rational Unified Process (RUP) Method:

a. Inception
   This stage is the earliest stage where the evaluation activity of a software project is carried out. In this case, we collected data by direct observation to the research site, namely BAZNAS Majalengka. We collect data needed to support application development, such as conducting interviews related to the menu ordering system and payment processing with the leadership of BAZNAS Majalengka. We also conducted literature studies related to the Cipher Block Chaining algorithm, QR Code, android application programming, and web application programming with PHP. The data that has been collected is then analyzed to determine user needs and the design of the system to be made.

b. Elaboration
   The purpose of this stage is to get an overview of the needs, requirements and main functions of the software. In this case the author focuses on planning the system architecture. Activities carried out at this stage include making subsystem architecture design (architecture pattern), display component design, modeling with UML (Unified Modeling Language) diagrams and making documentation.
c. Construction
The steps carried out in this phase are:
- Implementation
  At this stage the author begins to write program code (coding) using the Android
  programming language for users and PHP for admin
- Testing
  At this stage, the system is tested, the author uses blackbox, whitebox and User
  Acceptance Testing (UAT) testing.

d. Transition
This stage is focused on how to deliver the finished software to the user. In this case,
the author will install the system so that it can be understood by the user. Activities at
this stage include user training and maintenance.

The problem solving method used in this QR code is using the Cipher Block Chaining
method. Cipher Block Chaining is one of the developments of the Block cipher algorithm, this
algorithm will divide the clear text that will be sent with a certain size (called a block) with the
bit length of each block in accordance with the length of the bit in the key, and each block is
encrypted using the same key. and XOR it with the result of the previous block encryption[8].

Cipher Block Chaining works in block mode, which is grouping plaintext binaries into
several groups according to the conditions set by the user (the person who encrypts the
message). The encryption and decryption process is carried out by XORing each block value
with the previous block then the result obtained from the XOR operation in XOR it returns
with the key. Binary result of XOR operation on each block will be shifted to the left or right
by the amount specified by the user system. The initial value and key are set before the
encryption or decryption process is carried out and must be agreed upon by the encrypter and
the decryptor. Key length and initial value (initial vector/C0) must be equal to the number of
bits per group[9].

Steps in completing the Cipher Block Chaining algorithm process (CBC) are as follows:
1. Input plaintext or ciphertext, then convert the decimal value to binary
2. Determine the value of the number of bits for each group, key, initialization vector
   (C0)
3. Group the plaintext and ciphertext binaries into blocks according to the number of bits
   per group that has been previously determined.
4. Perform the encryption or decryption process on each block/binary group of
   plaintext or ciphertext where each block is interdependent with other blocks.
5. Perform the process of shifting the plaintext and ciphertext bits according to the
   number of bits set by the user, the result of this shift is the final result of the encryption
   or decryption process.

The flowchart of the encryption and decryption of the Cipher Block Chaining algorithm
can be seen in the following figure 2.
Mathematically, encryption and decryption with the Cipher Block Chaining algorithm is stated as follows:

\[ C_i = \text{Old}(P_i C_{i-1}) \]
\[ P_i = \text{Dk}(C_i C_{i-1}) \]
3 Result and Discussion

The results of this journal produce a use case diagram design for the zakat website application using a QR code as shown in Figure 3.

![Figure 3. Use Case Diagram](image)

The following is the result of the display of the zakat website application. The main menu page is the first page display when the website is opened. in the main menu page display there are several menus including the home menu, profile, program, service, zakat, infaq, download, contact. Figure 4 is a display of the main menu page.

![Figure 4. Main Menu Page](image)
The profile menu page contains three sub menus, namely: institution profile, vision and mission, and organizational structure. Figure 5 is a display of the profile page menu.

![Figure 5. Profile Page Menu](image)

The program menu page contains six menus, namely: Majalengka Pinter, Majalengka Bageur, Majalengka Cageur, Majalengka Singer, Majalengka Bener, Target Program. Figure 6 is a display of the program menu page.

![Figure 6. Program Page Menu](image)

The service menu page contains five sub menus including donations, online alms, calculating zakat, account numbers, infaq. Figure 7 is an illustration for the service page menu. On this page there is also a section that contains a QR code for processing alms giving transactions.
4 Conclusion

The conclusions that can be drawn after conducting this research are as follows:
1. This research produces a zakat web application using the Qr Code as one of the methods for transactions.
2. In this study, we succeeded in implementing the Cipher Block Chaining Algorithm which was generated in the form of a Qr Code for the encryption and decryption of transaction id.
3. This application can help in the process of giving zakat quickly, easily, and safely.
4. This application can make it easier for BAZNAS Majalengka in managing incoming zakat or donations because it is already computerized with the system.

References


Utilization of Non-Timber Forest Products by the Karangsari Village Community in the Use Zone of Mount Ciremai National Park

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Abstract. Mount Ciremai National Park (TNGC) has abundant natural resource potential, including non-timber forest products. The surrounding community, especially the people of Karangsari Village, utilize these non-timber forest products to meet their daily needs. This study aims to obtain information about the potential and utilization of non-timber forest products by the community. Collecting data on the use of forest resources using interview methods and distributing questionnaires, to determine the potential of non-timber forest products with an inventory of potential exploration methods. Based on the results of the analysis of the vegetation of 24 species of non-timber forest product plants. Utilization of natural resources by the community in the form of food plants, medicinal plants and animal feed. Forest resources that are always used by the community are avocado (Persea americana), Jackfruit (Artocarpus heterophyllus), Coffee (Coffee sp) and Kaliandra (Calliandra Calothyrsus).

Keywords: Non-timber forest products; TNGC; food plants; medicinal plants.

1 Introduction

Indonesia is a country that is rich in natural resources. Forests in Indonesia have the highest biodiversity in the world, although their land area is only 1.3% of the land area on the earth's surface [1] (Forest Watch Indonesia, 2000). As stated by [2] Yuda (2009), Indonesia is one of the 7 countries that have megadiversity, tropical forests are the richest terrestrial ecosystems on earth.

Basically, the wealth of forest resources can be used to support the life of the surrounding community in a sustainable manner. Community activities around forest areas in utilizing forest resources have been carried out for generations. Community attachment to natural forests can be seen from the socio-economic activities of village communities around the forest in order to meet their daily needs [3] (Lewerissa, 2015). Several studies have shown that community interaction with the forest tends to be high, marked by the number of people who fulfill their daily needs from within the forest area, such as taking firewood, farming, hunting and taking non-timber forest products [4]- [7] (Subarna, 2011; Nurraini, 2013; Sumanto, 2013). and Takandjandji, 2014). According to [8] (Rahmah et al, 2019) although the use of forest resources in the form of taking wild plants and animals within the national park area for consumption, especially production, is not supported by regulations, it cannot be denied that the practice of utilization is carried out in the community.
Mount Ciremai National Park as one of the conservation areas in its management needs to pay attention to the use of forest resources by the people who live in and around the area. Utilization of forest resources in the form of wood, non-timber and wildlife in the national park area can have a negative impact on the balance of the national park ecosystem. The existence of data and information regarding the potential and utilization of forest resources by village communities in the utilization zone in Mount Ciremai National Park is very important to know as a material for consideration of the area management plan and will be input for managers in taking better management steps and the benefits will be felt by the community, surrounding communities, so that disturbances to the sustainability of Mount Ciremai National Park can be avoided. This study aims to determine the potential and utilization of non-timber forest products in the utilization zone in the Gunung Ciremai National Park area.

2 Methodology

The location of the research was carried out in the utilization zone of the Mount Ciremai National Park Area, Karangsari Village, Darma District, Kuningan Regency. Primary and secondary data were collected using observation methods, potential inventory, interviews, literature studies, and documentation. Research respondents are people who utilize forest resources in the utilization zone of Mount Ciremai National Park, especially the people of Karangsari Village, Darma District, Kuningan Regency. The technique of determining respondents in this study used purposive sampling by determining respondents based on the needs of the researcher and deliberately selected based on certain considerations. The criteria for the selected respondents are residents who are involved in the use of non-timber forest products in the utilization zone of Mount Ciremai National Park.

Data on the utilization of forest resources were analyzed in tabulation to group each forest resource by type, benefit and amount. The data that has been collected is then analyzed descriptively. The potential of forest resources contained in the utilization zone of the national park is carried out with a potential inventory, then a vegetation analysis is carried out to determine the condition of the vegetation, determine the composition and dominance of a type of vegetation at the research location. The Important Value Index (INP) shows the importance of a plant species and its role in the community.

Important value index (INP) data processing [9] (Indrayanto, 2006):

\[
\text{Density of a species} = \frac{\text{number of individuals}}{\text{sample plot area}}
\]

\[
\text{Relatif density} = \frac{\text{density of species}}{\text{density of all species}} \times 100\%
\]

\[
\text{Frequency of a species} = \frac{\text{number of plots found a species}}{\text{frequency of all species}}
\]

\[
\text{Relatif Frequency} = \frac{\text{Frequency of species}}{\text{frequency of all species}} \times 100\%
\]

\[
\text{Dominance of a species} = \frac{\text{area of the base of species}}{\text{area of sample unit}}
\]

\[
\text{Relatif Dominance} = \frac{\text{Dominance of species}}{\text{Dominance of all species}} \times 100\%
\]

\[
\text{Important value index (INP) trees} = \text{KR} + \text{DR} + \text{FR}
\]

\[
\text{Important value index (INP) data processing [9] (Indrayanto, 2006):}
\]

\[
\text{Density of a species} = \frac{\text{number of individuals}}{\text{sample plot area}}
\]

\[
\text{Relatif density} = \frac{\text{density of species}}{\text{density of all species}} \times 100\%
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\]

\[
\text{Dominance of a species} = \frac{\text{area of the base of species}}{\text{area of sample unit}}
\]

\[
\text{Relatif Dominance} = \frac{\text{Dominance of species}}{\text{Dominance of all species}} \times 100\%
\]

\[
\text{Important value index (INP) trees} = \text{KR} + \text{DR} + \text{FR}
\]
3 Result and Discussion

Based on the results of research on the village community in Karangsari, the average livelihood is as farmers and as farm laborers. This is because the natural conditions are suitable for growing a vegetable garden. There are people who work on their own land or land owned by others to meet their needs.

Potential non-timber forest products (NTFPs) in the Gunung Ciremai National Park utilization zone are utilized by the Karangsari Village community in the form of food plants, medicinal plants, animal feed and craft materials and other forest products that will provide added value to their lives. Non-timber forest products used by the community can be seen in Figure 1.

The dominant type of non-timber forest product is white calliandra (Zapoteca tetragona). The spread of calliandra occurs because the Mount Ciremai National Park area has completely become open land [10] (BTNGC, 2013). [11] (Hermawan et al, 2017) explained that invasive plant species such as calliandra have dominated several open areas in Bukit Barisan Selatan National Park. (Hermawan et al, 2017) also added that calliandra grows well in open areas with lots of sunlight. Utilization of non-timber forest products carried out by the community is carried out individually. This is supported by the statement of [12] Ardiansyah, (2008) which states that for the community around the forest, the existence of the forest is very meaningful for their survival, they take advantage of existing resources in the forest such as firewood, food, medicines and other forest products that are will add value to their lives. [13] Wijaksono (2013) which states that the longer a person lives and settles in an area, in general, it will have a positive influence so that awareness grows to maintain and manage the forest area.
Non-timber forest products that are often used by the people of Karangsari Village are food plants, medicinal plants, animal feed and craft materials, including avocados (Persea americana), coffee (Coffee arabica), bananas (Musa sp), jackfruit (Artocarpus heterophyllus), Salam (Syzygium polyanthum), Limus (Mangifera foetida), White Calliandra (Zapoteca tetragona), Red Kaliandra (Calliandra callothyrsus), Elephant Grass (Pennisetum purpureum), and for Bamboo (Bambusa sp) used for common interests such as for events in village and so on. These types are for personal consumption for daily life as well as for sale. The community of Mire Village, Ulubongka District, Tojo Una-Una Regency utilizes non-timber forest products in the form of candlenut, rattan and honey bees [14] (Salma et al, 2020 Based on the results of the analysis, it was found that the villagers who were respondents knew several types of wood found around the National Park. 60% of the people of Karangsari Village know the types of wood found in the utilization zone and do not use wood from the National Park area at all. From the results of interviews with the community, knowledge of these types of wood has been passed down from generation to generation. The frequency for taking wood from the National Park area is not used by the community at all.

Utilization of non-timber forest products that are often used by the community are coffee, fruits and calliandra plants for animal feed. The use of coffee is very often used by the community because in the past people who grew coffee plants in the National Park area were still managed by Perhutani. Forest products in the form of coffee have a selling value which according to the community can help the economy. For the use of medicinal plants is not often done by the community, this is because the presence of medicines from the shop causes people to rarely take plants to be used as medicine.

4 Conclusion

Found 23 types of non-timber forest products that can be used as food plants, medicinal plants, animal feed and craft materials. The people of Karangsari Village utilize non-timber forest products in the form of food plants, medicinal plants, animal feed and craft materials, including avocados (Persea americana), coffee (Coffee arabica), bananas (Musa sp), Jackfruit (Artocarpus heterophyllus), Salam (Syzygium polyanthum), Limus (Mangifera foetida), White Kaliandra (Zapoteca tetragona), Red Kaliandra (Calliandra callothyrsus), Elephant Grass (Pennisetum purpureum), and for Bamboo (Bambusa sp) are used for common interests such as for events in the village and so forth

References

[1] Forest Watch Indonesia, 2000, Potret Keadaan Hutan di Indonesia, FWI, Bogor


Abstract. The presence of alien species in conservation areas has attracted a lot of attention. Pinus merkusii is one of the alien species in Gunung Ciremai National Park and dominates the lower part of the area because it previously functioned as a production forest. Pines in conservation areas should not be replaced through logging so that one possible effort is enrichment. However, not all local species are able to grow on pine stands because pine produces allelopathy. The aim of the study was to identify local tree species capable of growing in pine stands. Research using the Gentry method has recorded as many as 23 species of trees, consisting of 13 species at the seedling, 15 species at the sapling, and 3 species at the pole. The study did not record tree-level individuals in the sample plots. The most dominant species at the seedling to pole level is the *Trevesia sundaica*. Other species that can grow to the level of the pole are *Ficus fistulosa* and *Ficus ribes*. This study shows that the three types of plants can be considered in the enrichment of pine forests in conservation areas in the form of mountain ecosystems. Keywords: Alien species, Gunung Ciremai, invasif, national park, *Pinus merkusii*.

Keywords: Tree Species; Pines Conservation; Plant

1 Introduction

Information on local tree species capable of growing in *Pinus merkusii* stands is very helpful in species enrichment activities. The species for its survival will release a compound into the environment, called allelopathy [1]-[2]. These compounds are detrimental to other plant species because they are toxic [3]. Allelopathy belongs to a group of terpenoid compounds, namely monoterpenes α-pinene and β-pinene [4]-[1]. Allelopathy released by pine can inhibit the growth of other plant species in the vicinity [5]. Allelopathy by plants is excreted through roots, stems, leaves, and organ debris, as well as through leaching from external organs [6]-[7].

There are many studies that have conducted studies related to the plants species that can grow under pine stands. However, these studies generally examine understorey species, for example the research at Kalirajut RPH and Baturaden RPH Central Java [8], Gama Giri Mandiri forest, Yogyakarta [9], the pine forest of Mount Slamet Barat BKPH [10], and the pine forest of North Tapanuli Regency [11]-[12]. Research [13] in the pine stands of the Petungkriyono forest, Pekalongan Regency, Central Java is also limited to ferns species. Meanwhile, research on the trees species that can grow in pine stands has not been done much.
Several researchers who have done this include Alhamd & Rahajoe [14] in Gunung Gede Pangrango National Park, Natalia et al. [15] in a pine forest in the Gedong Songo Temple Area, Semarang Regency. The limitations of this study result in limited information regarding the types of trees capable of growing in pine stands.

Gunung Ciremai National Park (TNGC) is one of the conservation forest areas in which there are stands of *Pinus merkusii* [16] Pines that grow in TNGC are the result of planting. This species was planted when Gunung Ciremai was still functioning as a production forest managed by Perum Perhutani, the Kuningan Forest Management Unit (KPH). Pines in TNGC are classified as foreign tree species, in contrast to pine in Sumatra which are classified as natural species [17]. Even though they are classified as foreign species, pine trees in TNGC cannot be replaced by logging because they are in a conservation area. Therefore, a more feasible effort is enrichment activities.

This study aims to identify tree species that can grow in pine stands in TNGC. Information on the tree species obtained from this research activity is expected to be a recommendation for species selection in pine stands enrichment in conservation areas, both in TNGC and in other conservation areas that have pine stands, such as in Gunung Gede Pangrango National Park [14].

2 Methodology

2.1. Study Site

The research was conducted around Karangsari Research Station, Gunung Ciremai National Park. Based on government administration, the research location is in Karangsari Village, Darma District, Kuningan Regency. Land cover in the form of old pine stands [18]. The bottom is overgrown with shrubs, including Calliandra. Around 2004, the lower part of this pine stand was managed intensively by the local community by planting secondary crops and vegetables such as corn, green onions, cabbage, and potatoes.

2.2. Vegetation Survey

The parameters collected in this study were the name of the species and the number of individuals of each species for the seedling and sapling levels, the name of the species and the diameter of the stem for the pole level. Data was collected using the Gentry [19] method, in which the sample plots were 2 m wide and 50 m long. Sample plots were made continuously on a 2 km long line so that the total number of sample plots were 40 sample plots. The number of lanes made to place the sample plots were 2 lanes, with a length of 1 km/ lane. Data was collected by means of researchers tracing sample plots and recording all trees species found in each sample plot. Plants at the seedling, sapling, and pole levels were recorded in the same sample plot size.

2.3. Data Analysis

Data were analyzed descriptively. The calculations used in this data analysis include frequency, relative frequency (%), density (ind/ha), relative density (%), dominance (m²/ha), relative dominance (%), and Important Value Index (%) for every species. The formula used for each of these calculations is as follows:

1) Frequency

\[ F = \text{number of plots encountered species } i/\text{total plots} \]
2) Density (ind/ha)
   \( K = \text{number of individual species} \div \text{total area of sample plot (ha)} \)

3) Dominance (m²/ha)
   \( D = \text{base area of species} \div \text{total area of sample plot (ha)} \)

4) Relative Frequency (%)
   \( FR = \text{species frequency} \div \text{total frequency} \times 100\% \)

5) Relative Density (%)
   \( KR = \text{species density} \div \text{total density} \times 100\% \)

6) Relative Dominance (%)
   \( DR = \text{species dominance} \div \text{total dominance} \times 100\% \)

7) The Important Value Index (%) for seedling and sapling levels is
   \( \text{INP} = FR + KR \)

8) The Important Value Index (%) for the stake level is
   \( \text{INP} = FR + KR + DR \)

3 Result and Discussion

3.1. Number of Species

The main hope of carrying out this research is to obtain information about the trees species that are able to grow in pine stands. Research using the Gentry method [19] has found plant species at the seedling, sapling, and pole levels. Meanwhile, tree growth rate was not found in this research plot. The total plant species recorded were 23 species of local trees, which came from 13 species for the seedling level, 15 species for the sapling level, and 3 species for the pole level (Table 1). In addition, the study also recorded 6 trees species that are often cultivated, namely *Maesopsis eminii*, avocado *Persea americana*, cempedak *Artocarpus integer*, mahogany *Swietenia macrophylla*, pakel *Mangifera feotida*, and rosewood *Dalbergia latifolia* (Table 1).

As a comparison, research by Alhamd and Rahajoe (2013) on the permanent plot of the Bodogol pine forest in Gunung Gede Pangrango National Park has recorded as many as 29 tree species, including the pine species itself. However, the study did not mention in detail these species, except for the first 15 species which had the largest important value index. When examining the 15 species presented, the species reported by Alhamd and Rahajoe include cultivated and invasive species, namely *Maesopsis eminii*, *Calliandra calothyrsus*, and *Piper aduncum*. Thus, the number of local tree species growing on pine stands, especially on permanent plots, in Gunung Gede Pangrango National Park is less than 29 species.

Research by previous researcher [15] in the pine forest of the Gedong Songo Temple Area, Semarang Regency, only two types of trees were found, namely pursa *Schima walichii* and eucalyptus *Eucalyptus* sp. Based on the results of Pertiwi's research [20] in the education forest of Gunung Walat, Sukabumi, pursa has a very strong positive association with pine stands.
Table 1. List of Tree Species on Growth Rate from Seedling to Pole on Pine Stands in Mount Ciremai National Park

<table>
<thead>
<tr>
<th>No</th>
<th>Local Name</th>
<th>Scientific Name</th>
<th>Family</th>
<th>Observation (ind)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Seedling</td>
</tr>
<tr>
<td>1</td>
<td>Afrika</td>
<td>Maesopsis eminii</td>
<td>Rhamnaceae</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Alpukat</td>
<td>Persea americana</td>
<td>Lauraceae</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Beunying</td>
<td>Ficus fistulosa</td>
<td>Moraceae</td>
<td>13</td>
</tr>
<tr>
<td>4</td>
<td>Cempedak</td>
<td>Artocarpus integer</td>
<td>Moraceae</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Hamberang</td>
<td>Ficus sp.</td>
<td>Moraceae</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Kareumbi</td>
<td>Homalanthus populneus</td>
<td>Euphorbiaceae</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>Kijanitri</td>
<td>Elaeocarpus sp.</td>
<td>Elaeocarpaceae</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Kikeler</td>
<td>Diospyros sp.</td>
<td>Ebenaceae</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Kipare</td>
<td>Glochidion zeylanicum</td>
<td>Phyllanthaceae</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Kiteja</td>
<td>Cinnamomum iners</td>
<td>Lauraceae</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Kode 44.1</td>
<td>Elaeocarpus stipularis</td>
<td>Elaeocarpaceae</td>
<td>19</td>
</tr>
<tr>
<td>12</td>
<td>Kode 47.1</td>
<td>Memecylon myrsinoides</td>
<td>Melastomataceae</td>
<td>e</td>
</tr>
<tr>
<td>13</td>
<td>Kode 47.2</td>
<td>Calophyllum soulattri</td>
<td>Clusiaceae</td>
<td>5</td>
</tr>
<tr>
<td>14</td>
<td>Kode 48.1</td>
<td>Schima wallichii</td>
<td>Theaceae</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>Kode 49.2</td>
<td>Engelhardia serrata</td>
<td>Juglandaceae</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>Kode 52.1</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>17</td>
<td>Kode 61.1</td>
<td>Canthium dicoccum</td>
<td>Rubiaceae</td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td>Kode 61.2</td>
<td>Maesa ramentacea</td>
<td>Primulaceae</td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td>Kode 81.1</td>
<td>Ficus sp.</td>
<td>Moraceae</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>Kode 82.1</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>21</td>
<td>Mahoni</td>
<td>Swietenia macrophylla</td>
<td>Meliaceae</td>
<td>1</td>
</tr>
<tr>
<td>22</td>
<td>Pakoni</td>
<td>Mangifera foetida</td>
<td>Anacardiaceae</td>
<td>1</td>
</tr>
<tr>
<td>23</td>
<td>Peutag</td>
<td>Syzygium sp.</td>
<td>Myrtaceae</td>
<td>1</td>
</tr>
<tr>
<td>24</td>
<td>Reunghas</td>
<td>Gluta rengbas</td>
<td>Anacardiaceae</td>
<td>1</td>
</tr>
<tr>
<td>25</td>
<td>Salam</td>
<td>Syzygium polyanthum</td>
<td>Myrtaceae</td>
<td>5</td>
</tr>
<tr>
<td>26</td>
<td>Sanggabuana</td>
<td>Trevesia sundaica</td>
<td>Araliaceae</td>
<td>154</td>
</tr>
<tr>
<td>27</td>
<td>Sonokeling</td>
<td>Dalbergia latifolia</td>
<td>Fabaceae</td>
<td>1</td>
</tr>
<tr>
<td>28</td>
<td>Walen</td>
<td>Ficus ribes</td>
<td>Moraceae</td>
<td>2</td>
</tr>
<tr>
<td>29</td>
<td>Wuni</td>
<td>Antidesma buntu</td>
<td>Euphorbiaceae</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>200</strong></td>
</tr>
</tbody>
</table>

3.2. Dominant Species

The dominant species at the seedling, pole, and sapling levels are sanggabuana *Trevesia sundaica*. Other species that predominated were *Elaeocarpus stipularis* and *Ficus fistulosa* for the seedling level and *Elaeocarpus stipularis*, *Ficus ribes*, and *Ficus fistulosa* for the sapling level. From a total of 40 plots, sanggabuana was found in 24 plots for seedling level, 11 plots for sapling level, and 3 plots for pole level. *Elaeocarpus stipularis* was found in 12 plots for the seedling level, 4 plots for the sapling level (Table 2, Table 3, Table 4). *Trevesia sundaica* which was only found in three plots for the pile level indicated that the species had an uneven distribution at that level. *Ficus fistulosa* which was able to grow to the level of the pole was
only found in 2 plots (Table 4). In the research of Supartono et al. [21], *Ficus fistulosa* is the only pioneer tree species growing on a single plot of soil seedbank.

Table 2. List of Important Value Index (IVI) of Seedling Growth Rate on Pine Stands in Gunung Ciremai National Park

<table>
<thead>
<tr>
<th>No</th>
<th>Species</th>
<th>Obs. (ind)</th>
<th>Plots</th>
<th>D (ind/ha)</th>
<th>F</th>
<th>IVI (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>Trevesia sundaica</em></td>
<td>154</td>
<td>24</td>
<td>385,00</td>
<td>0,60</td>
<td>118,38</td>
</tr>
<tr>
<td>2</td>
<td><em>Elaeocarpus stipularis</em></td>
<td>19</td>
<td>12</td>
<td>47,50</td>
<td>0,30</td>
<td>30,19</td>
</tr>
<tr>
<td>3</td>
<td><em>Ficus fistulosa</em></td>
<td>13</td>
<td>8</td>
<td>32,50</td>
<td>0,20</td>
<td>20,29</td>
</tr>
<tr>
<td>4</td>
<td><em>Maesopsis eminii</em></td>
<td>2</td>
<td>2</td>
<td>5,00</td>
<td>0,05</td>
<td>4,45</td>
</tr>
<tr>
<td>5</td>
<td><em>Homalanthus populneus</em></td>
<td>2</td>
<td>2</td>
<td>5,00</td>
<td>0,05</td>
<td>4,45</td>
</tr>
<tr>
<td>6</td>
<td><em>Ficus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td><em>Elaeocarpus sp.</em></td>
<td>1</td>
<td>1</td>
<td>2,50</td>
<td>0,03</td>
<td>2,22</td>
</tr>
<tr>
<td>8</td>
<td><em>Diospyros sp.</em></td>
<td>1</td>
<td>1</td>
<td>2,50</td>
<td>0,03</td>
<td>2,22</td>
</tr>
<tr>
<td>9</td>
<td><em>Cinnamomum iners</em></td>
<td>1</td>
<td>1</td>
<td>2,50</td>
<td>0,03</td>
<td>2,22</td>
</tr>
<tr>
<td>10</td>
<td><em>Schima wallichii</em></td>
<td>1</td>
<td>1</td>
<td>2,50</td>
<td>0,03</td>
<td>2,22</td>
</tr>
<tr>
<td>11</td>
<td><em>Engelhardia serrata</em></td>
<td>1</td>
<td>1</td>
<td>2,50</td>
<td>0,03</td>
<td>2,22</td>
</tr>
<tr>
<td>12</td>
<td><em>Kode 52.1</em></td>
<td>1</td>
<td>1</td>
<td>2,50</td>
<td>0,03</td>
<td>2,22</td>
</tr>
<tr>
<td>13</td>
<td><em>Syzygium sp.</em></td>
<td>1</td>
<td>1</td>
<td>2,50</td>
<td>0,03</td>
<td>2,22</td>
</tr>
<tr>
<td>14</td>
<td><em>Gluta renggas</em></td>
<td>1</td>
<td>1</td>
<td>2,50</td>
<td>0,03</td>
<td>2,22</td>
</tr>
</tbody>
</table>

The results of this study differ from the results of research in the permanent plot of Bodogol pine stands, Gunung Gede Pangrango National Park [14]. The dominant species in the Bodogol pine forest was *Maesopsis eminii*, in addition to *Calliandra calothyrsus* and *Piper aduncum*. The last two types are classified as invasive species. Although the sanggabuana was found in the Bodogol permanent plot, it was not classified as the dominant species. In this study, *M. eminii* was only found at the seedling level in 2 plots, as many as 2 individuals, out of 40 plots.

Table 3. List of Important Value Indexes for Sapling Growth in Pine Stands in Mount Ciremai National Park

<table>
<thead>
<tr>
<th>No</th>
<th>Nama Jenis</th>
<th>Observasi (n ind)</th>
<th>Plots</th>
<th>D (ind/ha)</th>
<th>F</th>
<th>IVI (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>Trevesia sundaica</em></td>
<td>26</td>
<td>11</td>
<td>65,00</td>
<td>0,28</td>
<td>59,03</td>
</tr>
<tr>
<td>2</td>
<td><em>Elaeocarpus stipularis</em></td>
<td>9</td>
<td>4</td>
<td>22,50</td>
<td>0,10</td>
<td>20,83</td>
</tr>
<tr>
<td>3</td>
<td><em>Ficus</em></td>
<td>6</td>
<td>6</td>
<td>15,00</td>
<td>0,15</td>
<td>20,83</td>
</tr>
<tr>
<td>4</td>
<td><em>Ficus fistulosa</em></td>
<td>6</td>
<td>5</td>
<td>15,00</td>
<td>0,13</td>
<td>18,75</td>
</tr>
<tr>
<td>5</td>
<td><em>Calophyllum soulattri</em></td>
<td>5</td>
<td>4</td>
<td>12,50</td>
<td>0,10</td>
<td>15,28</td>
</tr>
<tr>
<td>6</td>
<td><em>Syzygium</em></td>
<td>5</td>
<td>4</td>
<td>12,50</td>
<td>0,10</td>
<td>15,28</td>
</tr>
<tr>
<td>7</td>
<td><em>Elaeocarpus</em></td>
<td>2</td>
<td>1</td>
<td>5,00</td>
<td>0,03</td>
<td>4,86</td>
</tr>
<tr>
<td>8</td>
<td><em>Persea americana</em></td>
<td>1</td>
<td>1</td>
<td>2,50</td>
<td>0,03</td>
<td>3,47</td>
</tr>
<tr>
<td>9</td>
<td><em>Artocarpus</em></td>
<td>1</td>
<td>1</td>
<td>2,50</td>
<td>0,03</td>
<td>3,47</td>
</tr>
<tr>
<td>10</td>
<td><em>Ficus</em></td>
<td>1</td>
<td>1</td>
<td>2,50</td>
<td>0,03</td>
<td>3,47</td>
</tr>
<tr>
<td>11</td>
<td><em>Glochidion zeylanicum</em></td>
<td>1</td>
<td>1</td>
<td>2,50</td>
<td>0,03</td>
<td>3,47</td>
</tr>
<tr>
<td>12</td>
<td><em>Memecylon myrsinoides</em></td>
<td>1</td>
<td>1</td>
<td>2,50</td>
<td>0,03</td>
<td>3,47</td>
</tr>
<tr>
<td>13</td>
<td><em>Canthium dicoccum</em></td>
<td>1</td>
<td>1</td>
<td>2,50</td>
<td>0,03</td>
<td>3,47</td>
</tr>
<tr>
<td>14</td>
<td><em>Maesa ramentacea</em></td>
<td>1</td>
<td>1</td>
<td>2,50</td>
<td>0,03</td>
<td>3,47</td>
</tr>
<tr>
<td>15</td>
<td><em>Ficus</em></td>
<td>1</td>
<td>1</td>
<td>2,50</td>
<td>0,03</td>
<td>3,47</td>
</tr>
<tr>
<td>16</td>
<td><em>Kode 82.1</em></td>
<td>1</td>
<td>1</td>
<td>2,50</td>
<td>0,03</td>
<td>3,47</td>
</tr>
<tr>
<td>17</td>
<td><em>Sweitenia macrophylla</em></td>
<td>1</td>
<td>1</td>
<td>2,50</td>
<td>0,03</td>
<td>3,47</td>
</tr>
</tbody>
</table>
This study has provided information that of the 23 local tree species that grow on pine stands, only 3 species are able to grow to the pole level, namely Treversia sundaica, Ficus fistulosa, and Ficus ribs (Table 4). These results indicate that not all tree species that are able to live in pine stands are able to grow and develop relatively quickly. This study also shows that the three species are species that are quite capable of adapting to pine stands. In addition to these three types, there is actually one other species that is able to grow to the level of pole growth, namely mahogany Swietenia macrophylla. However, mahogany is classified as an exotic species [22] so it cannot be selected for enrichment in pine stands. Mahogany is a fast-growing species and has the potential to be an invasive species [23]. Because it is potentially invasive, mahogany is not recommended to be planted in areas adjacent to conservation areas [24]. Through the wind, the seeds of this species will be easily dispersed because they have wings [25].

However, the three species also actually have a limited distribution – when based on the number of plots they encounter – and a fairly low density (Table 3). T. sundaica was found in 24 plots for seedling level, 11 plots for sapling level, and 3 plots for pole level. F. fistulosa was found in 8 plots for seedling level, 5 plots for sapling level, and 2 plots for pole level. F. ribs was found in 2 plots for seedling level, 6 plots for sapling level, and 1 plot for pole level.

Table 4. List of Important Value Indices of Pole Growth Rate in Pine Stands in Gunung Ciremai National Park

<table>
<thead>
<tr>
<th>No</th>
<th>Nama Jenis</th>
<th>Jumlah (ind)</th>
<th>Petak (ind/ha)</th>
<th>F</th>
<th>Dominance (m²/ha)</th>
<th>IVI (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Treversia sundaica</td>
<td>3</td>
<td>7,50</td>
<td>0,08</td>
<td>0,07</td>
<td>97,10</td>
</tr>
<tr>
<td>2</td>
<td>Ficus fistulosa</td>
<td>2</td>
<td>5,00</td>
<td>0,05</td>
<td>0,10</td>
<td>82,22</td>
</tr>
<tr>
<td>3</td>
<td>Swietenia macrophylla</td>
<td>2</td>
<td>5,00</td>
<td>0,05</td>
<td>0,10</td>
<td>82,32</td>
</tr>
<tr>
<td>4</td>
<td>Ficus ribs</td>
<td>1</td>
<td>2,50</td>
<td>0,03</td>
<td>0,04</td>
<td>37,36</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>8</td>
<td>20</td>
<td>0,20</td>
<td>0,30</td>
<td>300</td>
</tr>
</tbody>
</table>

3.3. Conservation Implications

One of the main functions of a conservation area is the preservation of plant species diversity, especially local species. The function of preserving the biodiversity of a conservation area will be reduced when there are non-native ecosystems in it, such as pine stands as happened in TNGC. Pine stands are very helpful in absorbing carbon [26], but when they are in a conservation area, they cause problems. Pine is a type of tree that produces toxic substances (alelopathy) to the detriment of other plant species, but pine should not be cut down because it is in a conservation area. Therefore, the effort that can be done is enrichment.

This research was conducted to obtain information about local tree species capable of growing in pine stands. Research has obtained information that the types of plants that are able to grow up to the pole level are T. sundaica, F. fistulosa, and F. ribs. These three species can be recommended to be planted in enrichment in Pinus merkusii stands, even though the density is relatively low. Research by Hendrayana et al. [27] also showed that F. fistulosa was one of the most common species found in shrubs in Mount Ciremai National Park. In the research of Sutomo et al. [28], Altingia excelsa and Schima walichii were classified as species...
that are able to grow together with pine stands. *A. excelsa* is a local species, native to the Gunung Gede Pangrango National Park [29]. Therefore, apart from the three species obtained from this study, *A. excelsa* and *S. walichii* can also be tested in the enrichment of pine stands in conservation areas. Seedlings for the five species can be obtained either through cuttings or plucking from other places. Other activities that need to be carried out related to the procurement of seeds are nursery development and research through experimental methods in procuring seeds from cuttings.

4 Conclusion

There are 23 trees species that can grow in pine stands. The species found were from the seedling level (13 species), sapling (15 species), and pole (3 species), but were not found at the tree level. Only three species were able to grow to the pole level, namely: *Trevesia sundaica*, *Ficus fistulosa*, and *Ficus ribes*. *T. sundaica* is the dominant species from seedling to pole level. Other species that are quite dominating are *Elaeocarpus stipularis* and *F. fistulosa* for the seedling level, *E. stipularis*, *F. ribes*, and *F. fistulosa* for the sapling level. The three species that are able to grow up to the pole level can be recommended for species enrichment in pine stands. More extensive research also needs to be carried out to obtain more complete information on the types that are able to grow in pine stands.

References


Application of the PBL Model with Exe Learning Media on Student's Motivation and Learning Outcomes

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Abstract. This study aims to apply the exe learning computer media program with the PBL model as an effort to increase motivation and improve student learning outcomes. The subjects in this study were class XI students of SMA Negeri 1 Garawangi, namely class A consisting of 32 students and class B consisting of 31 students. The research method was carried out using an experimental method, with a research design of pretest-posttest control group design. Hypothesis testing of learning motivation data and learning outcomes using Independent sample t-test. Based on the results of the study, it was concluded that the ability of students to use problem-based learning strategies integrated with the exe learning computer media program got higher motivation and learning outcomes. In practice, exe learning can present more interesting material, both audio and visual, according to the needs of students in the digital era. Based on the results of the study, that the increase in learning outcomes and student motivation with the application of the PBL model using the exe learning media was higher than the increase in the learning outcomes taught by the application of the PBL model without the exe learning media. This finding is relevant to the development of the industrial revolution 4.0 that in the world of education it is necessary to apply learning media that make it easier for teachers to deliver subject matter to technology-based students, in the world of education we usually know e-learning. Therefore, it is necessary to implement the use of other technology-based learning media in supporting a more varied and innovative learning process.

Keywords: learning outcomes; learning motivation; Exe Learning media; PBL model

1 Introduction

The development of Information and Communication Technology is growing and increasingly being applied to various aspects of life, not least in the world of education. Global demands demand that education and all its aspects must adapt to technological developments for the purpose of improving the quality and quality of education. Looking at the condition of the level of education in Indonesia based on information on numbers and HDI rankings (Human Development Index) it can be obtained a picture of the state of the welfare of the community as measured by the life expectancy of the people in a country by measuring health and nutrition, education as measured by the expected length of schooling and the average school participation, and standard of living as measured by GNI per capita [14].
Effective education is an education that allows students to learn easily, fun and achieve the expected goals. Thus, educators (lecturers, teachers, instructors, and trainers) are required to increase the effectiveness of learning so that learning can be useful. Relevant to current conditions in the digital era, it is important to use Information and Communication Technology in education. The use of Information and Communication Technology in education, especially in technology-based learning process activities, will be able to facilitate and expand access to the knowledge gained, it is felt that it will make it easier for anyone, especially students, to take part in learning in the 21st century.

One indicator of the low quality of education is reflected in the low learning outcomes obtained by students. Based on the facts in the field, it shows that the average student learning outcomes at SMA Negeri 1 Garawangi are below the Minimum Completeness Criteria (KKM) below 75. This evidence can be seen from the average student learning outcomes based on mid-semester and end-semester exam scores. Improving student learning outcomes cannot be separated from the teaching and learning process, because the teaching and learning process is essentially the core of activities in the educational process. Everything that has not been programmed will be carried out in the teaching and learning process that involves all learning components and will determine the extent to which the goals that have been set can be achieved. One of the learning components other than the teacher is the use of methods and media in learning. One of the goals of using learning methods and media in the teaching and learning process is that students are expected to easily accept and understand the material presented, based on several other research findings that learning models and methods have a positive correlation to improving student learning outcomes. Therefore, teachers should use appropriate learning methods and media in order to create a conducive learning atmosphere, encourage students' ability to be actively involved in teaching and learning activities, because active student involvement in the learning process will provide great opportunities for achieving learning objectives.

Based on the current digital era in line with technological developments, the role of teachers is also required to be able to integrate the development of information and communication technology in the learning process activities. At the implementation stage, teachers need to understand and apply various interesting, quality and innovative learning methods and media as one of the steps taken to maximize the quality of the learning process and results. The use of instructional media in the teaching and learning process can generate new desires and interests, and generate motivation for learning activities and even provide psychological effects for students [3].

E-learning program is one of the media that uses computer technology that can be used as a learning medium. Many E-Learning programs have been developed with various basic characteristics, namely providing student self-service, online learning, online assessment, collaborative learning, and training resource management [15]. Heinich et al (2005) stated that E-learning learning media can be designed and utilized so as to make learning that prioritizes problems and trains students' ability to solve problems and find solutions [5]. E-learning is effective and can improve the quality of learning where E-learning is designed to be centered on the abilities and activities of students. In addition, E-learning is an information and communication technology that is applied to enable students to learn anytime and anywhere.

One of the learning media that can be used as a technology-based digital learning media is Exe Learning. Exe Learning learning media is a website-based design program designed to assist teachers and academics in the design, development and display of web-based lessons.
and teaching materials without the need for special skills in HTML, XML or website application programming skills. In addition, Exe Learning provides a variety of iDevices that allow you to insert various kinds of animations, simulations, quizzes, practice questions with feedback and so on.

As has been understood together that in the teaching and learning process, in addition to the application of methods and media by the teacher, the motivational aspect has an important role in achieving learning outcomes. Motivation has an important role in learning because it encourages individuals to carry out learning activities so that behavior changes occur to achieve goals in the form of high learning outcomes. A student who has high motivation tends to try to develop all his abilities and potentials to achieve the expected goals, namely in the form of high learning outcomes. Learning motivation is an encouragement to students both intrinsically and extrinsically which can lead to activities for better and more effective learning [12].

In addition, the use of learning media cannot be applied without a learning model, so it is necessary to combine learning models that are in accordance with learning media. E-learning can be successfully delivered in a well-designed context and must use a learning model [19]. States that problem-based learning makes learning a problem, then the problem can arouse students’ interest or curiosity to actively solve problems with strategies created by students themselves by linking previous knowledge so that new knowledge is composed [4] [11]. The PBL learning model is a series of learning activities that emphasize the process of solving problems faced scientifically [1]. With the use of supportive constructivist learning, students can develop their own thinking skills. In this model the creativity and activeness of students will help them to stand alone in their cognitive lives. Given that each student has a different learning style, PBL provides opportunities for students to explore content (material) by using various means that are meaningful to themselves [7], and to conduct experiments collaboratively. The PBL model is an in-depth investment on a real world topic which will be valuable for the learning process carried out by students.

From the explanation of the background above, the formulation of the problem in this study is how does the application of the PBL model with Exe learning media affect students’ motivation and learning outcomes?

2 Methodology

This research is quasi-experimental, by giving treatment through teaching using learning media innovations with learning models and comparing with the control group. The research design used the pretest-posttest control group design. More clearly the research design can be seen in table 1 as follows:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Control Class (K1)</th>
<th>Experiment Class (K2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Motivation</td>
<td>Learning Outcomes</td>
</tr>
<tr>
<td>Employment</td>
<td>M</td>
<td>H11</td>
</tr>
<tr>
<td></td>
<td>H12</td>
<td>M</td>
</tr>
<tr>
<td></td>
<td>H21</td>
<td>H22</td>
</tr>
</tbody>
</table>

The subjects in this study were students of class XI SMA Negeri 1 Garawangi Social Sciences Department. Class A consists of 32 students for a class that is given a problem-based learning strategy based on Exe learning media and class B consists of 31 students for a
class that is given a problem-based learning model. Data collection techniques were carried out using student learning outcomes tests, motivation questionnaires and interview results. The learning outcomes test is in the form of multiple choice with a total of 25 items that have previously been validated by the test instrument. The test in this study was given twice, namely pretest and posttest. Then the increase in student learning outcomes is calculated in the form of Gain. Motivation questionnaires were given at the end of the lesson for both classes. Where the motivation questionnaire is a set of written questions given to research subjects to be answered according to the actual situation.

Broadly speaking, there are two ways to use a questionnaire as a data collection technique, namely (1) distributed which is then filled out by respondents and (2) used as a guide for interviews with respondents. Interviews were only conducted for classes using the Exe Learning program computer media. The data analysis techniques used include: 1) data homogeneity testing; 2) testing the normality of the data with Kolmogorov-Smirnov; 3) hypothesis testing using independent sample t-test of two parties in the SPSS 23 for window program.

3 Results and Discussion

Before testing the hypothesis, the data on learning outcomes and motivation must meet the prerequisites. There are two prerequisites that must be met so that hypothesis testing can be carried out, namely normality and homogeneity tests. Normality test is used to determine whether the data population is normally distributed or not. The normality of the data was carried out using the Kolmogorov-Smirnov test which was processed using SPSS version 23. The test criteria was to compare it with the sig value. ($\alpha = 0.05$) where if the value of Sig $>0.05$ then the data is normally distributed, if the value of Sig $<0.05$ then the data is not normally distributed. The results of the calculation of normality data, the authors present more clearly in the form of a table below:

<table>
<thead>
<tr>
<th>Sig. Value</th>
<th>Experiment Class</th>
<th>Control Class</th>
<th>Gain</th>
<th>Learning Motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre Test</td>
<td>Pre Test</td>
<td>Pre Test</td>
<td>Pre Test</td>
</tr>
<tr>
<td>Sig.</td>
<td>0.820</td>
<td>0.653</td>
<td>0.521</td>
<td>0.184</td>
</tr>
<tr>
<td>Desc</td>
<td>Normal (&gt;0.05)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on table 2 above, the pretest, posttest, gain and learning motivation data for both the experimental and control classes have data that are normally distributed. In addition to the data must be normally distributed, the absolute requirement that must be met is that the data must be homogeneous. The basis for decision making uses Levene Statistic calculations with SPPS version 21. The provisions are if the value of sig $>0.05$ then the data is homogeneous, otherwise if the value of sig $<0.05$ then the data is not homogeneous. The results of the homogeneity test of the pretest, posttest, gain and learning motivation of the two groups can be seen in the table as follows:
Table 3. Homogeneity Test Results Pretest, Posttest, Gain, and Learning Motivation

<table>
<thead>
<tr>
<th>Levene Statistic</th>
<th>Pre Test</th>
<th>Gain</th>
<th>Learning Motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sig.</td>
<td>0,363</td>
<td>0,101</td>
<td>0,102</td>
</tr>
<tr>
<td>Desc.</td>
<td>Homogen (&gt;0,05)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on table 3 above, the pretest, posttest, gain, and learning motivation data for both the experimental and control classes have homogeneous data. That is, the variance of students' abilities in the experimental class is identical to the variance of students' abilities in the control class. Furthermore, hypothesis testing using independent sample t-test can be presented by researchers more clearly as follows:

Table 4. Hypothesis Test Results

<table>
<thead>
<tr>
<th>No</th>
<th>Data</th>
<th>Sig. (2-tailed)</th>
<th>g</th>
<th>Desc</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Student learning outcomes (gain)</td>
<td>0,032</td>
<td>0,05</td>
<td>Ha accepted</td>
</tr>
<tr>
<td>2</td>
<td>Learning motivation</td>
<td>0,019</td>
<td>0,05</td>
<td>Ha accepted</td>
</tr>
</tbody>
</table>

From the results of data processing student learning outcomes in the control class and PBL class with Exe Learning media, Ha is accepted, meaning that there is a significant difference in student learning outcomes taught using a problem-based learning model compared to student learning outcomes taught using a problem-based learning model that is integrated with Exe learning program computer media. From these results it can be concluded that exe learning media can improve student learning outcomes in learning. The exe Learning program computer media can present the material well so that students can easily understand the material and ultimately learning outcomes can increase significantly. States that e-learning presents features that can help students acquire knowledge [18].

The increase in student learning outcomes in the experimental class using the PBL learning model based on the exe learning media with the class using only the PBL model is more clearly seen in the graph as follows:

Figure 1. Graph of Student Learning Results
To find out the increase in student learning outcomes using the PBL method based on exe learning, a normalized gain calculation using the Hoke formula was used. From the results of the n-gain data analysis, it can be seen from the table below:

![n-gain Graph](image)

**Figure 2. Graph of n-gain Results of Experiment Class and Control Class**

Based on the results of the research that has been done, it is found that there is a significant difference between the learning outcomes of students who use the PBL method based on exe learning media and students who use the PBL method. After knowing the difference, it turns out that the experimental class that uses the Exe Learning-based PBL method has a higher level of motivation and learning outcomes when compared to the control class without the use of media.

From the interview questionnaire, it can be seen that the experimental class students (PBL + Exe Learning Program Computer Media) are very happy and enthusiastic about participating in economic learning because of the Exe Learning program computer media which has an attractive appearance. This program provides material that is complemented by videos and independent exercises that encourage students to be more active and creative in studying the material presented. Videos help students master abstract material. While independent practice helps students to practice working on questions and feel challenged because they automatically know the score obtained. This is in line with Boeker's research, (2013) that e-learning is more fun and can increase students' motivation. A previous study by Sulaiman et al. (2013) compared problem-based learning with Moodle capable of developing students' creative thinking skills, especially flexibility, originality, and elaboration indicators [2].

In entering this digital era, a new paradigm is needed in the education system. Learning in this digital era is not enough just to practice skills in oneself but also life skills in society. Learning in this digital era is a strategy so that students are more comfortable in learning and have more insight or broad knowledge with relatively easy access so that they can produce an effective learning experience [15]. Teachers or educators are also very influential in the use of learning media. Teachers are not enough just to have knowledge about learning media, but also have to have a creativity or skill in the use and utilization of these media properly. In order to optimize the learning media, teachers should also receive training, considering that the media to be used is technology-based, so teachers should be very understanding about the media that will be given to students so that the use of the media runs optimally.
The selection and use of media in the context of utilizing digital-based learning media must be in accordance with the learning objectives and the level of student motivation. The application of appropriate learning methods with the use of learning media will make students more comfortable and interested in the learning process. Teachers who are able to properly utilize access to learning media and combine it with appropriate teaching methods, effectively and efficiently will be better able to create a good learning atmosphere and environment so that learning objectives can be achieved optimally. In learning at school, there are many learning models that utilize information and communication technology (ICT) or commonly called E-learning. E-learning is often interpreted as a form of web-based learning that can be accessed from the internet, local networks or intranets. E-learning materials do not have to be distributed online [4], but can also be offline, for example by using a CD/DVD and can be accessed in open source [8]. There are several advantages in the use of E-learning technology itself, including: 1) it is possible to distribute education to all corners of the country and unlimited capacity because it does not require classrooms. 2) the learning process is not limited by space and time as well as face-to-face in the classroom. 3) learning can choose topics or teaching materials according to the wishes and needs of each. 4) the length of time to learn depends on the ability of each. 5) the accuracy and current of teaching materials. 6) learning can be done interactively so that it is more interesting [9].

Based on research findings that the increase in student learning outcomes and collaboration taught by applying the PBL model using exe learning media is higher than the increase in student learning outcomes and collaboration taught by applying the PBL model without exe learning media [6] [10]. Therefore, the application of learning with E-learning is a medium that is expected to increase student activity, motivation and learning outcomes, because with the use of appropriate learning media it will be very useful to increase student motivation in learning, students become active and able to interact with others. teachers and other students, and make students able to learn independently. Independent learning is a way of learning that students do freely in determining their learning goals, whether it's planning the learning process, learning strategies, and in using the learning resources they choose. Therefore independent learning requires high motivation, desire, and responsibility to develop forward in knowledge.

Learning using the web or electronic learning (e-learning) has unlimited space and time to provide effective learning whenever we want to access it if we have computers, tablets, and mobile phones that are connected to the internet. So that the interaction of students and teachers becomes easier in real time [17].

The strategy of using E-learning in order to support the implementation of the learning process, is expected to increase the absorption of students regarding the material being taught, increase student activity, increase students' independent learning abilities, and expand the reach in the teaching and learning process using computer networks. To achieve these things, in the development of E-learning, it is necessary to note that the material displayed must be able to convey correct information, not only prioritizing the technology side, or its beauty, but it is necessary to pay close attention to how the teaching and learning techniques are used [10]. This proves that the use of Exe Learning learning media not only has a positive effect on student learning achievement, but also has a positive effect on learning motivation, where student motivation is higher when Exe learning learning media is applied. This is in line with research conducted by Siboro et al. (2017) that the results of this study indicate a positive relationship between student motivation and the use of Exe Learning mode in learning [13].
Learning using Exe learning can make learning variations that can be a way out to overcome student boredom and can stimulate students' motivation to learn independently so that students are interested in being active in understanding related to the material being studied, because the material presented in Exe learning is not only in the form of text material, but videos, pictures, and even practice questions that train students' abilities can be inserted, thus creating a more interesting and fun learning atmosphere for students. Exe Learning provides an opportunity for students to be in control of each other's success, because this Exe Learning can make students learn independently wherever and whenever, so students are certainly easier to explore what they need, and even if students do not understand something the material students can repeat or study again until they really understand the material. Because the use of web-based exe learning media is flexible, easy to access anywhere and anytime, so the learning process can be done dynamically and not limited by space and time.

4 Conclusion

The development of science and technology (IPTEK) has brought rapid changes in aspects of human life. One area that has had a significant impact on the development of science and technology is education. One of the science and technology products for learning is e-learning media. Based on the results of the study through analysis of data calculations and hypothesis testing, the researchers concluded that the increase in student learning outcomes and learning motivation by applying the PBL model using exe learning media was higher than the increase in learning outcomes by applying the PBL model without exe learning media. In the learning process, e-learning can be used as a learning medium that makes it easier for teachers to deliver subject matter to students based on technology.

References


Arthrobotrys Sinensis (Orbiliaceae Orbiliales), a New Record of Nematode-Trapping Fungal Species for Sumatra, Indonesia

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Abstract. Nematode-trapping fungi (NTF) are a unique group of predacious fungi which produce various type of trapping devices to prey on free-living and parasitic nematodes. These fungi are potential to be utilized in agricultural fields to control the infestation of root-knot nematodes into the horticultural plants. Exploration of indigenous NTF from Indonesia, especially North Sumatra region is still limited and worth investigated for the field application. A fungus was isolated from an urban organic waste in Deli Serdang Regency, North Sumatra, being able to entrap nematodes (Caenorhabditis elegans) by using three dimensional adhesive networks. The fungus was morphologically described as an unidentified Arthrobotrys species with hyaline conidiophores and 1–3 septated subsphaerical to obovoid-shaped conidia. PCR-amplified DNA encoding Internal Transcribed Spacer (ITS) region displayed 99% similarity to Arthrobotrys sinensis. Based on these morphological and molecular features, the fungus was then identified as A. sinensis, strain from North Sumatra and was regarded as a new record for Indonesia.

Keywords: Nematode-trapping fungi; Arthrobotrys sinensis; North Sumatra

1 Introduction

Nematode-trapping fungi (NTF) are a specialized group of predacious fungi which have been extensively studied for the past decades regarding its distribution, ecology, systematics, and utilization as biocontrol agents of animal- and plant-parasitic nematodes [1-3]. The group is distinctive for the unique vegetative hyphal modification as trapping devices with features of adhesive or mechanical traps [4]. Asexual hyphomycetous NTF were grouped into the family of Orbiliaceae (Orbiliales, Orbiliomycetes) as monophyletic lineage based on their morphologies and molecular evidences [5-7]. The first finding of Arthrobotrys superba Corda, an asexual state of Orbilia fimicola Jeng & Krug, initiated the study of predacious fungi with more discovery of novel species and newly described strains in the following years [8,9].

Arthrobotrys is one of the genus in family Orbiliaceae (Orbiliales), which capture and prey on nematodes using three dimensional adhesive networks (nets) differentiated from unstalked adhesive knobs [10]. There are currently 129 accepted species of Arthrobotrys [11] with some recently documented or renamed species in 2014, such as A. cookedickinsonianus Z.F. Yu [12], A. dianchiensis (Y. Hao & K.Q. Zhang) Z.F. Yu [13], A. huaxiensis Z.F. Yu
To date, new records of NTF have been reported exclusively from aquatic to terrestrial habitats and extreme environment with the potential of finding new records in any unexplored sites or regions [14–16]. There are presently limited information of Indonesian NTF, especially within Sumatra region. Preliminary studies have reported three species of NTF identified as *Arthrobotrys oligospora*, *Candelabrella musiformis*, and *Dactylella eudermata*, isolated from agricultural soil samples in North Sumatra [17,18]. Following a survey of nematophagous fungi in 2019, we collected some moist soil samples near urban organic waste. A previously undescribed NTF isolate was isolated and morphologically identified in *Arthrobotrys* while molecular identification using ITS-rDNA region revealed its identity as *A. sinensis*, as a new record for Sumatra and Indonesia.

2 Materials and Method

2.1. Fungus isolation
Soil samples were collected from a dumping site of residential organic wastes in an urban area of North Sumatra, Indonesia in 2019. The soil samples were placed in Ziplock plastic bags using a sterile scoop and delivered to the laboratory. Isolation of the nematode-trapping fungus was based on a modified soil sprinkle method [19,20]. Two grams of soil samples were spread in the edge of plate containing 0.1% (w/v) chloramphenicol and 2% (w/v) water-agar medium (CWA) in triplicate. Then, 1 mL of suspended *Caenorhabditis elegans* (± 500 larvae) was poured then cultures were incubated at 25–27 °C temperature for 30 days. Daily microscopic observation was carried out to monitor the presence of entrapped nematodes within the fungal structures. Suspected NTF isolate DS0818 was picked from the PDA medium fragments and transferred into a new Potato Dextrose Agar (PDA) medium and sub-cultured until pure fungal culture was obtained. Micro- and macro-morphological characteristics of the fungal colony was observed in a Corn Meal Agar medium (CMA) by using available references [13,21].

2.2. DNA extraction and sequencing
Extraction of fungal genomic DNA was following the protocol of a kit (Promega Corp., USA). Mycelial samples were suspended into a mixture of Phenol : Chloroform (600 µL) and SDS Tris-HCl buffer pH 8.0 (600 µL). DNA concentration and purity of the samples were estimated based on A260/280 using NanoPhotometer P-Class® (Implen, US).

Amplification of fungal genomic DNA in the ITS-rDNA region used a pair of universal primers, ITS-1F (5'-CTTGGTCATTTAGAGGAAGTAA-3') and ITS-4R (5'-TCCTCGCGCTTATTGATATGC-3') [22]. PCR was programmed for 35 cycles in a thermal cycler (SensoQuest GmbH, Germany) with following specification: 95°C (3 min), 95°C (45 sec), 55°C, (45 sec), 72°C, (45 sec), and 72°C (7 min). The ITS-rDNA amplicons was visualized on 1% agarose gel electrophoresis prior sequencing by Macrogen, Inc. (Singapore).

2.3. Bioinformatics study
Complete ITS1, 5.8S, and ITS2 rDNA sequences were aligned with 14 sequences retrieved from GenBank from standard database and reference sequences (RefSeq) from targeted loci project information using megablast (Table 1) [23,24]. Multiple sequences were aligned using
MUSCLE feature [25] provided in MEGA-X [26]. The DNA matrix of 15 taxa and 626 nucleotides were adjusted manually and were used to construct a maximum likelihood (ML) phylogenetic tree based on Kimura’s two-parameter model with bootstrap of 1000 replicates [27,28]. Alignment gaps and indels were treated as data; the transitions and transversions model was selected for the substitution model; branch swap filter was performed very weak. The nucleotide sequence obtained in this study was submitted to GenBank and was provided with an accession number MT_448860.

Table 1. List of Arthrobotrys species used in this study as references retrieved from GenBank

<table>
<thead>
<tr>
<th>Taxon</th>
<th>GenBank accession number (ITS)</th>
<th>Geographical origin</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arthrobotrys amerospora</td>
<td>NR_159625</td>
<td>USA</td>
<td>[27]</td>
</tr>
<tr>
<td>Arthrobotrys boryospora</td>
<td>NR_159626</td>
<td>Canada</td>
<td>[27]</td>
</tr>
<tr>
<td>Arthrobotrys dendroides</td>
<td>NR_159642</td>
<td>Malaysia</td>
<td>[27]</td>
</tr>
<tr>
<td>Arthrobotrys elegans</td>
<td>MH_179688</td>
<td>China</td>
<td>Unpublished</td>
</tr>
<tr>
<td>Arthrobotrys iridis</td>
<td>NR_159630</td>
<td>Japan</td>
<td>[27]</td>
</tr>
<tr>
<td>Arthrobotrys javanica</td>
<td>NR_159640</td>
<td>Indonesia</td>
<td>[27]</td>
</tr>
<tr>
<td>Arthrobotrys</td>
<td>NR_159640</td>
<td>Indonesia</td>
<td>[27]</td>
</tr>
<tr>
<td>Arthrobotrys microscaphoides</td>
<td>MF_948395</td>
<td>China</td>
<td>Unpublished</td>
</tr>
<tr>
<td>Arthrobotrys multiformis</td>
<td>NR_164434</td>
<td>Canada</td>
<td>[27]</td>
</tr>
<tr>
<td>Arthrobotrys</td>
<td>EF_059815</td>
<td>China</td>
<td>Unpublished</td>
</tr>
<tr>
<td>Arthrobotrys multisecundaria</td>
<td>NR_160072</td>
<td>USA</td>
<td>[27]</td>
</tr>
<tr>
<td>Arthrobotrys scaphoides</td>
<td>NR_145361</td>
<td>China</td>
<td>Unpublished</td>
</tr>
<tr>
<td>Arthrobotrys sinensis</td>
<td>AY_773445</td>
<td>China</td>
<td>[8]</td>
</tr>
<tr>
<td>Arthrobotrys thaumasia</td>
<td>AF_106526</td>
<td>Germany</td>
<td>[10]</td>
</tr>
<tr>
<td>Arthrobotrys vermicola</td>
<td>NR_144911</td>
<td>China</td>
<td>Unpublished</td>
</tr>
<tr>
<td>DS0818 (Arthrobotrys</td>
<td>MT_448860</td>
<td>Indonesia</td>
<td>Current study</td>
</tr>
</tbody>
</table>

3 Results and Discussion

2.4. Species description

Orbiliaceae Nannf. (1932)


Description: Colonies growing rapidly on CMA, ø 9 cm in 7 days at 25–27 °C, sparse and cottony colony. Vegetative hyphae hyaline, septate, branched, mostly 2.2–9.0 µm wide. Conidiophores hyaline, simple, erect, septate, rarely branched, mostly 90–500 µm, 5–6 µm wide both at the base and apex, bearing a single conidium. Conidia hyaline, subsphaerical to subglobose, 1–3, mostly 3-septate (55 %), 30 % 2-septate, and 15 % 1-septate, 20.4–30 (25.5) × 18–22 (20) µm. Chlamydospores rarely present. Specialized trapping hypha present in the form of three dimensional adhesive networks (Figure 1).

Distribution: China (Anhui, Jiangxi, Xizang, Yunnan) [13], Indonesia (Sumatra) [Current study]

Notes: Generally, the conidial shapes were suspected to resemble between A. sinensis, A. thaumasia, and D. gephyropaga, however the conidia of DS0818 tend to be subglobose
similar to *A. sinensis* in contrary to the broad-shaped, and somewhat clavate conidia as in *D. gephyropaga*, with a single conidium-bearing conidiophore differing from *A. thaumasia* which commonly bear more than 3 conidia.

Specimen examined: INDONESIA—Bangun Purba: Deli Serdang Regency, moist soils near a dumping site of urban organic wastes, 157 m alt., 3°18'42.0"N, 98°48'47.9"E, 05.13.2018, DS0818.

**Figure 1.** *Arthrobotrys sinensis*. Macro- and micro-morphological characters. a, colony surface grown on CMA of the isolate incubated for 7 d at 25°C. b, young conidia. c, conidiophore. d, conidia. e, adhesive network (arrow). Bar = 30 µm. Isolate number: DS0818

2.5. **DNA sequence analysis**

Confirmation of DS0818 identity was further investigated through molecular analysis in the region of ITS-rDNA. The precise identification of fungi, has been informatively facilitated by the use of ITS as the common DNA barcoding marker for fungal genomic DNA
comparison. However, a consensus has been made in specific to the members of Orbiliales which suggested the use of other supporting molecular markers, such as LSU, SSU, rpb1, rpb2, and tef1 since the some experts have doubted on the use of single marker to differentiate or identify novel species [28]. In this study, we found that the use of ITS was still sufficient in discriminate even in the level of species by optimizing the statistical option and model to describe the genetic relationship as revealed from the dendrogram result (Figure 2).

Figure 2. Dendrogram showing phylogenetic inference of aligned ITS-rDNA sequences based on ML statistical method. The nodes on the branches indicates the bootstrap values (BV) of 1000 replicates using Mega X. Sequences were retrieved from GenBank.

Based on the dendrogram analysis, we can observe three major clades within the species of Arthrobotrys with bootstrap values ranged from 70 to 100%. Clade I consisted of DS0818, A. sinensis, A. multisecundaria, A. microcephoides, A. elegans, and A. thaumasia. Clade II consisted of A. scaphoides, A. dendroides, A. amerospora, and A. javanica. Clade III consisted of A. botryospora, A. polycephala, A. vermicola, A. multiformis, and A. iridis. In previous efforts, distance-based phylogenetic method of dendrogram construction was unable to discriminate the isolate DS0818, A. sinensis, and A. thaumasia indicating a relatively close similarity genetic distance among them (data not shown).

The character-based method by utilizing all nucleotide sites have produced a more distinctive genetic dissimilarities within members of clade I as revealed from this study, yet confirmed the identity of DS0818 as Arthrobotrys sinensis. The utilization of this species has been reported to control the animal-parasitic nematodes although the records still followed the use of older name, Monacrosporum sinense. The formulation of NTF consortium were effective to control the infestation and viability of Ascaris suum eggs [29], Angiostrongylus vasorum first-stage larvae [30], Ancylostoma ceylanicum third-stage larvae [31], and producing nematicidal compounds to digest Angiostrongylus vasorum larvae [32]. Moreover, Monacrosporum sinense showed good tolerances to temperature and pH condition, explaining its future potential to control parasitic nematodes in the rumen environments [32].
4 Conclusion

The finding of *Arthrobotrys sinensis* DS0818 originating from Sumatra, Indonesia may give us an insight for the possibility in exploring other sources, either accidental or suspected unique habitats and discovery of new strains or species as a collection of Indonesian nematode-trapping fungi. In addition, the biological characteristics of *A. sinensis* DS0818 may be investigated further to assign its potential as biocontrol agent of nematodes in the field trial, in specific against *Meloidogyne* spp.

5 Acknowledgments

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References


The Effect of Capital Expenditures, Personnel Expenditures and Balancing Funds toward Regional Financial Independence in Regency Governments at West Java

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Abstract. This study aims to analyze the effect of capital expenditures, personnel expenditures and balancing funds on regional financial independence in the Regency Government of West Java Province in the 2015-2019 period. The research method used in this research is descriptive and verification method with a quantitative approach. The population used in this study were all districts in the West Java Province, with the sampling technique using the saturated sample technique or the census method, as many as 18 districts in the West Java Province. The type of data used in this study is secondary data obtained through the website of the Ministry of Finance of the Republic of Indonesia, Directorate General of Fiscal Balance (www.djpk.depkeu.go.id). The data analyzed in this study were obtained from the Realization Report of the Regional Revenue and Expenditure Budget (APBD). The data analysis technique used is panel data regression analysis. Technical analysis of data using panel data regression. The results show that capital expenditures and personnel expenditures have a positive and significant effect on regional financial independence, while balancing funds have a negative and significant effect on regional financial independence.

Keyword: Capital Expenditure; Personnel Expenditure; Balance Fund and Regional Financial Independence

1 Background

Regional development is an integral part of national development, the regional development cannot be separated from the principle of regional autonomy. The era of reformation provided a paradigm shift that was more just equitable and equal. The changes of paradigm can be carried out by policies of regional autonomy and centralized financial balance and that is regulated in the constitutions no. 32 of 2004 and Constitutions no. 33 of 2004 is the main basis of regional autonomy on its implementation, which essentially provides greater opportunities for regions to optimize regional potential, both in terms of human resources, capital, and other resources as regional assets performance. Through regional autonomy the regional governments are expected to be more solid and less dependent on the central government, both in terms of financing development and managing regional finances (Mamduh and Abdul, 2014).
This makes the topic of solidity regional financial in the era of autonomy increasingly interested to be discussed, with regional autonomy it is hoped that each region can be independent in fulfilling their needs. The ability of a region in implementing regional autonomy can be measured by regional financial performance and can be seen from regional independence.

According to Halim and Kusufi (2012), regional financial independence is the ability of local governments to be able to finance their own government activities, accountability and development, as well as services provided to people who have paid levies and taxes which are a source of income that is very much needed by the community area. Regional financial independence can be seen from the amount of Original Local Government Revenue (PAD) obtained.

Looking at the results of the calculation of the Regional Financial Independence Ratio in West Java Regencies during 2015-2019, it shows that regional financial independence in West Java districts is included in the very low financial independence criteria. This shows that the district government in West Java is still very dependent on assistance from the center or the regions and has not been able to explore sources of PAD optimally.

The regional governments need to optimize their revenue potential, one of which is by ensuring a larger portion of regional spending for productive sectors. And the implementation of a balanced balance fund that is in harmony as a means of intergovernmental financial balancing in stabilizing regional finances as well as capital expenditures allocated for the acquisition of fixed assets and management of personnel expenditures effectively and efficiently by needs and running according to a good governance system. However, despite the relatively high growth of local revenue, up to now, district government spending in West Java is still supported by balancing funds and in the revenue and expenditure budget, the portion of the apparatus budget is still larger than the budget for the people.

The capital expenditure enhancement is expected to improve the quality of public services, which in turn can increase the level of community participation (contribution) to development, which is reflected in the increase in regional income public services so that it affects regional financial independence. This statement is supported by research conducted by Ernawati & Riharjoa (2017) and research conducted by Defitrri (2020) which discusses the effect of capital expenditure and regional financial independence.

According to Erlina (2015: 155), personnel expenditure is compensation expenditure, in the form of salaries and bonuses as well as other income is given to civil servants determined by the provisions of the legislation. Through the allocation of adequate personnel expenditures, the quality of regional apparatus performance can be improved, in order to fulfill services to the community and regional financial independence can be achieved. This statement is supported by research conducted by Darwis (2015) by showing that the district/city government in West Sumatra Province has a significant effect on employee expenditure factors on the level of regional financial independence.

According to Djaenuri (2012: 100), balancing funds are a source of regional income obtained in the APBN to support the implementation of government authority to achieve the goal of granting autonomy to regions, namely improving services and better welfare. From regional income obtained in the APBN to support the implementation of government authority to achieve the goal of granting autonomy to regions, namely improving services and better welfare. In the research that has been done by Budianto and Alexander (2016) an the research conducted by Mahfud et.al (2020), it is explained that the balancing fund has a significant negative effect on regional financial independence. This shows that there are still many local governments that depend on funds from the central government.
1.1. Stewardship Theory

Stewardship theory illustrates that there is no situation where management is motivated for individual goals but rather focuses on the most important goal, namely the interests of the organization (Donaldson & Davis, 1991). Stewardship theory implies that the existence of local governments as institutions that are trusted to carry out their duties and functions properly like what is expected by the public so that public services or the welfare of the community can be achieved optimally. (Ernawati & Riharjo, 2017).

2 Research Method

The population and sample in this study were all-district governments in the province of West Java. The sampling method used for this research is the saturated sample method. According to Sugiyono (2018), which states that saturated sampling is the determination of the sample when all populations are used as samples. The sampling in this study, namely all District Governments in West Java Province which publishes APBD Realization Reports consecutively between 2015-2019 on the www.djp.kemenkeu.go.id website. So the research sample that will be used as a sample is 18 districts in West Java. From the 18 districts, the last 5 years, namely 2015-2019, so that the observation data is 90. This study uses secondary data, namely data obtained from the results of processing by a second party or data obtained from the results of publications from other parties (Sugiyono, 2018: 193). The secondary data used for this research is panel data, which is a combination of cross-sectional data and time-series data from 2015-2019.

The data used in this study is the Budget Realization Report for each district in West Java in 2015-2019. The data analysis method used in this study uses panel data regression analysis. Panel data (pooled data) is data that combines time-series data and cross-section data. Time series data is observation data in one research subject observed for a period of time. Cross-sectional data, namely observation data on several research subjects at one time, for example in one year. The equation of the model using cross-section data can be written as follows: (Gujarati, 2013).

\[
Y_{it} = \beta_0 + \beta_1 BM_{it} + \beta_2 BP_{it} + \beta_3 DP_{it} + \epsilon_{it}
\]

3 Result And Discussion

3.1. Research Results for Selection of Estimation Models

Examiner of estimation model selection to determine the best model used in panel data regression analysis. The model estimation test is done by using the Chow test and the Hausman test. The Chow test is used to choose which CEM or FEM is better used in the study.

<table>
<thead>
<tr>
<th>Effects Test</th>
<th>Statistic</th>
<th>d.f.</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross-section F</td>
<td>59.762573</td>
<td>(17,69)</td>
<td>0.0000</td>
</tr>
</tbody>
</table>
Based on table 4.1 above, it shows that the F-test is significant (p-value) 0.0000 <0.05, so Ha is accepted. And based on the value of Fcount > Ftable (59.762573 > 2.71) so Ha is accepted. So the fixed effect model is better than the common effect. Because the fixed effect model is accepted, then there must be a Hausman test. Furthermore, the Hausman test is used to choose REM or FEM which is better used for panel data regression.

**Table 4.2. Result of Hausman Test**

<table>
<thead>
<tr>
<th>Test Summary</th>
<th>Chi-Sq. Statistic</th>
<th>Chi-Sq. d.f</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross-section random</td>
<td>63.085499</td>
<td>3</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Based on table 4.2 shows that the prob value <0.05/(0.0000 <0.05) means that H1 is accepted and H0 is rejected. So the right model to use is the fixed effect. Because the fixed effect model is accepted, the selection of the right model used in this study is the fixed effect model.

4 Hypothesis Testing

a. Simultaneous Test (F Test)

**Table 4.3. Result of F Test**

| Statistic     | F-statistic | 53.79389 | Durbin-Watson stat | 1.935255 | Prob(F-statistic) | 0.000000 |

Based on the results of the F test in table 4.3 above, it can be seen that the Fount value is 53.79389. The value of F(0.05 with Ftable of 2.71 Because Fcount > Ftable (53.79389 > 2.71), then H0 is rejected and Ha is accepted, meaning that Capital Expenditures, Personnel Expenditures, and Balancing Funds have a significant joint effect on Regional Financial Independence.

b. Partial Test (T test)

**Table 4.4. Result**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>2.199908</td>
<td>0.183962</td>
<td>11.95846</td>
<td>0.0000</td>
</tr>
<tr>
<td>BM?</td>
<td>0.158784</td>
<td>0.060600</td>
<td>2.620215</td>
<td>0.0108</td>
</tr>
<tr>
<td>BP?</td>
<td>0.024421</td>
<td>0.011146</td>
<td>2.191087</td>
<td>0.0318</td>
</tr>
<tr>
<td>DP?</td>
<td>-0.110047</td>
<td>0.039491</td>
<td>-2.786621</td>
<td>0.0069</td>
</tr>
</tbody>
</table>

Sumber: Data diolah dengan Eviews V9, 2021
1. The Capital Expenditure Test results in a t value (t count) of 2.620215. For the value of ttable sought at 0.05 significance and degrees of freedom. The result of ttable is 1.66256. Because the value of t count > ttable (2.620215 > 1.66256), then H a is rejected and H 0 is accepted, with a significance level of 0.0108 < 0.05, meaning that Capital Expenditure has a positive and significant effect on Regional Financial Independence.

2. Employee Expenditure Testing produces a t value (tcount) of 2.191087. The result of ttable is 1.66256. Because the value of tcount > ttable (2.191087 > 1.66256),

c. Coefficient of Determination (R²)
then Ha is rejected and H0 is accepted, with a significance level of 0.0318 0.05, meaning that Employee Expenditure has a positive and significant effect on Regional Financial Independence.

3. The balancing fund test results in a t value (tcount) of -2.786621. The result of ttable is 1.66256. Because the value of - tcount > -ttable (-2.786621 > -1.66256), then Ha is rejected and H 0 is accepted, with a significance level of 0.0069 < 0.05, meaning that the Balancing Fund has a negative and significant effect on Regional Financial Independence.

Table 4.5. Result of Coefficient of Determination (R²)

<table>
<thead>
<tr>
<th>Cross-section fixed (dummy variables)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-squared</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
</tr>
<tr>
<td>S.E. of regression</td>
</tr>
<tr>
<td>Sum squared resid</td>
</tr>
<tr>
<td>Log-likel</td>
</tr>
<tr>
<td>F-statistic</td>
</tr>
<tr>
<td>Prob(F-statistic)</td>
</tr>
</tbody>
</table>

Based on table 4.5 above for this research model, it shows the Adjusted R-squared value of 0.922262, which means that 92.2262% changes in the Regional Financial Independence variable can be explained by the variables of Capital Expenditures, Personnel Expenditures and Balancing Funds, while the remaining 7.7738% is influenced by other variables not examined in this study that can affect Regional Financial Independence.

The Effect of Capital Expenditure, Personnel Expenditure and Balancing Fund together on Regional Financial Independence

Based on the results of statistical analysis, it is known that Capital Expenditures, Personnel Expenditures, and Balancing Funds together have a significant and significant effect on Regional Financial Independence, meaning that the hypothesis is accepted, that 92.2262% changes in the Regional Financial Independence variable can be explained by the Capital Expenditure variable, Personnel Expenditure and Balancing Fund, while the remaining 7.7738% is influenced by other variables not examined. Thus, this study can be generalized to all districts in West Java Province for the 2015-2019 period.
In accordance with the theory of stewardship, local government as an institution that is trusted to carry out its duties and functions appropriately in accordance with the public interest so that public services and public welfare can be achieved optimally and can be accountable to the community (public). With the existence of the capital expenditure budget, it has a strategic role which is manifested in regional development and regional improvement in various sectors and the existence of the personnel expenditure budget acts as a compensation tool given to regional officials as a reward for the work that has been carried out and also as a driver to increase work productivity. Regional officials in carrying out development in the region. And the existence of a balancing fund is a form of accountability that must be carried out by the government (steward) and the people (principal) as well as to the central government.

**Effect of Capital Expenditure on Regional Financial Independence**

Based on the results of hypothesis testing, it shows that Capital Expenditure has a positive and significant effect on Regional Financial Independence. The results of this study are in line with the results of research conducted by Darwis (2015), Ernawati & Riharjo (2017), Normalita & Mahmud (2017), Martini et al. (2019) and Defitri (2020) show that the capital expenditure variable has a positive effect on regional financial independence. In line with the theory of stewardship which implies that the existence of local government as an institution that is trusted to carry out its duties and functions appropriately is appropriate. This means that the higher the local government's capital expenditure, the higher the regional financial independence. The existence of a capital expenditure budget sourced from central assistance and regional revenues, this capital expenditure has a strategic role which is manifested in regional development and regional improvement in various sectors in increasing public service.

**The Effect of Personnel Expenditure on Regional Financial Independence**

Based on the results of hypothesis testing, it shows that employee expenditure has a positive and significant effect on Regional Financial Independence. This means that the higher the expenditure for local government employees, the higher the regional financial independence. The results of this study are in line with the results of research conducted by Putri (2014), Darwis (2015) and Defitri (2020) showing that personnel expenditures have a positive effect on regional financial independence. In line with the theory of stewardship which implies that the existence of local governments as institutions that are trusted to carry out their duties and functions appropriately in accordance. Regional apparatus in carrying out development in the region. Where the existence of personnel expenditure can encourage the productivity of the performance of the regional apparatus so as to increase regional financial independence.

**The Effect of Balancing Funds on Regional Financial Independence**

Based on the results of hypothesis testing, it shows that the Balancing Fund has a negative and significant effect on Regional Financial Independence. This means that the higher the regional government balancing fund, the lower the regional financial independence. The influence of balancing funds on regional financial independence is one of the external assistance received by a region to meet the needs of government programs if there is a deficit. The results of
this study are in line with the results of research conducted by Budianto and Aleksandria (2016), Santoso (2018), Anas (2018) and Mahfud et al. (2020) explaining that balancing funds have a negative influence on regional financial independence. The balancing fund variable has a relationship with the stewardship theory where the use of the balancing fund is a form of responsibility that must be carried out by the government (steward) and the people (principal) based on trust, collectively according to organizational goals. The effect of balancing funds shows that local governments still need the role of the central government to increase their output creation. This indicates that the higher the balancing fund in a region, the lower the level of financial independence of the region.

5 Conclusion

1. Capital Expenditures, Personnel Expenditures, and Balancing Funds together have a significant and significant effect on Regional Financial Independence. This means that the variables of Capital Expenditure, Personnel Expenditure, and Balancing Fund can be used as predictors to determine Regional Financial Independence.
2. Capital Expenditure has a positive and significant effect on Regional Financial Independence. This means that the higher the capital expenditure, the higher the regional financial independence.
3. Employee Expenditure has a positive and significant effect on Regional Financial Independence. This means that the higher and more efficient the personnel expenditure, the higher the regional financial independence.
4. The Balancing Fund has a negative and significant effect on Regional Financial Independence. This means that the higher the balance fund, the lower the regional financial independence.

6 Suggestion

1. Regional governments must seek to increase capital expenditures, especially exploring the potential for allocating funds in order to finance activities with the aim of meeting community needs, regional development in productive sectors such as tourism management, industrial infrastructure and regional improvement in various sectors in improving quality public services to society.
2. Local governments must make efforts to streamline and manage personnel expenditures properly according to needs which will have an impact on the creation of good human resource management, namely increasing the productivity of performance and professionalism of regional officials so as to support a good government system.
3. The negative effect of balancing funds shows that local governments still need the role of the central government to increase their output creation. Local governments must strive to reduce and optimize balancing funds and prioritize the suitability and compatibility of the implementation of balanced balance funds as a means of intergovernmental financial balancing.
4. For further researchers, it is recommended to use more independent variables in research, especially those related to regional independence. In addition to the regional expenditure variable and the characteristics of the regional government in
terms of the number of regional fixed assets, in further research, other independent variables can be added in the form of other regional government characteristics.

5. The use of a longer period of time so that it shows the generalization of the research results.

References

Sustainable Food Agriculture Land Protection Strategy: a Case Study in Pantai Labu Sub-District, Deli Serdang Regency, North Sumatera Province

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Abstract. The agricultural land conversion phenomenon becomes a challenge in itself to embody a sustainable agricultural development, especially related to strengthening food security. Deli Serdang Regency as one of the rice production centers in North Sumatra Province is inseparable from the practice of land conversion, marked by a decrease in the agricultural land area, especially in the Pantai Labu Sub-district. This study aims to obtain the concept of sustainable food agricultural land protection which is necessary to anticipate the increasing conversion of agricultural land to non-agricultural land in Pantai Labu Sub-District, Deli Serdang Regency. The applied research method is a qualitative method, and the formulation of a protection strategy is performed using SWOT analysis. Based on the results of the study, a sustainable food agricultural land protection strategy wasn’t only achievable from a juridical aspect but could also be supported by non-juridical strengthening of the strategy based on the SWOT analysis results by identifying internal and external factors. The obtained formulation of the strategies included the development of agricultural land based on the Regional Spatial Planning policy in order to create upstream-downstream synergies starting from the government, farmers, to the community and the preparation of convenient trade and distribution channels for farmers to be able to sell their agricultural products with good quality and price.

Keywords: land use conversion; SWOT analysis; protection strategy

1 Introduction

The fulfillment of food necessities in the future is a challenge for the Government of Indonesia, considering the increasing population growth. The existence of the agricultural sector is the foundation for realizing food security and stability in the future. In line with that, the availability of agricultural land is crucial to be protected. The dilemma is that Indonesia is also in the development current in various sectors where land is also a requirement, thereby sometimes there would be a competition for agricultural land and non-agricultural land. Early allocation of agricultural land needs to be implemented due to limited land resources in the future [1].

Control effort that has been carried out by the government is making policy through the issuance of Law Number 41 of the year 2009 concerning the Sustainable Food Agricultural Land Protection as amended by Law Number 11 of the year 2020 concerning Job Creation. This regulation is an instrument to protect agricultural land in Indonesia. Deli Serdang Regency has high potential for food agriculture activities and is one of the rice granaries
centers in North Sumatra Province, but in reality it is still influenced by the practice of land conversion. The parameter that can be applied to control land conversion is the preparation of the Regional Spatial Planning, the granting of location permits and regulations on land conversion[2]. The zoning of sustainable agricultural land has been included in the Deli Serdang Regency Regional Regulation Number 1 of the year 2021 concerning the Deli Serdang Regency Spatial Plan for 2021-2041. Pantai Labu Sub-district as a productive agricultural area is prioritized to become a sustainable agricultural area, but in reality in Pantai Labu Sub-district there has been a conversion of agricultural land use. Productive agricultural land becomes an important asset in agricultural development [3].

The attempt to protect sustainable food agricultural land is part of a shared responsibility, both across government sectors and also farmers. The government of Deli Serdang Regency should formulate strategies and policies to anticipate the increasing practice of agricultural land conversion through mapping agricultural land use zones. Availability of agricultural land is important considering the need for food is also increasing. The Regional Government of Deli Serdang Regency must consistently provide protection towards agricultural land in order to maintain the existence of food agricultural land. This study aims to describe the area of agricultural land that has changed functions in general in Deli Serdang Regency and in the study location, known as Pantai Labu Sub-District, and to formulate a strategy for protecting sustainable food agricultural land.

2 Method

This study utilized qualitative research method, a research method that is descriptive in nature, relies on analysis, refers to data, utilizes existing theories as supporting material, and produces a theory. Qualitative research method is a research method used to investigate, find, describe, and explain the quality or features of social influence that cannot be explained, measured or described through a quantitative approach [4].

The data in the study encompass primary and secondary data. Primary data were obtained from interviews with informants (in-depth interviews), related stakeholders, consisting of the Department of Agriculture for Deli Serdang Regency and Agricultural Extension Center (BPP) for Pantai Labu and also with farmers as agricultural business actors in the field. Secondary data were obtained from the National Land Agency (BPN), the Agriculture Department and the Central Statistics Agency for Deli Serdang Regency.

Determining strategy as an anticipatory attempt to protect sustainable food agricultural land using the SWOT method. SWOT analysis consists of Strengths (S), Weaknesses (W), Opportunities (O), and Threats (T). SWOT analysis is based on logic that can maximize strengths (S) and opportunities (O), but simultaneously minimize weaknesses (W) and threats (T) [5]. SWOT analysis compares external opportunities and threats with internal strengths and weaknesses [5].

Researchers would collect external and internal aspect data with a qualitative approach through interviews with stakeholders who are responsible for the protection of sustainable food agricultural land in Deli Serdang Regency. Information obtained from in-depth interviews, and secondary data would be used as a reference for analyzing strategies using the SWOT method.
3 Results and Discussion

Generally, based on the data listed in the Research and Development Center of the Ministry of Agararia and Spatial Planning/Land Agency, Rice Field Statistics book of Deli Serdang Regency and Ministry of Agriculture [6] - [8], the paddy fields area in Deli Serdang Regency almost always decreased from year to year (in the last 10 years). The percentage of changed land area is listed in Table 1.

<table>
<thead>
<tr>
<th>Number</th>
<th>Year</th>
<th>Land Area (Ha)</th>
<th>Changed Area (Ha)</th>
<th>Percentage</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>2010</td>
<td>45.156</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2.</td>
<td>2011</td>
<td>45.114</td>
<td>42</td>
<td>0.09</td>
<td>Decreasing</td>
</tr>
<tr>
<td>3.</td>
<td>2012</td>
<td>44.311</td>
<td>803</td>
<td>1.81</td>
<td>Decreasing</td>
</tr>
<tr>
<td>4.</td>
<td>2013</td>
<td>42.482</td>
<td>1,829</td>
<td>4.12</td>
<td>Decreasing</td>
</tr>
<tr>
<td>5.</td>
<td>2014</td>
<td>42.282</td>
<td>200</td>
<td>0.47</td>
<td>Decreasing</td>
</tr>
<tr>
<td>6.</td>
<td>2015</td>
<td>40.889</td>
<td>1,393</td>
<td>3.41</td>
<td>Decreasing</td>
</tr>
<tr>
<td>7.</td>
<td>2016</td>
<td>40.716</td>
<td>173</td>
<td>0.47</td>
<td>Decreasing</td>
</tr>
<tr>
<td>8.</td>
<td>2017</td>
<td>40.272</td>
<td>444</td>
<td>1.10</td>
<td>Decreasing</td>
</tr>
<tr>
<td>9.</td>
<td>2018</td>
<td>24.550</td>
<td>15.722</td>
<td>64.04</td>
<td>Decreasing</td>
</tr>
<tr>
<td>10.</td>
<td>2019</td>
<td>33.992</td>
<td>9.442</td>
<td>27.77</td>
<td>Increasing</td>
</tr>
</tbody>
</table>

Table 1. Changes in the rice field area in Deli Serdang Regency

Table 1 reveals the percentage of massive land area decline in Deli Serdang Regency that occurred every year, albeit a significant increase in 2019. This condition should be seriously heeded, if preventive measures weren’t taken, agricultural land would keep on being diminished. Pantai Labu Sub-district as a productive agricultural area is prioritized to become a sustainable food agricultural land as stated in the Regional Spatial Planning of Deli Serdang Regency, however in reality, Pantai Labu Sub-district is inevitably affected by the practice of agricultural land conversion. Data on land use in the Pantai Labu sub-district in 2016 and 2019 obtained from the National Land Agency (BPN) of Deli Serdang Regency showed that during that period there had been a change in land use from agricultural to non-agricultural. Land use in Pantai Labu Sub-district in 2016 consisted of 69.13% (4,690.024 Ha) of agricultural land and 30.86% (2,093.89 Ha) of non-agricultural land, then in 2019 the agricultural land was 68.28% (4,631.82 Ha) and 31.72% (2,152.09 Ha) of non-agricultural land. Comparison of agricultural land area from 2016 to 2019 showed that there was a decrease in land area of 58.20 Ha or 0.85%.

In Pantai Labu Sub-district, as many as 15 out of 19 villages/urban villages had experienced the practice of land-use change of agricultural land, whether the initial function was irrigated rice field or moor/field. The decrease in agricultural land was due to the conversion of land from agricultural land to non-agricultural land, most of which was for settlement/village. Population growth would be in line with the demand for land needs. Land wouldn’t increase, so what happened was land conversion which tended to reduce the proportion of land that was previously used for agricultural land to become non-agricultural land [9]. The occurrence of land conversion was due to competition in land use between the agricultural sector and the non-agricultural sector. Competition in land use could occur due to three economic and social phenomena, such as 1. limited land resources, 2. population growth and 3. economic growth [2]. The available land area is relatively limited, therefore, population growth would increase the scarcity of land that could be allocated for agricultural and non-agricultural activities [2].
The land area that experienced the most conversion of land use was <0.5 Ha which was used for the village (house), in the Binjai Bakung Villages. Similar to other village/Sub-district areas, many irrigated rice fields have turned into villages, such as in the areas of Durian Village, Denai Lama, Ramunia I and Perkebunan Ramunia village. In the area of Kubah Sentang Village, the most common land changes were the conversion of irrigated rice field into moor/field. Based on the land grouping, the moor/field is still defined as agricultural land, but the types of planted crops differed from rice in paddy field. The moor/field became a supporting land to produce crops other than rice, such as corn and cassava. The map of land-use change in 2016 – 2019 in Pantai Labu Sub-district can be found in Figure 1.

![Figure 1](image.png)

**Figure 1.** Land-use change in 2016 – 2019 in Pantai Labu Sub-district

The conservation of sustainable food agricultural land involves various complex elements. These elements can be analyzed from upstream to downstream, such as from the role of the government in formulating and issuing policies/statutory regulations, the role of farmers as the front liners of sustainable agriculture, the role of the Department of Agriculture and the human resources in field as extension workers, to consumers, the community who will become the end-users who consume agricultural products.

The attempt to protect agricultural land can be pursued through juridical factors by issuing regulations/policies and for the non-juridical way is by determining strategies through SWOT which analyzes strategies based on the internal and external environment. Agricultural land conversion is also influenced by external factors, internal factors and government policies[10].

Legally, the Government of Deli Serdang Regency has determined the zoning of food agricultural land that should be protected in the Deli Serdang Regency Regional Regulation 405.
Number 1 of the year 2021 concerning the Deli Serdang Regency Regional Spatial Planning for 2021-2041. The regulation has determined Pantai Labu Sub-district as one of the sustainable food agricultural lands. In Chapter V (Regency Spatial Pattern Plan), article 29 paragraph 5) it is stated that the sustainable food agricultural land is part of the agricultural and horticultural land with an area of approximately 26,212,096 hectares, one of which is in Pantai Labu Sub-district [11].

Based on the non-juridical aspect, the results of the SWOT analysis would be able to support the sustainable food agricultural land protection program in terms of existing regulations, thereby its implementation could be maximized. The results of the SWOT analysis are presented in Table 2.

Table 2. SWOT Matrix for Sustainable Agricultural Land Protection

<table>
<thead>
<tr>
<th>Internal</th>
<th>STRENGTHS (S)</th>
<th>WEAKNESSES (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S1. Availability of adequate sustainable food agricultural facilities and infrastructure</td>
<td>W1. The decrease of Agricultural Land as Rice Field</td>
</tr>
<tr>
<td></td>
<td>S2. Potential of irrigated land and rice harvest intensity</td>
<td>W2. The quality of sustainable agricultural products has not been maintained</td>
</tr>
<tr>
<td></td>
<td>S3. The existence of government programs and policies in terms of improving the welfare of farmers</td>
<td>W3. Limited farmers’ capital</td>
</tr>
<tr>
<td></td>
<td>S4. Potential for the conversion of non-agricultural land to agricultural land in accordance with Regional Spatial Planning</td>
<td>W4. The quality of farmers as human resources are still low and the traditional mindset must also be altered</td>
</tr>
<tr>
<td></td>
<td>S5. The huge number of Poktan (Farmers’ Group)</td>
<td>W5. Limited human resources in the field</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPPORTUNITIES (O)</td>
<td>STRATEGIES S-O</td>
<td>STRATEGIES W-O</td>
</tr>
<tr>
<td>O1. Availability of a sustainable food agricultural land protection program</td>
<td>1. The government empowers and provides supporting infrastructure for Poktan (Farmers’ Group), thereby enabling them to manage sustainable food agricultural land and produce an agricultural product in order to excel from other commodity products (S1, S5, O1, O3, O4, O5)</td>
<td>1. Limited farmers’ funds and traditional mindset can be overcome by the availability of facilities and infrastructure from the government such as subsidies for agricultural materials, human resources for field extension workers, etc. (W3, W4, W5, O1, O5)</td>
</tr>
<tr>
<td>O2. A great number of unused land that can still be used</td>
<td>2. The government prepares convenient trade and</td>
<td>2. Providing education and motivation to Poktan (Farmers’ Group) about the importance of making sustainable agricultural</td>
</tr>
<tr>
<td>O3. Huge demand for rice for Deli Serdang</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Regency and Medan City

O4. The growing consumer awareness towards products with good quality and safe consumption

O5. Support towards the policy of the Provincial, Regency/City government

- Sustainable agricultural land can be developed based on the Regional Spatial Planning policy, hence synergies can be created starting from upstream to downstream, such as from the government, farmers, to the community (S2, S4, S5, O1, O2, O5)

<table>
<thead>
<tr>
<th>Internal</th>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1. Availability of adequate sustainable food agricultural facilities and infrastructures</td>
<td>W1. The decrease of Agricultural Land as Rice Field</td>
<td></td>
</tr>
<tr>
<td>S2. Potential of irrigated land and rice harvest intensity</td>
<td>W2. The quality of sustainable agricultural products has not been maintained</td>
<td></td>
</tr>
<tr>
<td>S3. The existence of government programs and policies in terms of improving the welfare of farmers</td>
<td>W3. Limited farmers’ capital</td>
<td></td>
</tr>
<tr>
<td>S4. Potential for the conversion of non-agricultural land to agricultural land in accordance with Regional Spatial Planning</td>
<td>W4. The quality of farmers as human resources are still low and the traditional mindset must also be altered</td>
<td></td>
</tr>
<tr>
<td>S5. The huge number of Poktan (Farmers’ Group)</td>
<td>W5. Limited human resources in the field</td>
<td></td>
</tr>
</tbody>
</table>

| External | | |
|----------|-----------------|

<table>
<thead>
<tr>
<th>THREATS (T)</th>
<th>STRATEGIES S-T</th>
<th>STRATEGIES W-T</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1. Weak control over spatial control</td>
<td>1. The space utilization of agricultural land can be stopped by the issuance of laws and policies from the Government (S2, S4, T1, T2, T3, T4)</td>
<td>1. The government should facilitate Poktan (Farmers’ Group) by providing facilities and infrastructure such as human resources for extension workers that are not only in accordance with competency standards, but also initiate creativity and invite farmers to think outside the box and produce agricultural products that are not less profitable than other commodities in order to be</td>
</tr>
<tr>
<td>T2. Regional Spatial Planning consistency</td>
<td>2. The government and stakeholders can establish an agropolitan village in the Pantai Labu area in order to attract the interest of the younger generation and</td>
<td></td>
</tr>
<tr>
<td>T3. The high conversion of productive agricultural land use due to</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4 Conclusion

Based on the results and discussion, there are some conclusions that could be drawn, and these conclusions are in the form of description of the land conversion area in the research location and the strategies established for the protection of sustainable agricultural land, as follows:

1. Land-use change in Pantai Labu Sub-district from 2016 to 2019 was 58.20 Ha or 0.85%. The decrease in agricultural land was due to the conversion of land from agricultural land to non-agricultural land, most of which was for settlements/villages.

2. Based on the results of the SWOT analysis which included internal and external factors, 9 strategies for protection of sustainable food agricultural land can be formulated, such as:
   1) The government empowers and provides supporting infrastructure for Poktan (Farmers’ Group), thereby enabling them to manage sustainable food agricultural land and produce an agricultural product in order to excel from other commodity products.
   2) The government prepares convenient trade and distribution channels for farmers to be able to sell agricultural products of good quality and price.
   3) Sustainable food agricultural land can be developed based on the Regional Spatial Planning policy, hence synergies can be created starting from upstream to downstream, such as from the government, farmers, to the community.
   4) Limited farmers’ funds and traditional mindset can be overcome by the availability of facilities and infrastructure from the government such as subsidies for agricultural materials, human resources for field extension workers, etc.
   5) Providing education and motivation to Poktan (Farmers’ Group) about the importance of making sustainable agricultural efforts that produce high quality and competitiveness in the market.
   6) The space utilization on agricultural land can be stopped by the issuance of laws and policies from the Government.
   7) The government and stakeholders can establish an agropolitan village in the Pantai Labu area in order to attract the interest of the younger generation and visitors who come, especially in the field of sustainable agriculture.

T4. Development of other commodities that are considered more competitive.
T5. High interest rates and bank fees more in line with the objectives of sustainable agricultural land development (W2, W4, W5, T2, T3, T4)
8) The government should facilitate Poktan (Farmers’ Group) by providing facilities and infrastructure such as human resources for extension workers that are not only in accordance with competency standards, but also initiate creativity and invite farmers to think outside the box and produce agricultural products that are not less profitable compared to other commodities in order to be more in line with the objectives of sustainable food agricultural land development.

9) The government can motivate Poktan (Farmers’ Group) by cooperating with the person in charge or joint ventures with the private sector to enable the development of the quality of sustainable agriculture and agro-tourism villages.

References


The Effect of Guided Discovery Learning Method and Guided Inquiry Learning in Improving Students' Critical Thinking Ability with Students' Self-Efficacy Variable Moderator

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Abstract. The main problem in this research is grade X AKL students' low critical thinking ability in economy business subject in SMK Negeri 1 Palasah Kabupaten Majalengka. The purpose of this study was to determine the effect of guided discovery learning and guided inquiry learning methods in increasing students' critical thinking skills, the effect of self efficacy on critical thinking skills and how interactions between learning methods and self efficacy. This research is a quasi experiment with 2x2 factorial design. Analysis of the data used in the form of two way anova SPSS 22. Findings from this study indicate that: 1) there is an influence of learning methods in improving students' critical thinking skills. In this study it was found that the guided discovery learning method was superior in improving students' critical thinking skills, 2) self efficacy influences students' critical thinking skills, 3) there are interactions of learning methods and self efficacy to students' critical thinking skills. The implication of this research is to assist teachers in choosing learning methods that are appropriate to the material in the learning process to improve students' critical thinking skills.

Keywords: Guided Discovery Learning; Guided Inquiry Learning; Self Efficacy; Critical Thinking Ability.

1 Introduction

Learning in the 21st century includes to know, to do, to be, to live together. The government seeks to improve the quality of learning in Indonesia by designing a better curriculum, namely the 2013 curriculum, where the abilities that students must possess include critical thinking, creative thinking, communicative and collaboration. Curriculum 2013 learning objectives include the development of the domain of attitudes, knowledge and skills that can be obtained through observing, asking, exploring, associating and communicating activities. One of the important skills that must be possessed by students is the ability to think critically. The development of critical thinking skills is related to the skills to identify, analyze, and solve problems logically so as to produce the right decisions. The importance of critical thinking skills is also stated in Permendiknas 81A of 2013 concerning Curriculum Implementation which states that the abilities of students needed for future competencies include the ability to communicate, think critically and creatively by considering the values
and morals of Pancasila in order to become democratic and responsible citizens, tolerant in diversity, able to live in a global society, have broad interests in life and readiness to work, intelligence according to their talents/interests, and care about the environment. The curriculum must be able to answer these challenges so it is necessary to develop these abilities in the learning process. Teachers as organizers of learning in the classroom have a duty to help develop students' critical thinking skills. However, what happens in schools is that there are still many teachers who focus on learning outcomes only, and ignore aspects of students' critical thinking skills.

Rizal, et al (2017) in their journal stated that critical thinking skills can also becaused to solve everyday problems by thinking complexly, actively, and thoroughly in analyzing all available information. In an effort to analyze all the available information, it is inseparable from the influence of self-efficacy. This is based on Hidayat's opinion (in Rizal, et al: 2017) that any factors that influence a behavior are basically rooted in the belief that they can achieve the expected target. Self-confidence possessed by an individual in his ability to overcome obstacles in order to achieve the desired goal is self-efficacy. With self-efficacy, a person will tend to choose actions that make them feel competent and avoid actions that they think cannot be completed.

Looking at the Mid-Semester Examination data conducted at SMK Palasah shows the number of students who score below the KKM is almost 94.92% with students who score above the KKM only 5.07 %. This shows that the critical thinking ability of students at SMK Negeri Palasah is not good enough when viewed from the value of the Mid-Semester Examination. For this reason, a pre-study was conducted to see students' critical thinking skills. Table 1.1 below shows that the level of critical thinking skills of class XI Accounting Department at SMK Negeri 1 Palasah is still low. Of the 30 students who took the test, there were 23.33% of students who had low levels of critical thinking skills, and 66.67% of students had very low levels of critical thinking skills. This is clearly not in line with expectations. It shows that class XI students of the Accounting Department at SMK Negeri 1 Palasah are still very lacking in critical thinking skills. This shows that there is a gap between the material presented by the teacher and the students' thinking ability, so that when students face the problem of critical thinking, students cannot be used properly.

<table>
<thead>
<tr>
<th>No</th>
<th>Mastery Level</th>
<th>Standard Score</th>
<th>Category</th>
<th>Frequency (People)</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>90 – 100</td>
<td>A</td>
<td>Very High</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>2</td>
<td>80 – 89</td>
<td>B</td>
<td>High</td>
<td>1</td>
<td>3.33</td>
</tr>
<tr>
<td>3</td>
<td>65 – 79</td>
<td>C</td>
<td>Medium</td>
<td>2</td>
<td>6.67</td>
</tr>
<tr>
<td>4</td>
<td>55 – 64</td>
<td>D</td>
<td>Low</td>
<td>7</td>
<td>23.33</td>
</tr>
<tr>
<td>5</td>
<td>54 and below</td>
<td>E</td>
<td>Very Low</td>
<td>20</td>
<td>66.67</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30</td>
<td>100</td>
</tr>
</tbody>
</table>

Maximum score 81.25  
Minimum score 18.75  
Average Value 44.69  
Standard Deviation 18.19

Source: Appendix 1

Based on the research conducted by Hafrak et al (2019), it is explained that method discovery learning thehas a better effect than the method. Guided inquiry learning because the
average score of critical thinking students who learn to use the method discovery learning is higher than the average score of critical thinking students who learn to use the method inquiry learning. While the research conducted by Pratiwi and Mawardi (2020) in their journal explained that the average results prove that the level of critical thinking skills using the method inquiry learning significantly higher than using the method discovery learning. This study was conducted to determine the effect of using methods guided discovery learning and guided inquiry learning which are more effective in improving students' critical thinking.

2 Literature Review

2.1. Guided Discovery Learning

Various learning methods can be used to form students' critical thinking skills and scientific attitudes. However, the discovery learning method will be more in accordance with the characteristics and cognitive development of students. This learning method emphasizes the ability of students to investigate a relationship, collect data to strengthen a relationship, and use it to find applicable laws or principles with inductive thinking orientation. Students are expected to construct their own knowledge. The teacher does not act as a presenter and information display, but only acts as a facilitator. Arends (2008) states that discovery learning emphasizes active student-centered learning in which students discover their own ideas and describe their meaning. Discovery Learning has several types, namely pure discovery and guided discovery. Guided discovery is a learning method that emphasizes learning to find but the teacher guides students during the process of discovery learning activities. Teacher guidance in learning is expected to instruct students in student discovery activities to achieve learning objectives. However, teacher coaching is not an obligation rule, but teacher guidance in the form of guiding about work procedures. Through the discovery learning method, students are invited to study independently and it is hoped that students can understand the real problem and train their cognitive, affective, and psychomotor abilities. Similar findings by Kristen & Prasetyo (2016), show that the use of concrete objects in learning can improve students' cognitive abilities and skills.

2.2. Guided Inquiry Learning Method

Guided inquiry learning method or guided inquiry learning is student-centered learning. Piaget (in Puspita and Budi, 2013) suggests that the inquiry method is a method that prepares students in situations to conduct their own experiments extensively in order to see what is happening, want to do something, ask questions, and find answers on their own. In this guided inquiry learning method, students are more active in the learning process that has been conditioned to be able to apply thinking in an effort to explore all concepts themselves to take the initiative in solving problems, making decisions, and training students' critical thinking.

Sanjaya (in Azizah et al, 2019) Guided Inquiry is a learning method that involves students' activeness in exploring and discovering their own knowledge. The Guided Inquiry learning method to improve students' higher order thinking skills in subjects is a series of learning activities that emphasize critical and analytical thinking processes to seek and find answers to a problem in question. According to Nuryani (in Azizah et al, 2019) further said that in guided inquiry the teacher guides students in carrying out activities by giving initial questions and leading to a discussion. Then the teacher raises the problem, provides direction on solving, and guides students in recording data.
2.3. Critical Thinking Concept

Thinking is a certain mental process such as inferring, evaluating and classifying something. This view is often taken to imply that thinking and solving problems can be done by a series of steps or procedures. Meanwhile, as used in the expression critical thinking connotes the importance of thinking that leads to questions, issues or problems that pay attention to "critical" in this context means "rejection" or "negative" for complex personal problems, negotiating with groups about what actions to take or analyzing assumptions and the quality of the methods used scientifically in testing a hypothesis.

Critical thinking is closely related to thinking that contains the meaning of values. In a descriptive perspective, critical thinking is an analysis of problem situations through potential evaluation, synthesis, and problem solving which will eventually become a decision.

According to experts, individuals or groups involved in critical thinking can be seen through the existence of strong evidence such as through observation or assessment based on criteria using methods or techniques and asking questions. Critical thinking does not only involve logic but there are broad intellectual criteria readiness such as clarity, credibility, accuracy, precision, relevance, depth, breadth of meaning, and balance.

According to Ennis (in Kuswana, 2013, p. 12) said that:

"Critical thinking basically depends on two dispositions. First, a concern for "getting it right" as far as possible and a concern for presenting path positions and clarity. Second, depending on the evaluation process (applying criteria to assess possible answers), both implicitly and explicitly.

Critical thinking is focused on understanding something that is conscious and leads to a goal. The purpose of critical thinking is to consider and evaluate information that ultimately enables us to make decisions. Critical thinking focuses on whether to believe or do something implies that students who think critically do not just believe what the teacher explains. Students try to consider their reasoning and look for information to obtain the truth. With critical thinking skills, students will develop their knowledge and mindset, interpretation, analysis, evaluation, and argumentation.

Critical thinking is needed by everyone to address all the problems that arise and occur in the reality of life. Someone who has high critical thinking skills, he can address problems by adjusting, adjusting or changing his mindset according to the actions he must take so that he can make the right decisions. Someone who thinks critically is someone who is skilled and reasoned, and has a tendency to believe and act according to what he thinks. A person has the ability to think critically if he has the ability to analyze, prove based on rationally proven reasons, make generalizations of existing data, and provide an assessment of the adequacy of arguments and conclusions.

2.4. Self Efficacy

Bandura (1997) defines self-efficacy as an individual's belief about his ability to organize and complete a task needed to achieve certain results.

Friedman and Schustack (in Woropinasti, 2010) define self-efficacy as an expectation-belief (hope) about how far an individual is able to perform a behavior in a certain situation.

Meanwhile, Mujadi (2003) explains that self-efficacy is one of the personal factors that becomes an intermediary or mediator in the interaction between behavioral factors and environmental factors. Self-efficacy can determine the success of job performance and execution. Self-efficacy also affects the mindset, emotional reactions in making decisions.

So, it can be concluded that according to some experts' opinions, self-efficacy is a person's belief in himself in generating motivation and enthusiasm for learning so that he is confident
in completing the tasks given. This belief refers to the individual estimating the ability he has in carrying out a task needed to achieve a certain result. Confidence in all these abilities includes self-confidence, adaptability, cognitive capacity, intelligence and capacity to act in stressful situations. Self-efficacy will develop gradually and continuously along with increasing abilities and increasing experiences possessed by individuals.

A student who has a good category of self-efficacy will believe that he is capable of doing the tasks that the teacher gives him. These students will have positive suggestions for the subjects they are studying. So he will not find it difficult to learn the lesson. Conversely, if the student has a low self-efficacy category, he will feel afraid to learn. There is no motivation and enthusiasm in learning subjects. So it will be difficult when given tasks by the teacher.

Self-efficacy is the ability to realize, accept, and take responsibility for all potential skills or expertise appropriately. Self-efficacy has effectiveness, namely the individual is able to assess himself as having the power to produce something he wants. The high perceived self-efficacy will motivate individuals cognitively to act appropriately and directed, especially if the goal to be achieved is a clear goal. The individual's thoughts on self-efficacy determine how much effort is expended and how long the individual will persist in the face of obstacles or unpleasant experiences. Self-efficacy is always related and has an impact on the choice of behavior, motivation and individual determination in dealing with every problem.

3 Research Methods

The research method used in this study is a quasi-experimental method. "The quasi-experimental method is a research conducted on one group of students (experimental group) and a comparison group (control group)." (Sugiyono, 2015, p. 114). Quasi-experimental, namely research that provides an opportunity to examine treatments in society that occur naturally.

The research design used is Factorial Designs, often referred to as the F pattern, in principle the same as Treatment by Level Designs (TL), but the factorial pattern provides the possibility for researchers to simultaneously examine the effect of two or more experimental variables. In the factorial pattern, we can see three effects from the experiment, namely (1) main effect, (2) simple effect and (3) interaction effects.

This study looks for the interaction effect between learning methods that use guided discovery learning and guided inquiry learning with self-efficacy in the high and low categories on students' critical thinking skills. Because each variable has two categories that will be used, this study will use a 2x2 factorial design analysis. Factorial design analysis is used to evaluate the effect of the combination of two or more treatments on the dependent variable (Noor, 2014).

Through a 2x2 factorial design between subjects, researchers can find out whether there is a main effect, the influence of the independent variable on the dependent variable, meaning in this study the influence of learning methods on critical thinking and the influence of SE on critical thinking. Interaction effect, the joint effect of two or more independent variables on the dependent variable, means in this study the interaction of the influence of learning methods and self-efficacy on critical thinking. Main and interaction effects at least appear in the two-way anova method (Kusnendi, 2019). To determine the level of significance, the researcher used a two-way ANOVA test. The researcher used a two-way ANOVA test
because this experimental study had two factors on two independent variables that interacted to affect a dependent variable.

4 Result And Discussions

4.1. The Influence of Guided Discovery Learning and Guided Inquiry Learning Methods on Students' Critical Thinking Ability

The formulation of the first problem in this study is whether there is an effect of guided discovery learning and guided inquiry learning methods in improving students' critical thinking skills. Testing the proposed hypothesis using the Two-way ANOVA test. Hypothesis testing is done with the test criteria if the significance value is less than 0.05 then the null hypothesis is rejected and the alternative hypothesis is accepted. If the significance value is greater than 0.05, it means that the null hypothesis is accepted and the alternative hypothesis does not exist or is rejected.

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<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
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<th>F</th>
<th>Sig.</th>
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<td>.021</td>
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<td>0.046</td>
<td>0.059</td>
</tr>
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</table>

R Squared = .300 (Adjusted R Squared = .268)
Source: Appendix

Based on the data analysis that has been carried out and as shown in Table 4.10 shows that the F value is 4.148 with a significance number of 0.046 <0.05 (significance less than 0.05) which means that there is an influence of Guided Discovery Learning and Guided Inquiry learning methods. Learning on the variability of students' critical thinking skills. Thus it can be concluded that Ho is rejected and Ha is accepted. The value of partial eta squared is used to analyze the percentage of the contribution of the learning method to students' critical thinking skills, which is obtained a value of 0.59 with a small interpretation. Thus, the percentage of the contribution of learning methods to critical thinking skills is 5.9%.

The research results obtained will be compared with the proposed theory. The discussion of the findings is as follows. This section describes the influence of guided discovery learning and guided inquiry learning methods in improving students' critical thinking skills. Both in the framework of thinking and research hypotheses, it is suspected that guided discovery learning and guided inquiry learning methods can improve students' critical thinking skills.

Based on the results of hypothesis testing that has been carried out regarding learning methods in improving students' critical thinking skills, a finding is obtained which states that learning methods significantly influence students' critical thinking skills. This can be seen based on the hypothesis test with the acquisition of an F value of 4.148 with a significance of 0.048. This is in line with research conducted by Warda and Elok (2018) which states that learning methods can affect student learning outcomes, in this case the data taken is related to students' critical thinking skills so that the use of the right method will affect the acceptance of learning materials by students. Many factors affect learning outcomes. Slameto (2013) said that internal and external factors include physical conditions, motivation, interests, family
circumstances, learning methods, curriculum. Pozarnik & Marentic B. (2011) say about the role of teachers as facilitators, managers in managing classes in improving strategies to improve learning outcomes through learning methods that suit the demands of the material. Based on the above opinion, the teacher's role as class manager is required to be able to choose the right learning method in improving learning outcomes, especially the level of critical thinking.

Teachers should choose learning methods that can provide great opportunities for students to be able to develop their abilities independently. Students find problems, observe, explore, discover, try, discuss, conclude. The learning method used in this research is guided discovery learning and guided inquiry learning methods. Guided discovery learning and guided inquiry learning methods provide opportunities for students to develop students' critical thinking skills. This opportunity will result in an interaction that was believed by previous students with the new evidence obtained to achieve a better understanding.

The results of the hypothesis test prove that the use of guided discovery learning and guided inquiry learning methods can improve students' critical thinking skills. These findings are in line with the research of Sucipta et al (2018) which found that the application of the guided discovery learning method was effective in improving students' critical thinking skills.

Methods of learning guided discovery learning and guided inquiry learning is a method that is based on constructivist learning theory. John Dewey (in Sucipta et al, 2018) says individuals will learn well if they actively construct knowledge and understanding. Trianto (in Sucipta et al, 2018) states that students build their own knowledge, teachers provide facilities that make it easier for students to make discoveries, apply ideas, use strategies. Zuhdan Kun Prasetyo et al (in Susanti and Suhartono, 2015) argue that learning with the guided discovery method is discovery learning that is guided by the teacher. Teacher instructions can make students work more directed in an effort to achieve the goals that have been set. Teacher guidance is not a kind of recipe that must be followed, but only a direction on the necessary work procedures. Meanwhile, the Inquiry learning method according to Gulo (in Susanti and Suhartono, 2015) is a series of learning activities that involve all students' abilities to search and investigate systematically, critically, logically, analytically, so that students can formulate their findings confidently. The teacher's role in the guided inquiry learning method does not mean passive but the teacher is also active in directing students who need guidance in developing investigation procedures and conducting experiments.

The use of guided discovery learning and guided inquiry learning methods in improving critical thinking skills is considered good, because the students' scores have almost reached the KKM score. Based on the results of the N-Gain test, it shows that there are differences in students' critical thinking skills in the experimental class 1 with the guided discovery learning method and the experimental class 2 with the guided inquiry learning method. The difference in the improvement of students' critical thinking skills from the two experimental classes was only a slight difference. Experimental class 1 with guided discovery learning method has an N-Gain value of 0.62. Meanwhile, the experimental class 2 with the guided inquiry learning method obtained an N-Gain of 0.61. The improvement of students' critical thinking skills from experimental class 1 and experimental class 2 is included in the medium category. However, the N-Gain in the experimental class 1 (guided discovery learning) was higher than the N-Gain in the experimental class 2 (guided inquiry learning).
4.2. The Effect of Self-Efficacy in Improving Students' Critical Thinking Ability

The second problem formulation in this research is whether there is an effect of self-efficacy with high and low categories in improving students' critical thinking skills. Hypothesis testing is done by using the Two Ways Anova test. Hypothesis testing will be carried out with testing criteria if the significance value is less than 0.05, it means that the null hypothesis is rejected and the alternative hypothesis is accepted. On the other hand, if the significance value is greater than 0.05, the null hypothesis is accepted and the alternative hypothesis is rejected.

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<td>.111</td>
<td>22.213</td>
<td>.000</td>
<td>.252</td>
</tr>
</tbody>
</table>

R Squared = .300 (Adjusted R Squared = .268)

Based on Table 4.2 which presents the results of data analysis can be seen that there is the influence of self-efficacy on the ability of critical thinking. It is shown from the acquisition of F value of 22.213 with a significance figure of 0.000 which is smaller than 0.05. It can be concluded that Ho is rejected and Ha accepted. This conclusion also means that statistically there are differences in the ability to think critically on the category of students who have high levels of self-efficacy is high, with students at a low level of self-efficacy. Partial eta squared was used to analyze the percentage contribution of self-efficacy against critical thinking skills of students who obtained the value 0.252 with little interpretation. Thus the percentage contribution of self-efficacy results in the ability to think critically by 25.2%.

This discussion explains the effect of students' self-efficacy in improving students' critical thinking skills. In the framework of thinking and hypotheses proposed, it is suspected that self-efficacy has an effect on improving students' critical thinking skills. There are affective abilities that play a role in student success in improving critical thinking skills. One of the affective abilities in question is self-efficacy. As stated by Bandura (Utari et al, 2020) "Self-efficacy is defined as an attitude of assessing or considering one's own abilities in completing specific tasks". Mamu (2013) argues that aspects of critical thinking skills and self-efficacy are two things that humans must have and need to be raised in students so that they can be useful for themselves. Students who have the ability to think critically are able to make good decisions in making decisions for good or bad things. Associated with self-efficacy that is, self-confidence in their ability to generate their self-function in their environment. Bandura (in Naparin et al, 2020) relationship with self-efficacy. Bandura agrees that self-efficacy functions as a determinant or factor in awakening self-motivation, affection and taking wisely.

Based on the hypothesis test that has been done regarding the effect of self-efficacy in improving students' critical thinking skills, it was found that there is a significant effect of self-regulated learning in improving critical thinking skills of students at SMK Negeri 1 Palasah. This finding is in line with previous research conducted by (Naparin et al, 2020) which stated that there was an effect of self-efficacy on students' critical thinking skills. In addition, it is in line with research conducted by Utari et al (2020) which explains that there is a significant difference in mathematical critical thinking skills between students who have high and low self-efficacy after students obtain the submission and problem solving learning method (JUCAMA) and conventional learning methods.
This study found that there were differences in the improvement of students' critical thinking skills in the high and low self-efficacy categories. Students with high levels of self-efficacy are superior in improving critical thinking skills. Besides, students with high self-efficacy are very easy to follow the learning, they are enthusiastic about the task or stimulus given by the teacher so that they are active in finding and asking about the learning topics discussed. Therefore, it is very important for teachers to build an atmosphere of enthusiasm so that students' behavior, especially in secondary schools, becomes enthusiastic and has good self-efficacy, because students' own behavior is one aspect of their educational environment that they can control themselves, with expert guidance from the teacher, even their parents.

4.3. The Effect of Interaction of Learning Methods and Self-Efficacy on Students' Critical Thinking Ability

The third problem formulation in this research is whether there is an interaction effect of learning methods and students' self-efficacy on students' critical thinking skills. Testing of this hypothesis using the Two Ways Anova test. Hypothesis testing is carried out on the null hypothesis (Ho) with the test criteria if the significance value is less than 0.05, it means that the null hypothesis (Ho) is rejected and the alternative hypothesis (Ha) is accepted. On the other hand, if the significance value is greater than 0.05, it means that the null hypothesis (Ho) is accepted and the alternative hypothesis (Ha) is rejected.

<table>
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<tr>
<th>Dependent Variable: N-Gain KBK</th>
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<th>F</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Interaction</td>
<td>Learning Method * Self Efficacy</td>
<td>0.054 1</td>
<td>0.054</td>
<td>10,752</td>
<td>.002</td>
<td>.140</td>
</tr>
</tbody>
</table>

R Squared = .300 (Adjusted R Squared = .268)  
Source: Appendix

Based on the data analysis that has been carried out and presented in Table 4.12, the F value of 10,752 is obtained with a significance number of 0.002 or less than 0.05. This means that learning methods and students' self-efficacy with their interactions have a significant effect on students' critical thinking skills. So it can be concluded that Ho which states that there is no interaction of the influence of learning methods with self-efficacy on students' critical thinking skills is rejected. On the other hand, the alternative hypothesis (Ha) which states that there is an effect of using learning methods and self-efficacy on students' critical thinking skills is accepted. Thus it can be concluded that self-efficacy is a variable that moderates (strengthens or weakens) the effect of learning methods on students' critical thinking skills. The value of partial eta squared is used to analyze the percentage of the contribution of learning methods and self-efficacy to students' critical thinking skills, which is obtained a value of 0.140 with a small interpretation. Thus, the percentage of the contribution of learning methods and self-efficacy to critical thinking skills is 14.0%.

Because the variability of students' critical thinking skills is significantly influenced by the interaction between learning methods and self-efficacy, the data analysis was continued with a post hoc test to see the simple effect of learning method variables on students' critical thinking skills according to self-efficacy.
To further strengthen the findings of this study, a comparative test of students' critical thinking skills was also carried out in the category of students with high and low self-efficacy levels so that statistical differences could be seen.

Based on the results of hypothesis testing that has been carried out regarding the interaction of the influence of learning methods and self-efficacy on students' critical thinking skills, a finding is obtained that the interaction of learning methods and self-efficacy significantly affects students' critical thinking skills on Employment material. This is evident from the acquisition of the value of \( F = 10.752 \) with a significant number of \( 0.002 < 0.05 \). This is in line with the findings of Oktalia (2012) which states that there is an interaction effect between learning methods and self-efficacy. Students who have high self-efficacy learn more using nondirective multimedia-assisted learning methods than directives without multimedia assistance.

Basically the guided discovery learning and guided inquiry learning methods use skills. Guided discovery learning and guided inquiry learning methods provide opportunities for students to develop their skills. This opportunity will result in an interaction that was believed by the previous student with the new evidence obtained to achieve a better understanding. In addition, this method will also give birth and raise the attitude of students to seek an explanation.

In simple terms it can be concluded that any learning method that will be applied to students who have a high level of self-efficacy will show a good learning process. Because students are ready in all assignments and learning given by the teacher. So that students are active and responsive in learning activities, besides that students have responsibilities regarding the tasks given by the teacher and students can maintain enthusiasm and concentration in activities related to learning. This is because students with high self-efficacy will be easy to engage in learning activities and easy to integrate with the method to be used. Thus students' critical thinking skills will be much higher. And vice versa if students with low self-efficacy levels, any learning method used will show lower learning outcomes.

### 5 Conclusion

Based on the background of the problem, the formulation of the problem, the results of data processing and discussion of the results related to improving students' critical thinking skills, the following conclusions are obtained:

1. Significantly guided discovery learning and guided inquiry learning methods have an effect on improving the critical thinking skills of SMK Negeri 1 Palasah students on Employment material. In this study it was found that the guided discovery learning method was superior in improving students' critical thinking skills. This is
because the gain of N-Gain in the class using the **guided discovery learning** method is higher than the N-Gain in the class that applies the **guided inquiry learning** method.

2. There is an effect of self-efficacy on the critical thinking skills of SMK Negeri 1 Palasah students on the subject of Employment. In this study, it was found that students with high levels of self-efficacy had higher levels of critical thinking than students with low levels of self-efficacy.

3. There is an interaction effect of learning methods (**guided discovery learning** and **guided inquiry learning**) and self-efficacy on the critical thinking skills of SMK Negeri 1 Palasah students on Employment material. The magnitude of the interaction effect of learning methods with efficacy on students' critical thinking skills is 0.300. This means that the variability of students' critical thinking skills in economics subjects of 30.0% can be explained by the interaction between learning methods and self-efficacy. Thus, it can be concluded that self-efficacy is a variable that moderates (strengthens or weakens) the influence of learning methods on students' critical thinking skills.

**References**


**Journal Source:**


[16] Puspendik Kemdikbud. (2016). "Summary of Learning Assessment Results From the Results of the UN, PISA, TIMSS.


Sources of Thesis, Thesis and Dissertation:


Tree Health Analysis at Bungkirit Urban Forest in Kuningan Regency

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Abstract. Bungkirit is an urban forest that is open for public activities, many visitors come for recreation, educational tours and nature tourism interests. Trees in the Bungkirit urban forest area are thought to have decreased in tree quality. This study aims to determine the level of tree health. Data analysis using Forest Health Monitoring methods. Based on observations in the field, the health level in the Bungkirit urban forest has damage as many as 56 trees or about 39.2\% of the total number of trees observed and 85 trees or (59.5\%) do not have damage that is categorized as very healthy with a NIK of 5.01 including the category of minor damage. There are 7 types of damage experienced by trees in the Bungkirit urban forest, namely fungal cancer of open wounds, broken stems or roots, broken or dead branches, damaged leaves, buds or shoots and discolored leaves (not green). The most types of damage are broken or dead branches with the most damage locations on the trunk.

Keywords: Forest Health Monitoring (FHM); Bungkirit Urban Forest; Tree Health

1 Introduction

Urban forest aims to create sustainability, harmony and balance of urban ecosystems which include environmental, social and cultural elements. As an urban forest ecosystem, it functions to improve and maintain the microclimate and aesthetic value, absorb water, create balance and physical harmony in the city and support the preservation of Indonesia's biodiversity. \cite{2}

The trees in the Bungkirit Urban Forest area are suspected of having decreased tree quality. The decline in tree quality can be seen from the level of damage suffered by the constituent trees. Based on the initial observations that have been made, the trees experienced many broken branches and fallen trees. This condition has the potential to cause death or seriously endanger the safety of visitors or the management in Bungkirit Urban Forest. Damage can be caused by disease, insects, pests, weeds, fire, weather, animals or due to human activities. A tree is said to be healthy or normal when the tree is still able to carry out its physiological functions. On the other hand, it is said to be unhealthy if the tree is structurally damaged in whole or in part. The main causes of plant diseases can be pathogenic living organisms or physical environmental factors \cite{1}.

Analysis of tree health can use the modified Manglod concept \cite{4} through the Forest Health monitoring method. This concept assesses forest health based on the health of the trees that make up the forest. In the framework of looking at forest health, an individual tree will be incorporated into a population so that the health of the tree as an individual must be
considered. The death of an individual tree is an important issue to consider because it will lead to a decline in the population. The health level of a tree or group of trees is basically the end result of interactions between trees and biotic and abiotic factors [7].

Tree damage should be detected early by knowing the level of damage assessed in terms of the type of damage, the location of the damaged tree and the severity of the damage. Detecting tree damage can allow it to take maintenance action. To take action against tree damage, it is necessary to have data on tree health in the Bungkirit Urban Forest, so that it can be used as a recommendation for taking tree care actions so as to minimize the damage that occurs to trees.

Based on the problems above, this study aims to determine the level of tree health in the Bungkirit Urban Forest. The benefit of this research is to find out information about the health condition of trees in Bungkirit Urban Forest so that it can be the basis for further plant management. Identification of tree health status is an important effort in tree management, according to silvicultural rules to maintain the health of forest trees in stages controlling, facilitating, protecting and salvaging [5].

2 Methodology

2.1 Research Sites

The research was carried out in Bungkirit Urban Forest, Kuningan District, Kuningan Regency, West Java which has an area based on the Kuningan Regency Government Decree in 2008 which is 1.5 ha. Geographically, Bungkirit Urban Forest is located at coordinates 6° 0' 58.34.47" South Latitude and 108° 27' 53.22" East Longitude. This Urban Forest can be accessed from Kuningan town square for 2 km.

Data retrieval using the census method by dividing the observation area into 3 (three) parts, namely: the front is the entrance, the middle and the back. The census method on individual trees is used to assess the health of trees in recreational areas for visitors. Identification of tree health status was carried out using the method of the modified Manglod [4] concept through the Forest Health Monitori method namely the method of assessing tree health by classifying the type and level of damage per individual plant. The data taken include tree species, types of damage to trees, location of tree damage and severity of tree damage.

2.2 Data Analysis

In the Forest Health Monitori (FHM), signs and symptoms of damage are recorded according to the definition of damage that can kill the tree or affect the long-term viability of
the tree. Signs and symptoms of damage were given priority and recorded by location according to the order: roots, roots and rootstock, rootstock, rootstock and scion, scion, shoots, branches, buds and shoots and leaves with code 0 – 9. Within a given location, damage is recorded in order of priority following the number of possible damage types for that location. The higher the serial number of the damage type, the lower the priority. If there is more than one damage in the same location, then the damage has the highest priority scale (the most damaging) that is recorded [8]. The scoring codes for tree health assessment based on the FHM method are:

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<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>9</td>
</tr>
</tbody>
</table>

The scores for the three scoring codes can be seen in the table as follows:
### Table 4. Code and Weight of Damage Index Value

<table>
<thead>
<tr>
<th>Damage Type</th>
<th>Location of tree damage</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>Value</td>
<td>Code</td>
</tr>
<tr>
<td>Index (x)</td>
<td>Index (y)</td>
<td>Indeks (z)</td>
</tr>
<tr>
<td>1</td>
<td>1.9</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>1.7</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>1.5</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>1.5</td>
<td>3</td>
</tr>
<tr>
<td>11</td>
<td>1.6</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>1.3</td>
<td>5</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>21</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>22</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>23</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>24</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

The three weighted values are added up by the formula:

\[
N_{IK} = \sum_{x,y,z} (x.y.z)
\]

Explanations:
- \(N_{IK}\): Damage Index Value to trees
- \(x\): Tree damage type value
- \(y\): Value of tree damage location
- \(z\): Assess the severity of tree damage

Furthermore, it can be seen the classification of tree health based on the weight of the index value with the following criteria:
### Table 5. Tree damage class classification

<table>
<thead>
<tr>
<th>Skor NIK</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - &lt;5</td>
<td>Healthy class</td>
</tr>
<tr>
<td>6 – 10</td>
<td>Light damage class</td>
</tr>
<tr>
<td>11 – 15</td>
<td>Medium damage class</td>
</tr>
<tr>
<td>16 – &gt; 21</td>
<td>Heavy damage class</td>
</tr>
</tbody>
</table>

Notes: The higher the damage index value, the more it shows a high class of tree damage

### 3 Results and Discussion

#### 3.1. Type Of Damage

Figure 1 shows that there are 7 types of damage that occurred in the Bungkirit urban forest. The most common type of damage was broken or dead branches, which accounted for 39.26% of the total damage encountered, while the least common type of damage was leaf damage (not green) at 1.51%.

The damage observed was caused by the disruption of the physiological processes of the tree either due to disease, pests and other abiotic causes. Some of the symptoms that can be observed due to disruption of plant growth are changes in plants in shape, size, color, texture and others [3]. The sensitivity level of susceptible plants varies, so the severity of the damage suffered by each tree is also different.

![Figure 2. Type of tree damage](image)
Table 6. The Types Of Damage That Occurred In Bungkirit Urban Forest Are:

<table>
<thead>
<tr>
<th>Damage type</th>
<th>Explanations</th>
<th>Damage form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer</td>
<td>The surface of the skin is usually slightly pressed down or part of the skin is broken so that the wood is visible. Cancer can be infected seasonally or annually, so from season to season it will get bigger. Cancer attacks the cambium so that it kills the function of transporting nutrients and distributing nutrients [5].</td>
<td><img src="image" alt="Cancer" /></td>
</tr>
<tr>
<td>Mold</td>
<td>The number of trees affected by this damage is as many as 14 trees. Fungi which is a disease in the form of green or white spots found on the main stem of plants and the stems of plant branches. The process of weathering of wood by microorganisms with a wide range depends on the microorganisms that cause weathering, plant species and microhabitats in food sources. [9]</td>
<td><img src="image" alt="Mold" /></td>
</tr>
<tr>
<td>Open wound</td>
<td>Wounds are divided into 2 parts, namely: a) wounds that are limited to the outer skin only and b) wounds that occur on the outer skin, inner skin and also wounds on sapwood and heartwood [5]. All shapes and sizes of wounds can serve as sites of infection, from wounds caused by macroscopic insects to wounds caused by cutting stems and branches. Many pathogens use wounds as alternative sites of infection and take advantage of the vulnerable tissues [9].</td>
<td><img src="image" alt="Open wound" /></td>
</tr>
</tbody>
</table>
Broken stems or roots

The damage found occurred in the mango tree, Mangifera indica, due to burning garbage near the tree, causing the bark of the tree to be injured, causing pathogens and pests to attack the exposed trunk. Termites are a type of pest that attacks tree trunks.

Broken or dead branches

Damage to the branches or tree branches is broken or dead. Broken and dead branches occur due to several factors, such as wind when it rains and branch damage due to infection by fungal diseases or pests, so branches tend to be weak and break easily. Tree defects that generally cause damage to the branches are excessive load, rot, and weak connection with the main trunk [10].

Damaged leaves and shoots

The most visible symptom is that the leaves are eaten by insects or attacked by pests. One example is the black spot pest on the Mangifera indica tree, this is caused by a fungus called Meliola mengifer. In leaf damage there is also leaf rust and powdery mildew [10].

Leaves changing color

Damage occurred to the Angsana tree Pterocarpus indicus. This color change can be caused by the destruction of chlorophyll (green leaf substance) or due to lack of sunlight or due to disease. Damage to chloroplasts causes yellowing of the leaves, which are usually green. These symptoms often precede the symptoms of necrosis. If this yellowing symptom is systemic and is present on all leaves, it is usually a secondary symptom caused by parasitic attacks on other parts or can also be caused by unfavorable external conditions.

3.2. Location Of Tree Damage
The part of the tree that was most damaged was part 7 (branches) of 46.28% of the total part of the tree that was damaged. The percentage of damaged tree parts can be seen in Figure 3. The dominant type of damage is dead tree branches. This is due to the frequent occurrence of rain and high humidity resulting in weathering of branches so that these parts are easily broken. Broken branches also often occur because of the wind when it rains. Winds at speeds of approximately 45 km/hour can cause mechanical damage such as broken twigs or branches, fallen leaves, broken tree trunks and uprooted trees [8].

The part of the tree that suffered a lot of other damage was part 2 (roots and rootstock) of 16.2% of the total part of the tree that was damaged. This part of the tree suffered the most damage to the type of fungus. Bar 4 (lower and upper stem) was damaged by 14.24%, section 5 (upper stem) was 12.46% and section 3 (lower stem) showed the smallest damage of 7.12%.

Physically the stem is a canopy support and physiologically acts as an organ supporting the transport system for the distribution of nutrients. The role of stems according to [12] in the process of tree survival ranks third after roots and leaves, because infection by fungi can harm trees and cause death.

Damage to the trunks that have been observed has damage, one of which is due to termites. Damage caused by termites. Symptoms of this damage are characterized by the presence of soil crust covering the stem and its attack can cause plant death. Termite attacks do not only occur in one tree but can spread from one tree to another through trunks, branches, twigs on the forest floor and also from lianas on the tree.

Damage to the trunk was also found in the presence of lightning strikes which resulted in the trunk peeling horizontally, the symptoms of being struck by lightning on the Gmelina arborea tree. The condition of the tree that was struck by lightning at the time of the study had peeling skin wounds so that the wood was visible. This can spur pests to attack the injured part of the stem.

### 3.3. Tree Health Level

The number of trees in Bungkirit Urban Forest is 147 trees, there are 56 (39.2%) damaged trees and 85 (59.5%) healthy trees. Based on observations through the FHM method, it was found that the tree's health condition was classified as light with a damage index value (NIK) of 5.01. The severity of tree damage in the Bungkirit urban forest was 60% of the individual trees were not damaged (healthy), 22% of the trees were only 20-29% damaged and only 18% of the individual trees had 35% damage.
The front area is the main access entrance area that is passed by visitors and managers, tree health in this area is included in the healthy category. The central region is an area where many visitors’ activities for recreation and nature tourism are also categorized as having healthy trees. Meanwhile, the back area is an area for recreation for visitors, marked by several gajebos that have been erected indicating damage to the trees, although they are still in the light index category. So it is necessary to get greater attention from the manager for the comfort and safety of visitors and not to cause transmission of damage to other individual trees.

In the condition of tree damage in Bungkirit Urban Forest, it can still be overcome by carrying out maintenance. According to [7] that maintenance is an activity to maintain and care for trees in urban forests for all the constituent trees so that conditions are maintained properly. Maintenance that can be done to cope with the damage that exists in the Bungkirit Urban Forest, such as pruning, felling, treatment of wounds, treatment of holes due to damage to trees (cavity treatments), pest and disease control, control damage from nuisance plants, and embroidery.

Trees that are not found to be damaged can be said to be resistant to damage, under normal conditions they can adapt to pathogens and other causes of damage that are in their body tissues so that they do not affect their production capacity. Trees with a healthy class are classified as trees that are quite resistant to damage and are able to adapt well to their environment. Trees with light, medium and heavy damage are trees that are not resistant to damage.

4 Conclusion

Damaged trees found in the Bungkirit urban forest experienced 7 types of damage, namely: cancer, fungus, open wounds, broken stems or roots, broken or dead branches, damaged leaves and buds, and discolored leaves. The location of the greatest damage occurs in the main trunk and branches that are broken or fallen. The health condition of the tree is classified as healthy with a light class damage index value so that it can still be handled with regular maintenance and pruning only.
References


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Inventory and Identification of Medicinal Plants Based on Habitus at Karangsari Research Station

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Abstract. Medicinal plants play an important role in improving health, many medicinal plants have not identified the type or efficacy. The purpose of this study was to identify and inventory medicinal plant species based on their habitus, benefits and parts used using participatory observation methods. The results of the observations identified that 48% consisted of undergrowth habitus, 29% consisted of shrubs habitus, 7% consisted of lianas, and 16% consisted of woody trees. Of the 31 species with 26 families have uses as traditional medicine for various diseases. The results of this identification need to be documented as a form of preservation in support of plant conservation and pharmacological studies in the discovery of new drugs. The identification results need to be informed to the surrounding community so that they can develop processed herbal products as added value, and can also market these products. Expectations from the results of this study coincide with increasing the income of the surrounding community and health.

Keywords: medicinal plants; habitus; identification; conservation

1 Introduction

Medicinal plants have been widely used throughout human history and knowledge about how to use medicinal plants has been passed down from generation to generation through various ways, and modern science has devoted attention through various studies to the uses of these medicinal plants (Yong Ouk, et al, 2014). The use of natural ingredients as traditional medicine is increasing because of human awareness to return to nature (Latifah Siti, et al, 2020).

The use of herbal medicines is increasing worldwide especially in developing countries about 80 percent of the general population, and the global market for these medicinal plants with plant derivatives is estimated to reach 25.6 billion dollars in 2015 and increase to 35.4 billion dollars by 2020. (Alonso Castro, et al, 2017). A number of plants and plant species have the potential to provide value-added products and compounds for medicinal and therapeutic applications, so that in this condition it is necessary to continue to study in looking at sources and cultivation techniques of medicinal plants (Sheedy, 2010). Plants are rich sources of medicines and increase health problems and this urges researchers to revitalize natural products without harming the body (Priyanka, 2015), just as sintoc cinnamon is one of the medicinal plants that produces essential oils from the roots, leaves, and bark. (Ismail, et al, 2019). Traditional medicines derived from medicinal plants play an important role throughout the world (Malyavantam, 2019), and play a role in the treatment of several diseases in remote areas (Roy et al, 2018). Many medicinal plants for various types of diseases such as
hypertension, anti-tumor, and diabetes and are potential sources of anti-oxidants (Yeshi, et al, 2017), (Sedighi et al, 2017). It is also necessary to find several types, properties, and components of medicinal plants (Kumar, et al, 2017).

Plants have a variety of nutrients, but this condition has not been used optimally. Medicinal plants have the potential to be developed and need to have certainty as to improve the quality and suitability of their clinical trials (Fitzgerald, et al, 2020). Regarding its use, today's society has a tendency to return to using medicinal plants taken directly from nature, but the community is constrained by knowledge of the use of medicinal plants because there are still many unknown types and benefits of other medicinal plants (Mayangsari A et al, 2019). It is necessary to document various medicinal plants to be used as a treatment for various diseases (Sabraan, et al, 2016).

Medicinal plants are assets that need to be continuously explored, researched, developed, optimized for their use and development and saved by cultivation in order to remain sustainable (Noorhidayah et al, 2017). Seeing this condition, information on medicinal plants based on their habitus and their use needs to be done, so this study aims to identify and inventory medicinal plant species based on their habitus, benefits, and parts used at Karangsari research station and is expected to add information related to medicinal plants and their use for medicinal plants. wide community

### Methodology

This research was conducted at Karangsari Research Station, Kuningan Regency, West Java. The research was conducted in April 2021. This research was conducted using a qualitative descriptive method with participatory observation techniques. The variables observed in this study were (1) identification of species, (2) morphological characteristics, (3) efficacy and methods of utilization of medicinal plants. While the data collection procedures include: (1) direct observation by means of field surveys to obtain a clear picture of the habitat of medicinal plants, (2) conducting in-depth interviews with predetermined informants, (3) taking theoretical samples, namely plant species. the drug used, the local or regional name is recorded, the efficacy, aspects and utilization are recorded, then make herbarium specimens for description and identification purposes in determining the scientific name, (4) documenting.

### Results And Discussion

#### 3.1. Identification of the Diversity of Medicinal Plant Species

Based on the results of field observations, there were 31 species of medicinal plants in the Karangsari Research Station area, belonging to 26 families. The types and families of medicinal plants can be seen in Table 1.

Table 1. Types and families of medicinal plants in the Karangsari Research Station area

<table>
<thead>
<tr>
<th>No</th>
<th>Name</th>
<th>Type</th>
<th>Name Region</th>
<th>Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>Tithonia diversifolia</em></td>
<td>Kipahit</td>
<td>Asteraceae</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td><em>Lantana camara</em></td>
<td>Duria</td>
<td>Verbenaceae</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td><em>Sida rhombifolia</em></td>
<td>Sidaguri</td>
<td>Malvaceae</td>
<td></td>
</tr>
</tbody>
</table>
Based on the number of species owned by each family, medicinal plant data are grouped into three, namely the first group consists of a family that has 1 species totaling 22 families including Verbenaceae, Malvaceae, Amaranthaceae, Apiaceae, Elaeocarpaceae, Melastomataceae, Solanaceae, Araliaceae, Cyperaceae, Plantaginaceae, Liliaceae, Araceae, Polygalaceae, Begoniaceae, Mimosaceae, Lamiaceae, Euphorbiaceae, Oxalidaceae, Cyatheaceae, Myrtaceae, Lauraceae, Moraceae. The second group consists of the Zingiberaceae, Poaceae, and Fabaceae families with 2 species each and the third group is a family with 3 species, namely Asteraceae.

The results of observations show that there are medicinal plant habitus in the Karangsari research station area in the form of shrubs, undergrowth, lianas and also woody tree plants, with the composition shown in Figure 1. The habitus of understorey species is 48 percent because the area of this area was an area that used to be restoration. for reforestation areas so that with this land openness it supports and stimulates lower plants to grow and develop while lianas are only 7 percent because these plants have smaller hosts. With so many types of medicinal plants whose habitus are undergrowth, it indicates that they are a source of medicines that are no less important than medicinal plants whose habitus is trees. According to Abdiyani, S, 2008, understorey plays a very important role in nutrient cycles, reducing erosion, increasing infiltration, sources of germplasm, sources of medicines, animal feed and forest animals and so on.
Of the 31 species found at the Karangsari research station, only a few species were used by the local community for medicine. Though the potential of the area is rich in medicinal plants. Medicinal plants whose benefits have been identified such as for itching, fever, rheumatism, diabetes, burns, and so on (Table 1), so that the surrounding community can take advantage of and seek to cultivate these plants as medicine to be used directly or processed into a medicinal product. This is also an effort to preserve the area and species of medicinal plants as local wisdom, as is the case in Madura and Bali (Jadid, et al, 2017). Similar to the Tengger area, there are 30 identified species with 20 families including medicinal plants that have been used in the surrounding area (Jadid N, 2020).

3.2. Efficacy of Medicinal Plants and Parts used

The medicinal plants identified in the Karangsari area have shown many properties and uses to treat various diseases. The surrounding community has not taken advantage of all the existing medicinal plants, because they are not sure about the types and uses of these plants. Through this observation, the types and uses can be identified as shown in Table 2.

<table>
<thead>
<tr>
<th>Name of Plant Type</th>
<th>Used Part</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kipahit/Tithonia diversifolia</td>
<td>Leaf</td>
<td>Itching medicine, scabies, diabetes</td>
</tr>
<tr>
<td>Duria/Lantana camara</td>
<td>Leaf</td>
<td>Rheumatism, boil, asthma, fever, itchy</td>
</tr>
<tr>
<td>Sidaguri/Sida rhombifolia</td>
<td>Leaf, root</td>
<td>Malaria, cough, diarrhea, out of breaths</td>
</tr>
<tr>
<td>Jarong/Achyranthes aspera</td>
<td>Root</td>
<td>Fever, malaria, tonsils, urinary stones, cholesterol</td>
</tr>
<tr>
<td>Antanan/Centella asiatica</td>
<td>Leaf</td>
<td>Fever, hepatitis, hemorrhoids, diarrhea</td>
</tr>
<tr>
<td>Jenitr/Elaeocarpus sphacicus</td>
<td>Fruit</td>
<td>Heart, diarrhea</td>
</tr>
<tr>
<td>Harendong/Melastoma candidum</td>
<td>Leaf, fruit, stem</td>
<td>Diarrhea, hepatitis, cough,</td>
</tr>
</tbody>
</table>

Figure 1. Medicinal Plant Habitus
<table>
<thead>
<tr>
<th>Plant Name</th>
<th>Part(s)</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Kirinyu/ Chromolaena odorata</em></td>
<td>leaf</td>
<td>wound Indigestion, cholesterol, gout, heart</td>
</tr>
<tr>
<td><em>Takokak/ Salonum torvum</em></td>
<td>root</td>
<td>Gout, anemia, stomach, diabetes, high blood pressure</td>
</tr>
</tbody>
</table>

**Bottom Plant**

<table>
<thead>
<tr>
<th>Plant Name</th>
<th>Part(s)</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Jalentir/ Conyza</em></td>
<td>leaf, stem</td>
<td>Malaria, digestion, insect bites, skin, infection</td>
</tr>
<tr>
<td><em>Bandotan/ Hidrocotyle sibthorpioides</em></td>
<td>Leaf, stem, root</td>
<td>Flu, fever, diarrhea, rheumatism, itch</td>
</tr>
<tr>
<td><em>Laja gohei/ Alpinia malaccensis</em></td>
<td>Stem, fruit</td>
<td>Boil, skin, spices</td>
</tr>
<tr>
<td><em>Alang-alang/ Imperata cylindrical</em></td>
<td>Root, stem</td>
<td>Bleeding, fever reducer</td>
</tr>
<tr>
<td><em>Rumput Teki/ Cyperus rotundus</em></td>
<td>Leaf, root</td>
<td>Skin, diarrhea, sore eyes</td>
</tr>
<tr>
<td><em>Sangkoba/ Plantago major</em></td>
<td>Leaf, stem, root</td>
<td>Digestion, diabetes</td>
</tr>
<tr>
<td><em>Congkak/ Curculigo orchioides</em></td>
<td>Root, leaf, stem</td>
<td>Fever, anti-inflammatory, pain relief</td>
</tr>
<tr>
<td><em>Keladi Tikus/ Typhonium flagelliforme</em></td>
<td>Leaf, root</td>
<td>Inflammatory, asthma cough</td>
</tr>
<tr>
<td><em>Tatarasonan/ Polygalapaniculata</em></td>
<td>Leaf, root</td>
<td>Itchy, anti cancer, anti bacterial</td>
</tr>
<tr>
<td><em>Begonia/ Begonia aperta</em></td>
<td>Leaf, stem</td>
<td>Cough, fever, menstrual pain</td>
</tr>
<tr>
<td><em>Jampan/ Eleusine indica</em></td>
<td>Root, stem</td>
<td>Fever, typhus, seizures, kidney</td>
</tr>
<tr>
<td><em>Patri Malu/ Mimosa pudica linn</em></td>
<td>leaf</td>
<td>Diabetes, cough, fever</td>
</tr>
<tr>
<td><em>Kumis Kucing/ Orthosiphon aristatus</em></td>
<td>leaf</td>
<td>Asthma, cough, high blood pressure</td>
</tr>
<tr>
<td><em>Meniran/ Phyllanthus niruri</em></td>
<td>leaf</td>
<td>Diabetes, hepatitis</td>
</tr>
<tr>
<td><em>Calincing/ Oxalis corniculata</em></td>
<td>Leaf, root, stem</td>
<td>Fever, flu, diarrhea, hepatitis, eye drops</td>
</tr>
</tbody>
</table>

**Liana Plant**

<table>
<thead>
<tr>
<th>Plant Name</th>
<th>Part(s)</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Tepus/ Amomum cocineum</em></td>
<td>Leaf, stem, fruit, root</td>
<td>Fever</td>
</tr>
<tr>
<td><em>Paku Tiang/ Cyathea contaminans</em></td>
<td>leaf</td>
<td>Wound healer,</td>
</tr>
</tbody>
</table>

**Woody Plant**

<table>
<thead>
<tr>
<th>Plant Name</th>
<th>Part(s)</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Lamtoro/ Leucaena leucocephala</em></td>
<td>Fruit, leaf</td>
<td>Diabetes, swollen wound</td>
</tr>
<tr>
<td><em>Salam/ Syzygium polyanthum</em></td>
<td>Leaf, stem, root, skin</td>
<td>Diabetes, stomach ache, diabetes</td>
</tr>
<tr>
<td><em>Alpokat/ Persea americana</em></td>
<td>Fruit, leaf</td>
<td>Diarrhea, stomach ache, diabetes</td>
</tr>
<tr>
<td><em>Kaliandra/ Caliandra calothyrsus</em></td>
<td>Fruit, sap</td>
<td>Anti-cancer, antioxidant, antidote</td>
</tr>
</tbody>
</table>

**Source:** results of observations and processing of information, 2021

### 4 Conclusion

The Karangsari research station area has a diversity of medicinal plant species from various habitus. The identification results showed that 48% consisted of undergrowth habitus, 29% consisted of shrubs habitus, 7% consisted of lianas, and 16% consisted of woody trees.
Of the 31 species and 26 families identified in this area need to be documented as a form of conservation to support plant conservation and pharmacological studies, as well as the surrounding community can develop added value through processed herbal products so as to increase the income of local communities.

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Design of Leaf Detection Application using Deep Learning Convolutional Neural Network (CNN) Case Study Lambosir (Blok Leuweung Buah) Mountain Ciremai National Park

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Abstract. The Leuweung Buah Lambosir area of Mount Ciremai National Park is included in the rehabilitation zone, the plant diversity index in Lambosir is in the medium category. Increased knowledge and skills regarding the introduction of plant species for officers in Mount Ciremai National Park is often carried out, but for some officers there are some difficulties in identifying plants quickly and accurately. Deep learning is a branch of machine learning (ML) that uses deep neural networks to solve problems in the ML domain. This study aims to create a leaf detection application using a deep learning Convolutional Neural Network (CNN) approach. The types of leaves used in this study were 6 types of leaves including Sonokeling (Dalbergia latifolia Roxb.), Kuray (Trema orientalis), Bungur (Lagerstroemia sp), Kibeusi (Rhodamnia cinerea), Guava Rivet (Syzygium densiflorum), and Huni (Antidesma Bunius). Tests were carried out with a total of 600 images: 400 images as training data and 200 images as testing data. Testing of each object produces an accuracy rate above 80%.

Keywords: Leaf Detection; Deep Learning; CNN

1 Introduction

Mountain Ciremai National Park (TNGC) is geographically located at the coordinates of 108020' East Longitude – 108040 East Longitude and 6040 South Latitude – 6058 South Latitude. The topography of Mount Ciremai varies from sloping to steep. The slope of the land which includes sloping land (00 – 80) is only 26.52% and above 80 is 73.48%. The total area of TNGC ± 15,500 Ha is divided into two areas of 6,800.13 Ha in Majalengka Regency and 8,699.87 Ha in Kuningan Regency. Administratively, the TNGC region covers 2 regencies, namely the west including Majalengka Regency, and the east including Kuningan Regency with 7 sub-districts consisting of 25 villages in Kuningan Regency and 20 villages in 7 sub-districts in Majalengka Regency [1]. The Leuweung Buah Lambosir area of Mount Ciremai National Park is included in the rehabilitation zone, the plant diversity index in Lambosir is in the medium category.

The flora in Mount Ciremai National Park is very diverse, there are thousands of species of trees and plants in the area. To find out the types of plants there is a classic way, namely by looking at the basic organs, namely roots, stems, skin, fruits and leaves, but there are still many people who have not been able to distinguish the types of plants from the classical method. This is because there are several types of trees and plants that have the same...
characteristics and the limited human ability to distinguish between types of plants. Types of plants can be recognized based on the unique characteristics found in these plants. Leaves are one of the characteristics of plants that can be used to identify plant species because each plant has leaves and is easier to distinguish than tree bark [2]. One approach for detection using images is by using deep learning techniques which can make the detection process faster and more accurate [3,4,5]. Deep learning is one of the fields of machine learning, which is doing deeper learning with many layers.

This study aims to create a leaf detection application using a deep learning Convolutional Neural Network (CNN) approach. The types of leaves used in this study were six types of leaves including Sonokeling (Dalbergia latifolia Roxb.), Kuray (Trema orientalis), Bungur (Lagerstroemia sp), Kibeusi (Rhodamnia cinerea), Jambu Keling (Syzygium densiflorum), and Huni (Antidesma Bunius).

2 Methodology

2.1. Study Area

Field research was conducted to obtain leaf types based on preliminary studies and input from national park officials, there were six types of leaves to be sampled in this research. The location of the research is the Leuweung Buah Lambosir in Mount Ciremai National Park. Field research was carried out in August 2021.

![Figure 1. Research Location](image)
2.2. Research Stages

Referring to the SDLC Extreme Programming stage, the following steps were taken in completing the research as shown in the figure 2:

![Research Methodology Schema]

**Figure 2. Research Methodology Schema**

2.3. Exploration Stage

At this stage the researcher has observed the research site, and communicated with the officers BTNGC. In this process, the researcher conducted an interview process related to the condition of the area, the types of plants in the area. The BTNGC officers for the classification process or recognizing plants in the salty GCNP area use the manual method, namely by looking directly at the leaves, tree stands and roots so that the plant detection process takes a long time. Based on the results of the interviews, it was agreed that for the initial research to take 6 types of plants to be research objects including Sonokeling (Dalbergia latifolia Roxb.), Kuray (Trema orientalis), Bungur (Lagerstroemia sp), Kibeusi (Rhodamnia cinerea), Guava Rivet (Syzygium densiflorum), and Huni (Antidesma Bunius). The place of sampling is in the area of Leuweung Buah Lambosir National Park of Mount Ciremai.
2.4. Planning Stage
At this stage is the needs analysis process, namely the need for data and the need for research supporting equipment and making a schedule of research activities. For the test data needs, 600 images were taken from each type of leaf as many as 100 images, by taking pictures from a distance of approximately 20 cm. The following is an example of a leaf shooting technique.

![Figure 3. Image capture technique](image)

2.5. System Development Stages
At this stage the researcher collects data either from reference sources or from experts at BTNGC, in this process the preprocessing design and deep learning algorithm design in this case uses the CNN (Convolutional Neural Network) method. Inside the CNN model there is feature learning where the feature extraction process is carried out automatically and adaptively by the model. Here is an overview of CNN's architecture.

![Figure 4. CNN Architecture](image)

2.6. Production Stage and Final Release
After the previous stage process is complete, the next step is the production stage, where at this stage the implementation process will be carried out on an Android-based smartphone. Seeing that the research location cannot receive internet or GSM signals, in this study the
application does not require an internet connection or offline application to make it easier for officers to detect objects.

2.7. Report Preparation Stages

The last stage is the researcher will compose the final research report and the preparation of journals and conduct seminars on research results.

3 Result and Discussion

3.1. Algorithm Testing

From several stages that have been designed in the previous section, the results are in the form of leaf detection applications using Deep Learning Convolutional Neural Networks with an average accuracy rate of above 76%. In testing the algorithm used cross validation. Cross validation is a statistical method for evaluating and comparing learning algorithms by dividing the data into two segments, one segment for training data and the other used for data testing[7]. In cross-validation the training and validation sets must be crossover successively so that each data has a chance to be validated. In this study using a comparison of 80% for training data and 20% for testing data.

This test divides the data set into 6 folders where each folder contains 100 images which are divided into training data and testing data randomly. The total number of images is 600 images, 400 images for training data and 200 images for testing data. Each type of leaf was tested 5 times and the accuracy was calculated. The test results using K-Fold Validation can be seen in table 1.

<table>
<thead>
<tr>
<th>Leaf Type</th>
<th>Test-1 (%)</th>
<th>Test-2 (%)</th>
<th>Test-3 (%)</th>
<th>Test-4 (%)</th>
<th>Test-5 (%)</th>
<th>Average (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sonokeling (Dalbergia latifolia Roxb.)</td>
<td>78</td>
<td>76</td>
<td>83.5</td>
<td>76</td>
<td>78</td>
<td>78.3</td>
</tr>
<tr>
<td>Kuray (Trema orientalis)</td>
<td>80</td>
<td>79</td>
<td>82</td>
<td>83</td>
<td>82</td>
<td>81.2</td>
</tr>
<tr>
<td>Bugar (Lagerstroemia sp)</td>
<td>79</td>
<td>82</td>
<td>81</td>
<td>78.5</td>
<td>79</td>
<td>79.9</td>
</tr>
<tr>
<td>Kiberai (Rhodamnia cinnerea)</td>
<td>80</td>
<td>81</td>
<td>83</td>
<td>81.5</td>
<td>80</td>
<td>81.1</td>
</tr>
<tr>
<td>Jambu Keling (Syzygium densiflorum)</td>
<td>81</td>
<td>79</td>
<td>79.5</td>
<td>79</td>
<td>80.5</td>
<td>79.8</td>
</tr>
<tr>
<td>Hani (Antidesma bunius)</td>
<td>78.5</td>
<td>81</td>
<td>82</td>
<td>82</td>
<td>82</td>
<td>81.1</td>
</tr>
</tbody>
</table>

3.2. Application Interface

In the leaf detection application there are several views including Home, About, Tips, News and Capture views, for the first time the user will be presented with a display like the following
Figure 5. Application View

Figure 6. Leaf Detection Process Display
4 Conclusion

The results of observations from the research stages that have been passed as well as the application testing process, it can be concluded that: The picture taking experiment with the results using fold cross validation for leaves of the Sonokeling type (Dalbergia latifolia Roxb.) obtained an average value of 78%, Kuray (Trema orientalis) got an average value of 81.2%, Bungur (Lagerstroemia sp) got an average value of 79.9%, Kibeusi (Rhodamnia cinerea) got an average value of 81.1%, Jambu Keling (Syzygium densiflorum) obtained an average value of 79.8%, Huni (Antidesma Bunius) obtained an average value of 79.8%. With an average overall application get an accuracy rate of 80.2%.

References

Proportional Reasoning Level Based on Student Self-Efficacy Review

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Abstract. This study attempts to analyze the level of students' proportional reasoning in terms of self-efficacy by classifying students' self-efficacy, describing the levels of students' mathematical proportional reasoning, and describing the differences of their levels in terms of self-efficacy. The subjects of this study were students of class VII with a total of 40 students who had received proportion matter. The research instruments are questionnaires, test questions, interviews, observations, and documentation. The data collection procedure begins with students filling out a self-efficacy questionnaire. After the results of the questionnaire were obtained, two students were selected for each category, then reasoning tests and interviews were conducted. The results showed that from 40 students, three self-efficacy classifications were obtained, namely, nine students with high enough self-efficacy, 28 students with moderate self-efficacy, and three students with moderately low self-efficacy. Based on the results of this data analysis, it was found that students' proportional reasoning was at level 0 and level 3. At level 0, students could not solve proportional problems. They can only solve unknown values by using addition, difference, or unpatterned calculation, i.e., using arbitrary numbers and operations. At level 3, students can do proportional reasoning using unit values or scale factors in solving unknown value problems. Then there are differences in the level of mathematical proportional reasoning between students who have high enough self-efficacy, moderate self-efficacy, and moderately low self-efficacy.

Keywords: Mathematical Proportional Reasoning Level; Proportion Matter; Self-efficacy

1 Introduction

The reasoning is an important activity for students in the mathematics learning process, so that students can understand the concept and apply the concept in mathematical problems [1]. Because the reasoning process and mathematics have a close relationship, the lack of application of reasoning in learning activities can cause students to have difficulty solving problems [2]. Therefore, the reasoning is very important which is needed in learning mathematics.

Based on the results of The Trends in International Mathematics and Science Study (TIMSS) 2011, the level of mathematical reasoning of Indonesian students is very low when compared to the international average score. Indonesia is below the average and is far from other neighboring countries [3]. Based on the results of the 2015 TIMSS that Indonesian students are ranked 44th out of 49 countries in their reasoning ability [4]. Mathematical reasoning of Indonesian students based on the results of PISA as much as 75.7% of Indonesian students mathematical reasoning has not reached level 2 and as many as 42.3% of Indonesian
students mathematical reasoning has not reached level 1, where level 1 is the lowest level in the reasoning process [5]. Based on the results of TIMSS and PISA it can be stated that the mathematical proportional reasoning of Indonesian students is still relatively low even though the reasoning process is very important in learning mathematics.

Proportional reasoning is important for students to solve comparative problems, understand, apply, and develop them. Proportional reasoning is the basis for students to solve fractions problems and understand mathematical concepts such as fractions, decimals, ratios, and proportions [6]–[8]. It can be concluded that proportional reasoning is a thinking process related to mathematical problems to achieve an understanding of concepts from comparative material such as ratios and proportions.

Improving mathematical proportional reasoning can be done by using appropriate learning strategies, to design learning strategies can be done by knowing the students' mathematical proportional reasoning process [9], [10]. Therefore, teachers must know the level of students' proportional reasoning in order to improve students' mathematical proportional reasoning.

Self-efficacy is the belief that a person has about his ability to solve problems so that he can overcome various situations that arise in his life [11], [12]. It can be concluded that self-efficacy is the belief attached to each individual to take any action based on his ability. Students' mathematical reasoning is not influenced by self-efficacy but can be influenced by other factors, so there is no relationship between self-efficacy and increased students' mathematical reasoning [1], [13]. There is a strong relationship between self-efficacy and students' mathematical reasoning, the higher the student's self-efficacy, the higher the mathematical reasoning [14]. Based on some of the statements above, there are differences of opinion regarding the relationship between mathematical reasoning and self-efficacy. Therefore, the researcher conducted research on the analysis of the level of students' mathematical proportional reasoning in terms of self-efficacy.

Several researchers have conducted studies on mathematical reasoning and self-efficacy. Most of them discuss the description of the level of students' proportional reasoning, classification of self-efficacy, and differences in the level of students' mathematical proportional reasoning, by considering the problem, research subject, and subject matter [15]–[17]. Another study discusses increasing mathematical reasoning ability by using a bridging analogy approach in terms of self-efficacy [1]. However, in this study focuses on describing the level of students' proportional reasoning based on self-efficacy. The purpose of this study is to classify students' self-efficacy, describe the level of mathematical proportional reasoning, and describe the different levels of students' mathematical proportional reasoning based on self-efficacy. This research is very important to improve the mathematical proportional reasoning of students who are classified as low. Teachers need to use the right strategy during the learning process by knowing the level of students' proportional reasoning. After that, the teacher can design the right strategy to be used during the learning process in the classroom.

2 Research Method

This study uses a descriptive qualitative design. Qualitative descriptive research is one of the research methods carried out in natural conditions and emphasizes the process rather than the product [18]. Then called qualitative because the data collected and the analysis is more qualitative. The data obtained is more precise, more in-depth, credible, and meaningful with
Participants in this study were students of class VII SMP-IT Nurul Huda Foundation a total of 40 participants in the early stages of data collection to classify students' self-efficacy. After that, the two participants with the highest scores in each category of self-efficacy were selected for further analysis regarding their level of mathematical proportional reasoning. The determination of participants in this study was done using the purposive sampling technique. The purposive sampling technique is collecting data from participants to consider several aspects. The aspects considered are 1) participants are students of grade VII Junior High School, and 2) participants have studied proportion material so that participants are expected to be able to master the material that has been studied previously.

The data collection technique is a way for researchers to obtain information in the form of data obtained from participants. Data collection can be done in several ways. In this study, data were obtained from the participants of the SMP-IT Nurul Huda Foundation. The research source is the seventh-grade students of SMP-IT Nurul Huda as many as 40 participants. The data collection techniques that will be used by researchers are questionnaires, proportional reasoning tests, interviews, and observations. The research procedures carried out are as follows

1) Formulating the problem under study, namely classifying self-efficacy, describing the level of students' mathematical proportional reasoning in terms of self-efficacy, and describing the different levels of students' mathematical proportional reasoning in terms of self-efficacy.

2) Determining research participants

3) Develop research instruments, in the form of self-efficacy questionnaires, proportional reasoning test questions, interviews, and observations.

4) Validate research instruments. All instruments used have been validated and declared valid by the validator (expert).

5) Conducting direct field research begins by providing a self-efficacy questionnaire instrument. After that, give proportional reasoning test questions and finally conduct an interview.

3 Result and Discussion

Based on the results of observations in the field, some students have a low level of proportional reasoning (level 0) and there are differences in the results of previous studies. Therefore, the researcher researched the level of students' mathematical proportional reasoning in terms of self-efficacy.

3.1. Classifying Student Self-efficacy

To find out the classification of student self-efficacy owned by research participants, the researchers used a questionnaire that had been validated by 4 validators. The test consists of 26 questions in the form of statements in 13 positive statements and 13 negative statements. Each statement contains indicators of self-efficacy (each question has a different order of indicators). There are five answers (always, often, sometimes, rarely, and never) where students have to choose one answer by putting a checkmark on the option that suits them. Each answer they choose has its points according to the self-efficacy questionnaire scoring.
guidelines. The self-efficacy scoring guidelines are presented in Table 1 and the self-efficacy category guidelines are presented in Table 2 as follows.

**Table 1. Self-efficacy Questionnaire Scoring Guidelines**

<table>
<thead>
<tr>
<th>No</th>
<th>Answer Options</th>
<th>Scoring Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Statement</td>
</tr>
<tr>
<td>1</td>
<td>SL (Always)</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>SR (often)</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>KD (Sometimes)</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>JR (Rare)</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>TP (Never)</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Adapted from [1]

**Table 2. Self-efficacy Category Guidelines**

<table>
<thead>
<tr>
<th>No</th>
<th>Value Interval</th>
<th>Category Self-efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>91-100</td>
<td>Very high</td>
</tr>
<tr>
<td>2</td>
<td>78-90</td>
<td>High</td>
</tr>
<tr>
<td>3</td>
<td>65-77</td>
<td>High enough</td>
</tr>
<tr>
<td>4</td>
<td>52-64</td>
<td>Moderate</td>
</tr>
<tr>
<td>5</td>
<td>39-51</td>
<td>Low enough</td>
</tr>
<tr>
<td>6</td>
<td>26-38</td>
<td>Low</td>
</tr>
<tr>
<td>7</td>
<td>14-25</td>
<td>Very low</td>
</tr>
</tbody>
</table>

Source: Adapted from [19]

The following are the results of the self-efficacy classification of class VIII students of SMP-IT Nurul Huda.

**Table 3. Results of Student Self-efficacy Classification**

<table>
<thead>
<tr>
<th>Category of Self-efficacy</th>
<th>Number of Students</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very high</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>High</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>High enough</td>
<td>9</td>
<td>22.5</td>
</tr>
<tr>
<td>Moderate</td>
<td>28</td>
<td>70</td>
</tr>
<tr>
<td>Low enough</td>
<td>3</td>
<td>7.5</td>
</tr>
<tr>
<td>Low</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Very low</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Based on Table 3, there are three categories of self-efficacy in student class VII i.e. self-efficacy is high enough, self-efficacy is moderate, and self-efficacy is low enough. The self-efficacy of the dominant students is in the moderate self-efficacy category with a percentage of 70% while for the high enough category it only gets a percentage of 22.5% and the self-efficacy category is low enough with a percentage of 7.5%. Someone with high enough self-efficacy has great confidence when faced with every problem and they will try hard to overcome the existing problems [20]. Meanwhile, someone with low self-efficacy considers himself/herself to not have the ability to solve existing problems. When they are faced with a difficult situation, they will tend to give up easily and feel they can't do anything to solve the problem.
3.2. Description of Students' Mathematical Proportional Reasoning Level

The researcher chose six participants with the provision that two participants each had the highest score from each category to test the mathematical proportional reasoning questions. The selected participants are presented in table 4 as follows.

Table 4. Selected Participants Test of Proportional Reasoning Questions

<table>
<thead>
<tr>
<th>No</th>
<th>Participants</th>
<th>Score Positive Statement</th>
<th>Score Negative Statement</th>
<th>Amount</th>
<th>Average</th>
<th>Self-efficacy Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SP</td>
<td>60</td>
<td>40</td>
<td>100</td>
<td>76.92</td>
<td>High enough</td>
</tr>
<tr>
<td>2</td>
<td>ND</td>
<td>54</td>
<td>45</td>
<td>99</td>
<td>76.15</td>
<td>High enough</td>
</tr>
<tr>
<td>3</td>
<td>NS</td>
<td>46</td>
<td>37</td>
<td>83</td>
<td>63.85</td>
<td>Moderate</td>
</tr>
<tr>
<td>4</td>
<td>ANA</td>
<td>42</td>
<td>40</td>
<td>82</td>
<td>63.08</td>
<td>Moderate</td>
</tr>
<tr>
<td>5</td>
<td>NF</td>
<td>31</td>
<td>35</td>
<td>66</td>
<td>50.77</td>
<td>Low Enough</td>
</tr>
<tr>
<td>6</td>
<td>NR</td>
<td>35</td>
<td>30</td>
<td>65</td>
<td>50</td>
<td>Low Enough</td>
</tr>
</tbody>
</table>

To find out the level of students' mathematical proportional reasoning with proportion material, the researchers gave test questions. The form of the test questions given are in the form of description questions that have been prepared and adapted to proportional reasoning indicators modified from [2]. The test questions were then validated by four validators. The indicators for mathematical proportional reasoning are presented in table 5 and the level guidelines for mathematical proportional reasoning are in table 6 as follows.

Table 5. Indicators of Mathematical Proportional Reasoning

<table>
<thead>
<tr>
<th>No.</th>
<th>Indicator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ability to calculate worth comparisons using the right strategy</td>
<td>Students can solve the problem of comparative material worth using the correct strategy</td>
</tr>
<tr>
<td>2.</td>
<td>The ability to calculate the value-turned-comparison with the right strategy</td>
<td>Students can solve the problem of material comparison of reversed values by using the correct strategy</td>
</tr>
<tr>
<td>3.</td>
<td>Ability to calculate comparisons with three problems</td>
<td>Students can solve comparative material problems with three problems using the correct strategy</td>
</tr>
</tbody>
</table>

Table 6. Guidelines for Mathematical Proportional Reasoning Level

<table>
<thead>
<tr>
<th>No.</th>
<th>Proportional Reasoning Level</th>
<th>Description of Student Work Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Level 0 (non-proportionate)</td>
<td>Students who are at this level have not been able to solve proportional problems, they are only able to solve unknown values by using addition or difference. The solutions they use are not patterned.</td>
</tr>
<tr>
<td>2</td>
<td>Level 1 (manipulative proportional reasoning)</td>
<td>Students who are at this level can do proportional reasoning using pictures, models or manipulation of the problems to be solved.</td>
</tr>
<tr>
<td>3</td>
<td>Level 2 (replicative proportional reasoning)</td>
<td>Students at this level can perform proportional reasoning using repeated addition or constructing both measures in solving unknown value problems.</td>
</tr>
<tr>
<td>4</td>
<td>Level 3 (pre-multiplicative proportional reasoning)</td>
<td>Students at this level can do proportional reasoning using unit values or scale</td>
</tr>
</tbody>
</table>
The following is a description of the results of the research on the level of mathematical proportional reasoning of students with fairly high self-efficacy.

### Table 7. Level of Student Self-efficacy Proportional Reasoning is High Enough

<table>
<thead>
<tr>
<th>Indicators of Student's Mathematical Proportional Reasoning</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to calculate worth comparisons using the right strategy</td>
<td>SP participant: Unable to calculate worth comparisons using the correct strategy. SP is at level 0 (non-proportional reasoning). ND participants: Able to calculate the comparison of worth using the correct strategy, namely the variable factor strategy. SP is at level 3 (pre-multiplicative reasoning).</td>
</tr>
<tr>
<td>Ability to calculate value-reverse comparisons using the right strategy</td>
<td>SP participant: Unable to calculate the rate-return ratio using the correct strategy. SP is at level 0 (non-proportional reasoning). ND participants: Unable to calculate the rate-return ratio using the correct strategy. ND is at level 0 (non-proportional reasoning).</td>
</tr>
<tr>
<td>Ability to calculate comparisons with three problems</td>
<td>SP participant: Unable to calculate comparisons with three problems. SP is at level 0 (non-proportional reasoning). ND participants: Unable to calculate comparisons with three problems. ND is at level 0 (non-proportional reasoning).</td>
</tr>
</tbody>
</table>

Based on table 7, SP and ND have quite high self-efficacy but both have different levels of proportional reasoning. In question 1, the indicator of the ability to calculate comparisons worth SP is at level 0 (non-proportional reasoning) while ND is at level 3 (pre-multiplicative proportional reasoning). In question 2 with an indicator of the ability to calculate inverse comparisons, the SP and ND values are at level 0 (non-proportional reasoning) and question 3 with an indicator of the ability to calculate comparisons with the three problems both are also at level 0 (non-proportional reasoning). According to [21] someone who is at level 0 means they have not been able to solve proportional problems, they solve these problems using arbitrary operations and those at level 3 mean they can solve proportional problems using scale factors or unit values. In line with [13] states that students' mathematical reasoning abilities are not influenced by self-efficacy but can be influenced by other factors.

SP and ND have quite high self-efficacy, one of which is shown during interviews, both are participants who are able to answer questions well and can be seen from their style which is full of calm and confidence. This is in line with Bandura's statement (in [13]), a person who has high enough self-efficacy will create a calm feeling in the face of a difficult activity or problem. When working on proportional reasoning problems, both of them are very enthusiastic and have full confidence in their abilities. In line with [20] states that someone...
with high enough self-efficacy has great confidence when faced with every problem and they will try hard to overcome the existing problems. SP tends to have skills that are less visible from the answers that SP give during the interview process and are not very able to explain precisely according to the questions asked by the researcher while ND has better skills than SP. ND has good skills, this can be seen from the answers he gave in accordance with the questions the researchers asked. Regarding these skills, [11] states that self-efficacy is not related to the skills a person has, but is related to individual beliefs about what can be done with the skills he has, no matter how big.

The following is a description of the results of the research on the level of mathematical proportional reasoning of students with moderate self-efficacy.

Table 8. Moderate Self-efficacy Students' Proportional Reasoning Level

<table>
<thead>
<tr>
<th>Indicators of Student's Mathematical Proportional Reasoning</th>
<th>Information</th>
<th>NS participants</th>
<th>ANA participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to calculate worth comparisons using the right strategy</td>
<td>Able to calculate the comparison of worth using the correct strategy, namely the variable factor strategy. NS is at level 3 (pre-multiplicative proportional reasoning)</td>
<td>Unable to calculate worth comparisons. ANA is at level 0 (non-proportional reasoning)</td>
<td></td>
</tr>
<tr>
<td>Ability to calculate value-reverse comparisons using the right strategy</td>
<td>Unable to calculate the rate-return ratio using the correct strategy. NS is at level 0 (non-proportional reasoning)</td>
<td>Unable to calculate the rate-return ratio using the correct strategy. ANA is at level 0 (non-proportional reasoning)</td>
<td></td>
</tr>
<tr>
<td>Ability to calculate comparisons with three problems</td>
<td>Able to calculate comparisons with three problems using unit values. NS is at level 3 (pre-multiplicative proportional reasoning)</td>
<td>Unable to calculate comparisons with three problems. ANA is at level 0 (non-proportional reasoning)</td>
<td></td>
</tr>
</tbody>
</table>

Based on table 8, it can be seen that NS and ANA have moderate self-efficacy but both have different levels of proportional reasoning. In question 1, the indicator of the ability to calculate comparisons worth NS is at level 3 (pre-multiplicative proportional reasoning) while the ANA is at level 0 (non-proportional reasoning). In question 2 with an indicator of the ability to calculate inverse comparisons, the NS and ANA values are at level 0 (non-proportional reasoning) and question 3 with an indicator of the ability to calculate comparisons with three NS problems is at level 3 (pre-multiplicative proportional reasoning) while the ANA is at level 0 (reasoning), non-proportionate). According to [21] someone who is at level 0 means they have not been able to solve proportional problems, they solve these problems using arbitrary operations and those at level 3 mean they can solve proportional problems using scale factors or unit values.

Based on the results of the self-efficacy questionnaire, NS and ANA are participants who have moderate self-efficacy. According to [11] states that self-efficacy can change meaning that it can be learned through four main sources of information, namely mastery experience, vicarious experience, verbal persuasion, and physiological state. ANA tends to have skills that are less visible from the answers ANA gave during the interview process and are not very able to explain precisely according to the questions asked by the researcher while NS have better skills than ANA. NS has good skills; this can be seen from the answers he gave in
accordance with the questions asked by the researcher. Regarding these skills, [11] states that self-efficacy is not related to the skills a person has, but is related to individual beliefs about what can be done with the skills he has, no matter how big. The following is a description of the results of the research on the level of mathematical proportional reasoning of students with low self-efficacy.

Table 9. Level of Student Self-efficacy Proportional Reasoning is Low Enough

<table>
<thead>
<tr>
<th>Indicators of Student's Mathematical Proportional Reasoning</th>
<th>Information</th>
<th>NF participants</th>
<th>NR participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to calculate worth comparisons using the right strategy</td>
<td>Unable to calculate worth comparisons. NF is at level 0 (non-proportional reasoning)</td>
<td>Able to calculate worth comparisons using the correct strategy, namely the variable factor strategy. NR is at level 3 (pre-multiplicative proportional reasoning)</td>
<td></td>
</tr>
<tr>
<td>Ability to calculate value-reverse comparisons using the right strategy</td>
<td>Unable to calculate the rate-return ratio using the correct strategy. NF is at level 0 (non-proportional reasoning)</td>
<td>Unable to calculate the rate-return ratio using the correct strategy. NR is at level 0 (non-proportional reasoning)</td>
<td></td>
</tr>
<tr>
<td>Ability to calculate comparisons with three problems</td>
<td>Unable to calculate comparisons with three problems. NF is at level 0 (non-proportional reasoning)</td>
<td>Able to calculate comparisons with three problems using unit values. NR is at level 3 (pre-multiplicative proportional reasoning)</td>
<td></td>
</tr>
</tbody>
</table>

Based on table 9, it can be seen that NF and NR have fairly low self-efficacy but both have different levels of proportional reasoning. In question 1, the indicator of the ability to calculate comparisons worth NR is at level 3 (pre-multiplicative proportional reasoning) while NF is at level 0 (non-proportional reasoning). In question 2 with an indicator of the ability to calculate inverse comparisons, the NF and NR values are at level 0 (non-proportional reasoning) and question 3 with an indicator of the ability to calculate comparisons with three NR problems is at level 3 (pre-multiplicative proportional reasoning) while NF is at level 0 (reasoning non-proportionate). According to [21] someone who is at level 0 means they have not been able to solve proportional problems, they solve these problems using arbitrary operations and those at level 3 mean they can solve proportional problems using scale factors or unit values.

NF and NR have fairly low self-efficacy, one of which is shown during interviews, both of them are participants who answer the researcher's questions with uncertainty and doubt about their ability to solve proportional reasoning questions. This is in line with Bandura's statement (in [13]) that a person who has low self-efficacy will be easily discouraged, unsure of his abilities when solving a problem, tends to be stressed, and has a narrow vision. In line with the statement [20] states that a person with low self-efficacy considers himself or herself to not have the ability to solve existing problems. When they are faced with a difficult situation, they will tend to give up easily and feel they cannot do anything to solve the problem.

3.4. Differences in Students' Mathematical Proportional Reasoning Levels Based on Self-Efficacy

From the results of the description of the data analysis, each level of self-efficacy has a different level of proportional reasoning. Even in this study, although they have the same level
of self-efficacy, they have different levels of reasoning. The different levels of students' mathematical proportional reasoning are presented in table 10 as follows.

Table 10. Differences in Students' Mathematical Proportional Reasoning Levels

<table>
<thead>
<tr>
<th>No</th>
<th>Participants</th>
<th>Self-Efficacy Test</th>
<th>Proportional Reasoning Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Problem 1</td>
</tr>
<tr>
<td>1</td>
<td>SP</td>
<td>High enough</td>
<td>Level 0</td>
</tr>
<tr>
<td>2</td>
<td>ND</td>
<td>High enough</td>
<td>Level 3</td>
</tr>
<tr>
<td>3</td>
<td>NS</td>
<td>Moderate</td>
<td>Level 3</td>
</tr>
<tr>
<td>4</td>
<td>ANA</td>
<td>Moderate</td>
<td>Level 0</td>
</tr>
<tr>
<td>5</td>
<td>NF</td>
<td>Low Enough</td>
<td>Level 3</td>
</tr>
<tr>
<td>6</td>
<td>NR</td>
<td>Low Enough</td>
<td>Level 3</td>
</tr>
</tbody>
</table>

Based on table 10 in question 1 (the ability to calculate equivalent comparisons using the correct strategy) it can be seen that SP, ANA and NF are at level 0 (non-proportional reasoning). According to [21] suggests that students who are at level 0 have not been able to solve proportional problems, they are only able to solve unknown values by using addition, difference or unpatterned counts, namely using any numbers and operations. While ND, NS, and NR are at level 3 (pre-multiplicative proportional reasoning). According to [21] suggests that students who are at level 3 can do proportional reasoning using unit values or scale factors in solving problems of unknown values. According to [13] states that students' mathematical reasoning is not influenced by self-efficacy but can be influenced by other factors. This statement is in accordance with the difference in the level of mathematical reasoning in participants with different self-efficacy categories, for example, SP (self-efficacy is high enough) in question 1 is at level 0 while NR (self-efficacy is low enough) in question 1 is at level 3.

In question 2 (the ability to calculate inverse comparisons using the correct strategy) it can be seen that all participants are at level 0 (non-proportional reasoning). According to [21] states that students who are at level 0 have not been able to solve proportional problems, they are only able to solve unknown values by using addition, difference or non-patterned counts, namely using any numbers and operations. In accordance with Van de Walle's statement (in [15]) which states that one of the students' mistakes in solving comparison problems is including unknown values. In this case, students do not fully understand the relationship between two quantities. It can be concluded that the six participants with indicators of the ability to calculate inverse comparisons of values, all selected participants have not been able to understand the relationship between two quantities, meaning that participants have not been able to use reasoning problem solving strategies correctly. To overcome the problem at the level of mathematical proportional reasoning where all selected participants are dominantly at level 0 especially in question 2, [22] states that the level of students' mathematical proportional reasoning can be increased by using the application of the Connecting, Extending, and Review (CER) learning model which has been effective to use.

In question 3 (ability to calculate a comparison with the three problems) it is known that SP, ND, ANA, and NF at the level of 0 (reasoning nonproportional). According to [21] states that students are at level 0 cannot solve the problem of proportion. NS and NR are at level 3 (pre-multiplicative proportional reasoning). According to [21] states that the student is at level 3 can perform proportional reasoning by using the value of the unit or the scale factor in solving the problem of unknown value. It can be seen students with self-efficacy is high enough as participants SP and ND at about 3 at the level of 0 and ANA with self-efficacy was
at the level of 0 as well. Meanwhile, NS (self-efficacy moderate) and NR (self-efficacy is low enough) at about 3 in the level 3. The condition according to [11] states that self-efficacy is not related to one's own skills, but related the individual's beliefs about things to do with the skill he possessed no matter how big. In line [1] states that there is no relationship between self-efficacy with an increase in students' mathematical reasoning. Classification of mathematical reasoning students with self-efficacy of different will remain the same despite being given the treatment is different because of self-efficacy in accordance with students' beliefs rather than the reasoning ability.

4 Conclusion and Suggestion

Based on the results of this research is that the classification of self-efficacy of students is dominated by self-efficacy with category with details of 9 self-efficacy is high enough, 28 self-efficacy moderate, and 3 self-efficacy is low enough. Students with a fairly high self-efficacy category are at level 0 meaning they have not been able to solve proportional problems in question 2 (the ability to calculate the comparison of turning values using the correct strategy) and question 3 (the ability to calculate comparisons with three problems). In question 1 (the ability to calculate worth comparisons using the correct strategy) students with a fairly high self-efficacy category are at level 0 and level 3.

Students with the self-efficacy category are at level 0 meaning that they have not been able to solve the proportional problem in question 2 (the ability to calculate the comparison of turning values using the correct strategy). In question 1 (the ability to calculate comparisons worth using the correct strategy) and question 3 (the ability to calculate comparisons with three problems) students in the self-efficacy category are at level 0 and level 3.

Students with a fairly low self-efficacy category are at level 0 meaning they have not been able to solve the proportional problem in question 2 (the ability to calculate the comparison of turning values using the correct strategy). In question 1 (the ability to calculate the ratio worth using the correct strategy) and question 3 (ability to calculate a comparison with three issues) students with the category of self-efficacy is low enough to be at level 0 and level 3. From the description of the data analysis, each category of self-efficacy has different levels of mathematical proportional reasoning, although with the same self-efficacy category.

From the results of the study, it can be seen that each category of self-efficacy has a different level of proportional reasoning even with the same self-efficacy category having a different level of reasoning. Students are more dominant at level 0 which means they have not been able to solve proportional problems. By knowing the level of students' proportional reasoning, the teacher can apply the CER learning model which is effectively used to increase the level of students' mathematical proportional reasoning. The CER learning model consists of three elements, namely (1) connecting, students learn by connecting their knowledge with concepts in the material studied in groups, (2) extending, students can develop their abilities by doing various similar questions, and (3) review, students re-check the results of the work on the questions that have been done. In addition, teachers can design appropriate learning strategies such as inquiry learning strategies that emphasize critical and analytical thinking processes so that students are required to find their own answers to a given problem or problem-based strategies that emphasize the completion process to solve a problem. By applying the CER approach and appropriate learning strategies, teachers can help students increase the level of students' mathematical proportional reasoning. For further research, it is
recommended to conduct research on the development of learning strategies that can increase the level of students' mathematical proportional reasoning.

References


Design Study on Cup Packaging Labels of Micro Coffee Business Products in Kuningan Regency as Brand Identity and Brand Image (Case Study: Otaku Coffee and Sisijalan Kopi)

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Abstract. The development of micro-coffee businesses in the form of coffee shops is increasingly widespread and has become a new commodity for the people of Kuningan Regency, marked by about a hundred coffee shop micro-business units appearing in this city. Many of the products offered by coffee shops are packaged in cup form. This cup packaging not only serves to protect the product, but also serves as a coffee shop brand identity. The cup packaging which is the identity of this product has a visual communication message in the form of illustrations, text, images, logos, and colors that can make the label on the cup packaging as the brand identity of a coffee shop business. Many people still think that the cup packaging label is just a wrapper/container for the product, while the packaging label is also important as a brand identity and marketing tool, which is still not being realized. Therefore, this study was conducted to find out how the cup packaging label design structure for micro coffee shops in Kuningan Regency can build brand identity and brand image with case studies of Otaku Coffee and Sisijalan Kopi. This study uses a qualitative approach with interpretive descriptive analysis. The method used is an analysis of the cup packaging label design structure including elements and principles of graphic design as a form of image and brand identity through various ways, namely literature studies, questionnaires, observations, and interviews. The results of this study indicate that the cup packaging label design structure for the Otaku Coffee is composed by Japanese typography as their logo element and the red color which represents ‘diligence/tenacity’ and is closely related to ‘Japanese culture’ as its brand image. As for Sisijalan Kopi, the cup packaging label design structure is composed by textual elements, visuals (illustrations) with outer space theme that portray the ‘youth and exploration’ as the brand image.

Keywords: graphic design; packaging label design; brand image; brand identity; coffee shop

1 Introduction

The development of micro coffee businesses in the form of coffee shops is increasingly widespread and has become a new habit for the community. Not only in big cities, coffee shop businesses are now also popping up in small towns. This is indicated by the number of micro coffee business units (coffee shops) also appearing in Kuningan Regency, accounting for approximately 100 coffee shop business units. The products that are widely offered and
served by coffee shops are beverages, both coffee and non-coffee which are packaged in the form of cups. Packaging in this case does not only function as a protector/container for the product being sold, but more than that, the packaging also functions in selling the protected product/container. Through visual communication messages in the form of illustrations, written text, images, logos, and colors, the label on this cup packaging can be used as a brand identity for a coffee shop business.

Awareness of the importance of packaging label design as a differentiator and brand identity for micro coffee entrepreneurs in Kuningan is still lacking. Many of them still consider this cup packaging label to be just a wrapper/container for the contents of the product, while the use of packaging labels as a branding or marketing tool is still few. Increasing brand value and brand equity through the formation of brand identity and image is currently considered important for micro, small and medium enterprises (MSMEs) including coffee shop businesses. Based on the results of a simple survey through a questionnaire, the two coffee shop business brands that will be used as case studies in this research are Otaku Coffee and Sisijalan Kopi. Based on the description above, it can be understood that the problem is trying to be solved is the cup packaging label design structure and its function in building a brand identity and brand image.

2 Literature Review

Packaging design can be viewed from the point of view of the packaging structure (including shape, material, size) and other points of view related to the graphic structure to support the information conveyed (labels and brand visualization). Packaging has two main functions. First, product packaging serves as a medium to protect products from various possibilities that can cause product damage such as weather, sunlight, falls, piles, germs, insect, and others. Second, packaging also functions as a tool to convey information about the product in question. [1].

Graphic design elements on packaging are usually indicated through labels that aim to convey messages or information in the form of visual or verbal signs. In general, according to Nugrahani these elements include text, color, and image [2]. Textual elements that contain information in the package are largely determined by the processing of fonts/typography. Typography on packaging is generally an alphabetical series that displays numbers, punctuation marks, words, or sentences in containing information about products and brands. The role of typography in packaging label design is important because of its potential to be able to represent a concept both as a reading element and as a visual element [3]. The element of color is the most important stimulant that creates visual appeal. Marketing studies prove that humans have special reactions to certain colors that can drive subconscious perceptions and consumer behavior. Each color has a distinct and strong psychological impact. For example, red and yellow have been shown to induce hunger and impulse buying, so we see many of these color combinations used by fast food outlets. Image elements in the context of packaging labels can be in the form of illustrations, icons, symbols, logos, photography, ornaments, or other visual elements. This image element is usually an explanatory/accompaniment of product information. This function develops along with the development of methodologies in marketing communications and understanding of the brand (brand). The image element then becomes part of the product representation as well as the iconic visual character of the product in question. The elements above are then arranged in an
orderly manner through the management of design elements which according to Rustan is called a ‘layout’ which is based on the basic principles of graphic design, including sequence, emphasis, balance, and unity [4].

Brand identity according to Kotler and Armstrong is related to the name, logo, color, tagline, and symbol of a brand. Brand identity is a unique brand association and shows a ‘promise’ to consumers. To be effective, brand identity needs to have resonance or a relationship with consumers. This aims to be able to distinguish the brand from its competitors and can explain what the company will do in maintaining its sustainability [5]. According to Aaker and Erich in Fajry, brand identity is formed from twenty dimensions which are then compiled into four, namely ‘brand as a product’, ‘brand as organization’, ‘brand as person’, and ‘brand as symbol’ [6].

3 Research Methods

This research is a qualitative, which according to Kriyanto is research that uses inductive thinking, which departs from specific things or empirical facts to things that are general (concept level) [7]. The results and discussion in this study is descriptive. This is because basically the research method used focuses on the study of design and formalistic interpretation of the cup packaging label design structure as part of the appearance of the brand identity and brand image which includes pictures or words instead of numbers [8].

In general, this research will go through several stages as follows:

a) Collecting and processing the main data and supporting data in the research.

b) Analyzing the graphic structure of the sample cup packaging labels for micro coffee business products in Kuningan Regency whose data has been managed in the first stage, with case studies of

c) Otaku Coffee and Sisijalan Kopi’s cup packaging labels.

d) c) Describing the findings in the form of an interpretation of the brand identity and brand image builder of coffee shops in Kuningan Regency through the design of cup packaging labels whose structure has been analyzed in the second stage.

e) d) Concluding the results of the research descriptively and thoroughly related to the topic of the problem being asked.

4 Result and Discussion

This section is discusses the research findings through a study of the visual structure of the design contained in the cup packaging label from a formalistic perspective, which includes elements of the packaging label graphic design and the layout principles used. In this section also discusses the appearance of brand identity and image through the identified structure.

Below are the elements that have been identified from the design of the Otaku Coffee cup packaging label with the signature menu of ‘Miruku’ iced coffee milk.
Through the image above, it can be identified that the elements contained in the label of the Otaku Coffee cup packaging include an image element in the form of a logo on the front of the packaging. The logo elements are arranged using the Japanese character “オタク” (pronounced: otaku) in red and written vertically. Another element is typography/character written horizontally in red in the form of the Japanese word “コーヒー” (pronounced: kōhī) which means ‘coffee’. The last element on the front of the packaging is a text element that reads “@OTAKUCOFFEE” using the Amatic SC typeface which is also red. The text element is the Instagram social media username for the Otaku Coffee brand which also functions as a translation of the Japanese characters found on the cup packaging label.

On the back of the cup packaging, there is a red text element in the form of quotes that read: “Don’t grieve! Whatever you lose will come back in another form. We’ll have coffee at the garden later. -JR-.”

The text uses the Bryndan Write typeface which is included in the handwritten/cursive font category.
In the design of the Otaku Coffee cup packaging label, the layout principle can be identified as follows.

a) Sequence
The sequence or flow of reading the label for the Otaku Coffee cup packaging uses the letter 'I' model from top to bottom. The flow of reading starts from the front and then rotates to the back. This can be seen from the logo element on the front whose size is made larger than the other elements so that it becomes a sign that this element is the main object that needs to be seen earlier.

Figure 3. Sequence on cup packaging label design of Otaku Coffee

b) Emphasis
The emphasis on the design of the Otaku Coffee cup packaging label lies in the “オタク” image/logo element on the front. This is caused by the contrast in terms of shape (Japanese letters), size (made larger than the other elements), and the layout is made vertical itself. Therefore, the logo element becomes the focus point so that the audience who sees it immediately focuses on this element.

Figure 4. Emphasis on cup packaging label design of Otaku Coffee
c) Balance

The design of the Otaku Coffee cup packaging label both on the front and back uses a symmetrical balance. At the front, the principle of symmetrical balance is achieved through a centric or center-aligned element layout. Along the lines of the front, the elements on the back symmetrically built using a centered paragraph.

![Figure 5. Balance on cup packaging label design of Otaku Coffee](image)

d) Unity

The principle of unity that appears in the design of the Otaku Coffee cup packaging label is not only achieved through the layout of the elements, but also communicatively in conveying the message that Otaku Coffee is a coffee shop that uses the concept of Japanese culture. This is implemented through the embedding of several elements, namely the form of Japanese letters and the red color that are in harmony with Japanese culture. Formally, unity is achieved through the harmony of presented elements such as color, distance between elements, size, and placement.

In the design of the Otaku Coffee cup packaging label, the brand identity is represented by design elements in the form of symbols/logos, text, and colors. More clearly the formation of the brand identity can be seen in the image below.
The name, logo and color of the Otaku Coffee brand are represented by the label on the front of the cup. Otaku Coffee has two types of symbols/logos that represent their brand according to their purpose and designation. The vertical "オタク コーヒー" symbol is used for cup packaging labels, while the horizontal one is used for other needs such as social media publications or product menus.

This brand identity then helps build the brand image of Otaku Coffee. Through the logo/symbol in the form of Japanese letters (read 'Otaku Coffee') and using red color, the image to be formed is that of a coffee shop that embeds Japanese culture in its brand and adapts the values of a diligent and earnest work culture. The term 'otaku' itself is not used simply because the word represents 'anime' culture, but departs from the definition that 'otaku' is a term intended for people who pursue a hobby and usually more than other people in
Another brand image is close and caring for its consumers. This image is shown through text elements in the form of quotes on the back of the Otaku Coffee cup label. The quote reads “Don't grieve! Whatever you lose will come back in another form. We'll have coffee at the garden later. - J.R.-”.

Along the lines of the Otaku Coffee cup packaging label, the elements contained in the Sisijalan Kopi cup packaging label design also consist of elements of text/typography, images/illustrations, and colors. The image below is an identification of these elements.

Figure 8. Graphic element on the front of Sisijalan Kopi’s cup

On the front of the Sisijalan Kopi cup packaging label, there are two graphic elements that are present, namely text elements and image elements. The text element in this section reads “SISIJALAN”. This element is not only a text element, but also an image element. This is due to its function as a symbol and brand identity in the form of a logotype (a logo formed by elements of text or typography). While the image element that appears on the front of the cup packaging label is an illustration of a landscape with an astronaut figure running on a barren land as if to represent the background of an outer planet. The “SISIJALAN” text and logo elements described in the previous paragraph are also included in this illustration. The logo element in this image is placed as a street signage.
The label for the Sisijalan Kopi cup packaging on the back has an image/graphic element in the form of four thin horizontal lines that are lined up a certain distance downwards. This element is a guideline for product providers (barista) to write certain messages for consumers. Another element is a text element that reads "#temansisijalan" (read: friend of Sisijalan) and "#satutahunsisijalan" (read: one year of Sisijalan). The use of the '#' symbol (hashtag) is usually intended to convey a message in the form of a tagline of a marketing campaign phrase to the audience. The typeface used is Helvetica regular/normal which is included in the ‘sans serif’ font category.

In the design of Sisijalan Kopi cup packaging labels, the layout principles can be identified including the principles of sequence, emphasis, balance, and unity as follows.

a) Sequence

The front of the Sisijalan Kopi cup packaging label is dominated by image elements so that the reading path is identified through its sub-elements. The sequence on the image element on the front uses the 'U' reading model, starting from the sub-element on the top-left (the logotype says “SISIJALAN”) and ending on the top-right side (the object image of astronauts and ringed planets).
Then the sequence on the back of the label design uses the letter 'I' model from top to bottom, namely

![Figure 11. Emphasis on cup packaging label design of Sisijalan Kopi](image)

b) Balance
The design of the Sisijalan Kopi cup packaging label on the front uses a layout with an asymmetrical balance, which is a pseudo balance based on the weights of the elements in it. Although not mathematically balanced, layouts that use the asymmetrical balance principle will still look like balanced and seem dynamic. While on the back of the package, the balance of the layout used is horizontally symmetrical, as shown in the image below.

![Figure 12. Balance on cup packaging label design of Sisijalan Kopi](image)

c) Unity
The principle of unity in the design of Sisijalan Kopi's cup packaging labels can be seen from the illustration on the front of the label, which are not separated from each other. The sub-elements contained in the illustration are composed to relate to each other and strengthen the message to be conveyed. At least from the theme raised about "space", the elements in the illustration represent that theme.

In the Sisijalan Kopi cup packaging label design, the brand identity is represented by design elements in the form of symbols/logos, images, and text. In the image below, it can be seen more clearly the formation of the brand identity.
Figure 12. Brand identity of Sisijalan Kopi

The brand name, logo and mascot/illustration of the Sisijalan Kopi are represented by the label on the front of the cup packaging. Sisijalan Kopi has three types of logo shapes that represent their brand according to its purpose and designation. The three logo look different in terms of shape, the 1st logo emphasizes typography, the 2nd logo combines the two main elements of the illustration on the cup packaging label, while the 3rd logo simplifies the previous logo into a simpler form and adds a logotype with a different style.

The three logos are also used for different needs, the 1st logo is used in illustrations on cup packaging labels and shop signage. The 2nd logo is used on bottled beverage packaging labels. While the 3rd logo is used on the product packaging label for ‘cold brew’ menu and merchandise designs.

Figure 12. Variated logo of Sisijalan Kopi

Although the three types of logos used by Sisijalan Kopi look different, the images they want to build are related. Through the design of the Sisijalan Kopi cup packaging label, the brand image that appear is an explorative young figure who is undergoing a process of maturation. The brand image is represented by an image element of an astronaut who is running on land in outer space. The figure of an astronaut who can explore outer space is used as a brand representation or icon of Sisijalan Kopi because it is considered someone who has
advantages over the others. In addition, there is a personal aspect of Sisijalan Kopi owners who love the Star Wars film series. This was adapted by Sisijalan Kopi with the aim of giving a message to the audience that this coffee shop has advantages over other shops and communicates the personal aspects of the owners.

Another brand image is the closeness between Sisijalan Kopi and its consumers. This is represented by the hashtag/tagline that is pinned on the back of the Sisijalan Kopi cup packaging label. The hashtag/tagline reads “Friends of Sisijalan” which means a call or name for its consumers, both new consumers and existing customers.

5 Conclusion

Based on the explanation above about the image that will be formed by the two coffee shops in Kuningan Regency, it can be concluded that the awareness of the owners is in the branding process. Both are well aware that it is important for a micro business to build a brand image, especially a coffee shop, considering that its competitors are increasing from time to time. The two coffee shops that are the case studies also realize that their brand image can be formed and displayed not only through the logo, but can also be supported by other elements, including through the design of the packaging labels that they present to their consumers.

The identity and image that emerges through the cup packaging label Otaku Coffee is a coffee shop that attaches Japanese culture to its brand and adapts the cultural values of diligent and earnest work. Another image that is raised is that he is close and cares about his customers. As for Sisijalan Kopi, the image that emerges is that of a young, exploratory figure who undergoes a process of maturation through the coffee business and is close to its consumers.

References

Development of Higher Order Thinking Skills Assessment Based on Scientific Article Reviews

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Abstract. Higher order thinking skills are essential skills that must be possessed by students where the assessment tool developed must also be adjusted to the competencies to be achieved, but lecturers are still having difficulties due to the lack of authentic assessment alternatives that assess these skills. There are several authentic forms of assessment to assess higher order thinking skills, namely the assessment of written works and product project including of scientific article reviews. The purpose of this study is to develop an authentic assessment of higher order thinking skills based on a scientific article review strategy. This research is a research and development (R&D). The results of expert validation are construct validation 3.4 (valid) and content validation 3.4 (valid), meaning that the assessment developed is valid. The results of the small-scale trial show that the assessment tool is valid and reliable in the high category. Profile of students' higher order thinking skills with superior criteria in analyzing, evaluating and creating skills. Where the highest score is on the analytical skill and the lowest is the creative skill. The conclusion of this study is that the assessment developed is valid and reliable for use in several courses that facilitate higher order thinking skills by applying the strategy of reviewing scientific articles.

Keywords: HOTS; Scientific Literature Review; Skills

1 Introduction

Higher Order Thinking Skills (HOTS) is a term that is increasingly being mentioned and discussed in the 21st century education era because it is considered one of the 21st century skills. 21st century learning emphasizes the ability of students to find out from various sources, formulate problems, analytical thinking, cooperation and collaboration in solving problems [1]. The 21st century learning frameworks include the following: (a) critical thinking and problem solving skills; (b) communication and collaboration skills; (c) the ability to create and renew; (d) information and communication technology literacy; (e) contextual learning ability. To facilitate these abilities, learning must familiarize students to practice higher order thinking skills.

Higher-order thinking skills are needed to deal with the demands of changing times. The concept of HOTS is described in the discussion of the cognitive domain, which is a domain that involves knowledge and intellectual skills. Bloom describes the level of cognitive processes from the simplest to the complex level, known as the level of cognitive skills. The level categories have been revised and organized into 6 levels, namely Remembering, Understanding, Applying, Analyzing, Evaluating and Creating, also known as C1 to C6.
Based on the level of intellectual skills, levels C4 (Analyze), C5 (Evaluate) and C6 (Create) are categorized as high-level thinking skills or HOTS [2]. HOTS is indispensable in preparing students to face global challenges. To see the achievement of higher thinking skills, it is necessary to conduct an assessment using authentic assessments that measure these skills [3].

Learning will be meaningful if students are invited to think at a higher level. The success of mastery of concepts will be obtained when students are able and accustomed to high-level thinking, where students not only remember and understand concepts but are able to analyze, evaluate and create a concept. The concepts that have been understood can be embedded in students' memories for a long time, so it is very important that students have higher-order thinking skills [4]. HOTS is very important to be applied and developed in learning. If students have high-order thinking skills, then in learning they will be able to use problem solving methods properly, precisely and confidently. When learning activities focus on the target of developing HOTS, it will greatly affect learning activities that are more effective and students become more trained [5].

Assessment is a process of collecting data that can show the progress of students' learning, the assessment that is used should be an authentic assessment which can clearly and clearly describe the thinking processes of students. [6] states that authentic assessment is an assessment carried out through presentation or appearance by students in the form of working on certain tasks or activities that have educational meaning. Authentic assessment provides opportunities for students to complete authentic assignments that are interesting, useful and relevant to students' lives. Based on some authentic research, an assessment to assess HOTS can be in the form of students' ability to ask questions and have opinions during the learning process, it can also be seen through students' writings or representations in the form of images, media and other products produced by students. The HOTS assessment that needs to be developed is not an assessment that only plays a role in measuring the level of student achievement, but an assessment that will train students to think critically and is equipped with feedback that will provide information to students about weaknesses that need to be improved.

The assessment that will be developed in this research is to assess students' skills in analyzing relevant research journals including background, research methods, results and discussion; skills in evaluating national and international journals that are relevant to the themes and issues studied; skills in creating research proposal designs based on the results of the journal's analysis. The results of research proposal designs made by students can provide an overview of how the level of students' higher-order thinking skills and can be used as a reference in writing the next thesis. The activity of analyzing scientific articles is a form of learning to study the development of a theory or a science. By analyzing scientific articles, students will get information that will increase their knowledge about a science being studied [7].

2 Methodology

The research method used in this study is research and development (Research & Development) which consists of two main objectives, namely developing products and testing the effectiveness of products in achieving goals [8]. The product developed is an assessment of higher order thinking skills based on a review of scientific articles. The subjects used in the small-scale trial were 27 students who took the Biology Education Seminar course. Taking the subject by using purposive sampling technique. Validation of expert users as many as 3 people
who are experts in the field of evaluation tools and users of the assessment. The criteria for the success of the product developed are based on 2 criteria, namely the validity of the expert must be valid, and the second is that the assessment has high validity and reliability.

3 Result and Discussion

The research results begin with the results of expert and user validation. The results of the expert validation of the assessment of higher order thinking skills based on a review of scientific articles were valid with a slight revision to the grammar used as material for improving the assessment tool and then a small-scale trial was carried out on 27 students. The validation results are presented in Table 1.

<table>
<thead>
<tr>
<th>No.</th>
<th>Validasi</th>
<th>Rata-rata skor</th>
<th>Keterangan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Construct validation</td>
<td>3,4</td>
<td>Valid</td>
</tr>
<tr>
<td>2</td>
<td>Content validation</td>
<td>3,4</td>
<td>Valid</td>
</tr>
</tbody>
</table>

The assessment of higher-order thinking skills developed consists of analytical skills which include: analyzing the background of the research problem, analyzing the suitability of the research methodology and the problems studied, analyzing theoretical studies relevant to research journals, and analyzing the suitability of research results with problems. Evaluation skills which include: presenting their own views on research journals with valid arguments, and providing an assessment of the consistency of research journals, while creative skills include: determining the theme of the proposal design, compiling research proposals adapted to the results of journal analysis, accuracy in compiling theoretical studies, systematic accuracy preparation of research proposals, and the correct use of writing and language. The results of the small-scale assessment were tested for validity using the KMO Bartlett's test of variance analysis and tested for reliability using Cronbach's alpha. The results of the validity and reliability tests are presented in Tables 2 and 3.

<table>
<thead>
<tr>
<th>KMO and Bartlett’s Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaiser-Meyer-Olkin Measure of Sampling Adequacy</td>
</tr>
<tr>
<td>Bartlett’s Test of Sphericity</td>
</tr>
</tbody>
</table>

| Table 2. Results of the Validity Test of Higher Order Thinking Skills |

<table>
<thead>
<tr>
<th>Table 3. Reliability Test Results of Higher Order Thinking Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cronbach’s Alpha</td>
</tr>
<tr>
<td>0.74</td>
</tr>
</tbody>
</table>
The assessment of higher order thinking skills was revised based on some suggestions from the validator and then applied to assess students’ skills on a small scale trial. The results of the assessment can provide a description or profile of students’ higher-order thinking skills in biology education seminar courses. The overall assessment results are presented in Figure 1.

![Figure 1. Profile of Students' Higher Order Thinking Skills](image)

The results of the assessment of higher order thinking skills on a small scale trial are analyzing skills of 3.6, evaluating skills of 3.4 and creating skills of 3.3. Based on the results of the assessment, it shows that the skills in creating proposal designs are the lowest, but overall students are competent in making proposal designs based on the results of journal analysis. Higher order thinking skills are an important aspect in the teaching and learning process, especially in universities. The practice of higher order thinking skills can be applied to science courses where students who have higher order thinking skills are able to improve their performance and reduce their weaknesses [9]. In learning that facilitates higher-order thinking skills, it must be precise in the selection of learning strategies and types of assessments so that these assessments can assess according to learning objectives [10].

Higher order thinking requires a person to apply the new information or knowledge he has gained and manipulate the information to reach possible answers in new situations [10]. The selection of the right assessment approach can help improve and evaluate students’ higher order thinking skills according to the indicators of learning materials [11]. Learning using a scientific article review strategy can improve cognitive learning outcomes in this case are students’ higher-order thinking skills so that an authentic assessment is needed that is developed to assess the assignment of scientific article reviews [12].

4 Conclusion

This study resulted in an assessment of students' higher thinking skills with a strategy of reviewing scientific articles. The results of expert and user validation indicate that the assessment is valid and feasible to use with minor revisions. The result of the small-scale trial is that the assessment developed has a high value of validity and reliability so that the assessment is worthy of being used as an authentic assessment alternative with good quality.
References


Design of Waste Transportation Management System Using Fuzzy Logic Algorithm Based on Internet of Things

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Abstract. Garbage is one of the environmental problems faced by society in general. The process of managing and transporting waste that is carried out on a scheduled basis by officers is still not optimal in management. The process of transporting this model is considered ineffective because the volume of waste in the available trash cans is unpredictable. This study aims to apply Internet of Things (IoT) technology in a waste transportation system by applying the Mamdani Fuzzy logic algorithm. The system created serves to draw the best decisions in uncertain problems, namely to determine the condition of the volume of waste by calculating the input parameters based on the distance of the sensor to the object of waste and the time of landfilling. The system development method used in this research is using the Rational Unified Process (RUP) method. The stages in this study include inception, elaboration, construction, and transition. The results of this study are a prototype of a waste transportation management system in the form of a mobile web-based application. Based on the results of tests that have been carried out on the prototype, namely two trash bins, the results show that the system can work well by providing information on the results of measuring the level of waste from the proximity sensor installed in both bins and the results of data processing based on the time parameter can be displayed on the application in the form of notifications. waste transportation decisions that can be made by the cleaning staff.

Keywords: Algorithm; Internet of Things; Fuzzy; RUP; garbage.

1 Introduction

Inadequate and inefficient waste management systems cause severe environmental problems. In most cities, overflowing trash cans give off a bad smell and make the environment unhygienic, and can cause various kinds of diseases. [1] In research [2] the development of a smart green environment from a waste monitoring system by measuring the level of waste in real-time. Internet of Things monitoring has been used in smart bin designs by connecting them to the Internet of Things.

Research [3] develops practical real-time applications in designing and building prototypes to open and close trash bins automatically to detect human intervention who wants to dispose of their garbage. The depth of the trash in the trash is measured using an ultrasonic sensor and the weight of the trash can with the trash is measured from the load cell [4].

The accumulation of garbage can not only cause unpleasant odors, it can also cause various kinds of diseases. Good waste management is expected to create a cleaner and more
comfortable environment for its residents. So to overcome one of the problems that arise, it is necessary to create a waste monitoring system that can be monitored in real-time. Research [5] developed a monitoring system for trash bins using the HC-SR04 sensor to detect garbage loads and detect the distance of humans throwing garbage. The results of testing the maximum and minimum distances from the sensor reached an average of 143cm and 0cm. The determination of the action to clean the trash can is determined using the fuzzy logic method with 100% accuracy in determining the action.

This study aims to develop a waste management system based on the level of waste height using an ultrasonic sensor. The system is made to provide notifications to officers through applications that have been installed on smartphone devices. Notifications on the application are the result of data processing from sensor readings using fuzzy logic algorithms. This system can assist officers in scheduling waste transportation according to the condition of the waste level.

2 Methodology

The block diagram of the system design developed in this study is shown in Figure 1. The trash can is equipped with an ultrasonic sensor to measure the level of the waste height. This sensor is connected directly to the ESP8266 microcontroller module. The data sent by the sensor will be sent to the internet via the Wi-Fi module.

![System Block Diagram](image)

Figure 1. System Block Diagram

In this research, the solution method used is the Fuzzy Mamdani Algorithm. This algorithm is also known as the MIN - MAX method. This method was introduced by Ebrahim Mamdani in 1975.

To solve this research problem, the flowchart of the fuzzy mamdani algorithm is as follows:
Input data Variabel input dan output dan himpunan keanggotaan input dan output data yang akan dihitung

\[ \mu_{\text{AND}} = \min (\mu_{a}(x), \mu_{b}(x)) \]

Menentukan aturan fuzzy

\[ a_{pi} = \mu_{a}(x_{i}) \]

Defuzzifikasi Metode Centeroid

\[ x_{o} = \frac{\sum_{i=1}^{n} a_{pi} x_{i}}{\sum_{i=1}^{n} a_{pi}} \]

Keluaran (Hasil) Perhitungan fuzzy

END
3 Result and Discussion

In this section, the results of the research will be discussed which include system design, system implementation, and testing of the system that has been developed. The automatic waste transportation system developed in this study was made in the form of a prototype, the system was designed to be able to provide notifications automatically. waste transportation that can be carried out/works automatically, based on the information on the height of the filled/full trash can. Broadly speaking, this system consists of two parts, namely software/application / system and a trash can that has been installed with ultrasonic sensors.

The system development method used is the Rational Unified Process (RUP). The RUP software development process is described in 2 dimensions, namely the horizontal dimension and the vertical dimension. The horizontal dimension represents the time and stages of development, while the vertical dimension represents the workflow at each stage that needs to be done. RUP stages are Inception, Elaboration, Construction, Transition.

3.1. Mamdani Fuzzy Algorithm

The Mamdani method is often also known as the MIN - MAX method. This method was introduced by Ebrahim Mamdani in 1975. To get the output, it takes 4 stages, including:

3.2. Fuzzy Set Formation

The first stage of the Mamdani Fuzzy Method procedure is the formation of a fuzzy set or also known as fuzzification. For the calculation of the function on the fuzzification as follows:

a. Persamaan fungsi segitiga :

$$\mu[x] = \begin{cases} 0; & x \leq a \text{ atau } x \geq c \\ \frac{b-a}{x-a}; & a \leq x \leq b \\ \frac{c-x}{c-b}; & b \leq x \leq c \end{cases}$$

b. Persamaan fungsi trapesium :

$$\mu[x] = \begin{cases} 0; & x \leq a \text{ atau } x \geq c \\ \frac{x-a}{b-a}; & a \leq x \leq b \\ \frac{c-x}{c-b}; & b \leq x \leq c \end{cases}$$
Sensor Distance Parameters are divided into three parts, namely Low, Medium and High. The value range of the sensor distance parameter is between 0-30 in centimeters. The degree of membership of the sensor distance parameter is shown in Figure 3.

The fuzzification sensor distance parameter is calculated based on the graph. The following is the equation for the sensor distance parameter in the following equation.

\[
\mu[x] = \begin{cases} 
0; & x \leq a atau x \geq c \\
\frac{x-a}{b-a}; & a \leq x \leq b \\
1; & b \leq x \leq c \\
\frac{d-x}{d-c}; & c \leq x \leq d 
\end{cases}
\]

The fuzzification time parameter is calculated based on the graph. Here is the equation for the time parameter.

\[
\mu_{\text{Cepat}}[x] = \begin{cases} 
\frac{36 - x}{18} & 1; x \leq 18 \\
18 & 18 \leq x \leq 36 \\
0 & x \geq 36 
\end{cases}
\]

\[
\mu_{\text{Sedang}}[x] = \begin{cases} 
0 & x \leq 18 \\
\frac{x - 18}{62 - x} & 18 \leq x \leq 36 \\
\frac{18}{8} & 36 \leq x \leq 54 \\
1 & 54 \leq x \leq 62 
\end{cases}
\]

\[
\mu_{\text{Lama}}[x] = \begin{cases} 
\frac{x - 54}{8} & 0; x \leq 54 \\
1 & 54 \leq x \leq 62 
\end{cases}
\]

After obtaining the input and output variables, the next step is to determine the application of the implication function, the implication function used is.

\[
\mu_{A \& B} = \min(\mu_A[x], \mu_B[x])
\]

Berikut adalah aturan yang dibentuk :

[R1] If (Jarak Sensor is Tinggi) and (Waktu is Cepat) then (Pengangkutan is Tidak Angkut).

[R2] If (Jarak Sensor is Tinggi) and (Waktu is Sedang) then (Pengangkutan is Tidak Angkut).

[R3] If (Jarak Sensor is Tinggi) and (Waktu is Lama) then (Pengangkutan is Tidak Angkut).

[R4] If (Jarak Sensor is Sedang) and (Waktu is Cepat) then (Pengangkutan is Tidak Angkut).

[R5] If (Jarak Sensor is Sedang) and (Waktu is Sedang) then (Pengangkutan is Tidak Angkut).

[R6] If (Jarak Sensor is Sedang) and (Waktu is Lama) then (Pengangkutan is Angkut).

[R7] If (Jarak Sensor is Rendah) and (Waktu is Cepat) then (Pengangkutan is Angkut).

[R8] If (Jarak Sensor is Rendah) and (Waktu is Sedang) then (Pengangkutan is Angkut).

[R9] If (Jarak Sensor is Rendah) and (Waktu is Lama) then (Pengangkutan is Angkut).

Figure 4. Membership Degree Time
After obtaining the results of the implication function, the next step is to determine the composition of each rule and method used in performing fuzzy system inference. There are 3 methods used in performing fuzzy system inference, namely max, additive and probabilistic OR (probor).

a) System Design

The initial stage for the design is the analysis of the current system. (Figure 2). The next stage, the researcher makes a proposed system design that will be developed. The results of the system design to be made are shown in Figure 5.

Gambar 2. Flowmap Sistem Berjalan

Gambar 3. Flowmap Sistem Usulan
Metode perancangan atau pemodelan perangkat lunak yang digunakan dalam penelitian ini yaitu Unified Modeling Process (UML).

**Figure 5. Use Case Diagram**

b) **System Implementation**

The next stage of the research is testing the system interface, namely applications developed on smart phones and desktops. The display of the developed application is shown in Figure 6.

**Figure 6. Application Login Page**

Figure 6 is the login page for admins and officers. To be able to login the user must enter a username and password.
On the detail menu page, the admin can monitor the level of the trash can in each room.

**Figure 7.** Dashboard website
Figure 8. Data Log

Figure 9 shows the prototype design of the trash can that was developed consisting of an integrated sensor and a microcontroller as a data processing center. The next testing process is to determine the performance of the system made, the authors make a prototype, namely a trash can that has been fitted with an ultrasonic sensor. The ultrasonic sensor functions to read objects in the trash, which is used to measure the height of the trash level in the trash can.

Gambar 9. Trash can prototype.
As previously mentioned, this study develops a waste transportation system by applying fuzzy logic algorithms for decision making in collecting waste in the form of notifications on the application.

4 Conclusion

This research produces a prototype of an android-based garbage transportation system by applying a fuzzy algorithm. The prototype was developed using an ultrasonic sensor module to detect the level of waste in the trash can. Based on the test results, the system can work well according to the design. Information on the condition of the height of the waste level can be displayed on a smartphone device in real-time. Officers receive notification of waste transportation status. If the trash can is full, the system will automatically notify the officer, for further transportation.

The development of a waste transportation system is expected to be a solution to the problem of managing waste that accumulates which can cause unfavorable conditions for the surrounding environment. So that this system can be developed to assist sanitation officers in monitoring the condition of the trash.

References

Measuring Components of Cognitive Load in Integrated Learning About Plant Structure and Function

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Abstract. Understanding how cognitive load is measured is a basic challenge in the cognitive load theory. This measurement is necessary when student receiving highly interconnected information which results in high cognitive load. Therefore, this study uses quasi experiment to measure student’s cognitive load in learning plant structure and function. The subject of this study are 64 undergraduate students enrolling in plant anatomy course. The cognitive load is measured through information analysis skill (intrinsic load), attitude (extraneous load), and reasoning skill (germane load). The results shows that there is a significant correlation between the three components of cognitive load wherein students’ information analysis skill is “sensitive” to intrinsic processing (developing prior knowledge) while attitude is sensitive to extraneous processing (developing attitude and positive developing attitude and positive perception). This is shown by the test result on reasoning skill. The result is also consistent with cognitive load theory stating that the component of cognitive load should be measured by different measure.

Keyword: Cognitive load measurement; integrated learning; plant structure and function

1 Introduction

Conceptual integration is important in optimizing learning process and outcome for students. This is in line with the objective of integrated learning applied by Indonesia’s current curriculum, the curriculum 2013. It is stated that conceptual integration happens when there is continuous understanding of an idea through different level, breadth, and depth within discipline in specific learning domain, and integrated skill and concept understanding between different disciplines with similar characteristics [1]. Therefore, the conceptual integration is used to develop learning in holistic manner by relating ideas between different concepts. To ensure comprehensive integration, the integration should cover the wide and the depth and between disciplines [2]. The integrated learning material has a positive impact on student’s understanding and knowledge and is deemed to be effective to lower students’ cognitive load [3, 4]. Furthermore, it is asserted that the cognitive theory grows on the idea that learning happens when students actively construct knowledge representation within the limited working memory [5].

The main challenge in designing learning instruction especially in integrated learning is the sensitivity of cognitive load in learning process [6, 7]. The integration should specifically be measured in a way that the total cognitive processing needed does not exceed the capacity of
students’ working memory. Therefore, an integrated learning model is needed to facilitate students’ cognitive process and keep the process within students’ capacity. The integrated learning in this study uses nested type aiming to facilitate students in integrating social, thinking, and content-specific skills when discussing a topic. To measure students’ cognitive load during learning process, an effective measurement is needed.

According to triarchic theory of cognitive load, there are three types of cognitive process during learning which contribute to cognitive load namely, extraneous processing which is the load irrelevant to the objective of learning, intrinsic load which is the load relevant to the process of understanding learning material, and germane processing which is the load related to a deeper cognitive process of organizing information and connecting knowledge [8, 9]. This study, therefore, analyze the way to lower extraneous processing by developing positive attitude and perception and lower intrinsic processing by utilizing prior knowledge when processing information. This study also analyzes the difference in students’ germane load using reasoning skill test.

The process of developing positive attitude and perception as well as the utilization of prior knowledge is delivered through nested-typed integrated learning using Marzano instructional framework. This process aims to facilitate student in integrating plant structure and function using five learning dimensions of Marzano. The learning dimension is able to translate how a student learns and thinks (dimension of thinking) to a framework of performance (practical framework) leading to the development of students’ reasoning skill [10]. Thus, the use of Marzano instructional framework is able to facilitate students in processing information in accordance with natural design of human brain function, thus, the cognitive processing does not exceed the capacity of working memory. Moreover, reasoning skill test is used to analyze the difference in germane processing due to the process of reasoning that involves mental operations such as concept construction, principle of construction, comprehension, problem solving, and decision making which are the projection of knowledge construction as a result from learning process.

In this study, the sensitivity of the three cognitive load components is tested based on students’ ability to analyze information during learning, mental effort in understanding learning material, and reasoning skill after conducting learning. The measurement of information analysis skill using information analysis test which is equipped with performance objective aiming to analysis plant structure in relation to its function, analyze plant adaptation strategy by relating plant structure and function, interpret data on plant structure and function, and design an experiment within a time frame. The students’ mental effort in comprehending learning material is attributed to teaching model measured by attitude scale. The main aim of this study is to determine whether the three measurements of cognitive load component are sensitive to the difference in strategy to lower student cognitive load, comparing integrated learning with nested model with the conventional nested model. The three measurement is deemed as sensitive if the three components of cognitive load has significant correlation with one another.

2 Method

This study uses quasi experimental method with nonequivalent control group design. The subject of the study were 64 undergraduate students taking Plant Physiology Subject in the academic year of 2019/2020. The 33 students learned with nested type integrated learning
with Marzano instructional framework, while the other 33 students participated in conventional integrated learning as a control group. In collecting the data, this study uses three instruments for measuring each component of cognitive load. The intrinsic load is measured using a test covering the task to analyze the conceptual information of plant function. The tasks are (1) identifying the plant structures which are relevant to function (2) integrating the concept of plant structure to the function (3) applying relations between plant structure and function (4) designing an experiment. Meanwhile, the extraneous load is measured using attitude scale to obtain the data of students’ mental effort while understanding the learning material and the germane load is measured with 30 test items of multiple choices with reasons covering students’ reasoning skill in analytical, causal, and proportional reasoning. The result of the tests was analyzed to obtain the information of students’ cognitive load during the implementation of 2 types of integrated learning.

The conventional nested typed integrated learning applied to control group is a learning strategy that integrate multiple skills in achieving the learning objective. The skills being integrated in this study are social, thinking, and content specific skills. The steps of conventional nested typed integrated learning are:

a. Delivering problems related to relation between plant structure and function to facilitate thinking skill. The problems delivered are always related to natural phenomena in order to stimulate students to think speculatively and to recognize the pattern between plant structure, plant function, and plant habitat.

b. Delivering learning material with contextual theme to facilitate students’ content specific skill. The contextual theme in this study is defined as how student construct their knowledge about plant physiology by integrating it with the knowledge about plant anatomy which is previously learned and kept as cognitive schemes.

c. Providing chances for students to complete their tasks by collaboration to facilitate students’ social skill.

Meanwhile, the nested typed integrated learning with Marzano instructional framework applied to experimental group is a learning strategy based on a way the brain works when processing information to understand learning material. This strategy is conducted by integrating social skill emphasizing on teacher and students’ interactions in classroom discussion, thinking skill, and content specific skills. By using Marzano instructional framework, the learning process is expected to be able to facilitate students in learning and thinking. The principles of this learning strategy are:

a. Creating conducive learning environment by maintaining interactions between lecturer-students and among students

b. Delivering problems and solutions to the problems aiming to facilitate students in developing thinking process

c. Providing chances for students to complete their task by collaborating to enhance students’ optimum development zone and increase students’ optimism in learning

d. Providing an objective performance guidance covering the operational verbs to direct students’ performance in integrating plant structure and function in order to ease the information processing in working memory

e. Utilizing prior knowledge in long term memory to construct the concept of plant structure in relation to topic being delivered, leading to knowledge assimilation.

The strategy to measure the three components of cognitive load are described in the following subsections.

2.1. Measuring Intrinsic Load
Measuring intrinsic load aims to obtain data about students’ ability in analyzing information. The test on information analysis skill is applied on the concept of transpiration and photosynthesis. The test items demand students to write down their answer in a paragraph to obtain students’ information analysis skill on the aspect of identifying components of plant structure which are relevant to its function, integrating plant structure to function, applying the principles of correlation between plant structure and function, and designing an experiment.

Furthermore, the analysis is carried out using tasks and a rubric. There are nine tasks given to the students to gain data about their information analysis skill. Meanwhile, the rubric is provided to analyze the completeness of components used in analyzing information with 4 scale from 1 to 4. The aspect measured by the rubric of information analysis skill is adapted from a rubric developed by Marzano [11]. The further detail about the tasks and rubric are shown in Table 1 and table 2.

Table 1. Information analysis tasks

<table>
<thead>
<tr>
<th>Identifying components of plant structure relevant to its function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Choosing the plant tissues on a specific organ structure which are suitable to compare</td>
</tr>
<tr>
<td>2 Identifying similarity and differences of plant tissues on an organ</td>
</tr>
<tr>
<td>3 Explaining and categorizing plants based on the characteristics of organ tissues</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Integrating the concept of structure with function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Integrating knowledge about plant structure and function</td>
</tr>
<tr>
<td>2 Analyzing the “mistake” in relating the plant structure and function to adaptation strategy in plant habitat</td>
</tr>
<tr>
<td>3 Constructing supporting details by providing proof of the difference between the plant structure with its adaptation strategy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Applying the principles of correlation between plant structure and function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Applying the principles of plant structure and plant function</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Designing an experiment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Hypothesizing</td>
</tr>
<tr>
<td>2 Designing an experiment based on plant structure and the principle of process in plant physiology</td>
</tr>
</tbody>
</table>

The score of students’ information analysis skill follows categorization by Arikunto [12] explained as follow:

Table 2. Categorization of information analysis skill

<table>
<thead>
<tr>
<th>score</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.2 – 4.0</td>
<td>Excellent</td>
</tr>
<tr>
<td>4.1 – 3.1</td>
<td>good</td>
</tr>
<tr>
<td>4.0 – 2.6</td>
<td>Fair</td>
</tr>
<tr>
<td>4.0 – 1.2</td>
<td>Unsatisfactory</td>
</tr>
<tr>
<td>3.9 – 1.6</td>
<td>Very low</td>
</tr>
</tbody>
</table>

2.2. Measuring Extraneous load.

Measuring extraneous load aims to collect the data on the mental effort needed to understand a certain learning material. A rubric is used to obtain the data with 5 level of Likert scale (1) very easy (2) easy (3) medium (4) hard (5) very hard. The lower the average score achieved by the students, the lower the mental effort needed to understand learning material.
The aspects measured by the instrument of extraneous load are on identifying components which are relevant to the plant function integrating the structure and function of plant, and integration scheme of function and application of the principles of correlation between plant structure and function.

3 Reasoning skill test (Germane Load)

The method to obtain data about students’ ability to develop cognitive schemes by organizing knowledge and relating newly learned knowledge with the knowledge kept in the long-term memory is done by using reasoning skill test. It is assumed that if a student has a good reasoning skill, they would have a good concept mastery [13, 14]. The instrument is arranged in multiple choices with reasons. The student reasoning skill is measured covering the inductive and deductive reasoning with the aspects of causal, analysis, and proportional reasoning [15]. These reasoning aspects are chosen following the statement form Marzano stating that reasoning is thinking process which covers concept construction, principles construction, comprehension, problem solving, research, decision making and thinking process skill which are needed in learning plant physiology [16]. The categorization of students’ reasoning skill is adapted from previous study [17] explained in the Table 3.

<table>
<thead>
<tr>
<th>Score</th>
<th>Categorization</th>
</tr>
</thead>
<tbody>
<tr>
<td>75 - 100</td>
<td>Excellent</td>
</tr>
<tr>
<td>61 - 74</td>
<td>Good</td>
</tr>
<tr>
<td>51 – 60</td>
<td>Fair</td>
</tr>
<tr>
<td>35 - 50</td>
<td>Less satisfactory</td>
</tr>
<tr>
<td>25 - 34</td>
<td>Very low</td>
</tr>
</tbody>
</table>

The instrument for reasoning skill developed in this study is also used to measure students’ concept mastery based on the taxonomy of processing level developed by Marzano [11, 18]. The level of processing used to measure concept mastery are generalization, decision making, problem solving, and experimenting. The five processes developed in germane load instrument is in accordance with the demand of Indonesian qualification framework for undergraduate level in Biology subject, which are applying biological concept to contextual setting, solving problems, adapting to dynamic situations, formulating procedural solution for problems, and performing decision making based on data and information.

The data would then analyzed quantitatively on the components that lower cognitive load by conducting T-test on the average decrease of cognitive load between experimental and control classes, correlation test between the components of cognitive load on experimental and control classes and regression test between the component of cognitive load to obtain the information about which component influences students’ reasoning skill. The statistical measurement is done with the aid of Statistical Package for Social Science (SPSS) for Window 20. The final step of data analysis is the triangulation analysis by interpreting the result qualitatively and quantitatively to ensure whether the data support or “against” one another [19].

4 Result and Discussion
4.1. Instrument to measure Information Analysis Skill

The validity of information analysis skill instrument (intrinsic load) using factor analysis with SPSS 20 for Window shows the score of 0.612 – 0.741. This score shows validity of the instrument only if the coefficient correlation is greater than $\alpha 0.05 (22) = 0.413$. The result then shows that all items in the information analysis skill instrument has bigger coefficient than $\alpha 0.05$, indicating that the instrument is valid. Furthermore, the reliability test using Cronbach’s alfa statistical test shows the result as below:

<table>
<thead>
<tr>
<th>Cronbach's Alpha</th>
<th>Cronbach's Alpha Based on Standardized Items</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.711</td>
<td>.700</td>
<td>8</td>
</tr>
</tbody>
</table>

Table 4 shows that the value of Cronbach alfa is 0.711. Following the credibility criteria [20], it can be concluded that the instrument has high reliability with the score of 0.60 – 0.79. Thus, it can be concluded that the instrument has significant reliability and validity and is appropriate to measure students’ information analysis skill.

4.2. Instrument to measure mental effort in understanding learning material

Ensuring the validity and reliability of the instrument measuring mental effort needed in understanding learning material is needed to have a reliable and valid information about students’ mental effort when learning with integrated learning approach. The result of validity test shows the score of 0.732 – 0.780. This score shows the high validity of the instrument only if the coefficient correlation is greater than $\alpha 0.05 (22) = 0.413$. The result then shows that all items in the mental effort instrument has bigger coefficient than $\alpha 0.05$, indicating that the instrument is valid indicating a high validity of the instrument. Furthermore, the reliability test using cronbach’s alfa statistical test shows the result as below:

<table>
<thead>
<tr>
<th>Cronbach's Alpha</th>
<th>Cronbach's Alpha Based on Standardized Items</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.711</td>
<td>.700</td>
<td>8</td>
</tr>
</tbody>
</table>

Table 5 shows that the value of cronbach alfa is 0.765. Following the credibility criteria by Sujana (2002), it can be concluded that the instrument has high reliability with the score of 0.60 – 0.79. Thus, it can be concluded that the instrument has significant reliability and validity and is appropriate to measure students’ mental effort.

4.3. Instrument to measure reasoning skill

The validity and reliability of reasoning skill instrument is measured using item analysis with product moment correlation technique conducted by Anatext program. The result of validity test shows the score of 0.72 while the reliability score is 0.84. This indicates that the instrument is valid and reliable to measure students’ mental effort, thus the instrument is appropriate to be used in this study. In addition, the instrument is also tested by item difficulty test, which generated score between 0.00 – 0.83. The definition of difficulty percentage category is shown in table 6.
Table 6. Percentage of item difficulty on Mental effort instrument

<table>
<thead>
<tr>
<th>Score</th>
<th>Percentage</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00 – 0.30</td>
<td>24%</td>
<td>Low</td>
</tr>
<tr>
<td>0.30 – 0.70</td>
<td>72%</td>
<td>Medium</td>
</tr>
<tr>
<td>0.70 – 1.00</td>
<td>8%</td>
<td>High</td>
</tr>
</tbody>
</table>

The result shows that 4% of the items in mental effort instrument are considered hard, 6% is medium, and 32% is easy.

The students’ cognitive load in this study is analyzed based on their ability to analyze information for intrinsic load, mental effort in understanding learning material for extraneous load, and reasoning skill for germane load. Students’ intrinsic load is considered as low when they obtain high score in information analysis. On the contrary, the extraneous load is considered low when they have low mental effort. Meanwhile, the germane load is considered low when students obtain high score in reasoning skill.

The result of statistical analysis on cognitive load in control and experimental classes shows that students in experimental class have lower cognitive load than students in the control class. The result is shown in Table 7.

Table 7. Cognitive load in Experimental and Control Class

<table>
<thead>
<tr>
<th>Cognitive Load</th>
<th>Experimental Class</th>
<th>Control Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information analysis skill (intrinsic load)</td>
<td>3.2</td>
<td>2.5</td>
</tr>
<tr>
<td>Mental effort (extraneous load)</td>
<td>0.28</td>
<td>0.32</td>
</tr>
<tr>
<td>Reasoning skill (germane load)</td>
<td>68.2</td>
<td>59.4</td>
</tr>
</tbody>
</table>

The Table 7 shows that the experimental class attain higher scores in information analysis skill and reasoning skill, indicating that the student in experimental class have lower intrinsic and germane load compared to students in control class. Likewise, the extraneous load of the experimental class is lower meaning that students in experimental need less mental effort than students in the control class to understand the same learning material.

The low the cognitive loads are attributed to the nested typed integrated learning with Marzano instructional framework which not only emphasis on thinking process but also create supportive learning environment for students to be involved in learning process. This specific characteristic of the learning approach leads to the low students’ cognitive loads when integrating plant structure and function. Furthermore, this study also combining the specific characteristics of the learning approach with a strategy that considering the natural design of students’ cognitive structure that is the limitation of working memory and the system of long-term memory that store information as cognitive scheme [21, 22].

The development of strategy in nested typed integrated learning with Marzano instructional framework follows the statement that a thinking skill program is an approach designed in a structured manner and identical with cognitive learning development [23]. The development of learning attitude and engagement would motivate students to be actively involved in learning process, thus, students would feel at ease in understanding learning material because the topic is meaningful for solving everyday problems. The students would understand that learning about plant structure is helpful to support them in learning plant function resulting in better learning attitude and greater interest. Furthermore, the utilization of prior knowledge has significant impact on lowering intrinsic processing for three reasons.
First, students are facilitated to organize information about plant structure which is relevant with the plant function, thus, students are challenged to relate their learning process with the knowledge they have previously learnt leading to the construction of cognitive schemes in students’ long-term memory. Second, the process of constructing cognitive scheme by relating plant structure and function leads to integrated comprehension of the learning material as the students now understand that the knowledge about plant structure is important in learning about plant structure. Lastly, the learning process deliberately develops cognitive schemes because students are facilitated to relate the newly learned information with the knowledge stored as schemes in the long-term memory, leading to wider and deeper knowledge gained in understanding plant physiology topic [2]. For instance, after students relating plant structure and function, they are led to connect their knowledge with the influence of plant environment on plant adaptation. This process follows the notion that prior knowledge does not only influence the process of learning new concept but also influence students’ perception and engagement in learning [24].

To further understand the relation between the three components of cognitive load, a correlational test is conducted which result is shown in Table 8.

<table>
<thead>
<tr>
<th>No</th>
<th>Correlation</th>
<th>Correlation coefficient ($r^2$)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Experiment class</td>
<td>Control class</td>
</tr>
<tr>
<td>1</td>
<td>Intrinsic load and germane load</td>
<td>0.899</td>
<td>0.785</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$r = 0.95$</td>
<td>$r = 0.89$</td>
</tr>
<tr>
<td>2</td>
<td>Extraneous load and germane load</td>
<td>-0.684</td>
<td>-0.825</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$r = 0.83$</td>
<td>$r = 0.91$</td>
</tr>
<tr>
<td>3</td>
<td>Intrinsic load and extraneous load</td>
<td>-0.837</td>
<td>-0.689</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$r = 0.91$</td>
<td>$r = 0.83$</td>
</tr>
</tbody>
</table>

The result shows that the three components of cognitive load have significant correlations with value of $p = 0.00*<0.01$. The correlation of germane load in experiment class is greater influenced by intrinsic load ($r^2 = 0.899$) than by the extraneous load ($r^2 = 0.684$). Meanwhile in the control class, the germane load is greater influenced by extraneous load ($r^2 = 0.825$) than by intrinsic load ($r^2 = 0.786$). This positive correlation between intrinsic and germane load implies that information analysis skill is proportionally related with reasoning skill. On the contrary, the negative correlation between extraneous load and germane load indicates that the students’ reasoning skill is inversely related to mental effort. Likewise, the negative correlation between intrinsic load and extraneous load shows that the lower student mental effort, the better their ability in analyzing information.

Furthermore, the determination coefficient ($r$) between intrinsic and germane load in experimental class is 0.95, while in control class in 0.89. This shows that 95% of students’ reasoning skill in experimental class is influenced by information analysis skill, whereas in the control class, the influence is at 89%. Likewise, the determination coefficient between extraneous load and germane load in experimental class is 0.83 compared to 0.91 in control class. This indicates the mental effort is influence 83% of students reasoning skill in experimental class and 91% in control class due to the learning approach. Moreover, the determination between intrinsic and extraneous load in experimental class is 0.91 while in control class in 0.83. This means that 91% of students’ information analysis skill in experiment class and 83% in the control class is influenced by students’ mental effort emerged due to the learning approach. Thus, it can be concluded that intrinsic load and extraneous load effect the development of students’ reasoning (germane load) because the
cognitive capacity of students enabling them to invest their knowledge about relation between plant structure and function in their cognitive schemes. The students with low reasoning score have high mental effort as well as low information processing skill. On the contrary, students with high reasoning skill have low mental effort and high information analysis skill.

The intrinsic and extraneous load significantly influence germane load [5]. The regression equation between the three components of cognitive load in experimental class is \( \hat{y} = 49.4 + 9.1 x_1 - 3.95 x_2 \), meanwhile in the control class is \( \hat{y} = 60.4 + 11.3 x_1 - 9.76 x_2 \). The regression equation in the experimental class shows that the comparison between information analysis skill \( x_1 \) and mental effort \( x_2 \) has greater comparison compared to the control class. Therefore, in the experimental class, the increasing complexity of learning material which influence mental effort and intrinsic processing in working memory has insignificant effect to germane load because students already have cognitive schemes which lower load in working memory while processing information. On the contrary in control class, the increasing complexity of learning material significantly influence mental effort due to the process of cognitive scheme construction which relies greatly on the lecturers’ explanation rather than active involvement of students. This results in overcapacity in working memory in processing information due to the lack of synergy between working memory and long-term memory [25, 26]. The graph of regression equation of the experimental and the control classes are shown in Figure 1.

![Figure 1. Regression graph of experimental and control classes](image)

On the Figure 1, it can be seen that students reasoning skill is influenced by information analysis skill and mental effort. In regards to the data in table 2, the germane load in experimental class is influenced greater by intrinsic load ( \( r = 0.95 \) ) than by extraneous load ( \( r = 0.83 \) ), while in the germane load in control class is greater influenced by extraneous load ( \( r=0.91 \) ) than by intrinsic load (0.89). This means that the decrease in germane load is better to be influenced by the decrease in intrinsic load than the decrease in extraneous load. This explains why the construction of students’ cognitive schemes is better when being influenced by information analysis skill than mental effort. This finding is supported by regression test shown in Figure 1. The regression graph for the experiment class shows the existence of a significant increase in information analysis skill compared to that in the control class.
Moreover, in the experimental class, it is clearly observed that as students’ information analysis skill develops, the students’ reasoning skill is also increasing. However, it is not the case for the control class showing that the decrease in mental effort does not positively effect students’ reasoning skill.

5 Conclusion

The study of measurement of cognitive load components shows that the measurement of information analysis skill is sensitive to the method of lowering intrinsic processing (utilization of prior knowledge) and the attitude scale is sensitive to the method of lowering extraneous load (development of positive attitude and perception) which are reflected in the result of reasoning skill test. According to the data analysis, it is also discovered that the difference in the measurement of cognitive load has a significant correlation to one another. This finding is consistent with triarchic theory of the cognitive load wherein the different aspects of cognitive load should be treated with different method of measurement.

References


Sweller J, Sweller S. Natural information processing systems. Evolutionary Psychology 2006; 4: 147470490600400130.
The Effect of Family Ownership on Corporate Social Responsibility with Cost of Capital as Moderating

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Abstract. This study examines the effect of family ownership on the disclosure of corporate social responsibility (CSR). CSR in this study was proxied using GRI G4 disclosure items as many as 91 items. Meanwhile, family ownership is measured using the percentage of family ownership. In addition, this study also adds a moderating effect of the variable cost of capital which is proxied using the cost of debt. The population of this study are mining companies listed on the Indonesian stock exchange, as many as 56 companies with the year of observation from 2016 to 2020. The selected sample is 50 companies so that the observation data is 250 data. Hypothesis testing using panel regression analysis using the interaction model. The results show that family ownership has a positive effect on the extent of CSR disclosure, but it is not proven that the cost of debt can be a moderator in the effect of family ownership and CSR disclosure.

Keywords: CSR; Capital; Family Ownership

1 Introduction

The practice of implementing CSR (Corporate Social Responsibility) by companies in Indonesia is still an interesting topic to research. Although the Indonesian government has required companies to disclose CSR information in their annual reports. The results of research by Djajadikerta & Trireksani (2012) provide evidence that the level of CSR disclosure made by Indonesian companies is relatively low and the nature of the disclosure is mostly descriptive. The results of this study illustrate that in Indonesia, CSR practices are still in the early stages and companies still do not understand the importance of CSR. In East Asia, Indonesia ranks relatively high in terms of concentrated firms and firms under family control (Claessens, Djankov, Lang, & Kong, 2000). Several studies have proven that CSR information disclosure practices are also influenced by the form of company ownership, especially family ownership (Cabeza-garcia, Sacristán-navarro, & Gómez-ansón, 2017; El Ghoul, Guedhami, Wang, & Kwok, 2016; Elliott & Jacobson , 1994; Rees & Rodionova, 2014). Research by Rees & Rodionova (2014) and El Ghoul, Guedhami, Wang, & Kwok (2016) proves that in the Asian region, Indonesian companies under family control tend to have low CSR performance. The results of this study indicate a negative influence between companies with family ownership and CSR performance. Poor CSR performance in family-controlled companies has serious agency problems. This is in line with the research of Cabeza-garcia, Sacristán-navarro, & Gómez-ansón (2017) which provides evidence that both family ownership and/or power of
family members in a company have a negative effect on the company's commitment to provide CSR information.

In contrast to the results of research by Dyer & Whetten (2006) and Berrone, Cruz, Gomez-Mejia, & Larraza-Kintana (2010) that there is a positive influence between companies under family control and CSR performance. This is because family companies prioritize their reputation in front of shareholders. Family companies have the view that this reputation impact not only affects the company's performance but also the company's name. According to Kim et al. (2012) managers can use CSR information to improve the company's reputation and limit its opportunistic behavior. Family owners and managers also position the company as part of themselves so that when the company's reputation is not good, they will feel hurt.

The inconsistency of some of the results of these studies motivates researchers to re-examine the effect of family ownership on CSR in family companies in Indonesia. In addition, the development in this study is to add a moderating effect, namely the variable cost of capital which is proxied by the cost of debt. According to Bhuiyan (2018), the cost of debt can decrease when CSR disclosure is presented more broadly. This results in lower investment risk as well. Researchers chose the research year 2016 to 2020 and used the latest CSR practice guidelines, namely GRI G4 and disclosed in sustainability reporting. The GRI G4 guidelines are also used by researchers as a measure of the level of CSR disclosure by family companies. Meanwhile, family ownership in this study was measured using the percentage level of common stock ownership owned by family members (Wang, 2006). In addition, this study also adds a moderating effect, namely the cost of capital which is proxied using the cost of debt using the measurement of Francis et al. (2005).

As we know that by presenting CSR disclosures, corporate image can increase, a high corporate image will reduce company risk and information asymmetry. The company's low risk and small information asymmetry will attract investors to invest their capital in the company, so the company does not need to spend more to attract investors to invest so that it can reduce the company's cost of capital (Ariyani, 2013). When CSR disclosure is wider, it can further reduce the cost of debt (Bhuiyan & Nhung, 2019). Xu (2014) also explained that the wider the CSR disclosure made by the company is a signal given to investors, it will reduce transaction costs and risks assigned by investors to the company so as to reduce the company's cost of capital.

2 Methodology

The population in this study are mining companies listed on IDX from 2016 to 2020, which are 56 companies. The sample selection in this study was carried out using the slovin formula with quota sampling technique. The selected sample is 50 companies with 5 years of observation so that the number of observations is 250 data. Secondary data is used in this study by downloading the Sustainability reporting and Annual Report through the website of each company.

2.1. Variable Operations
2.1.1 Corporate Social Responsibility

The measurement of CSR as the dependent variable in this study uses a content analysis technique with reference to the GRI G4 indicators covering economic, social and environmental aspects. The researcher assigns a score of "1" to companies that provide...
information related to these CSR indicators and "0" if they do not provide such information. Furthermore, after giving the score, the researcher added and averaged the scores. The average CSR value of each company is used to find out how much the company discloses its CSR activities to the public.

2.1.2. Family Ownership
Referring to Wang (2006), the measurement of family ownership in this study uses the percentage of common stock ownership by members of the founding family. The large percentage of ownership is able to describe the voting power possessed by family members in decision making.

2.1.3. Cost of Capital
Cost of capital in this study is proxied using Cost of debt capital (COD) is the interest rate that must be paid by the company on its loans. The following formula for calculating COD refers to Francis et al. (2004).

\[ \text{COD}_t = \frac{r_d t (1 - T_1)}{SD_t - LD_t} \]

Note: CODt is Cost of debt capital for year t; rdt is interest expense for year t; T1 is the rate of tax paid for year t; SDt is short-term debt for year t; and LDt is long-term debt for year t.

2.2. Research Model Test
This study presents the formulation of the hypothesis as follows:
H1: The percentage of family ownership has a positive effect on CSR disclosure
H2: The effect of family ownership on CSR disclosure is moderated by the cost of debt

The first stage of testing in this study is to test the classical assumptions in this study, namely normality test, multicollinearity test, heteroscedasticity test and autocorrelation test. Furthermore, the data analysis to test the hypothesis in this study is panel regression analysis using the Eviews 12 analysis tool. The first regression test was conducted to examine the effect of the percentage of family ownership on CSR disclosure. Meanwhile, the second test examines the moderating effect, namely the cost of debt on the effect of the percentage of family ownership on CSR disclosure.
Model A (without interaction)
CSR$_i$ = $\alpha$ + $\beta_1$FO$_i$ + $\beta_2$COD$_i$ + e

Information:
$\alpha$ = Constant
CSR$_i$ = CSR disclosure item score divided by the number of GRI G4 standards
FO$_i$ = percentage of family ownership
COD$_i$ = cost of debt
FO$_i$ * COD$_i$ = interaction of family ownership and cost of debt
$\beta_1$, $\beta_2$, $\beta_3$ = regression coefficient
e = error

Model B (with interaction)
CSR$_i$ = $\alpha$ + $\beta_1$FO$_i$ + $\beta_2$COD$_i$ + $\beta_3$FO$_i$ * COD$_i$ + e

3 Result and Discussion

Table 1 shows the statistical descriptive analysis for each variable used in this study. The number of observations processed in this study was 250 data using data from mining companies in Indonesia.

Table 1. Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>CSR</th>
<th>FO</th>
<th>COD</th>
<th>COD x FO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.431793</td>
<td>0.056156</td>
<td>-1.83E+10</td>
<td>-1.75E+09</td>
</tr>
<tr>
<td>Median</td>
<td>0.428571</td>
<td>0.000000</td>
<td>-4714.995</td>
<td>0.000000</td>
</tr>
<tr>
<td>Maximum</td>
<td>0.747253</td>
<td>0.542000</td>
<td>8.00E+11</td>
<td>7.93E+10</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.098901</td>
<td>0.000000</td>
<td>-3.82E+12</td>
<td>-7.52E+11</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>0.174673</td>
<td>0.117545</td>
<td>3.68E+11</td>
<td>4.86E+10</td>
</tr>
<tr>
<td>Observations</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>250</td>
</tr>
</tbody>
</table>

CSR = corporate social responsibility; FO = Family Ownership; COD = Cost of Debt; COD x FO = Interaksi cost of debt dan family ownership

After going through several stages of classical assumptions, namely normality test, multicollinearity test, heteroscedasticity test and autocorrelation test and passed for all of the classical assumptions, the researcher then entered the analysis stage of model selection using the help of EViews 12 software. Right between Common Effect, Fixed Effect and Random Effect models. Based on the Chow test, the Common Effect model was chosen for this study. The results of panel data regression using common effects are shown in table 2.

Table 2. Regresi Data Panel

<table>
<thead>
<tr>
<th>Model A (without interaction)</th>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C</td>
<td>0.394553</td>
<td>0.011007</td>
<td>35.84690</td>
<td>0.0000*</td>
</tr>
<tr>
<td></td>
<td>FO</td>
<td>0.668725</td>
<td>0.084581</td>
<td>7.906330</td>
<td>0.0000*</td>
</tr>
</tbody>
</table>
CSR = corporate social responsibility; FO = Family Ownership; COD = Cost of Debt; COD x FO = Interaksi cost of debt dan family ownership

Model A examines the effect of the percentage of family ownership on CSR disclosure. Based on table 2, the family ownership variable shows p value <0.05 with a t-stat of 7.906330 which has a positive direction which means that there is a positive influence between CSR disclosure and the percentage of family ownership. These results support the first hypothesis in this study.

The results of this study support the research of Dyer & Whetten (2006), Berrone, Cruz, Gomez-Mejia, & Larraza-Kintana (2010), Kim et al. (2012) and Hariadi et al. (2020) that family companies that tend to prioritize the company's reputation will use information on CSR as a company's strength to show its reputation in front of shareholders and the public. And this CSR is also able to cover up opportunistic behavior carried out by family members.

Model B in this study examines the effect of the percentage of family ownership on CSR moderated by COD. Table 2 shows that the R square value of Model A to Model B has an increase of 0.002191. This means that the COD variable is able to moderate the effect of the percentage of family ownership on CSR disclosure but is not supported by the acquisition of the COD * FO p value of 0.4118 meaning p value > 0.05. Therefore, it can be interpreted that the interaction of the cost of debt as a moderator is not able to moderate the relationship between the percentage of family ownership and CSR disclosure so that the second hypothesis in this study is not supported.

The results of this study are in line with Yeh et al (2019) that high CSR performance is not accompanied by an increase in COD. Most of the low COD is shown in companies that have a high level of CSR performance. Creditors will provide a low cost of capital when the company is able to provide good CSR performance. In this study, it is similar that the extent of CSR disclosure made by family companies is not supported by the low cost of debt received by the company.
4 Conclusion

The conclusions that can be drawn in this study are first, the percentage of family ownership is able to encourage companies to disclose their CSR information more broadly. Family companies will try to improve the company's image by presenting CSR information that is seen as being able to benefit the company by increasing its reputation. In addition, family members and management within the company consider the company as part of themselves so that they will do their best to maintain the company's reputation even though the costs are high.

Second, the cost of debt in this study does not affect CSR disclosure and the cost of debt is not able to moderate the effect of the percentage of family ownership on CSR disclosure. The high CSR disclosure shown by family companies in fact does not become a driving factor for creditors to reduce the cost of capital they provide. So that the extent of CSR information on family companies is only a small part influenced by the cost of debt and has no significant impact.

References


The Effect of Profitability, Leverage, and Inventory Intensity on Tax Aggressiveness with Majority Ownership as Moderating Variables

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Abstract. The purpose of this research is to know and analyze the influence of profitability, leverage, and inventory intensity on tax aggressiveness with majority ownership as a moderating variable. The research method used is an associative quantitative approach. The object of this research is the mining sector companies listed on the Indonesia Stock Exchange in 2017-2019. The sample used is the annual report of 41 companies in the mining sector using the quota sampling method. The data collection technique used documentation technique and the data analysis technique used multiple linear regression and Moderated Regression Analysis (MRA). The results showed that profitability, leverage, and inventory intensity simultaneously have significant effect on tax aggressiveness. Profitability and inventory intensity have a positive effect on tax aggressiveness, leverage has a negative effect on tax aggressiveness. Majority ownership moderates the effect of profitability and leverage on tax aggressiveness, and majority ownership does not moderate the effect of inventory intensity on tax aggressiveness.

Keywords: Tax Aggressiveness; Profitability; Leverage; Inventory Intensity; Majority Ownership

1 Introduction

The most important source of funding for the Indonesian economy is taxes. In the Law on General Tax Provisions Number 16 of 2009 Article 1 Paragraph 1, tax is a mandatory contribution to the state that is owed by an individual or entity that is coercive under the law, with no direct compensation and is used for the state's purposes for as much as possible. the prosperity of the people. The problem that is often familiar with the development of people's lives is the existence of taxation. Tax has its own meaning for the government and taxpayers. For companies, as taxpayers, taxes can be interpreted as a burden that can reduce profits. The greater the tax paid by the company, the greater the state revenue from the tax sector. So do not be surprised if various phenomena related to taxes occur, one of which is tax aggressiveness (Margie & Habibah, 2021) It is known that of the 41 mining sector companies listed on the Indonesia Stock Exchange in 2017- 2019, there are 39 companies or around 95% of mining sector companies with an average of tax aggressiveness, while only 2 companies do not tax aggressiveness or around 5%. These results are adjusted to the ETR value, where the calculation results refer to the research conducted by Lanis &
Richardson (2012). The ETR value that is close to zero indicates that the company has taken tax aggressiveness.

The purpose of this study is to find out, analyze, and provide empirical facts about the effect of profitability, leverage, and inventory intensity on tax aggressiveness and to obtain empirical evidence or facts about majority ownership can moderate the effect of profitability, leverage, and inventory intensity on tax aggressiveness.

2 Research Hypothesis:

- **H1**: Profitability, leverage, inventory intensity have a simultaneous effect on tax aggressiveness.
- **H2**: Profitability has a positive effect on tax aggressiveness.
- **H3**: Leverage has a negative effect on tax aggressiveness.
- **H4**: Inventory Intensity has a positive effect on tax aggressiveness.
- **H5**: Majority ownership moderates the effect of profitability on tax aggressiveness.
- **H6**: Majority ownership moderates the effect of leverage on tax aggressiveness.
- **H7**: Majority ownership moderates the effect of inventory intensity on tax aggressiveness.

3 Methodology

The population in this study are mining sector companies listed on the Indonesia Stock Exchange (IDX) for the 2017-2019 period taken from the official website www.idx.co.id. The sample taken must be representative, meaning that all population characteristics should be reflected in the selected sample. To determine the number of samples in this study, it was calculated using the Slovin formula with an error rate of 5%, then sampling was carried out using the quota sampling technique. The following are the results of selecting samples that have met the criteria in the study:

<table>
<thead>
<tr>
<th>C</th>
<th>Number of Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining companies listed on the Indonesia Stock Exchange (IDX) in report period</td>
<td>51</td>
</tr>
<tr>
<td>Companies that do not publish complete financial reports and annual reports required during the research period</td>
<td>(6)</td>
</tr>
<tr>
<td>The company suffered losses during the research</td>
<td>(4)</td>
</tr>
<tr>
<td>Number of samples</td>
<td>41</td>
</tr>
<tr>
<td>Number of observations (41 x 3 Years)</td>
<td>123</td>
</tr>
</tbody>
</table>

The data collection technique in this study was carried out with documentation techniques. Documentation technique is data collection by processing pre-existing data.
3.1. Operational Variables

To make it easier to understand the operationalization of variables, it can be observed in the table below:

<table>
<thead>
<tr>
<th>Variables</th>
<th>Variables definition</th>
<th>Indicator</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tax Aggressiveness (Y)</td>
<td>Tax aggressiveness is the company's efforts to reduce the amount of tax burden that must be paid either legally (Tax Avoidance) or illegally (Tax Evasion) by taking advantage of loopholes in tax regulations. (Frank et al., 2009).</td>
<td>Effective Tax Rate:</td>
<td>an</td>
</tr>
<tr>
<td></td>
<td></td>
<td>‘Pajak’</td>
<td>‘Pajak’</td>
</tr>
<tr>
<td></td>
<td></td>
<td>‘Laba Sebelum Pajak’</td>
<td></td>
</tr>
<tr>
<td>Profitability (X1)</td>
<td>Profitability ratio is a ratio to assess the company's ability to seek profit. (Kasmir, 2017)</td>
<td>Return On Assets:</td>
<td>Ratio</td>
</tr>
<tr>
<td></td>
<td></td>
<td>‘Laba Bersih’</td>
<td>‘Total Aset’</td>
</tr>
<tr>
<td>Leverage (X2)</td>
<td>The leverage ratio is the ratio used to regulate the extent to which the company's activities are financed with debt. (Kasmir, 2017)</td>
<td>Debt to Asset Ratio:</td>
<td>Ratio</td>
</tr>
<tr>
<td></td>
<td></td>
<td>‘Total’</td>
<td>‘Kewajiban’</td>
</tr>
<tr>
<td>Inventory Intensity (X3)</td>
<td>Inventory is a number of goods stored by the company in one place (warehouse). Inventory intensity describes how much the company invests in inventory. (Andhari &amp; Sukartha, 2017).</td>
<td>Inventory Ratio:</td>
<td>Ratio</td>
</tr>
<tr>
<td></td>
<td></td>
<td>‘Total Persediaan’</td>
<td>‘Total Aset’</td>
</tr>
<tr>
<td>Majority Ownership (Modation)</td>
<td>Majority ownership can be interpreted as share ownership by parties who have a large percentage of non-public or public companies (Sari, 2017).</td>
<td>Dummy variable,</td>
<td>Nomi</td>
</tr>
<tr>
<td></td>
<td></td>
<td>where the value is 1 if the share ownership is above 50% and the value is 0 if the share ownership is</td>
<td></td>
</tr>
</tbody>
</table>

3.2. Descriptive Analysis

Descriptive analysis is used to explain the data description of the overall profitability, leverage, inventory intensity, and majority ownership variables in the study as seen from the minimum value, maximum value, average (mean) and standard deviation.

3.3. Verification analysis

The verification analysis used in this study uses the classical assumption test, namely normality test, heteroscedasticity test, autocorrelation test, and multicollinearity test. The analytical method used is multiple regression analysis and Moderate Regression Analysis (MRA).
4 Results and Discussion

4.1. Results

Table 3. Descriptive Statistics Test Results

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profitability</td>
<td>123</td>
<td>-0.579</td>
<td>0.456</td>
<td>0.04780</td>
<td>0.128391</td>
</tr>
<tr>
<td>Leverage</td>
<td>123</td>
<td>0.106</td>
<td>1.292</td>
<td>0.52585</td>
<td>0.227733</td>
</tr>
<tr>
<td>Inventory Intensity</td>
<td>123</td>
<td>0.00002</td>
<td>0.319</td>
<td>0.06034</td>
<td>0.056926</td>
</tr>
<tr>
<td>Tax Aggressiveness</td>
<td>123</td>
<td>-3.443</td>
<td>3.551</td>
<td>0.20598</td>
<td>0.695622</td>
</tr>
<tr>
<td>Majority Ownership</td>
<td>123</td>
<td>0.000</td>
<td>1.000</td>
<td>0.60163</td>
<td>0.491566</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>123</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Output IBM Statistic SPSS 25

Based on Table 3, it can be concluded that the profitability variable with a sample size (N) of 123 has a minimum value of -0.579 units and a maximum value of 0.456 units. The average value (mean) of profitability is 0.0478 units and the standard deviation is 0.128391 units which indicates that the data deviation from the standard deviation is relatively larger than the average value. The leverage variable with the number of samples (N) 123 has a minimum value of 0.106 units and a maximum value of 1.292 units. The average value (mean) of leverage is 0.52585 units and the standard deviation is 0.227733 units which indicates that the data deviation from the standard deviation is relatively smaller than the average value. Inventory intensity variable with the number of samples (N) 123 has a minimum value of 0.000002 units and a maximum value of 0.319 units. The average value (mean) of inventory intensity is 0.06034 units and the standard deviation is 0.056926 units which indicates that the deviation of the data from the standard deviation is relatively smaller than the average value. The tax aggressiveness variable with a sample size (N) of 123 has a minimum value of -3.443 units and a maximum value of 3.551 units. The average value (mean) of tax aggressiveness is 0.20598 units and the standard deviation is 0.695622 units which indicates that the deviation of the data from the standard deviation is relatively larger than the average value. The majority ownership variable with a sample (N) of 123 has a minimum value of 0 and a maximum value of 1. The values of the minimum and maximum are obtained from the results of the dummy variable, where the value is 0 if it does not have a share ownership percentage above 50% and the value is 1 if have a share ownership percentage above 50%. The average value (mean) of majority ownership is 0.60163 and the standard deviation is 0.491566 which indicates that the deviation of the data from the standard deviation is relatively smaller than the average value.
4.2. Classic assumption test

Table 4. Recapitulation of Classical Assumption Test Results

<table>
<thead>
<tr>
<th>Variables</th>
<th>Normality</th>
<th>Heteroscedasticity (2-tailed)</th>
<th>Autocorrelation</th>
<th>Multicollinearity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Asymp. Sig.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROA</td>
<td>.145</td>
<td>.198</td>
<td>5.059</td>
<td></td>
</tr>
<tr>
<td>LEV</td>
<td>.062</td>
<td>.406</td>
<td>2.462</td>
<td></td>
</tr>
<tr>
<td>INSITY</td>
<td>.195</td>
<td>.268</td>
<td>3.731</td>
<td></td>
</tr>
<tr>
<td>Moderasi</td>
<td>.807</td>
<td>.191</td>
<td>5.248</td>
<td></td>
</tr>
<tr>
<td>Moderasi</td>
<td>.465</td>
<td>.313</td>
<td>3.191</td>
<td></td>
</tr>
<tr>
<td>Moderasi</td>
<td>.200</td>
<td>.268</td>
<td>3.731</td>
<td></td>
</tr>
</tbody>
</table>

Source: Output IBM Statistic SPSS 25

Based on Table 4, it shows a significant value of the normality test of 0.200 which indicates that Asymp. Sig (2 tailed) is greater than 0.05, this means that the residual data is normally distributed and the regression model meets the normality test. The results of the heteroscedasticity test through the glejser test can be seen that sig. on each variable is worth more than 0.05 or 5%. It can be concluded that in this regression model there are no symptoms of heteroscedasticity. The results of the autocorrelation test showed that the Durbin-Watson value was 2.204, this value was then compared with the table DW value using a significance value of 5%, the number of samples was 123 (N) and the number of independent variables was 3 (k=3). It is known that the DW value of 2.204 is greater than the upper limit (dU) 1.7536 and less than 4 – 1.7536 (4 – dU) (1.7536 < 2.204 < 2.2464), so it can be concluded that there is no autocorrelation. The results of the multicollinearity test for each variable indicate that the tolerance value is > 0.1 and VIF < 10. So it can be concluded that the independent variables in this study are not correlated with each other or it can be said that there are no symptoms of multicollinearity between variables. Based on the results of the four classical assumption tests, it can be concluded that this research is feasible to continue.

4.3. Multiple Regression Analysis

Table 5. Multiple Regression Analysis Results

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Coefficients Standardized</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>.1250</td>
</tr>
<tr>
<td></td>
<td>ROA</td>
<td>1.275</td>
</tr>
<tr>
<td></td>
<td>LEV</td>
<td>-.143</td>
</tr>
<tr>
<td></td>
<td>INSITY</td>
<td>.6890</td>
</tr>
</tbody>
</table>

Based on Table 5 above, it can be developed using the multiple linear regression equation model as follows:

\[ \text{ETR} = 0.125 \times 1 + 1.275\times \text{ROA} - 0.143 \times \text{LEV} + 0.6890 \times \text{INSITY} + \varepsilon \]
The constant value in the above equation is 0.1250 which indicates that when the overall predictor variables (profitability, leverage, and inventory intensity) are equal to zero, the tax aggressiveness is 0.1250 units. The regression coefficient value of the profitability variable shows a positive result of 1.275, meaning that if the profitability increases by one unit while the leverage and inventory intensity variables remain, then the tax aggressiveness increases by 1.275 units. A positive coefficient means that there is a unidirectional relationship between profitability and tax aggressiveness. The regression coefficient value of the leverage variable shows a negative result of -0.143, meaning that if the leverage increases by one unit while the profitability and inventory intensity variables remain, the tax aggressiveness decreases by -0.143 units. A negative coefficient means that there is a unidirectional relationship between leverage and tax aggressiveness. The regression coefficient value of the inventory intensity variable shows a positive result of 0.689, meaning that if the profitability has increased by one unit while the profitability and leverage variables remain, the tax aggressiveness has increased by 0.689 units. A positive coefficient means that there is a unidirectional relationship between inventory intensity and tax aggressiveness.

4.4. Moderated Regression Analysis – MRA

Table 6. Results of Moderated Regression Analysis – MRA

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Coefficients Standardized</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>1 (Constant)</td>
<td>.083</td>
<td>.040</td>
</tr>
<tr>
<td>ROA</td>
<td>2.030</td>
<td>.035</td>
</tr>
<tr>
<td>LEV</td>
<td>-1.199</td>
<td>.078</td>
</tr>
<tr>
<td>INSITY</td>
<td>.709</td>
<td>.215</td>
</tr>
<tr>
<td>Moderasi KM_ROA</td>
<td>-0.769</td>
<td>.037</td>
</tr>
<tr>
<td>Moderasi KM_LEV</td>
<td>.227</td>
<td>.167</td>
</tr>
</tbody>
</table>

Source: Output IBM Statistic SPSS 25

Based on Table 6 above, it can be developed using the equation model of moderated regression analysis as follows:

\[
ETR = 0.083 + 2.030\text{ROA} - 0.159\text{LEV} + 0.709\text{INSITY} - 0.769\text{KM_ROA} + 0.227\text{KM_LEV} + 0.314\text{KM_INSITY} + \varepsilon
\]

The moderated regression analysis equation shows that the direction of each independent variable on the dependent variable and also the moderating variable if the coefficient is positive, there is a unidirectional relationship between profitability and tax aggressiveness.

The constant value in the above equation is 0.083 which indicates that when the overall predictor variables (profitability, leverage, inventory intensity, majority ownership moderates profitability, majority ownership moderates leverage, and majority ownership moderates inventory intensity) is equal to zero, then tax aggressiveness is 0.083 unit. The regression coefficient value of the profitability variable shows a positive result of 2.030, meaning that if profitability has increased by one unit while the variable leverage, inventory intensity, majority ownership moderates profitability, majority ownership moderates leverage,
and majority ownership moderates inventory intensity remains, then tax aggressiveness increases by 2,030 units. The regression coefficient value of the leverage variable shows a negative result of -0.159, meaning that if the leverage has increased by one unit while the profitability variable, inventory intensity, majority ownership moderates profitability, majority ownership moderates leverage, and majority ownership moderates inventory intensity remains, then tax aggressiveness decreases by -0.159 units. The regression coefficient value of the inventory intensity variable shows a positive result of 0.709, meaning that if the inventory intensity increases by one unit while the profitability, leverage, majority ownership variables moderate profitability, majority ownership moderates leverage, and majority ownership moderates inventory intensity remains, then tax aggressiveness increases by 0.709 unit.

The regression coefficient value of the majority ownership variable moderating profitability shows a negative result of -0.769, meaning that if moderated profitability, majority ownership increases by one unit while the profitability, leverage, inventory intensity variables, majority ownership moderates leverage, and majority ownership moderates inventory intensity remains, then tax aggressiveness suffers a decrease of -0.769 units. The regression coefficient value of the majority ownership variable moderating leverage shows a positive result of 0.227, meaning that if leverage is moderated, majority ownership increases by one unit while the profitability, leverage, inventory intensity variables, majority ownership moderates profitability, and majority ownership moderates inventory intensity remains, then tax aggressiveness increases of 0.227 units. The regression coefficient value of the majority ownership variable moderating inventory intensity shows a positive result of 0.314, meaning that if the inventory intensity is moderated, the majority ownership increases by one unit while the profitability, leverage, inventory intensity variables, majority ownership moderates profitability, and majority ownership moderates fixed leverage, then tax aggressiveness suffers an increase of 0.314 units.

4.5. Coefficient of Determination

Table 7. Coefficient of Determination Test Results

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.746a</td>
<td>0.556</td>
<td>0.504</td>
<td>0.093816</td>
</tr>
</tbody>
</table>

Source: Output IBM Statistic SPSS 25

Based on the results in Table 7, the Adjust R-square value is 0.504 or 50.4%. This amount means that the variables of profitability, leverage, and inventory intensity can explain 50.4% of the tax aggressiveness variable. While 49.6% is influenced by other variables such as liquidity, sales growth, corporate social responsibility, company size, capital intensity and other things.
4.6. Simultaneous Test (F Test)

Table 8. Simultaneous Test Results

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>0.563</td>
<td>6</td>
<td>0.094</td>
<td>10.657</td>
<td>0.000b</td>
</tr>
<tr>
<td>Residual</td>
<td>0.449</td>
<td>51</td>
<td>0.009</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1.012</td>
<td>57</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Output IBM Statistic SPSS 25

Based on Table 8 above, it can be seen that the calculated F value is 10.657 with a sig value of 0.000. By calculating the F table value at a significant level of 0.05 with df2 (nk-1) df2 = 123-3-1 = 119 the results are obtained for Fcount > Ftable (10.657 > 2.68) and a significance value < 0.05 means Ho is rejected and Ha accepted. So it can be concluded that hypothesis 1 is accepted and profitability, leverage, and inventory intensity have a simultaneous effect on tax aggressiveness.

4.7. Partial Test (t Test)

Table 9. Partial Test Results Without Moderating Variables

<table>
<thead>
<tr>
<th>Model</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Constant)</td>
<td>3.012</td>
<td>0.004</td>
</tr>
<tr>
<td>ROA</td>
<td>6.787</td>
<td>0.000</td>
</tr>
<tr>
<td>LEV</td>
<td>-2.257</td>
<td>0.028</td>
</tr>
<tr>
<td>INSITY</td>
<td>3.226</td>
<td>0.002</td>
</tr>
</tbody>
</table>

Source: Output IBM Statistic SPSS 25

The Effect of Profitability on Tax Aggressiveness

Based on Table 9, testing the profitability variable on tax aggressiveness before the moderating variable resulted in a t count statistic of 6.787. For the t table value at significance = 0.05 with df (n- k) = 123 – 3 = 120, the table value is 1.658. If the t count value is compared with the table value, then tcount > ttable (6.787 > 1.658) with a significance value of 0.000 < 0.005 meaning Ho is rejected and Ha is accepted. So it can be concluded that profitability has a positive and significant effect on tax aggressiveness.

The Effect of Leverage on Tax Aggressiveness

Based on Table 9, the test of the leverage variable on tax aggressiveness before the moderating variable resulted in the t-statistical value of -2.257. For the t table value at significance = 0.05 with df (n-k) = 123 – 3 = 120, the ttable value is -1.658. If we compare the value of tcount with the value of ttable, then tcount < ttable (-2.257 <-1.658) with a significance value of 0.028 <0.005 meaning Ho is rejected and Ha is accepted. So it can be concluded that leverage has a negative and significant effect on tax aggressiveness.
Influence of Inventory Intensity on Tax Aggressiveness

Based on Table 9, testing the inventory intensity variable on tax aggressiveness before the moderating variable resulted in a tcount statistic of 3.226. For the ttable value at significance = 0.05 with df (n-k) = 123 – 3 = 120, the ttable value is 1.658. When compared with the tcount value with the ttable value, tcount > ttable (3.226 > 1.658) with a significance value of 0.002 < 0.005 meaning Ho is rejected and Ha is accepted. So it can be concluded that inventory intensity has a positive and significant effect on tax aggressiveness.

<table>
<thead>
<tr>
<th>Model</th>
<th>T</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>2.063</td>
<td>.044</td>
</tr>
<tr>
<td>ROA</td>
<td>5.753</td>
<td>.000</td>
</tr>
<tr>
<td>LEV</td>
<td>-2.042</td>
<td>.046</td>
</tr>
<tr>
<td>INSITY</td>
<td>3.304</td>
<td>.002</td>
</tr>
<tr>
<td>Moderasi KM_ROA</td>
<td>-2.033</td>
<td>.047</td>
</tr>
<tr>
<td>Moderasi KM_LEV</td>
<td>2.354</td>
<td>.034</td>
</tr>
<tr>
<td>Moderasi KM_INSITY</td>
<td>5.590</td>
<td>.558</td>
</tr>
</tbody>
</table>

Source: Output IBM Statistic SPSS 25

The Effect of Profitability on Tax Aggressiveness with Majority Ownership as Moderating

Based on Table 10, the majority ownership variable in moderating profitability has a significance value of 0.047. This shows that the level of significance is smaller than the standard error (0.047 < 0.05). It can be concluded that majority ownership is able to moderate the effect of profitability on tax aggressiveness, thus hypothesis 5 is accepted.

The Effect of Leverage on Tax Aggressiveness with Majority Ownership as Moderating

Based on Table 10, the majority ownership variable in moderating leverage has a significance value of 0.034. This indicates that the level of significance is smaller than the standard error (0.034 < 0.05). It can be concluded that majority ownership is able to moderate the effect of leverage on tax aggressiveness, thus hypothesis 6 is accepted.

Influence of Inventory Intensity on Tax Aggressiveness with Majority Ownership as Moderating

Based on Table 10, the majority ownership variable in moderating inventory intensity has a significance value of 0.558. This indicates that the level of significance is greater than the standard error (0.558 > 0.05). It can be concluded that majority ownership is not able to moderate the effect of inventory intensity on tax aggressiveness, thus hypothesis 7 is rejected.

5 Discussion

The Effect of Profitability, Leverage, and Inventory Intensity on Tax Aggressiveness

Based on the results of the F (simultaneous) test, it shows that profitability, leverage, and inventory intensity simultaneously have a significant effect on tax aggressiveness.
Simultaneously, profitability, leverage, and inventory intensity can be used to plan companies to take tax aggressive actions to reduce deferred tax costs.

Based on the results of the analysis obtained from the determination test, it shows that profitability, leverage, and inventory intensity contribute or influence 50.4% to tax aggressiveness, while 49.6% is influenced by other variables such as liquidity, sales growth, corporate social responsibility, size company, capital intensity and other things.

This is supported by the results of research by Luke & Zulaikha (2016); Windaswari & Merkusiwati (2018); Ayem & Setyadi (2019); and Maulana (2020) which states that profitability, leverage, and inventory intensity simultaneously have a significant effect on tax aggressiveness.

The Effect of Profitability on Tax Aggressiveness

The results of the t test show that profitability has a positive and significant effect on tax aggressiveness. Companies that have high profitability will reduce the total burden of tax obligations as a result have the opportunity to carry out tax planning. When the profit earned by the company is higher, the income tax payable and tax aggressiveness also increases, as a result the company will be more aggressive in conducting tax avoidance practices on its tax obligations. When the company receives high profits in the current period, the amount of tax paid will be higher. This condition can increase the tendency of companies to carry out tax aggressiveness.

The results of this study are supported by Napitu & Kurniawan (2016); Luke & Zulaikha (2016); Andhari & Sukartha (2017); and Dewi & Yasa (2020) which shows that profitability has a positive effect on tax aggressiveness.

The Effect of Leverage on Tax Aggressiveness

The results of the t test show that leverage has a negative and significant effect on tax aggressiveness. Companies that rely on debt to finance their operations have a high interest expense as well. This high interest expense can be used to deduct taxable income. The greater the company's debt, the smaller the taxable profit because the tax incentives on debt interest are getting bigger. The increased interest costs will have the effect of reducing the company's tax burden, as a result the tax imposed on the company will be low, so the company does not need to do earnings management for tax purposes. The results of this study support research conducted by Andhari & Sukartha (2017); Savitri & Rahmawati (2017); and Wulansari et al., (2020) who explained in their research that leverage has a negative effect on tax aggressiveness.

Influence of Inventory Intensity on Tax Aggressiveness

The results of the t-test indicate that inventory intensity has a positive and significant effect on tax aggressiveness. Inventory intensity describes how a company invests its wealth in inventory. Companies that have a high level of inventory will cause a waste of costs. These costs include storage costs and maintenance costs. Costs caused by high inventory levels will reduce profits, thereby reducing the tax burden. The high profit earned by the company will result in a high tax burden that must be borne in a period, resulting in the company increasingly taking tax aggressive actions as an effort to reduce the amount of the tax burden in that period.

This explanation is supported by research by Adisamartha & Noviari (2015); Luke & Zulaikha (2016); Yuliana & Wahyudi (2018); and Maulana (2020) who explained in their research that inventory intensity has a positive effect on tax aggressiveness.
The Effect of Profitability on Tax Aggressiveness with Majority Ownership as Moderating

The results of the interaction test show that the interaction variable between profitability and majority ownership has a significant effect on tax aggressiveness, thus majority ownership is able to moderate the effect of profitability on tax aggressiveness. Companies with high profitability have the opportunity to position themselves in tax planning, so they can reduce the tax burden that must be paid. When the condition of the company earns high profits, the higher the company's tendency to lower current profits into the future to reduce the high political costs. The greater the profit earned by the company, the higher the amount of income tax payable.

The existence of majority ownership causes disparities between management and shareholders. Managers as opportunistic agents will try to maintain company profits, so they tend to minimize the tax burden. Meanwhile, shareholders tend to avoid the detection risk of tax evasion activities and do not want to take risks that can destroy the company's reputation. Investors with large shareholdings can force managers to focus on the company's performance and avoid opportunities to prioritize their personal interests. This explanation is supported by research by Olivia & Dwimulyani (2019) which shows that majority ownership weakens the effect of profitability on tax aggressiveness.

The Effect of Leverage on Tax Aggressiveness with Majority Ownership as Moderating

The results of the interaction test show that the interaction variable of leverage with majority ownership has a significant effect on tax aggressiveness, thus majority ownership is able to moderate the effect of leverage on tax aggressiveness. The more loans the company has, the more funding that comes from third parties, resulting in an increase in interest costs that must be borne by the company and a decrease in company profits that should be distributed to shareholders. The existence of majority ownership as one of the shareholders expects the highest level of return on the funds they invest. In this case, it becomes a contradiction with the majority ownership as investors who want the maximum rate of return on the investment they provide in the form of dividends.

These results are in line with the underlying agency theory, where companies in managing their leverage and taxes also consider the interests of the parties concerned, such as the majority shareholder and the government. The majority shareholder is generally more in favor of management and leads to personal interests and focuses on company profits. If the company's debt to third parties is managed properly, it can provide greater profits so that the returns to investors are even greater.

With a high majority ownership, it indicates that the level of tax aggressiveness is low. Because the majority shareholder does not want to take the risk of tax aggressiveness and shareholders expect the maximum return on their investment. This research is in line with research conducted by Aprianto & Dwimulyani (2019) which shows the results that majority ownership can moderate the effect of leverage on tax aggressiveness.

Influence of Inventory Intensity on Tax Aggressiveness with Majority Ownership as Moderator

The results of the interaction test show that the interaction variable of inventory intensity with majority ownership has no significant effect on tax aggressiveness, thus majority
ownership is not able to moderate the effect of inventory intensity on tax aggressiveness. In agency theory there is a separation between principals and agents, but the results of the study show that majority ownership cannot actually influence management actions. The majority ownership which acts as the party that monitors the company is not necessarily able to provide good control over the management's opportunistic actions in carrying out tax aggressiveness practices. This could be due to the lack of quality resources from the majority owner.

Shareholders do not exercise their authority properly in supervising and controlling the decisions made by managers so that tax aggressiveness still occurs (Arianandini & Ramantha, 2018). Majority ownership cannot minimize tax aggressiveness because the shareholders are not actively involved in the company's operations, especially in increasing inventory intensity.

6 Conclusion

This study discusses the effect of Profitability, Leverage, and Inventory Intensity on Tax Aggressiveness with Majority Ownership as moderating variables in mining companies listed on the Indonesia Stock Exchange (IDX) during the 2017-2019 period. Based on the test results, this study produces findings that can be concluded as follows:

1. Profitability, leverage, and inventory intensity have a simultaneous effect on tax aggressiveness. This means that the use of predictors of profitability, leverage, and inventory intensity together can explain tax aggressiveness.
2. Profitability has a positive and significant effect on tax aggressiveness. Thus, the higher the profitability, the more aggressive the company will be in avoiding its tax obligations.
3. Leverage has a negative and significant effect on tax aggressiveness. Thus, the higher the company's leverage level, the lower the company's indication for tax aggressiveness.
4. Inventory intensity has a positive and significant effect on tax aggressiveness. Thus, companies with a high level of inventory intensity will be more aggressive towards taxes.
5. Majority ownership weakens the effect of profitability on tax aggressiveness. The higher the majority ownership owned by the company, the weaker the management in carrying out the company's performance, especially in taxation actions, because it will feel supervised by investors.
6. Majority ownership weakens the effect of leverage on tax aggressiveness. The higher the majority ownership owned by the company, it is expected that management can control the level of debt owned by the company.
7. Majority ownership is not able to moderate the effect of inventory intensity on tax aggressiveness. The higher the majority ownership owned by the company will help management in increasing its inventory.
References


Innovation in Management Digital-Based Paper Research of Bachelor Student in Information Engineering Study Program Faculty of Computer Science Uniku

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Abstract. Kuningan University is one of the universities located in Kuningan. To become a superior university, it is not only supported by facilities and infrastructure but also supported by other supports such as the use of information technology in various activities. Currently, the use of technology allows for easy data processing, can produce the required information accurately, streamline time and costs so that it is more efficient. One of the obstacles faced by the Faculty of Computer Science, especially the Informatics Engineering study program, is managing thesis data which is done manually. At this time, the management of thesis data in the study program, especially in Informatics Engineering at the FKOM UNIKU level, is still done manually starting from submitting titles and processing thesis data, where the title submission goes to the supervisor and study program, the thesis file is not neatly arranged, and Borrowed research reports of bachelor student are not returned. This is seen as the need for an application so that some activities that take a long time can use an application faster. To overcome these problems, in this study an application will be designed to manage thesis data. The research method used is library research, observation, interviews, and stages of Rapid Application Development (RAD) as a system development method. The application is designed using UML and several tools for application development such as XAMPP, Macromedia Dreamweaver, and PHP as a programming language. The result of this design is a Web-Based Thesis Management Application for the Informatics Engineering Study Program, Faculty of Computer Science, Universitas Brass.

Keywords: Skripsi; Study Program; RAD; UML; Web

1 Introduction

According to UU Number 14 (2005 in Dikti, 2010) a study program is a unified study plan as a guide for the implementation of academic and/or professional education which is held on the basis of a curriculum and is intended so that students can master the knowledge, skills, and attitudes in accordance with the curriculum objectives. [1]

Research of Bachelor Student is a final project that must be followed by all students in order to get the title and to prove that the student has studied as well as possible in college. For research data processing in the Informatics Engineering Study Program, it is still done manually starting from submitting titles and processing research data. This resulted in several
problems, namely, title submissions were made during working hours, title submissions had to
go to prospective supervisors and study programs, research reports were not arranged neatly,
and borrowed research reports were not returned.

The mechanism for selecting supervisors in the Informatics Engineering Study Program,
Faculty of Computer Science, Uniku, is carried out by students but for the appointment of
supervisors, examiners, and thesis exam schedules, the study program is carried out. The title
that has been approved will be submitted to the supervisor while the examiner and schedule
are informed through the eclass system. So this process requires good management so that
students get mentors in accordance with the scientific field and the right exam schedule so as
not to interfere with the lecturer's schedule. By using a system that integrated makes it easy for
all parties to get information quickly and optimal. [2].

2 Literature Survey

System Design can be defined as drawing, planning, and making sketches or arrangements
of several separate elements into a unified whole and functioning [3]. The web is a distributed
information system based on hypertext. Documents managed on the web can be of various
types (word processors, worksheets, data-driven tables, presentations, hypertexts and others)
and various formats (.doc, .pdf, .xls, .ppt, .htm) [4]. An information system is a system within
an organization that brings together daily transaction processing needs, supports operations, is
managerial and strategic activities of an organization and provides certain outside parties with
the necessary reports [5].

3 Methodology

This study uses a system development method in the form of Rapid Application
Development (RAD).
There are 4 phase of RAD:

1. Planning
   In this phase, identification project scope including problem of system that used in Engineering Study Program using interviews, literature study and observation.

2. User Design
   After planning, build a prototype (user design) for back end and front end user.

3. Constraction
   Model what data is needed based on business modeling and define its attributes and their relationships with other data. At this stage, the author makes a design using Rich Picture, Flowchart, UML (Use Case Diagram, Class Diagram, Sequence Diagram)

4. Implementation
   Implementing the design results into a programming language using PHP and MySql as the database.

4 Discussion and Results

Design of the system can be be seen in figure 1.

![Use Case Diagram](image)

**Figure 1. Use Case Diagram**

In this system, lecture/student/study program can manage profile, manage master data, submit title of paper research, guidance of paper research and register defence of paper research.
5 Conclusion

The research that is built can help Student to know lectures that available to choose for guidance paper research, Student and lecture to guidance of paper research, Study program can monitoring and evaluation progress of research student. The application will run on the web platform as a lecture, student and for the admin/study program. The results of the application made are as in figure 2, 3, 4, 5, 6 and 7.

![Student/Study Program Interface for Add Title of Paper Research](image_url)

Figure 2. Student/Study Program Interface for Add Title of Paper Research
Figure 3. Student/Study Program Interface for List of First Lecture Guidance Research

Figure 4. Student/Study Program Interface for List of Second Lecture Guidance Research
Figure 5. Lecture Guidance Interface for Add Guidance

Figure 6. Student Interface for History of Guidance Student
References

How to Maintain Employee Performance in The New Normal Era?

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Abstract. This study examines the strategy of improving Human Resources performance in the New Normal Era with Transformative Leadership and Organizational Commitment through employee readiness for change. A case study in private companies in Kuningan. This study is included in quantitative research, which uses data or numbers as a tool in the analysis process. The sampling technique in this research is non-probability sampling. The data analysis method in this study uses Path Analysis. Based on the results of the study, it indicates that Transformational Leadership and Organizational Commitment have a significant effect on readiness for change. Transformational Leadership and Organizational Commitment have a significant effect on employee performance, readiness for change has a significant effect on employee performance and readiness for change significantly mediates the effect of Transformational Leadership and Organizational Commitment on employee performance.

Keywords: Employee performance; transformational leadership; organizational commitment; readiness for change.

1 Introduction

The COVID-19 pandemic in early 2020 caused various fundamental changes in all aspects of human life. It happened because the pandemic conditions required governments in various countries to issue social restrictions policies to overcome the spread of the COVID-19 virus. Indonesia was not in exception, the high rate of the spread of COVID-19 from the early to the end of 2020 caused many changes in various activities which then required all levels of society to be able to adapt to the new normal era. New normal era is an era of a change in behavior to continue normal activities while still implementing the health protocols.

On the other hand, the era of the Industrial Revolution 4.0 also has a significant effect on various changes that cannot be avoided. Therefore, every business organizations must be able to prepare the best strategy to remain competitive and win the market. One of the important aspects in winning business competition is Human Resources. Human Resources is considered as a key factor in maintaining company performance because the progress of the company depends on Human Resources performance (Istijanto, 2010; Navimipour, et al. 2015; Yuniarsih, 2018).

However, according to Yuniarsih (2018), although Indonesia has a surplus in Human Resources, it has not been able to assist the national economic growth, this is due to the low quality of human resources and the competencies that do not match the needs. Based on the results of a research by Yuniarsih, et al (2014, 2015, 2016 in Yuniarsih 2018) it shows...
empirical conditions that the quality of Human Resources performance in various institutions has not shown the excellent performance.

In order to improve the performance of Human Resources in the global competition of Industry 4.0 in the New Normal era, currently, it is very necessary for Human Resources to have the readiness for change. The willingness of employees to change will build up the company in the future because change is a major need for the survival of the company (Muhdin, 2018). Bernerth (2004) in Zulkarnain and Hadiyani (2014) suggests that the success factor for organizational change is the readiness of employees to change.

Various studies have shown that Organizational Commitment plays an important role related to the employees readiness for change, so that, the Organizational Commitment is considered as one of the factors that influence employees readiness for change (Pranatha & Majorsy, 2018; Pramadani & Fajrianthi, 2012; Astuti & Khoirunnisa, 2018; Mangundjaya, 2012; Qureshi, et al. 2018).

Besides the Organizational Commitment, Transformational Leadership is a factor that influence employees readiness for change (Radian & Magundjaya, 2018; Sasmita, 2019; Asbari, et al. 2020). The implementation of the Transformational Leadership style will make the subordinates loyal, respect their superiors and at the end, their subordinates will be motivated to do more than expected (Alam, et al, 2013).

Based on the background, the researchers are interested in exploring strategies for improving Human Resources performance in the New Normal Era by establishing employees readiness for change through Transformational Leadership and Organizational Commitment study on employees of private companies in Kuningan Regency.

2 Methodology

Based on the data analysis, this research is included in quantitative research, which uses data or numbers as a tool in the analysis process (Suliyanto, 2018). The data analysis method in this study used the Path Analysis, which is an analysis that explains the indirect effect given by the independent variable through the intervening variable on the dependent variable. The population of this study is the employees of the private companies in Kuningan Regency.

The model in this study is described as follows:

![Research Model](Figure 1. Research Model)
The hypothesis on this study are:
H1 : Organizational Commitment affects readiness for change
H2 : Transformational Leadership affects employees' readiness for change
H3 : Organizational Commitment affects employee performance
H4 : Transformational Leadership affects employee performance
H5 : Readiness to change affects employee performance
H6 : Organizational Commitment has a significant effect on employee performance through readiness for change
H7 : Transformational Leadership has a significant effect on employee performance through readiness for change

3 Result and Discussion

Based on the result of the path analysis calculations, the following results are obtained:

Figure 2. The Result of Path Analysis Calculation

Organizational commitment has a significant effect on readiness for change, this is in accordance with the results of a research conducted by Astuti (2018), Pramadani & Pajrianthy (2012); Mangundjaya and (2012) which shows that organizational commitment has a significant effect on readiness for change.

Transformational leadership has a significant effect on readiness for change. This is in accordance with the result of a research conducted by Asbari, et al. (2020), Fitriana & Sugiono (2019), Radian & Mangundjaya (2019), Sasmita (2019), and Gazali et al. (2020) which research results show that transformational leadership has a positive and significant effect on employees readiness for change.

Readiness for change has a significant effect on employee performance. This is in accordance with the research results of Kustini, et al (2020) which states that readiness for change affects employee performance. Holt, et al (2007) stated that employees who are ready to change will believe that the organization will have a progress if the organization makes changes, besides that they have a positive attitude towards organizational change and have a desire to be involved in implementing organizational change.
Organizational commitment has a significant effect on employee performance. This is in accordance with the results of a research by Thamrin (2012), Vipraprastha, et al. (2018), Ahmad, et al (2019), and Erina (2021) which shows that organizational commitment has a positive and significant effect on employee performance.

Transformational leadership has a significant effect on employee performance. This is in accordance with the results of a research by Thamrin (2012), Ahmad, et al (2019), and Erina (2021) which shows that transformational leadership has a positive and significant effect on employee performance. Another study from Vipraprastha, et al. (2018) shows different results that transformational leadership has no significant effect on employee performance.

Based on the results of the Path Analysis calculation, the magnitude of the indirect effect of organizational commitment on employee performance through readiness for change is (0.365x0.512) = 0.186 > 0.162, and the magnitude of the indirect effect of transformational leadership on employee performance through readiness for change is (0.415x0.512) = 0.212 > 0.147. Therefore, the readiness for change significantly mediates the effect of organizational commitment and transformational leadership on employee performance. According to Alam, et al (2013) The implementation of a transformational leadership style will make subordinates loyal, respect their superiors and at the end their subordinates will be motivated to do more than expected. Furthermore, according to Rafferty, et al. (2013) employees who are ready to face organizational change produce supportive behavior towards the changes, positive work attitudes, and commitment to the organization. Asbari, et al. (2020) states that when changes are made, two attitudes will be appeared, which are positive and negative. A positive attitude is indicated by a readiness for change and a negative attitude is indicated by a rejection of change, to create a positive attitude in employees, it can be done by creating a readiness for change in employees so that the changes that are made can achieve the expected success.

4 Conclusion

Based on the results of the study, it can be concluded that organizational commitment has a significant effect on readiness for change, transformational leadership has a significant effect on readiness for change, readiness for change has a significant effect on employee performance, organizational commitment has a significant effect on employee performance, transformational leadership has a significant effect on employee performance and readiness for change significantly mediates the effect of organizational commitment and transformational leadership on employee performance.

This study provided an answer that companies can maintain the performance of their employees in the new normal era by paying attention to maintain the organizational commitment of employees, maintain a transformational leadership style, and strengthen the mentality of employees to have an attitude that is ready for change.

References


Analysis of Factors Affecting Financial Behavior

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Abstract. Financial behavior is a core factor in the development of a country's economic progress. With the pandemic situation that has been going on for more than a year, the country's current economic growth is declining, even having a negative value. We try to photograph financial behavior in a pandemic situation. Based on the results of the initial survey, only 32% understand financial behavior well. Based on these conditions and several previous studies that are still not aligned, the researchers are interested in knowing what are the factors that influence financial behavior, in this case students of the Faculty of Economics, Universitas Kuningan. In this study, the variables taken by the researcher were financial knowledge and self-control. This is very important because students must have good financial knowledge because they have already received such knowledge and knowledge during lectures. The method used in this research is descriptive and verification. While the population used is the students of the Faculty of Economics, University of Kuningan with the sampling technique used is purposive sampling. The result shows that Financial Knowledge has positive effect to financial behavior, Self Control has positive and significant effect to financial behavior, Financial Knowledge and Self Control have a simultaneous and significant effect to financial behavior.

Keywords: Financial behavior; Financial knowledge; Self control

1 Introduction

Indonesia's economic turmoil is now affected by the COVID-19 pandemic. Since the pandemic that required the government to implement PSBB to avoid the spread of the virus that had an impact on economic movements, as evidenced by the decline in household consumption in 2020 by 2.12% compared to 2019. The decline in household consumption reflects the behavior of the public who are more careful in managing their finances, supported by the decline in retail sales in all sectors to an average of 11.8%. The decline in public demand has an effect on the decline in supply production in all sectors, even many businesses have gone bankrupt.

Financial behavior according to Shefrin (2000) is a study that studies how a person's psychology affects personal financial behavior. Then the researchers made a temporary survey as variable Y (Financial Behavior) to 30 students in Kuningan Regency through googleform. Questions based on financial behavior indicators According to Hilgert and Hogart (2003), namely making budgets and expenses, paying obligations on time, keeping records of expenses and spending, providing emergency funds, saving periodically, and making price comparisons between stores before buying goods. The survey results are as follows:
Based on the results of the initial survey in March 2021, it was stated that 0% of students who strongly agreed and agreed to understand financial behavior were 38%. While the remaining 15% strongly disagree, 35% disagree, and 12% neutral. This means that 62% of students do not understand their own financial behavior patterns. Students surveyed are students of the Faculty of Economics who already understand how financial behavior should be because they have received finance courses to advanced stages. As a liaison of knowledge for the community, students should be able to carry out financial literacy activities for the community, but if they do not understand themselves, it will be difficult to implement. If this is not anticipated as early as possible, there will be a decline in financial literacy for the community and the impact on the pattern of public financial behavior will be very consumptive, meaning that for state finances this will be very bad.

Research by Alexander and Pamungkas (2019) states that financial behavior is influenced by financial knowledge and locus of control. In a journal compiled by Sari et.al (2020) stated that financial behavior is influenced by financial literacy and lifestyle. Meanwhile, research by Fauziyah and Ruhayati (2016) states that financial behavior is influenced by self-control and financial literacy.

Research by Arifin et. al. (2017) stated that financial knowledge has a positive effect on financial behavior. Supported by research by Alexander and Pamungkas (2019), financial behavior is influenced by financial knowledge. Meanwhile, according to Kholilah and Irhamani (2013) financial knowledge has a negative effect on financial behavior management. This study is supported by Muhidia (2019) which states that financial knowledge has no significant effect on the Financial Behavior of Management Study Program Students, University of Muhammadiyah Gresik.

In addition to financial knowledge, Statman (2008) states that self-control or also called self-control has a role in one's actions in making financial decisions. Self-control according to Chaplin (2015) is a person's ability to master his own behavior, and to suppress impulsive actions. In conclusion, Self Control is how individuals make financial decisions and refrain from impulsive actions. Based on this phenomenon, the researcher intends to conduct research on financial knowledge, self control, influence on financial literacy and its impact on financial behavior in students throughout Kuningan Regency.
2 Methodology

The purpose of this study was to determine the financial behavior of students in Kuningan Regency. Financial behavior is all activities related to financial matters such as shopping, buying and selling shares, borrowing money, and others that are carried out by humans. Financial behavior is all activities related to financial matters such as shopping, buying and selling shares, borrowing money, and others that are carried out by humans. According to Nofsinger (2001) behavioral finance studies how individuals behave in an actual financial decision. Nababan and Sadalia state that financial behavior relates to the way a person manages, treats, and uses financial resources responsibly in using the money he has, such as making a budget, investing, saving money, to paying obligations on time.

According to a study studied by Irfandi (2020), financial behavior is influenced by Self Control. In a journal compiled by Sari et.al (2020) it is known that lifestyle influences financial behavior. Meanwhile, in the research conducted by Alexander and Pamungkas, financial behavior is influenced by financial knowledge.

Nababan and Sadali (2012) state that financial behavior indicators are in the form of budgeting and spending, paying obligations on time, keeping records of expenses and spending, providing emergency funds, saving periodically and making price comparisons between stores before buying goods.

Financial knowledge is the knowledge that a person has about finance, both concepts and the use of supporting financial tools. This is supported by a study conducted by Bowen in 2003, financial knowledge is an understanding of financial terms and concepts that are needed to be used in everyday social life. While Aminatuzzahra (2014) states that humans want to have good financial knowledge, then one must have financial ability and learn how to use financial tools (ATMs, credit cards, checks, cash, etc.). By proficiently using financial tools, a person can develop his behavior in making decisions on his finances.

Self-control according to Chaplin (2015) is a person's ability to master his own behavior, and to suppress impulsive actions. Self-control according to Chaplin (2015) is a person's ability to master his own behavior, and to suppress impulsive actions.

The study conducted by Ghufron and Risnawati (2014), taken from Irfandi (2020) is the ability to control behavior, the ability to control stimuli, the ability to anticipate an event or events, the ability to interpret events or events and the ability to make decisions. Basically humans have unlimited desires but are limited by the needs and abilities of these humans. It's just whether you can control it properly or not. Based on the results of the research above, this research will focus more on how financial behavior is influenced by financial knowledge and self-control which is derived into the hypothesis proposed in this study as described in the framework below.

Based on the picture above, the hypothesis is:
H1: Financial knowledge and self control simultaneously affect financial behavior
H2: Financial Knowledge has a positive effect on financial behavior
H3: Self control has a positive effect on financial behavior

The research method used is descriptive verification. The type of research used is quantitative. The population used in this study were students of Kuningan Regency from 4 campuses, namely Universitas Kuningan, UNISA, STKIP Muhammadiyah and STIKES Kuningan. The samples taken were using purposive sampling technique and sampling using Slovin. The criteria used are having studied financial management courses. The number of active student population is 7546 people. Based on academic guideline data and study program data, the number of students who have studied financial management is 818 students who have taken advanced finance courses. After processing the samples obtained were 136 people. The operationalization of variables is described in the following table:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Behavior (Y)</td>
<td>1. Make a budget and expenditure</td>
</tr>
<tr>
<td></td>
<td>2. Pay obligations on time</td>
</tr>
<tr>
<td></td>
<td>3. Make a record of expenses and Interval spending</td>
</tr>
<tr>
<td></td>
<td>4. Provide emergency funds</td>
</tr>
<tr>
<td></td>
<td>5. Save periodically</td>
</tr>
<tr>
<td></td>
<td>6. Make price comparisons between stores before buying goods</td>
</tr>
<tr>
<td>Financial Knowledge (X1)</td>
<td>1. Division</td>
</tr>
<tr>
<td></td>
<td>2. Time value of money</td>
</tr>
<tr>
<td></td>
<td>3. Loan interest paid</td>
</tr>
<tr>
<td></td>
<td>4. Interest calculation plus balance Interval</td>
</tr>
<tr>
<td></td>
<td>5. Compound interest</td>
</tr>
<tr>
<td></td>
<td>6. Risk and return,</td>
</tr>
<tr>
<td></td>
<td>7. Definition of inflation</td>
</tr>
<tr>
<td></td>
<td>8. Diversification.</td>
</tr>
<tr>
<td>Self Control (X2)</td>
<td>1. Ability to control behavior</td>
</tr>
<tr>
<td></td>
<td>2. Ability to control stimuli</td>
</tr>
<tr>
<td></td>
<td>3. The ability to anticipate an event or occurrence</td>
</tr>
<tr>
<td></td>
<td>4. The ability to interpret events or events Interval</td>
</tr>
<tr>
<td></td>
<td>5. The ability to make decisions.</td>
</tr>
</tbody>
</table>

Hilgert and Hogart (2003)
Atkinson and messy (2012)
Ghufron and Risnawati (2014)
3 Result and Discussion

Hypothesis is a temporary answer to the formulated problem. Therefore, this provisional answer must be tested empirically. Hypothesis testing in this study was carried out using simple regression techniques for the first, second, and third hypotheses, while for the fourth hypothesis using multiple regression techniques. The explanation of the results of testing this hypothesis is as follows:

The first hypothesis states that financial knowledge and self control simultaneously affect financial behavior. We can see the result as shown in the following table:

**Table 2. Regression Analysis for The First Hypothesis**

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>8987.384</td>
<td>2</td>
<td>4275.736</td>
<td>43.523</td>
<td>0.000</td>
</tr>
<tr>
<td>Residual</td>
<td>13728.587</td>
<td>133</td>
<td>91.342</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>19352.319</td>
<td>135</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R Square</td>
<td>0.506</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted R Square</td>
<td>0.527</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From table 2 above, the calculated F is 43.523 with a significance level of 0.000. This shows that the probability < the tolerable level of significance (0.000 < 0.05), then H1 is accepted and Ho is rejected. This shows that there is a significant positive influence on financial knowledge and self control together on financial behavior.

Then to show what percentage of the influence of financial knowledge and self control together on financial behavior. the coefficient of determination is used. From the table, it can be seen that the coefficient of determination (Adjusted R square) is 0.527, which means that 52.7% of financial behavior variables can be explained by all independent variables consisting of financial knowledge and self-control, while the remaining 47.3% of financial behavior variables are influenced by other variables not included in the research model.

We can see The second and the third hypothesis testing that states that financial knowledge affect financial behavior and that self control affect financial behavior summary of the results of simple linear regression analysis is obtained as shown in the following table:

**Table 3. Regression Analysis for The Second and Third Hypothesis**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Regression Coefficient (B)</th>
<th>t</th>
<th>Sig.t</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>26.113</td>
<td>7.321</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Financial knowledge (X₁)</td>
<td>0.462</td>
<td>2.342</td>
<td>0.000</td>
<td>Significant</td>
</tr>
<tr>
<td>Self control (X₂)</td>
<td>0.324</td>
<td>1.984</td>
<td>0.000</td>
<td>Significant</td>
</tr>
</tbody>
</table>

The results of multiple linear regression analysis as in the table above can be written the regression equation as follows:

\[ Y = 26.113 + 0.462 \, X_1 + 0.324 \, X_2 + e \]

The constant value is 26.113 this means that financial behavior will be 26.113 if financial knowledge and self control are equal to zero.
The financial knowledge variable (X1) has a positive influence on financial behavior, with a regression coefficient of 0.462 indicating that if financial knowledge increases by 1 percent, financial behavior will increase by 0.462 percent assuming the other independent variables are constant. The significant value (sig) is 0.000, this value is much lower than 0.05, so the influence of financial knowledge on financial behavior is significant.

Based on the SPSS calculation, the t value is 2.342 while the p value is 0.000, so that the p value is <5% (0.000 < 0.05), meaning that there is a significant influence of the financial knowledge variable on financial behavior. These results indicate that the higher the financial knowledge, the better the financial behavior, and vice versa.

The self-control variable (X2) has a positive influence on financial behavior, with a regression coefficient of 0.324 indicating that if self-control increases by 1 percent, financial behavior will increase by 0.324 percent assuming the other independent variables are constant. The significant value (sig) is 0.000, this value is much lower than 0.05, so the effect of self control on financial behavior is significant.

Based on SPSS calculations, the t-value is 1.984 while the p-value is 0.000, so that the p-value is <5% (0.000 < 0.05), meaning that there is a significant effect of the self-control variable on financial behavior. These results indicate that the higher the self-control, the better the financial behavior, and vice versa.

4 Conclusion

The purpose of this study was to determine the financial behavior of students in Kuningan Regency. This study uses descriptive and verification analysis methods. Based on multiple regression analysis we can see that, the first hypothesis which states "Financial knowledge and self control simultaneously affect financial behavior" is accepted. The second hypothesis which states "Financial Knowledge has a positive effect on financial behavior" is accepted. Likewise, the third hypothesis which states "Self control has a positive effect on financial behavior" is accepted. So we can conclude that financial behavior of student in Kuningan affect by financial knowledge and self control.

References


Language Register Around Debt Collectors at Illegal Fintech Lending Companies (Online Loans) Against Defaulting Debtors That Impact Legal Products Forensic Linguistic Review

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Abstract. This study aims to describe legal products in the form of (hate speech) related to the potential of the Undang-Undang ITE from the debt collector register at Illegal Fintech Lending companies (online loans) in their communication to defaulted customers. This study uses a qualitative descriptive research method with a review of forensic linguistics. The techniques used are listen, take notes, and screenshots. Based on the results of data analysis that has been carried out, it is found that data in the form and function of the debt collector register have an impact on potential legal products (hate speech). The forms of registers found are classified into two parts, namely lingual and open. Furthermore, the register functions found are classified into two parts, namely instrumental functions and problem solving functions. Then the context of the speech of legal products found in the form of threats to customers who fail to pay. From this research, it is hoped that there will be no misunderstanding in understanding and using the register language later

Keywords: debt collector register; forensic linguistics; legal product

1 Introduction

Communication has an important role in everyday life, and all of that cannot be separated from the function of a language. Language is a system of arbitrary sound symbols used by people to work together, interact, and identify themselves. This means that there is no mandatory relationship between the language symbol in the form of sound and the concept or understanding intended by the symbol (Chaer, 2007: 45). The branching unit of language that produces communication, one of which is sociolinguistics as a branch of linguistics views or places the position of language in relation to language users in society, because in social life humans are no longer as individuals, but as social communities. Ironically, communication is often misused, all of which has cause and effect, because humans in speaking will always be influenced by situations and conditions around them. Fishman states that who speaks what language to whom and when (Fishman, 1975: 15). Sociolinguistics is an interdisciplinary science that deals with linguistic problems in relation to social, situational, and cultural factors. One thing that is interesting and used as a closed communication medium is registers (language variations) among certain people. By definition, register is a variation of language used for a particular purpose, community or
job/profession. For example, the fields of journalism, military, agriculture, trade, education, and so on. (Chaer, 2004: 68) Register is a variety of language used for a specific purpose, as opposed to social and regional dialects (which vary due to speakers). Then it developed and was born one of the registers (language variations) among illegal non-OJK fintech debt collectors (Illegal Online Loans) which became an important concern for law enforcement in Indonesia and became one of the concerns of debtor victims, because there are so many registers (language variations), and confidential in this community which generally has the potential for intimidating language. The existence and emergence of this phenomenon, cannot be separated from the impact of covid-19 where the Indonesian people are looking for practical things in applying for online loans for consumptive needs and business capital. Then illegal Fintech from the results of the investigation by the Investment Alert Task Force (SWI) throughout February 2021. From 2018 to February 2021, SWI has closed 3,107 illegal fintech lending. Illegal fintech operates without OJK permission and usually does not comply with applicable business operational rules, so that many victims of debtors who are late paying the target of online language intimidation, both billing intimidation language communication via WhatsApp or Text SMS. There are indications that they use the context of the language register because in its use it is easier to pursue the billing target, which on the other hand ignores the social and psychological impacts of illegal borrowers. From the explanation and the phenomenon of registering the illegal non-OJK fintech lending debt collectors, terms that are quite often found in WhatsApp text and SMS text, such as; “Hey dude, when are you going to pay: From one of these findings, the use of the term register is not just for nothing. There may be messages of information or motives that seem undisclosed from the general public to intimidate. Of course, with this communication, the community must find a way so that they can stay safe in pursuing the billing target, but it is ruled out that the text that has been appealed to debtors who fail to pay contains language products that are against the law.

2 Literature Review Sociolinguistics

Sociolinguistics examines the relationship between language and society, which links two fields that can be studied separately, namely the formal structure of language by linguistics and the structure of society by sociology (Wardhaugh 1984: 4; Holmes 1993: 1; Hudson, 1996: 2). Sociolinguistics is an interdisciplinary field of science that studies language in relation to the use of that language in society (Chaer and Agustina 2003: 2). Bram & Dickey, (ed. 1986:146) stated that sociolinguistics focuses its study on how language functions in society. They also state that sociolinguistics seeks to explain human abilities using rules

2.1. Language Variation

Maryono (2002: 18) divides the forms of language variation in the form of idiolects, dialects, speech levels, language variety and registers. The explanation of the five language variations can be explained as follows: 1. Idiolects are variations of language that are individual in nature, meaning that the distinctive nature of one's speech is different from the speech of others. Example: language that can be seen through the color of the sound. 2. Dialect is a variation of language that is distinguished by differences in the origin of speakers and differences in the social class of speakers, therefore, the concepts of geographic dialects
and social dialects (sociolects) emerge. Example: enyong means I which is used in certain areas, namely the Banyumasan area. 3. Speech levels are variations in language caused by differences in the speaker's perception of his relationship with the speech partner. Example: we give something to an older person using a different language than we give to a friend of the same age. 4. Language variety is a variation of language caused by differences from the speaker's point of view, place, subject matter and situation. In connection with this, it is finally recognized that there are various official languages (formal) and informal languages (casual, intimate). Register is a language variation caused by the specific characteristics of the user's needs, for example in written language there is advertising language, show language, article language, and so on, in spoken language there is comedy language, political language, prayer language, broker language and so on. Groesjean (1982: 136) suggests four factors that influence the choice of language variation in social interaction, namely (1) participants, (2) situations, (3) discourse content, and (4) interaction functions. Situational factors refer to (1) the location or setting, (2) the presence of a monolingual speaker, (3) the level of formality, and (4) the level of familiarity. Discourse content factors refer to (1) the topic of conversation, and (2) the type of vocabulary. The interaction function factor includes aspects (1) raising status, (2) creating social distance, (3) prohibiting entry/exiting someone from the conversation, and (4) commanding or asking for appropriate language in various situations namely the function of using language that is oriented to the mandate or purpose to be conveyed. Language in this function is used to express and convey thoughts or ideas and feelings of speakers or writers. 6. Information function, namely the use of language that functions as a tool to provide news or information so that other people can know.

3 Research Methods

The method that will be used in this research is descriptive research. According to Sudaryanto (1986: 62) suggests that descriptive research is research that is carried out only based on existing facts or phenomena that are empirically alive in the speakers, so that what is produced is in the form of language variants which are usually said to be portraits, exposures as they are. This research is descriptive because the news presented is in the form of a narrative description obtained based on the situation under study. In addition, according to (Djajasudarma, 2006:16), descriptive method is a method of solving problems by collecting data, compiling, analyzing, classifying, and interpreting.

4 Results And Discussion

The results of the research that have been carried out have presented various forms and functions of registering debt collectors in communication on WhatsApp social media. The data is divided into:
4.1. Register Form

a) Register *Selingkung Terbuka*

This form of registration is more open with informal or spontaneous language. This register form also has a meaning associated with registers.

![Image 1](data-tangkapan-1.jpg)

*Gambar 1. Data tangkapan layar*

Hasil percakapan:
Debtcolector: “Awal juni Ga ada otak lu Anjing bener’ mau main’ lu ama gua Ok gua bikin lebaran taun ini malulu satu keluarga
Nasabah: “Anceman lagi”

All conversations from the narrative do not use official language, showing the form of an open envelope register.

b) Lingual Register

This lingual register is a form that goes through a morphological process, namely abbreviation. Abbreviation is the process of beheading one or several parts of a lexeme to a combination of lexemes, resulting in a new form with the status of a word (Sudjalil, 2018).

![Image 2](data-tangkapan-2.jpg)

*Gambar 2. Data tangkapan layar*

Hasil percakapan:
Debtcolector: “Ya engga bisaaaaa bodoh
Siapa yg mau ngerubah hari raya kantor libur
Hari rabu”
In the conversation, there are words (yg/YG) have gone through a morphological process and are considered to have the same meaning as words that are included in the lingual register category.

4.2. Register Function

This context, register functions are the same as language functions. According to Halliday, language has seven functions, namely instrumental, regulatory, representational, interactional, personal, heuristic, and imaginative functions. However, in research related to health registers in the Covid-19 pandemic era in communication in various online media, four kinds of language functions were found, namely instrumental, regulatory, representational, and heuristic. The functions are:

a) Instrumental Function

Instrumental function is a language function that can be used to persuade, appeal and have an effect on the interlocutor or listener. The instrumental function can be used to regulate the behavior of the interlocutor or listener so that they believe the information conveyed is an accurate and accountable fact. The data are as follows:

```
Hasil percakapan:
Debtcolektor: “Iya pinjaman anak anda disini 1.7 sudah keterlambatan tempo 25hari
Kalau anda mau bayarkan sekarang sy kasih 2 jta itu lunas”
The collector's conversation, there is a word Jika dibayarkan sekarang sy kasih 2 juta lunas. The speaker tries to persuade and influence the speaker to follow directions.
```

b) Problem solving function

The problem-solving function or heuristic is the function of using language contained in expressions that ask for, according to, or state an answer to a problem or problem. The language used is usually as a tool to learn everything, investigate reality, find facts, and explain. used in this function is in the form of a question that demands an explanation or elaboration, for example “try explaining!”, “how does the process work…?” etc.
5 Conclusion

After conducting research on the register of illegal fintech debt collectors, in communication on WhatsApp, it can be concluded that the data found is classified into two parts, namely form and function. The forms of registers found from the results of this study are the forms of the lingual register, and the open envelope. The form of the lingual register consists of forms that have gone through a morphological process, namely abbreviation. Then, the open envelope register has a more open meaning and language that is not official or spontaneous. In addition to register forms, language functions are also found or in this context can also be called register functions. The function was found to be divided into two parts, namely instrumental function and problem solving/heuristic. The most dominant form is open environment because debt collectors contain more language that aims to influence, threaten, scare and remind, most of which use informal language. It is clear from several findings that the form and function of screenshot data, registers that are conveyed to customers, are dominant in the form of language threats which, when examined in depth, lead to the context of hate speech, and have the potential to produce legal reports.

References


Student Satisfaction of Quality Academic and Non-Academic Services During Pandemic Covid-19

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Abstract. This study aims to describe the Quality of Academic Services, Non-Academic Services, student Satisfaction and measure the degree of closeness between the quality of academic services and non-academic services and student satisfaction from the 2019 class of Faculty of Teacher Training and Education FKIP, Universitas Kuningan. Descriptive correlational method was used in this study with a population of 267 students and the sample was taken based on the calculation of 160 students. This study used Random Sampling. The technique of data collection for this study was done by distributing questionnaires. The result of the calculation of the coefficient of determination of the influence of the Quality of Academic and Non-Academic Service on Student Satisfaction is 43.7%, while the remaining 56.3% influenced by other factors that were not examined.

Keywords: Student Satisfaction; Quality Academic; Academic Services

1 Introduction

The occurrence of the COVID-19 pandemic has brought major changes to the world, including Indonesia. "The policies issued to limit the spread of the corona virus have an impact on various fields throughout the world, especially in education). The very changing learning system has had a major impact on the world of education. [1]

Higher education institutions are public organizations that are not profit-oriented. But it focuses more on the satisfaction of the services provided to stakeholders. The stakeholders in question are students, lecturers, employees, and alumni. Along with the increase in the level of education and knowledge, students become more critical, they consider that students' perceptions of satisfaction are a right that they must continue to accept during this pandemic. The satisfaction felt by students is created when their expectations can be met by producers (colleges). Because the level of student satisfaction is very influential on the loyal attitude of students towards universities, therefore universities must pay attention to the hopes and desires of students so that students feel satisfied. [2] [3]

Based on personal experience, the results of interviews with several students and the results of the distribution of pre-research questionnaires, it turned out that most of the students of the Faculty of Teacher Training and Education, Universitas Kuningan complained of dissatisfaction during the COVID-19 pandemic. Many learning activities, services, infrastructure and student activities are less than optimal during the COVID-19 pandemic.
Higher education institutions do not only focus on the end result of a process, but also on the processes that are carried out so as to achieve the expected results. To obtain the expected results, namely graduates who are absorbed in various sectors, of course through a process that does not just run as it is. The process that is run must have a predetermined quality. One of them is the quality of service to students. Have students received maximum service? The service in question is to meet all student needs as one part of higher education institutions, namely administrative services, improvement of teaching and learning processes, improvement of facilities and infrastructure and others.

2 Methodology

This paper uses a quantitative approach, where the data analyzed is in the form of numbers as a tool to find information about what you want to know. The method used in this research is descriptive correlational method. Correlational descriptive method is one of the research methods on problems in the form of existing facts by collecting and then the data is correlated and analyzed to draw conclusions.

The flow of this research is described as follows:

![Flowchart]

The population used in this study were students of the class of 2019 Faculty of Teacher Training and Education, Universitas Kuningan with a total of 267 students. According to Sugiyo (2016: 136), "The sample is part of the number and characteristics possessed by the
population. If the population is large, and it is impossible for researchers to study everything in the population. While the sampling technique used in this study is proportional stratified random sampling which is a sampling technique if the population has members/elements that are not homogeneous and proportionally stratified. [6] [7] The sample in this study amounted to 160 students of the 2019 FKIP UNIKU class.

Starting from the framework of thinking that has been put forward, the researcher presents the hypothesis in this study as follows:

1. There is an influence between the quality of academic and non-academic services on student satisfaction
2. There is a positive influence between the quality of academic services on student satisfaction.
3. There is a positive influence between the quality of non-academic services on student satisfaction

3 Result and Discussion

3.1. Result

To describe the description of the Quality of Academic Service (variable X1) and Non-Academic Service (variable X2) on Student Satisfaction (variable Y) is calculated using the formula mean, median, mode and size of data spread. Based on the calculation results, it was obtained that the Quality of Academic Service during the Covid-19 period was 64 (40%) respondents. This shows that the quality of academic services is in a Good category in increasing student satisfaction. While the score for Non-Academic Services during the Covid-19 period was 73 (45.62%) respondents. This shows that Non-Academic Services are in the Dissatisfactory category in increasing Student Satisfaction. So that non-academic services during the Covid-19 pandemic need to be improved again. And the Student Satisfaction score during the Covid-19 period was 61 (38.13%) This shows that student satisfaction is included in the Unsatisfactory category.

We can see that the lowest score of indicator of academic services is tangible and assurance. It’s mean that Online learning facilities provided less optimally in helping lecture activities, so it has to increase in the quality of online learning facilities to be more optimal in launching learning activities. Then the fact that laboratories that can usually be used as practicum activities, during Pandemic period cannot be used as a practicum activity as usual. Because of the restrictions on activities in the village, so that the activities practicum that should be carried out more optimally. So it is necessary to hold special scheduling for practicum activities in the laboratory that are indeed practicum activities. In addition, FKIP is lacking provide complaint services for students during the pandemic period so that Students cannot express their grievances online learning in pandemic times. Therefore, FKIP needs to open up more widely and open to complaints from students so that their aspirations can be considered by the faculty to continue to improve services in the pandemic period so that students still satisfied.

The lowest score of indicator of non academic services is Physical evidence and soft skills coaching. Student organization equipment provided by FKIP has not fully supported the organization's activities, among them are incomplete operational equipment such as computers, printers, Cabinets and other operational equipment needed to support. Moreover the services of
FKIP administration personnel are less friendly in serving students. The atmosphere of the FKIP building is less comfortable and peaceful to the implementation of non-academic activities because FKIP does not have the field is quite extensive like other faculties so that organizational activities The campus cannot be implemented optimally in the FKIP building. Expected FKIP has a large enough field to support activities Non-Academic student activities.

To describe the influence of the Quality of Academic and Non-Academic Services during the Covid-19 Pandemic Period on the Satisfaction of Class 2019 Students of the Faculty of Teacher Training and Education, Universitas Kuningan, Can be seen from the following table

<table>
<thead>
<tr>
<th>Table 1. Regression Analysis Result</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
</tr>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

Dependent variable: student satisfaction

From the table above, an equation can be made:

\[
\text{Student Satisfaction} = 21.962 + 0.204 \text{ Academic Service Quality} + 0.132 \text{ Non-Academic Service } + \epsilon
\]

Referring to the regression equation above, the following explanation is obtained:

1. Obtained a constant value of 21.962 which means that without the influence of the quality of academic services and non-academic services, the value of student satisfaction remains or constant at 21.962

2. Academic Service Quality obtained a coefficient value of 0.204 where an increase in Academic Service Quality by one unit will contribute to a high level of student satisfaction of 0.204

3. Non-Academic Services get a coefficient value of 0.132 where an increase in Non-Academic Services by one unit will contribute to a high level of student satisfaction of 0.132

<table>
<thead>
<tr>
<th>Table 2. Coefficient of Determination Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
</tr>
<tr>
<td>Academic Service Quality</td>
</tr>
<tr>
<td>Non Academic Service</td>
</tr>
</tbody>
</table>

Based on the results shown in table 2, it is known that the coefficient of determination is 0.437 or 43.7%. Student satisfaction can be influenced by the quality of academic services and non-academic services, while 56.3% is determined by other factors not examined by researchers.

<table>
<thead>
<tr>
<th>Table 3. F Statistic Test Results and t Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variable</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Academic Service Quality</th>
<th>6.100</th>
<th>.000</th>
<th>Academic Service</th>
<th>3.156</th>
<th>.002</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>
Based on the results of the partial test shown in table 3, it can be explained as follows:
1. The quality of academic services has a significance value of 0.000 < 0.10. This means that H1 is accepted, which indicates that the quality of academic services has a positive effect on student satisfaction.
2. Non-Academic Services obtained a significance value of 0.002 < 0.10. This means that H2 is accepted, which indicates that Non-Academic Services has a positive effect on Student Satisfaction.

Based on the results of the simultaneous test shown in table 3, a significance value of 0.000 < 0.1 was obtained. This means that the quality of academic services and non-academic services has an effect on student satisfaction.

4 Discussion

Overview of Academic Service Quality (X1), Non-Academic Service (X2) and Student Satisfaction (Y)

Based on the results of descriptive analysis, it was obtained a score that the Quality of Academic Services was in a good category in increasing student satisfaction, which means that the Quality of Academic Services during the Covid-19 pandemic must continue to be maintained and also continue to be improved so that the level of student satisfaction does not decrease, while Non-Academic Services are in the poor category in increasing student satisfaction, it means that Non-Academic Services during the covid-19 pandemic must continue to be improved so that the level of student satisfaction increases, this can be seen from the low-value questionnaire items such as improving the service of administrative staff to be more friendly in serving students. And based on the descriptive analysis, Student Satisfaction is in the unsatisfactory category as indicated by low questionnaire scores such as the teaching methods used in online learning are less than optimal, the lack of student interest in recommending FKIP UNIKU to the surrounding community.

The Effect of Academic Service Quality (X1) and Non-Academic Service (X2) on Student Satisfaction (Y)

Philip Kotler states that, "Customer or consumer satisfaction is the level of one's feelings after comparing the perceived performance (result) with his expectations." Rema said that students are students who gain high knowledge, where at this level they are considered to have physical maturity and broad thought development, so that with these extra values they can have the awareness to determine their attitude and be able to take responsibility. responsible for their attitudes and behavior. Philip Kotler says that, "Factors that cause satisfaction include what is received is equal to or exceeds expectations, good service, good communication and culture and values". From this opinion, it can be concluded that student satisfaction as customers or consumers of higher education institutions is a level of feeling felt by students after comparing the performance of educational institutions with their expectations, there are factors that cause satisfaction when what is received exceeds expectations, as well as the good services provided. [9][10]

Based on the results of multiple regression analysis, the value of $a = 21.962$, the value of $bX_1 = 0.204$ and the value of $bX_2 = 0.132$. Thus, it can be seen that the Y regression equation for $X_1$ and
X2 is Y= 21.962 + 0.204 X1 + 0.132X2. This shows that if done together, every 1 increase in the score of the Academic Service Quality variable can cause an increase in the Student Satisfaction level of 0.204 and every 1 increase in the Non-Academic Service score can cause an increase in the student satisfaction level of 0.132 at a constant 21.962. Constant value is the initial value of the level of student satisfaction before the influence of the quality of academic services and non-academic services. In other words, the quality of academic and non-academic services together has a positive effect on student satisfaction.

Analysis of the coefficient of determination shows that student satisfaction is influenced simultaneously by the quality of academic services and non-academic services. It can be seen from the R value of 0.661 and Rsquare of 0.437. This shows that the quality of academic services (X1) and non-academic services (X2) has an effect on student satisfaction of 0.437 or 43.7% while the remaining 56.3% is influenced by other factors not examined by researchers.

This is in line with the theory put forward by Philip Kotler (2012: 95) which states that "Factors that cause satisfaction include what is received is equal to or exceeds expectations, good service, good communication and culture and values". Factors that make consumers satisfied for example: "by providing a good quality product, the price is more cheaper delivery of products faster, and better service than the rivals. As for the satisfaction of students as recipients of services from The campus or faculty satisfaction factor can be in the form of acceptance of services quality, affordable education costs, better service. [13] [14] So based on this theory student satisfaction can be influenced by other factors such as good communication, culture and values. In this case, it is hoped that further research can add some of the other factors so that it is more comprehensive.

The Effect of Academic Service Quality (X1) on Student Satisfaction (Y)

Based on the results of the calculation of the partial effect of Academic Service Quality on Student Satisfaction, it shows a positive effect of 0.476 (beta) or 47.6% with a significance value of 0.000 which means the sig value is smaller than the probability value of 0.05 (0.000 <0.05) Thus it can be said that if the quality of academic services is getting better, student satisfaction will increase. And vice versa, if the quality of academic services is not good, the level of student satisfaction will also be less.

The results of hypothesis testing can be seen that Ho is rejected and Ha is accepted. Meaning: Academic Service Quality has a significant effect on Student Satisfaction. This is based on the value of t = 6.100 or in other words the Family Environment has a significant effect on learning outcomes at an error level of 5% or a confidence level of 95%. This shows the hypothesis which reads "Quality of Academic Services has a positive effect on Student Satisfaction" Accepted.

After looking at the theory and the results in the field, it can be said that the quality of academic services has an effect on student satisfaction. The higher or better the Quality of Academic Service, the Student Satisfaction will increase so as to create a good image and students will recommend it to others.

Service quality is a comparison between services that are equal to or exceed the expected service quality, then the service can be said to be of high quality and satisfactory. [11] Academic services, which are sometimes referred to as curricular services, include: academic regulations, lectures, curriculum, academic guidance/consultation, practicum, final project, evaluation, including lecture aids such as libraries, OHP, laboratories, and etc." Based on this theory, the quality of academic services is a comparison between academic services such as
curriculum, lectures and so on that are perceived by students as equal to or exceeding the expected service quality. [12] [13]

The Effect of Non-Academic Service Quality (X2) on Student Satisfaction (Y)

Based on the results of the calculation of the partial effect of Non-Academic Services on Student Satisfaction, it shows a positive effect of 0.246 (beta) or 24.6% with a significance value of 0.002 which means the sig value is smaller than the probability value of 0.05 (0.002 <0.05) ) thus it can be said that if the non-academic services are getting better, student satisfaction will increase. And vice versa, if non-academic services are not good, the level of student satisfaction will also be less.

The results of hypothesis testing can be seen that Ho is rejected and Ha is accepted. It means: Non-Academic Services have a significant effect on Student Satisfaction. This is based on the value of t = 3.156 or in other words the Family Environment has a significant effect on learning outcomes at an error rate of 5% or a confidence level of 95%. This shows the hypothesis which reads "Non-Academic Services have a positive effect on Student Satisfaction" Accepted.

After looking at the theory and the results in the field, it can be said that non-academic services have an effect on student satisfaction. The more effective or the better the Non-Academic Service, the Student Satisfaction will increase and the institution or university will benefit because it gets a good image so that it can face competition.

Services to students, namely extracurricular services include the development of interests and talents, extracurricular activities and soft skill development. Based on this theory, the researcher concludes that non-academic services include the development of interests and talents, extracurricular activities and soft skill development. The non-academic services to students of the Faculty of Teacher Training and Education, Universitas Kuningan, namely the availability of various kinds of student organizations or student organizations that can be attended by students of the Faculty of Teacher Training and Education from any major or study program. As well as the services provided by administrative staff.

Satisfaction will be felt by a person if what his hopes or needs can be fulfilled properly. As felt by the Class of 2019 Students of the Faculty of Teacher Training and Education, Universitas Kuningan when they received the results of academic services from the campus, they expected to receive good and pleasant service, especially during the Covid-19 pandemic. Because the quality of service is the fundamental key to success and profit. Quality provides encouragement to consumers or students in establishing relationships with educational institutions, especially in understanding the hopes and desires of students as their main customers. Therefore, an educational institution should provide quality services so that consumers are reluctant to leave and move to other companies. To measure student satisfaction, according to Irawan (2008: 9) is "fun, giving a good image (recommend) to other parties, and expectations are met." [14] [15]

5 Conclusion

Based on the results of the analysis and discussion that have been stated previously, the following conclusions can be drawn:

1. An overview of the quality of academic services in the covid-19 pandemic is in the good category, non-academic services are included in the poor category and student
satisfaction for the 2019 FKIP class in the covid-19 pandemic is in the unsatisfactory category.

2. The quality of academic services and non-academic services has an effect on student satisfaction for the 2019 batch of the Faculty of Teacher Training and Education, Universitas Kuningan. The effect is 43.7% in the medium category.

3. Academic Service Quality has a positive effect on Student Satisfaction. The better the quality of academic services, the higher the level of student satisfaction [17] [18] [20].

4. Non-Academic Services have a positive effect on Student Satisfaction. The better the Non-Academic Service, the higher the level of Student Satisfaction [20].

References

Style And Pose Wedding Photography Through Technique Single Lighting in Expression Photography (Case Study: Malausma)

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Abstract. This research is entitled Style and Pose Wedding Photography through Techniques Single Lighting in Photography Expressions that aim to visualize nonverbal forms of communication, present more aesthetic visuals and know style and pose. With the formulation of the problem, how to introduce and provide education about trends in style and poses in wedding photography in order to create photo works with expressive and aesthetic results. Your research uses qualitative methods in data analysis, observation, interviews, and questionnaires as data collection methods, SWOT analysis in the selection of the main media. The theoretical basis used is Roland Barthes’ semiotic theory. The information media used in the form of print media in the form of look books and photo frames with other supporting media. With this media, trends style and poses in photos in wedding photography will be recognized and recognized by many other photographers. This media will be useful as a photographic work that attracts photographers in the Malausma area to further update the trends style and poses used.

Keywords: Wedding photography; style; pose; photography.

1 Introduction

Wedding photography is a specialty in model photography or expression photography. This activity includes a photo shoot for a couple or one of the bride and groom during wedding activities (either a ceremony or blessing) as well as poses for a pair of brides. Wedding Photography is usually in demand by consumers by requesting poses or styles according to their wishes. Expression photography in wedding photography is an expression that prioritizes a person's personal identity which will be expressed in a photo shoot.

The style and pose of wedding photography with the technique was Single Lighting chosen because the art of expression photography in the Majalengka and Kuningan districts is generally considered to still apply the old school style. This has become the author's tendency to research about expression photography as a contribution of innovative thinking that should be done, especially in the world of wedding photography. The reason the author chose the research location in the Malausma sub-district is because the research access is easy to reach and the tendency of creativity in the style or pose of wedding photography using techniques single lighting still requires development.

Previous research in the form of a thesis with the title: "Improving the Quality of Photography Wedding and Pre-wedding Processing by Utilizing Software Adobe Photoshop Digital Using Techniques Retouching.” By Hendrix Syamsul Huda. In 2017, Semarang State
University, which contains engineering or editing of wedding and prewedding photos using software Adobe Photoshop to obtain maximum and aesthetic results, is relevant to this research in improving the quality of expression photos for more aesthetic results by adapting trend styles and poses. developing at this time.

The technique used in this research is Publication Strategy analysis. Developing a strategy for a marketing strategy must be carefully thought out by business people, especially in the realm of wedding photography. A business must be able to identify the intended target market and the marketing media used to deliver a product to customers. The target in question is a number of customers who are getting married.

2. Research Methods

a. Description of Research The results

Results that will be shown are Style and Pose Wedding Photography through Techniques Single Lighting in Expression Photography which aims to visualize nonverbal forms of communication, present more aesthetic visuals and know style and poses as well as photography techniques with single lighting concepts, where there is information about descriptive knowledge about styles trending and poses as well as shooting techniques with types single lighting in wedding photography in the Majalengka and Kuningan areas.

There are several sources of reference in making this thesis taken from books on photography, scientific works, journals, articles that are relevant to the problems stated above. Relevant internet sources are also used for additional reference. These journals were obtained from online sources in an open manner access, which were collected and then reviewed based on the order of year of publication, the data presented in descriptive form.

b. Data Presentation

John Berger writes in Ways of Seeing “the way we see things is influenced by what we know or what we believe.” For Berger, a photograph is an important form of impression defined as a “sign that has been reproduced or reproduced”. Berger also added below; photo is an appearance, or a collection of performances that have been separated from the place and time where the photo was first created and maintained (1972: 9-10), this makes who pose "a direct testimony about the world surrounded by other peoples at different times".

Theories related and familiar with photography include Barthes' semiotics. Barthes (1977:17) suggests that by using the media of photography in semiotics and all artificial arts contained in two messages. First is the message denotation that is analog on. Analog on can be interpreted as a representation of the actual object in the image which does refer to object particular, the perception of the reality of an image. Second is the message connotation, that is how the audience to a certain extent communicates what is acceptable and in thinking about the message.

Furthermore, messages in a photographic work, the meaning of denotation and connotation are distinguished into having meanings that cannot be contested, but have meanings as messages that are sterilized by the culture of a certain audience. (1977:21). The point is, denotation as a message that represents the object of reality itself, while connotation has its own procedure for how the message is conveyed.
c. Research Methods and Approaches

Based on the approach and type of data used, this research is included in qualitative research so that it will produce descriptive data in the form of words. "Qualitative research is intended to collect information about the status of an existing symptom, namely the state of the symptoms according to what they were at the time the research was conducted". Therefore, qualitative research can reveal phenomena in a subject that wants to be studied in depth (Arikunto, 1998).

The qualitative research method itself is a scientific research method based on efforts to build their views which are examined in detail, in words, as well as a holistic and complex picture. This definition looks at the perspective of research, which is looking at an effort to build the views of research subjects on these things. The opinion of Bogdan and Taylor as quoted by Lexy J. Moeleong in his book Qualitative Research Methodology defines qualitative methodology as a research procedure that produces descriptive data in the form of written or spoken words from people and observable behavior (Moeleong, 2005: 4).

d. SWOT Analysis Method The

stages in this study include the orientation stage, the exploration stage, and the experimental stage. In this research, the method used to solve the problem is using the SWOT analysis technique.

1. Strength(Strength)
   As one media to capture the moment and as one way for more varied picture.

2. Weakness(Weakness)
   Lack of knowledge wedding photography about the poses and styles more varied and techniques single lighting that are not optimized in the process of making its object.

3. Excellence (Opportunity)
   The more varied poses and expressions and lighting techniques used, the greater the chance of good photos and the more interesting the photos produced, thus affecting trust in the Wedding Organizer.

4. Threats (Threats) The
   lack of variety of poses for wedding photography, causing less attractive results and lack of attractive photos, the less public trust in the Wedding Organizer.

Based on the SWOT analysis, the author uses the WO strategy as a reference to open insight into wedding photography related to style and fashion and add a reference to photography models as a reference for better works. So that photographers in the Malausma area can be more creative with varied and aesthetic works, namely: Opening insight into wedding photography related to style and fashion, and adding photographic model references as a reference for better works.

3 Results And Discussion

a. The concept of Knowing the Trending Style and Pose.

Knowing the styles and poses that are trending in wedding photography is inseparable from the interest in the model photo and expression photography categories. Model photos are a type of photography that is in great demand by photography hobbyists today. The definition of a photo model is a person who becomes an object in a photo showing expressions, clothes,
gestures or body movements. The technique of shooting model photos is almost the same as the basic technique of photographing other objects, only has special differences.

The difference is in the object being photographed, namely 'humans' whether male or female, small adults or old. In wedding photography, a model is the two brides who are the objects, and most of the objects of the bride are the objects that are most photographed because they have more aesthetic value.

b. **Big Idea Message The**

   concept idea of *wedding photography* begins with a list of *values* regarding aesthetic values with style and poses, including This  
   1. is one of the author's contributions to introduce the concept of *wedding photography* with a technique *single lighting* that is varied and not rigid. 
   2. Have aesthetic visuals and fall into the category of model photo and expression photography.

c. **Creative**

   Concepts The creative concept in *wedding photography* that you want to do is with the right angle of shooting, good lighting and poses that are not rigid, so that it shows the expression of the bridal model. The visual message that is intended is an aesthetic message that is attractive, warm and has a modern concept.

d. **Visualization of Works**

   In accordance with the results of research that has been carried out, namely by making print media works in the form of photos *wedding photography* with *styles* and poses using technique *single-lighting* a trending.
Title: Pose wedding
Work: M. Umam Al-farizi Year: 2021
Print Media
Size: 30.5 cm x 38.1 cm Paper: DOP
Frame: Fiber Color: White

Description of the work
In this photo the object poses with both palms like bernamaste. The position is like someone who gives namaste by bowing slightly and touching the tip of the nose. Namaste itself has the meaning of bowing to you (the other person who will be given the handshake of the namaste). This photo has low light, and creates a shadow behind the object. Taking pictures from the side aims to show the bride's hand makeup while at the same time giving the message that the bride and groom say hello.

A: Camera
B: Object
C: Lighting Specifications
Media: print Tools: ring light, tripod, camera.
Shutter: 1/100 Aperture: f/2
ISO: 100 Camera: Canon EOS 550D
Focal length: 50 mm Year: 2020
The shooting technique uses a shutter speed of 1/100, f (diaphragm) 2 and ISO 100. Shooting with 170 light, makes shadow next to the camera. This photo editing uses the lightroom application to adjust the light and color grading.

![Figure 3. “Pose Wedding 2”](image)

**Title:** Pose wedding  
**Work:** M.Umam Al-farizi  
**Year:** 2021  
**Print Media**  
Size: 40 cm x 60 cm  
Paper: DOP  
Frame: Fiber  
Color: White  
**Description of Work**  
The bridal pose stands with hands as if turn the waist and tilt to the side and a flat facial expression. The purpose of this pose is to give the impression of a firm bride.

**A:** Camera  
**B:** Object  
**C:** Lighting **Specifications**  
Media: print  
Tools: flash softbox, camera.  
Shutter : 1/200  
Aperture : f/4  
ISO : 100  
Camera : Canon EOS 60D  
Focal length : 35 mm  
Year : 2020  
The shooting technique is a medium shot using a shutter speed of 1/200, f (diaphragm) 4 and ISO 100.

![Figure 4. Shooting Scheme](image)

The photo shoot is done indoors, the direction of light is 315° to the object making a shadow behind the object but it is a bit sideways. Added edits using the Photoshop application by adjusting the light level.
Title: Pose wedding
Work: M. Umam Al-farizi Year: 2021
Print Media
Size: 30 cm x 40 cm
Description of Work
The bridal pose stands in front of the aisle with smiling expression with elegant makeup using 1 lighting with reflected flash up/bounce, making the light spread and making the light soft.

A: Camera
B: Object
C: Lighting
Specifications
Media: print Device: camera, external flash
Shutter: 1/250 Aperture: f/3.2
ISO: 200 Camera: Canon EOS 600D
Focal length: 50 mm Year: 2020
Medium shoot shooting technique, using a shutter speed of 1/250, f (diaphragm) 3.2 and ISO 200. The direction of the light is 0°. For editing use the lightroom application and adjust the light and adjust the color grading darker.
Title: Pose wedding  
Work: M. Umam Al-farizi Year: 2021
Print Media
Size: 8 in x 10 in Paper: Glossy
Description of Work
This photo shoot was done indoors, the pose of the bride and groom standing in front of the ring light and create a shadow behind the object, plus the reflection of the image from the mirror makes the image more interesting, with a happy facial expression and both hands holding a sign.

A: Camera  
B: Object  
C: Lighting

Specifications
Media: print  Tool: camera, ringlight
Shutter: 1/160  Aperture: f/6.3
ISO: 100  Camera: NIKON D7200
Focal length: 26 mm  Year: 2020

Medium shoot shooting technique, using shutter speed 1/160, f (diaphragm) 6.3 and ISO 100. With the light direction of 270° and create a shadow behind the object. For editing use the lightroom application and adjust the light and adjust the color grading darker.
Title: Pose Wedding  
Work: M. Umam Al-farizi Year: 2021  
Print Media  
Size: 8 in x 10 in  Paper: Glosi  Frame: Fiber  
Color: White  
Description of Work  
This photo shoot was taken in front of the aisle, and the aisle happened to be dark and I used dim light or low light, medium shoot shooting techniques, and a flat expression with my eyes closed, and pulled the dress as an additional effect to make it look attractive, the rest was edited to make the dress more aesthetic.  
A: Camera  
B: Object  
C: Lighting Specifications  
Media: print  Tool: camera, ring light  
Shutter: 1/250  Aperture: f/2.0  
ISO: 100  Camera: Canon EOS 60D  
Focal length: 50 mm  Year: 2020  

Figure 9. “Pose Wedding 5”  

Medium shoot shooting technique, using a shutter speed of 1/250, f (diaphragm) 2.0 and ISO 100. With a light direction of 270° and create a shadow next to the object. For editing use the lightroom application and adjust the light and adjust the color grading darker and photoshop to edit the dress to make it more aesthetic.
Title: Pose wedding  
Work: M. Umam Al-farizi  Year: 2021  
Print Media  
Size: 8 in x 10 in  
Paper: Glosi Frame: Fiber Color: White  
Description of Work  
This photo shoot was done indoors, and using ringlight, with medium shoots and smiling expressions with closed eyes with hands like a prayer with the intention that the event will run smoothly and safely, with light pointing at the face making the picture interesting.  

Medium shoot shooting technique, using a shutter speed of 1/100, f (diaphragm) 2 and ISO 100. With a light direction of 90° and create a shadow behind the object. For editing use the lightroom application and adjust the light and adjust the color grading darker and photoshop to edit the dress to make it more aesthetic.
Title: Pose wedding  
Work: M. Umam Al-farizi  
Year: 2021  

Print Media  
Size: 40 cm x 60 cm  
Frame: Fiber  
Color: White  

Description of Work  
This photo shoot was done indoors, with the property behind him, with an upright standing position with the right hand holding the front side of the waist and the left hand holding the back waist, with a flat expression making the photo more attractive.

Figure 13. “Pose Wedding”

A: Camera  
B: Object  
C: Lighting  

Specifications  
Media: print  
Tool: camera, ring light  
Shutter: 1/200  
Aperture: f/4  
ISO: 100  
Camera: Canon EOS 60D  
Focal length: 50 mm  
Year: 2020  

Medium shoot shooting technique, using a shutter speed of 1/200, f (diaphragm) 4 and ISO 100. With a light direction of 315° and creating a shadow next to the object. For editing use the lightroom application and adjust the light and adjust the color grading darker.
4 Conclusion

1. *Wedding photography* in the Malausma area has a lot of potential to develop better. By introducing references *wedding photography* that are trending in other cities such as Kuningan and Majalengka, you can expand the imagination and work of photographers to be more varied so that they are not only limited to capturing wedding moments but can create more aesthetic works. Results *wedding photography* in Malausma which in fact looks stiff, makes enthusiasts *wedding photography* prefer photographers from outside the region because the photos are considered more varied and interesting.

2. The steps taken by photographers in the Malausma sub-district in order to find out which styles and poses are *trending* are holding workshops and sharing with photographers from the Kuningan and Majalengka areas to open up insights related to fashion and *style* as well as poses that are more varied and aesthetic.

3. How to educate about *style* and poses in order to produce an expression of the bridal model in the community in Malausma sub-district is to open knowledge about creative ideas about the responsibility of a photographer who must be communicative, understand make-up, update about fashion, modern photography culture and style, and poses that are trending.

5 Suggestion

1. Photographers in the Malausma area can create a community and increase educational activities for their members, for example seminars or sharing of works in the category of model photos or *wedding photography* in order to make photographers in the Malausma area more diverse and provide aesthetically pleasing works that attract more interest.

2. The photographer community in Malausma increases publication activities, such as model photography exhibitions which aim to promote to a large audience so that they can update about style, fashion, modern culture and more proper shooting techniques.

3. This research can continue with the aim of developing so that it can contribute to the photographer community in Kuningan and Majalengka so that creative ideas can be carried out and learn from each other and exchange information about the science of model photography and *wedding photography*.

References


Other Sources:
Analysis of the socio-economic influence on fertility in the Tiang Pumpung sub-district Merangin regency, Jambi

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Abstract. A recent study of the high number of early births and marriages that often occur in villages, hence researchers take the title: analysis of the socioeconomic impact on fertility at pumpung, affected districts' research done to analyze the impact of economic conditions on family incomes, and the social conditions of wife work, wife education, married age of the wife using birth control.

Keywords: Socio-Economic; Fertility; Education

1 Introduction

Greater growth in population will have a distinct impact on various countries, greater density influenced fertility or living birth. While factors affecting the low fertility rate of first marriage age, use of family incomes and women status improvements. A premature age at first marriage can lead to premature weddings. Considering the many factors that influence fertility according to occupation experts, the level of education attained by the population particularly the female population represents one of the most significant factors affecting fertility.

The study of fertility was an important study in the field of occupation. This is because of several reasons: (1) fertility is responsible for biological replacement and the survival of a society; (2) fertility rates affect the growth of the number of people in a positive way.

Meaning increase (decrease) in population size: (3) uncontrolled fertility can cause social and political problems (junaidi and hardiani, 2009).

As for the purpose of this research, it is to know and analyze the effects of income I families, wife's education, and wife's work on fertility rates through the interpreting variable age at first marriage and use of contraception in Tiang Pumpung District, Merangin Regency.

2 Methodology

The paper will use Analysis models path analysis. The methods used in this study are the methods of the survey, in which information and data come from sampled respondents using patterned, structured questions (questionnaires) lists and according to need. The data
used in this study are primary and secondary data. The techniques for collecting data in this study involve interviews and questionnaires. In the researchers' data processing use qualitative and quantitative analysis using SPSS. As for the data analysis model in this study, it is an analysis model used to see the extent to which a directly and indirectly exotic variable might affect an endogenous variable.

One of the components that affect the rate of population growth is the magnitude of the fertility rate. This fertility rate is influenced by several socio-economic aspects. From the conceptual framework above, it can be seen that what functions as independent variables are family income, education or wife, education or husband, wife's occupation, age at first marriage, and duration of use of contraceptives, while the dependent variable is fertility. The path analysis model uses multiple linear regression equations, the basic equation can be written as follows (Hasan, 2008):

The analysis model can be applied based on the following diagram:

![Figure 1. research framework](image)
Model diagrams in the figure 2. The above shows that PK, PDI and PI have a direct and indirect effect on FR through UKP and PAK. Based on Figure 3.1. There are 3 structural equations: 

\[
\begin{align*}
\text{UKP} &= \rho_{ukp,pk} \text{PK} + \rho_{ukp,pd} \text{PD} + \rho_{ukp,pi} \text{PI} + \epsilon_1 \\
\text{PAK} &= \rho_{pak,pk} \text{PK} + \rho_{pak,pd} \text{PD} + \rho_{pak,pi} \text{PI} + \epsilon_2 \\
\text{FR} &= \rho_{fr,pk} \text{PK} + \rho_{fr,pd} \text{PI} + \rho_{fr,pi} \text{PD} + \rho_{fr,ukp} \text{UKP} + \rho_{fr,pak} \text{PAK} + \epsilon_3.
\end{align*}
\]

description:

- FR = Fertility
- PK = family income
- PD = wife’s education
- PI = wife’s job
- UKP = Age of first marriage (year)
- PAK = Use of contraceptives
- $\rho$ = rho
- $\epsilon$ = disturbing variable

3 Result and Discussion

The social condition of the people of the Tiang Pumpung sub-district from year to year continues to improve. This is as a result of the provision of more adequate social infrastructure and facilities. Based on the research results, the average fertility of each child of childbearing age is 2 children, the average income is IDR 2,000,000, the average wife’s education is elementary school, meaning that the education level is still low, and the wife does not work, and many get married at an average age of under 18 years old or underage, while the contraceptives used are injections.
Table 1. Structural Equation I Multiple Regression Results Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>T</th>
<th>Sig.</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
<td>Tolerance</td>
</tr>
<tr>
<td>(Constant)</td>
<td>14,285</td>
<td>1,110</td>
<td>14,285</td>
<td>1,110</td>
<td>12,87</td>
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<tr>
<td>PK</td>
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<td>.000</td>
<td>-.174</td>
<td>-2,357</td>
<td>.020</td>
</tr>
<tr>
<td>PDI</td>
<td>.596</td>
<td>.073</td>
<td>.698</td>
<td>8,125</td>
<td>.000</td>
</tr>
<tr>
<td>PI</td>
<td>.555</td>
<td>.386</td>
<td>.089</td>
<td>1,438</td>
<td>.153</td>
</tr>
</tbody>
</table>

a. Dependent Variable: UKP

Source: data processed, 2021

The results of the regression in the first equation are family income, wife's education has a significant effect on variable age at first marriage, while the wife's occupation has no significant effect.

Table 2. Structural Equation II Multiple Regression Results

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>T</th>
<th>Sig.</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
<td>Tolerance</td>
</tr>
<tr>
<td>(Constant)</td>
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<td>.178</td>
<td>14,098</td>
<td>.000</td>
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<td>PK</td>
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<td>.000</td>
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<tr>
<td>PDI</td>
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<td>-.616</td>
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<td>.000</td>
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<tr>
<td>PI</td>
<td>-.153</td>
<td>.062</td>
<td>-.235</td>
<td>-2,471</td>
<td>.015</td>
</tr>
</tbody>
</table>

a. Dependent Variable: PAK

Source: data processed, 2021

The results of the regression in the second equation are family income, wife's education, wife's work has a significant effect on the use of contraceptives.

Table 3. Structural Equation III Multiple Regression Results

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
</tr>
<tr>
<td>(Constant)</td>
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<td>.677</td>
<td>1,062</td>
</tr>
<tr>
<td>PK</td>
<td>9,572E-7</td>
<td>.000</td>
<td>.893</td>
</tr>
</tbody>
</table>

a. Dependent Variable: C

Source: data processed, 2021
In structural equation 3 using regression path analysis with interpreting variables to see the effect of family income, wife's occupation and wife's education on fertility through age at first marriage and use of contraceptives, the results show that family income, wife's occupation and wife's education have no significant effect on fertility through age at first marriage, while the variables between the use of contraceptives, family income, wife's occupation and wife's education have a significant effect on fertility.

Based on the correlation results, it can be seen the Pearson correlation between family income, wife's occupation and use of contraceptives so that a path diagram can be obtained which can be described:

Figure 3. Path diagram of structural equation III

The direct and indirect effects of exogenous variables, namely family income, wife's occupation and use of contraceptives on fertility can be seen in Table

Table 4. Direct effect, indirect effect and total effect of structural equation III
The influence of PDI, PI, and PAK to FR = R^2 = 94.7

Effect of external variables = 5.3

Total = 100

Source: data processed, 2021

The strength of family income which directly determines changes in fertility is 81 percent, and through its relationship with wife's education 12.69 percent, through its relationship with wife's work -13.32 percent and through the use of contraceptives by 12.52 percent. In total, family income determines fertility changes by 92.28 percent. Wife's educational strength which directly determines fertility changes is 2.62 percent, and through its relationship with family income is 12.69, through its relationship with wife's work is -2.65 percent and through the use of contraceptives is 0.68 percent. In total, the wife's occupation determines the changes in fertility by 13.34 percent. Wife's Employment Strength which directly determines Fertility changes is 4.08 percent, and through its relationship with family income is -13.32, which through its relationship with wife's education is -2.65 percent and through the use of contraceptives is -0.6 percent. In total, the wife's occupation determines the changes in Fertility by -12.49 percent. The power of using contraceptives that directly determine changes in fertility is 0.96 percent.

4 Conclusion

It is important for women to continue to improve their knowledge, especially through formal education, so that they can know, especially for married women, the importance of using contraceptives which can help to plan the number of children they will have and to suppress child births, thereby reducing child births, and will reduce the burden of expenses in the family so that the family will get a prosperous life. To be able to see the factors that affect fertility in the District of Tiang Pumpung, further research is needed. With the results of this research, it is hoped that it can contribute in knowing more deeply the factors that affect fertility.

References

The Analysis of Fraud Detection Using the Beneish Ratio Index and the F Score Model Method on the Financial Statements of the State-Owned Insurance Companies Registered in Indonesia

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Abstract. This study aims to see a company that is trying to manipulate the presentation of the accounting report seen from the financial ratios of the Beneish M Score and Dechow F Score models. The Beneish M-Score Model is a model that uses eight ratios related to asset changes and sales growth consisting of DSRI, GMI, AQI, SGI, DEPI, SGAI, LVGI, and TATA. If the score obtained is above -2.22, the company is said to tend to manipulate or manipulate. Meanwhile, the F Score Model is a financial report fraud detection model developed using a scaled logistic probability technique where financial reports with an F score of more than one should be suspected of containing fraud. The seven ratios are RSST accruals, changes in receivables, changes in inventory, percentages of soft assets, changes in cash sales, changes in return on assets, and issuance. The results of using both methods show that companies suspected of manipulating financial statements are the same companies, which are PT Asuransi Jiwasraya (Persero) and PT Asabri (Persero). The calculation method for the two different methods also shows that the company is the same, and the research results show that the company presents a good report, which is PT Taspen (Persero). PT Asuransi Jiwasraya (Persero) produces the M Score of 0.808, while the F Score model produces a score of 1.852. PT. Asabri (Persero) produces an M Score of -1.388, while the F Score model produces a score of 1.563. The two companies have been calculated using both calculation methods and produce a score that exceeds the predetermined amount of cut-off.

Keywords: Beneish M Score; Dechow F Score; Fraud; Annual Report

1 Introduction

Fraud is a criminal act known for manipulation, misstatement, or breach of trust that does not affect threats of violence or physical force. A fraud financial report is an act of financial statements content manipulation where the contents are manipulated so that it is better and does not explain the real situation, and this can harm the other party who made as decisions and financial fraud. Fraud is a false representation of material facts created by one party to another party to deceive and persuade the other party by using the fact that harm him. The statement made by management is known as management fraud, so they are more publicly monitored following an increase in numbers of companies that have fallen due to fraud management (Fadilah, et al., 2019).
Fraud also occurred in Indonesia last 2019 that reported by the Ministry of State-Owned Enterprises. Indication of fraud on PT Asuransi Jiwasraya (Persero) to the Attorney General's Office in November 2019 by the Ministry of State-Owned Enterprises. It was done after the Ministry of State-Owned Enterprises did a review of a not transparent managed financial statement. Some facts were found among them there are several company assets to invest prudently. Furthermore, Jiwasraya had time to issue an insurance product that offers a high return to the customer. This what makes Jiwasraya experiencing liquidity pressure lately. Companies are forced to postpone claim payments to their customers. The government, as the holder of Jiwasraya shares, is now looking for a scheme to improve the company's finance. The Ministry of State-Owned Enterprises is coordinating with the Ministry of Finance and the Financial Services Authority (OJK) to map the strategy that will be carried out later. Currently, Jiwasraya has formed a subsidiary named Jiwasraya Putra for financial assistance parent company. It is just that the Ministry of State-Owned Enterprises also mentioned that it is not enough to improve Jiwasraya's finances fully (Wicaksono, 2019).

Indonesian General Insurance Association (AAUI) said that the general insurance industry has the potential to suffer losses up to billions of rupiahs throughout 2018. This loss due to an act of fraud or fraud carried out by several customers. There are three lines of business general insurance which is often an easy target rogue customer to trick the company. The three sectors including travel insurance, vehicles motorized, and shipping. The act of fraud occurs in the motor vehicle insurance sector occurs to the customer by making a fake damage complaint vehicle so that customers can apply claims to insurance companies. Another fraud also occurs in the owner of shipping products by faking the identity of the ship's age becomes younger, so it deserves to be insured. Furthermore, the customer claims for the risk that did not happen. Indonesian General Insurance Association (AAUI) reported so far, 14 companies reported fraud acts to the police. A fraud incident like this has been investigated by Indonesian General Insurance Association (AAUI) since 2017 but has not been detected until finally the detection was done in 2018 (Agi, 2019).

The research was conducted by Shabnam Fazli Aghghaleh and colleagues in 2016 by examining data on fraud that occurred in Malaysia. The results of these studies indicated that Dechow F-score's ability to detect fraud was 73.17% higher than the model Beneish that can predict correctly was 69.51% of the fraud data contained in Malaysia. Therefore, it can be concluded that The Dechow F-score is more suitable for fraud cases of financial reports occurring in Malaysia from 2000 to 2014. Deficiencies in existing research performed by Shabnam Fazli Aghghaleh and colleagues is a limitation on financial data; therefore, non-financial data that plays a significant role in detect fraud is ignored (Aghghaleh, et al., 2016).

The academic literature shows that financial reports presented by the company can be analyzed to get the score of whether the score of a company can be categorized as manipulator firms that tend to commit fraudulent financial statements. Score that is known as the Beneish M-Score developed by Professor Messod Daniel Beneish. This model uses 8 financial ratios to get a certain score for the identification of fraud possible in the company. The eighth financial ratio is the Receivable Days Sales Index, Gross Margin Index, Asset Quality Index, Grow Sales Index, Depreciation Index, general and administration Sales Index, Leverage Index, Total Accrual to Total Assets Based on the score obtained. Furthermore, a company can be grouped as a manipulator and a non-manipulator company. Beneish M-Score itself is a probabilistic model (Santosa, et al., 2019).

Based on these reasons, stakeholders need a way to help them to detect fraud/report manipulation finance. Messod Daniel Beneish in his research entitled "The Detection of Earnings Manipulation" in 1999 found a way to identify which financial statements in the case
are faked. Beneish conducted a study against companies that make fake reports, finances, then compared to companies that are registered with Compustat in the period 1982-1992. The results showed Beneish found the characteristics of manipulated financial statements, such as an unnatural increase in accounts receivable, a decrease in gross profit and assets, increased growth sales, as well as an increase in accruals. (Beneish, 1999)

Based on these characteristics, Beneish formulated the Beneish Ratio Index and M-score, which are eight variables (in the form of a formula) that can be applied to catch the presence of steeping fraud reports, finance (Beneish, 1999). Beneish, ratio index consists of DSRI (ratio of accounts receivable to sales), GMI (gross profit ratio), AQI (quality ratio assets), SGI (sales growth ratio), DEPI (ratio depreciation rate), SGAI (cost of sales ratio, administration, and general), LVGI (leverage ratio), and TATA (the ratio of accruals to total assets). The results of the Beneish ratio index will collect companies based on their status, namely as a manipulator or non-manipulator. The level of accuracy of the Beneish ratio index in identifying manipulator companies up to 71% (Beneish, 1999). Even though it has not reached 100% yet, the ability of the Beneish ratio index helps stakeholders much to avoid malefic decision making (Apriani, et al., 2019).

Based on the background above, the researchers are interested in re-examining the “Fraud Detection Analysis by Using the Beneish Ratio Index and Method of F Score Model on Financial Statements State-owned insurance company registered in Indonesia”.

2 Methodology

The population and sample in this study is the Indonesian state-owned insurance company. The sample in this study is the state-owned insurance company with the most recent appropriate financial reports with the issuance date of the company's financial statements.

The selection of sample criteria in this study using the purposive sampling method where the sample is selected based on the sample criteria contains all the data required in counting the Beneish M-Score and Dechow F-Score model.

There are eight state-owned insurance companies now. Each company is engaged in various insurance fields, whether health, safety, or insurance in the future. The eight companies are presented in the following table.

<table>
<thead>
<tr>
<th>No</th>
<th>Name of the State-Owned Insurance Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Perum Jamkrindo</td>
</tr>
<tr>
<td>2</td>
<td>PT Asabri (Persero)</td>
</tr>
<tr>
<td>3</td>
<td>PT Askrindo (Persero)</td>
</tr>
<tr>
<td>4</td>
<td>PT Asuransi Ekspor Indonesia (Persero)</td>
</tr>
<tr>
<td>5</td>
<td>PT Asuransi Jasa Indonesia (Persero)</td>
</tr>
<tr>
<td>6</td>
<td>PT Asuransi Jasa Raharja (Persero)</td>
</tr>
<tr>
<td>7</td>
<td>PT Asuransi Jiwasraya (Persero)</td>
</tr>
<tr>
<td>8</td>
<td>PT Taspen (Persero)</td>
</tr>
</tbody>
</table>

Source: The Ministry of State-Owned Enterprises
2.1. Beneish M-Score Ratio

a. Days’ sales receivables index (DSRI)

Days’ sales in receivables index or DSRI is the ratio of the number of sales days in accounts receivable in the first year (year t) to the measurement of the previous year (year t-1). DSRI is an index of the number of days on credit sales in the first year the manipulation was suspected profit compared to the previous year. DSRI can be obtained by the formula below:

\[
\text{DSRI} = \frac{\text{Receivables (t)}}{\text{Sales (t)}} \times \frac{\text{Receivables (t-1)}}{\text{Sales (t-1)}}
\]

Information:

\( t = \) period t
\( t-1 = \) period t-1

A high DSRI score indicates the changes to the company's credit policy to drive sales. However, an increase in disproportionate accounts receivable can be concluded as an indication of revenue inflation. The cut-off DSRI score (Beneish, 1999: 27) is described as follows:

- DSRI < 1,031 = non-manipulator
- DSRI > 1,031 = manipulator

2.2. Gross Margin Index (GMI)

Gross Margin Index or Gross Profit Index or GMI is a measure of the level of profitability company. GMI is the gross margin ratio in the previous year (year t-1) where there was a first-year gross margin (year t). This index is the comparison of changes in gross profit in one year with the previous year. GMI bias was obtained by the following calculations:

\[
\text{GMI} = \frac{\text{Sales (t-1)} - \text{Cost of Goods Sold (t-1)}}{\text{Sales (t-1)}} \times \frac{\text{Sales (t)} - \text{Cost of Goods Sold (t)}}{\text{Sales (t)}}
\]

Information:

\( t = \) period t
\( t-1 = \) period t-1

If the GMI score passes the cut-off point, which is 1.014 then it is a sign that the company experienced a decrease in gross profit that means a negative signal for the company's prospects in the future. Beneish assesses companies with excellent prospects worse, more potential for manipulation income. GMI cut-off score (Beneish, 1999: 27) is described as follows:

- GMI < 1.014 = non-manipulator
- GMI > 1.014 = manipulator

Assets Quality Index or the Asset Quality Index or AQI is a comparison of non-current assets besides fixed assets with total assets in this year with the previous year. AQI is a non-
current asset ratio (not include plant, property, and equipment) to the total assets that measure the proportion of total assets to future advantages. The AQI score can be formulated as follows:

\[
AQI = \frac{\text{Current Asset (t)} - \text{PPE (t)}}{\text{Total Assets (t)} - \text{Current Asset (t-1)} + \text{PPE (t-1)}}
\]

Information:
- \( t = \) period 1
- \( t-1 = \) period t-1

AQI shows changes in assets besides current assets and fixed assets in the total asset for the year compared to the previous year. Then, AQI can be used to indicate how much the proportion of other assets in total assets. The high AQI indicates the company is doing deferral of expense. Deferral of expenses will make a greater profit and it is one of the ways to commit fraud reports finance. AQI cut-off score (Beneish, 1999: 27), described as follows:
  a. AQI < 1.039 = non-manipulator
  b. AQI > 1.039 = manipulator

2.3. Sales Growth Index (SGI)

SGI is an index that focuses on observing the ups and downs of company sales. The SGI score is obtained by the following formula:

\[
SGI = \frac{\text{Sales (t)}}{\text{Sales (t-1)}}
\]

Information:
- \( t = \) period t
- \( t-1 = \) period t-1

SGI is the ratio of sales in the first year (year t) to the sales of the previous year (year t-1). The SGI score that is more than 1.134 indicates an increase in sales from last year. Companies that experience an increase in sales tend to maintain this condition and more motivated to commit fraudulent financial statements. It is because the company’s financial position and the need for capital put pressure on managers to achieve targets, so the possibility of fraud is quite large. The cut-off score of the SGI (Beneish, 1999: 27) is explained as follows:
  a. SGI < 1.134 = non-manipulator
  b. SGI > 1.134 = manipulator

2.4. Depreciation Index (DEPI)

Depreciation Index or DEPI is the ratio of depreciation expense to fixed assets before depreciation between periods. The Index Depreciation can be obtained by the formula:

\[
DEPI = \frac{\text{Depreciation (t)} - \text{Depreciation (t-1) + ppe (t-1)}}{\text{Depreciation (t)} - \text{Depreciation (t-1) + ppe (t)}}
\]

Information:
- \( \text{ppe} = \) plant, property, and equipment (fixed assets)
- \( t = \) period t
- \( t-1 = \) period t-1
If the DEPI ratio exceeds 1.001, this indicates that the company is making an effort to postpone the recognition of depreciation expense, or in other words, to increase the life of the assets. In addition to this possibility, the DEPI ratio also indicates the company's effort by applying new methods to increase revenue. The cut-off score of DEPI (Beneish, 1999: 27) is explained as follows:

a. DEPI <1,001 = non-manipulator  
b. DEPI> 1,001 = manipulator

2.5. Sales, General, and Administrative Expenses Index (SGAI)
Sales, General and Administrative Expenses Index or SGAI is an index that measures the comparison between selling, administrative and general expenses to sales between two periods. The calculation for getting SGAI is as follows:

\[
\text{SGAI} = \frac{\text{Sales, General and Administrative Expenses (t)}}{\text{Sales(t)}} - \frac{\text{Sales, General and Administrative Expenses (t-1)}}{\text{Sales(t-1)}}
\]

Information:
SGAI : Sales General and Administrative
Expense t = period t
(t-1 = period t-1)

The SGAI index that is more than or equal to 1 indicates an increase in spending on marketing and administration costs. It shows a decrease in efficiency in the use of marketing and administrative costs, indirectly reflecting the increased risk of loss that the company will experience in the future. This company conditions tend to commit fraudulent financial statements. The SGAI cut-off score (Beneish, 1999: 27) is explained as follows:

a. SGAI <1.054 = non-manipulator  
b. SGAI> 1.054 = manipulator

2.6. Leverage Index or Debt Index (LVGI)
Leverage Index or debt index or LVGI is the ratio of total debt to total assets this year and the previous year. It illustrates the level of debt the company has against total assets from year to year. LVGI is obtained by the following calculations:

\[
\text{LVGI} = \frac{\text{Long term Debt (t) + Current Liabilities (t)}}{\text{Total Assets (t)}} - \frac{\text{Long term Debt (t-1) + Current Liabilities (t-1)}}{\text{Total Assets (t-1)}}
\]

Information:
t = period t  
t-1 = period t-1

LVGI is a ratio that compares total debt to total assets. The LVGI score that more than 1 indicates an increase in leverage. High leverage indicates the risk of debt or the need to pay the high debt so that companies will tend to manipulate financial statements. The LVGI cut-off score (Beneish, 1999: 27) is described as follows:

a. LVGI <1.037 = non-manipulator  
b. LVGI> 1.037 = manipulator
2.7. Total accrual total assets or Total Accrual Index (TATA)

Total accruals to total assets or Total Accrual Index to Total Assets or TATA. Total accruals are a component of the number of accrual earnings. The high number of total accruals illustrates the portion of cash in generated earnings. TATA knows the income from accruals (accounting profit) and not from cash profit. TATA is obtained with the following formula:

\[
TATA = \frac{\text{Net Income - Cash Flow from Operation}}{\text{Total Assets (t)}}
\]

Information:
\( t = \text{period t} \)
\( t-1 = \text{period t-1} \)

TATA measures the ratio of a company's accruals to total assets. The inclusion of the accrual aspect because there is a large opportunity/gap in accruals to commit fraud. TATA knows the income from accruals (accounting profit) and not from cash (cash profit). The cut-off score of TATA (Beneish, 1999: 27) is explained as follows:

a. TATA <0.018 = non-manipulator
b. TATA> 0.018 = manipulator

The results of the eight Beneish ratio indexes can be used to find the M-Score with the mathematical equation as shown below:

\[
\text{M-Score} = -4.84 + (0.92 \times \text{DSRI}) + (0.528 \times \text{GMI}) + (0.404 \times \text{AQI}) + (0.892 \times \text{SGI}) + (0.115 \times \text{DEP}) - (0.172 \times \text{SGAI}) + (4.679 \times \text{TATA}) - (0.327 \times \text{LVGI})
\]

The cut-off score of M-Score is as below:
1. M-Score < -2.22; categorized as non-manipulator.
2. M-Score > -2.22; categorized as manipulator
3. M-Score = -2.22; categorized as grey area (grey company)

2.8. Dechow F Score

The F score model is a financial report fraud detection model developed using a scaled logistic probability technique. The score of F can be counted using the following formula:

\[
\text{Predicted} = -7.893 + 0.790 (\text{RSST Acc}) + 2.518 (\text{ch_rec}) + 1.191 (\text{ch_inv}) + 1.979 (\text{soft_assets}) + 0.171 (\text{ch_cs}) + (-0.932) (\text{ch_ROA}) + 1.029 (\text{issue})
\]

a. RSST Accruals

This variable measures the changes of current assets with the formula as below:

\[
\text{RSST} = \Delta WC + \Delta NCO + \Delta FIN \text{Average Total Assets}
\]

\[
\Delta WC = \left(\frac{\text{Current Assets} - \text{Cash and Short term Investment}}{\text{Current Liabilities - Debt in Current Liabilities}}\right) - \left(\frac{\text{Current Assets} - \text{Cash and Short term Investment}}{\text{Current Liabilities - Debt in Current Liabilities}}\right)
\]

\[
\Delta NCO = \left(\frac{\text{Total Assets - Current Assets - Investment and Advances}}{\text{Total Liabilities - Long term Debt}}\right) - \left(\frac{\text{Total Assets - Current Assets - Investment and Advances}}{\text{Total Liabilities - Long term Debt}}\right)
\]

\[
\Delta FIN = \left(\frac{\text{Short-term Investment + Long-term Investment}}{\text{Long-term Debt + Debt in Current Liabilities + Preferred Stock}}\right) - \left(\frac{\text{Short-term Investment + Long-term Investment}}{\text{Long-term Debt + Debt in Current Liabilities + Preferred Stock}}\right)
\]

\[
\text{Average Total Asset} = \text{Total Asset t + Total Asset t-1/2}
\]

b. Changes in Receivables

Changes in receivable from last year to this year are scaled against the average of total assets. It indicates a big change in accounts receivable that shows the income and income manipulation. The changes in accounts receivable formulated with the following model:

\[
\text{Ch_Rec} = \text{Account Receivables Average Total Assets}
\]
c. **Changes in Inventories**

The change in inventory from last year to this year is scaled against the average of total assets. Big changes in inventory can indicate a surplus, shortage, obsolescence, or liquidation. The change in inventory is obtained by the following formula:

\[ INV = \frac{\Delta \text{Inventory}}{\text{Average Total Assets}} \]


d. **Percentages of Soft Assets**

This measure is as total assets minus total cash and cash equivalents (scaled against total assets). The ratio of the current asset can be obtained with the following formula:

\[ \text{Soft Assets} = \frac{\text{Total assets} - \text{PPE} - \text{Cash and cash equivalents}}{\text{Total Assets}} \]


e. **Changes in cash sales**

This measure is the change percentage in cash sales from last year to this year. The formula used to get the change in cash sales are as follows:

\[ \frac{\text{Cash Sales}}{\text{Salest - \Delta Accounts Receivablest}} = \frac{\text{Salest - \Delta Accounts Receivablest-1}}{\text{Salest-1\Delta Accounts Receivablest-1}} \]

f. **Changes in Return on Assets**

This measure is the percentage calculated as revenue divided by total assets this year less than the same measure last year. Volatile income might be an indicator of revenue manipulation. The formula is as below:

\[ \text{Change ROA} = \frac{\text{earnings} - \text{Average total asset}}{\text{earnings}_{t-1} - \text{Average total asset}_{t-1}} \]

g. **Issuance**

This measure is a dummy variable that is 1 if additional securities were issued during the year of the manipulation and 0 if there are no securities issued. Issuance = 0 or 1 (Score = “1” if bonds or shares are issued);

3 **Results And Discussions**

3.1. **Beneish M Score**

The Beneish M-Score Model is a mathematical model used to detect fraud in financial statements. Beneish stated that generally, the financial statements of companies that manipulate earnings will show a significant increase in revenue and a significant decrease in expense accounts between accounting periods. Beneish uses eight ratios related to asset change and sales growth to measure the Beniesh M Score. If the score obtained is above -2.22, the company is said to tend to manipulate or manipulator. Meanwhile, if the company's Beneish M-Score is less than -2.22, it can be said that the company is not manipulating or in the non-manipulator group of companies.

After knowing the score of the eight variables, the calculation results using the Beneish M-Score are obtained to classify the sample companies include companies indicated as manipulators, non-manipulators, and gray companies. The results of the Beneish M Score
calculation for state-owned insurance companies registered in Indonesia can be classified based on the M Score score obtained by each company which is presented in the following table.

Table 2. The Classification of Companies Based on the Beneish M Score

<table>
<thead>
<tr>
<th>No</th>
<th>Name of the Companies</th>
<th>M-Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Asabri</td>
<td>-1.388</td>
</tr>
<tr>
<td>2</td>
<td>Asei</td>
<td>-2.435</td>
</tr>
<tr>
<td>3</td>
<td>Askrindo</td>
<td>-2.301</td>
</tr>
<tr>
<td>4</td>
<td>Jamkrindo</td>
<td>-2.264</td>
</tr>
<tr>
<td>5</td>
<td>Jasa Raharja</td>
<td>-2.236</td>
</tr>
<tr>
<td>6</td>
<td>Jasindo</td>
<td>-2.844</td>
</tr>
<tr>
<td>7</td>
<td>Jiwasraya</td>
<td>0.808</td>
</tr>
<tr>
<td>8</td>
<td>Taspen</td>
<td>-3.458</td>
</tr>
</tbody>
</table>

Source: Processed Data

From the table above, it can be seen that the Asabri and Jiwasraya companies produce M Score more than the predetermined cut-off, which is -2.220, so the company can be said to be manipulating in the presentation of financial statements detected using the Beneish M Score Method. The higher the M-Score, the more that a company will falsify its financial statements. The M Score is obtained from eight Beneish ratio index variables. The size of each variable will affect the M-Score, and the cut-off of each variable will show the gap where the company is committing fraud. The results showed that the company with the highest M-Score was PT Asuransi Jiwasraya (Persero) with an M Score is 0.808 and followed by PT Asabri (Persero) with an M Score is -1.388.

3.2. Clinical Assumption Test

The F-Score model is a development of the Beneish M-Score model that is specifically designed so that users can get the score directly without using an index in the calculation. The F Score model is a financial report fraud detection model developed using a scaled logistic probability technique where financial reports with an F score of more than one should be suspected of containing fraud. After knowing the score of the seven ratios contained in the F Score model, which is RSST accruals, changes in receivables, changes in inventory, percentages of soft assets, changes in cash sales, changes in return on assets, and issuance. Below is the result of the Dechow F Score calculation, then it can be grouped into companies that are indicated as manipulators or non-manipulators.

Table 3. The Classification of Companies Based on the Dechow F Score

<table>
<thead>
<tr>
<th>No</th>
<th>Name of the Companies</th>
<th>F-Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Processed Data
<table>
<thead>
<tr>
<th>No</th>
<th>Name of the Companies</th>
<th>F Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Asabri</td>
<td>1.563</td>
</tr>
<tr>
<td>2</td>
<td>Asei</td>
<td>-0.788</td>
</tr>
<tr>
<td>3</td>
<td>Askrindo</td>
<td>-0.656</td>
</tr>
<tr>
<td>4</td>
<td>Jamkrindo</td>
<td>-0.569</td>
</tr>
<tr>
<td>5</td>
<td>Jasa Raharja</td>
<td>-0.461</td>
</tr>
<tr>
<td>6</td>
<td>Jasindo</td>
<td>-1.204</td>
</tr>
<tr>
<td>7</td>
<td>Jiwasraya</td>
<td>1.852</td>
</tr>
<tr>
<td>8</td>
<td>Taspen</td>
<td>-2.651</td>
</tr>
</tbody>
</table>

Source: Processed Data

From the table above, it can be seen that the Asabri and Jiwasraya companies produce F Score more than the predetermined cut-off, so the company is suspected of manipulating the detected financial statements using the F Score Model. The Fraud Score model or F-Score is a composite measure that is claimed as a tool to detect material misstatements in financial statements. The variable component on the F-Score includes two things in the financial statements. They are accrual quality as proxied by RSST and a financial performance that proxied by changes in accounts receivable, changes in inventory accounts, changes in cash sales accounts, changes in the F Score model are the summation of two variables which is the quality of accruals and financial performance (Indriani, et al., 2017).

The results of processed data show that PT Asuransi Jiwasraya (Persero) with an F score of 1,852 and followed by PT Asabri (Persero) with an F score of 1,563. The F Score model is a financial report fraud detection model developed using a scaled logistic probability technique where finance reports with an F score of more than one should be suspected of containing fraud. Therefore, according to the results of calculations using the F Score Model method, it was found that the two companies were suspected of manipulating financial statements.

4 Conclusions

From the results of testing and analysis, it can be concluded that the Beneish M-Score Model is a model that uses eight ratios related to asset changes and sales growth to measure the Beneish M Score. If the score obtained is above -2.22, the company tends to manipulate or manipulator. Meanwhile, if the company's Beneish M-Score is less than -2.22, it can be said that the company is not manipulating or in a non-manipulator group of companies.

From the results of both methods, the company suspected of manipulating the financial statements is PT Asuransi Jiwasraya (Persero) and PT Asabri (Persero). The method of calculating the two methods is different with different details but results in a prediction for the same company. The suspected companies that present financial reports well, seen from the use of the two methods, also come from the same company, which is PT Taspen (Persero).

PT Asuransi Jiwasraya (Persero) produced an M Score of 0.808, which is more than the cut-off score in the Beneish M Score Model. It shows that PT. Asuransi Jiwasraya undertakes
efforts to manipulate company reports as seen from the eight financial ratios that have been taken into account in the M Score model. Whereas in the F Score model, PT Asuransi Jiwasraya (Persero) also produced a score that exceeds the cut-off of the Model F Score, which is equal to 1,852. The cut-off score in the Model F Score is 1. If there is more than one, then the company is suspected of having attempted to manipulate the presentation of the company's financial statements.

PT. Asabri (Persero) also produced a calculated value using the M Score and F Score Models with the results exceeding the cut-off. In calculations using the M Score Model, PT Asabri (Persero) produces a score of -1,388. This score is bigger than the cut-off for the M Score Model calculation, which is -2.22. Therefore, PT Asabri (Persero) should be suspected of doing business in manipulating company reports as seen from the eight financial ratios that have been calculated in the M Score model. Whereas in the F Score model, PT Asabri (Persero) also produces a score that exceeds the cut-off of the Model F Score, which is worth 1.563, which exceeds the cut-off amount in the Model F Score of 1. The calculation results use the F Score Model with more than one result. The company is alleged to have attempted to manipulate the presentation of financial statements.

References


Can Financial Ratios Detect Fraudulent Financial Reporting?

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Abstract. This research was conducted to examine whether financial ratios can detect fraudulent financial reporting. The financial ratios analyzed are Days' Sales Outstanding Growth, Cash Flow from Operating Divided by Net Income, and Accounts Receivable Divided by Sales. The target population in this study was State-Owned Enterprises (BUMN) in Indonesia, particularly the Cluster of Insurance Services Industry and Pension Funds. The research data were analyzed by multiple linear regression method using eviews program. The results showed that the ratio of Days' Sales Outstanding Growth and the ratio of Accounts Receivable Divided by Sales had an effect on Fraudulent Financial Reporting. Meanwhile, the ratio of Cash Flow from Operating Divided by Net Income had no effect on Fraudulent Financial Reporting. This study proved that financial ratios can detect fraudulent financial reporting.

Keywords: Financial Reporting; Ratio; Cash Flow

1 Introduction

The fraud phenomenon is still a matter that needs to be addressed and investigated. Based on the survey of the Association of Certified Fraud Examiners (ACFE) Indonesia Chapter [1], there were 239 cases of fraud with a total loss of Rp. 873,430 million. According to the survey results, the financial statement fraud case caused a loss of Rp 242,260,000,000. The organization that is most disadvantaged by fraud is the government. While the institutions that are most harmed by fraud are State-Owned Enterprises (BUMN) and the industries that are most harmed by fraud are the financial and banking industries.

The results of the Indonesian fraud survey are in line with the reality conditions that occur in the Indonesia financial industry SOEs, particularly the insurance industry and pension funds. Based on the findings of the Indonesia Supreme Audit Agency (BPK RI), PT Asuransi Jiwasraya (Persero) caused state losses due to investments that were not properly analyzed and were placed in stocks and mutual funds which amounted to Rp. 16.8 trillion. Based on Jiwasraya's 2019 financial report, premium income decreased significantly from Rp. 16.8 trillion (2018) to only Rp. 3.09 trillion (2019). Likewise, the amount of equity that experienced a greater decline than the previous year, from minus IDR 30.26 trillion in 2018 to minus IDR 34.57 trillion in 2019 [2]. Other state losses caused by fraud were also carried out by PT. Asabri (Persero). The amount of state losses based on the explanation from the Attorney General's Office reached Rp. 23.7 trillion [3].

Financial information is needed by interested parties to make financial decisions. Ratio analysis derived from financial information helps provide an overview of the financial
condition of an entity. Thus, financial ratio analysis can also be used to detect indications of fraud in the financial statements. Several studies have been conducted to detect indications of fraudulent financial reporting using the Beneish M-Score [4]; [5]; [6]; [7], F Score [8]; [9]; [10]; [11], and Z Score [4]; [12]; [13].

Research that examines indications of fraudulent financial reporting using financial ratios is expected to give a signal when interested parties analyze the entity's financial performance. This will make it easier to identify indications of fraud in the financial statements. Schilit and Perler [14] recommend several financial ratios that can be used to detect indications of fraudulent financial reporting, which is called the financial shenanigans technique. Several studies examining financial ratios to detect fraud in financial statements have been carried out by Goel [14], Mohammed et al. [15] and Sakti et al. [8]. In contrast to studies examining fraud theory, the use of financial shenanigans techniques in analyzing indications of fraudulent financial reporting is still rarely studied.

One of the financial shenanigan techniques proposed by Schilit et al. [16] is the detection of earnings manipulation, which is the most frequent action taken by the management of an entity to manipulate sales and profits in one step. Several financial ratios used to detect earnings manipulation as an indication of fraud in financial statements are Days' Sales Outstanding Growth (DSOG), Cash Flow from Operating Divided by Net Income (CFFONI), and Accounts Receivable Divided by Sales (ARSAL).

When management is under pressure to get a lot of profit, management tries to collect receivables faster than it should. The speed of collection of receivables depends on how policies are taken by management or it can also depend on how long the debtor will pay the receivables. Therefore, the management strives for the collection of receivables to be faster than it should be [8]. The unreasonable speed of receivable collection period is an indication of profit manipulation. One way to measure it is by paying attention to the billing period. If the rate of collection for each period or quarter is getting faster, it indicates that management is collecting receivables faster than it should. These conditions can be an indication of red flag financial shenanigans. By looking at the billing period growth ratio which measured by Days' Sales Outstanding Growth (DSOG), investors can find out whether there are problems or not in the company's financial statements [16]. Based on these arguments, the first hypothesis formulated in this study was:

**H1:** Days' Sales Outstanding Growth has an effect on Fraudulent Financial Reporting.

Investors tend to choose a company with a stable profit in investing. This pressure causes management to take various ways to keep the company's profits in a stable condition. Schilit et al. [16] argues that manipulation of net income will leave an imprint on cash flows from operations. The manipulation of net income will create a gap between cash flow from operations and net income, thus indicating that the company has committed fraud. By using the ratio of cash flow from operations divided by net income, investors can indicate the presence of red flag financial shenanigans. Goel [14] has proven that cash flow from operating divided by net income (CFFONI) has a significant effect on indications of fraudulent financial reporting (FFR). Based on these arguments, the second hypothesis in this study was:

**H2:** Cash Flow from Operating Divided by Net Income (CFFONI) has an effect on Fraudulent Financial Reporting (FFR).

Bad loans reflect uncertainty in the collection of receivables, this condition is highly undesirable by investors and can be a pressure for management to commit fraud. When long-term receivables that should be billed for more than one period are billed prematurely, this
will cause problems where receipts from receivables are faster than sales, and it can be a red flag financial shenanigan [16]. Dalnial et al. [17]; [18] and Kanapickiene & Grundiene [19] have found evidence that the ratio of receivables divided by sales has a significant effect on indications of financial statement fraud. Based on these arguments, the third hypothesis in this study was:

H₃: Accounts Receivable Divided by Sales (ARSAL) has an effect on Fraudulent Financial Reporting (FFR).

2 Methodology

The population in this study is the Cluster of State-Owned Enterprises in the Insurance Services and Pension Funds Industry, which consists of 8 (eight) companies with a 5 (five) year observation period. Considering the small population size, all members of the population are selected as samples. Therefore, the sample selection technique used in this study was total sampling. The data analysis method used in this research is multiple regression analysis, because it can be used as a predictive model of a dependent variable from several independent variables. Multiple linear regression model can be categorized as a good model if the model meets the assumption of data normality and free from classical statistical assumptions, both multicollinearity and autocorrelation.

Hypothesis testing in this study was carried out by: 1) F Statistical Test, which was conducted to determine the significance of the effect of the independent variable on the dependent variable; 2) The Coefficient of Determination Test (R²) was carried out to see the magnitude of the variation of the independent variable simultaneously in influencing the dependent variable; and 3) t-statistical test, which is used to see the significance of the effect of each independent variable partially on the dependent variable. The research model is described as follows:

3 Result and Discussion

Based on a predetermined population, this study should consist of 40 observational data. However, the data on the financial statements of PT. Asuransi Jiwasraya (Persero) for 2017 and 2018 were not available, so the research data was incomplete. The unpublished financial report of PT. Asuransi Jiwasraya (Persero) for 2017 and 2018 is closely related to the adverse opinion obtained for the 2017 financial statements, and the large losses reported in 2018. Thus, the data that can be collected in this study is only obtained from 7 companies with an observation period of 5 years, so the number of research data that can be analyzed was 35.

The dependent variable in this study is Fraudulent Financial Reporting (FFR) as measured by the F-Score. While the independent variables consist of the ratio of Days' Sales Outstanding Growth (DSOG), the ratio of Cash Flow from Operations divided by Net Income (CFFONI), and the Ratio of Receivables to Sales (ARSAL).

According to the results of descriptive statistics, the average of FFR was 0.10, while the minimum and maximum values were -1.19 and 2.55, respectively. Meanwhile for the ratio of DSOG, the average was 0.36, the minimum and maximum values were -0.75 and 3.90, respectively. For the ratio of CFFONI, the average was 0.67, the minimum was -1.48 and the
maximum was 4.87. Furthermore, for the ratio of ARSAL, the average was 0.77, the minimum and maximum were 0.06 and 2.26, respectively.

An F-Score value > 1 indicates the risk of fraud is above the normal limit, while an F-Score value < 1 indicates a low or normal risk of fraud [20]. The research data showed that PT. Asabri (Persero) for 3 consecutive years had an F-Score > 1. Based on the F-Score value from the research data, PT. Asabri (Persero) was indicated to have fraud risk from misstatement of financial statements. This evidence strengthens the phenomenon of state loss cases which are indicated to have originated from fraudulent financial statements by PT. Asabri (Persero). Thus, the F-Score can be used to detect fraud in financial statements.

Before using the regression equation to perform the analysis, a classical assumption test was performed to determine whether the data were normally distributed, free from autocorrelation, and multicollinearity in the obtained regression. Detection of normality was tested using Jarque Bera. By using eviews, the output value of Jarque Bera is 3.882856 with a p-value of 0.143499 which is greater than 0.05, so it can be determined that the data is normally distributed.

Data free from autocorrelation is an indication that there is no correlation caused by residuals in one observation with other observations in the regression model. Furthermore, to find out whether the data is free from autocorrelation, the Durbin Watson (DW) test is used. The calculated DW value is compared with the DU and DL values in the Durbin Watson table. If the value of DW > DU and the value (4-DW) > DU or simplified to (4-DW) > DU < DW, then there is no autocorrelation problem, either positive or negative autocorrelation. Based on the output eviews, the DW value is 2.339700. Meanwhile, based on the DW table, the values of DL = 1.2833 and DU = 1.6528 are obtained. Thus, (4 - 2.339700) = 1.6603 > 1.6528 < 2.339700, which means that the data is free from autocorrelation.

To find out whether it is free from multicollinearity, it can be seen from the VIF value. The limit value for two variables categorized as having high collinearity can be seen through the VIF (Variance Inflation Factors) value. If the VIF value for the independent variable is greater than 10, then one of the highly correlated variables must be derived from the regression model.

Table 1. Multikolinearity Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient Variance</th>
<th>Uncentered VIF</th>
<th>Centered VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSOG</td>
<td>1.000000</td>
<td>0.200318</td>
<td>0.066821</td>
</tr>
<tr>
<td>CFFONI</td>
<td>0.200318</td>
<td>1.000000</td>
<td>-0.281498</td>
</tr>
<tr>
<td>ARSAL</td>
<td>0.066821</td>
<td>-0.281498</td>
<td>1.000000</td>
</tr>
</tbody>
</table>

The calculation results in table 1 show that the centered VIF value is less than 10 so it can be concluded that the data is free from multicollinearity.

The output evaluation results for the fixed effect model are shown in table 2, which shows the R2 value of 0.769583, which is greater than 0.5, which means that the independent variable is very strong in explaining the dependent variable. Furthermore, Prob(F-statistic) shows a value of 0.000330, smaller than 0.05, which means that the simultaneous effect of the independent variable on the dependent variable is proven to be statistically significant.
3.1. Hypothesis Testing

Based on statistical testing using multiple regression analysis with the eviews program, there is evidence that DSOG has a negative and significant effect on FFR. This can be seen from the significance level of 0.0249 which is greater than 0.05 in table 3. It shows that the lower the billing period growth ratio, the higher the tendency for fraudulent financial reporting. Thus, the DSOG ratio can be indicate fraudulent financial reporting, this result in line with Schilit et al. [16]. But not in line with Sakti et al. [8]; Carpenter et al. [21]; and Gorczynska [22].

Table 3 also show that CFFONI has no effect on FFR. This can be seen at the significance level of 0.9552 which is greater than 0.05. Too conspicuous figures of operating cash flow and net income in financial statements could be the reason why management being very carefully to manipulate it. So, it will be too easy to detect fraudulent financial statements using the CFFONI ratio. The results in line with Sakti et al. [8] and Gaol & Indriani [23], but not in line with Grove & Basilico [24] and Goel [14].

According to the output eviews in table 3, the ARSAL ratio has a negative and significant effect on FFR. This is indicated by the significance level of 0.0080 which is smaller than 0.05. Indications of fraud can be seen from the collection of receivables faster than sales. Receivables that are collected prematurely are a reflection of the pressure that the company's management exerts to manipulate earnings. The results of this study are in line with Dalnial et al. [17]; [18]; and Kanapickienė & Grundienė [19], but not in line with Sakti et al. [8].

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**Table 2. Results of Fixed Effect Model**

Cross-section fixed (dummy variables)

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R-squared</td>
<td>0.769583</td>
<td>Mean dependent var</td>
<td>0.280000</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.654374</td>
<td>S.D. dependent var</td>
<td>0.823502</td>
</tr>
<tr>
<td>S.E. of regression</td>
<td>0.484136</td>
<td>Akaike info criterion</td>
<td>1.659553</td>
</tr>
<tr>
<td>Sum squared resid</td>
<td>4.218986</td>
<td>Schwarz criterion</td>
<td>2.135340</td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-13.23374</td>
<td>Hannan-Quinn crit.</td>
<td>1.805006</td>
</tr>
<tr>
<td>F-statistic</td>
<td>6.679906</td>
<td>Durbin-Watson stat</td>
<td>2.339700</td>
</tr>
<tr>
<td>Prob(F-statistic)</td>
<td>0.000330</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 3. The Effect of DSOG, CFFONI, and ARSAL on FFR**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>1.118345</td>
<td>0.264875</td>
<td>4.222156</td>
<td>0.0005</td>
</tr>
<tr>
<td>DSOG</td>
<td>-0.246662</td>
<td>0.100802</td>
<td>-2.446998</td>
<td>0.0249</td>
</tr>
<tr>
<td>CFFONI</td>
<td>0.004761</td>
<td>0.083561</td>
<td>0.056976</td>
<td>0.9552</td>
</tr>
<tr>
<td>ARSAL</td>
<td>-0.954428</td>
<td>0.319930</td>
<td>-2.983236</td>
<td>0.0080</td>
</tr>
</tbody>
</table>
4 Conclusion

Based on the results of study, it can be concluded that the lower the daily sales growth, the higher the possibility of fraud in the financial statements. The ratio of operating cash flow divided by net income cannot detect fraudulent financial reporting. The faster the receivables than sales, the higher the possibility of fraudulent financial reporting. Thus, the fraud detection model in financial statements using the financial shenanigans ratio can be identified from the Days' Sales Outstanding Growth (DSOG) ratio and the Accounts Receivable Divided by Sales (ARSAL) ratio. Furthermore, it is recommended for others to conduct an analysis using financial shenanigans ratios to detect the possibility of fraudulent financial reporting. Further researchers are expected to develop a model by analyze other variables in the financial shenanigan technique, such as the ratio of faster revenue growth from receivables, the ratio of increasing or decreasing liabilities, and faster operating profit growth ratios from sales.

References


Strategic Mapping During Covid-19 Pandemic in PT. Zamrud Bumi Indonesia Base on Swot and Business Model Canvas Strategy

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Abstract. PT. Zamrud Bumi Indonesia is a company that produces organic liquid fertilizer from Kuningan Regency, West Java. In the COVID-19 pandemic, PT ZBI underwent a strategy adjustment and tried to adapt in running its business. This study aims to describe the business strategy of PT. ZBI during the COVID-19 pandemic, was equipped with a mapping of its business model using a business model canvas through a qualitative descriptive research approach. The covid-19 pandemic has an impact on the business turnover of PT. ZBI and more specifically, the most affected are in marketing strategies that previously used offline marketing techniques more often by conducting counseling and product demos, now have to change by optimizing digital marketing strategies, then what changes and is affected are the marketing and financial aspects where sales decline and has an impact on revenue shrinkage, which is now trying to improve with digital marketing strategies. Meanwhile, other elements of the business model canvas, such as key activities, key partner, customer relationship and cost structure are carried out any changes, in terms of costs there are additional digital marketing costs. Then, for the SWOT Analysis of internal and external factors based on SWOT use ST strategy or market diversification strategy.

Keywords: Business Strategy; Business Model Canvas; Covid-19 Pandemic

1 Introduction

World Health Organization (WHO) states that Coronavirus Disease (Covid-19) is spreading so fast to all corners of the world and becoming a frightening phenomenon for the world community including Indonesia. The covid-19 pandemic has an impact on various sectors, especially the economic sector. The impact felt by this phenomenon is from government policies in the form of restrictions on social relations and PSBB (Large-Scale Social Restrictions) and other policies to be the cause of the hampering of economic activity for a while (Virgin Wineka, 2020). The agricultural sector is one of the sectors that continues to run despite the covid-19 pandemic.

PT. Zamrud Bumi Indonesia located Kuningan Regency, West Java is a manufacturing company engaged in the processing of multipurpose liquid organic agricultural fertilizer, with the trademark Power Bumi. This fertilizer has been widely used by the people of Java island even outside the island. Although the sale of products has been sold to outside java island but in each period experiencing sales that are up and down or fluctuating. The covid pandemic had an impact on the decline in sales caused by the declining purchasing power of consumers
because the company could not carry out the usual marketing strategy, with the government's policy related to keeping distance resulting in the company having to reset the marketing strategy, this resulted in a decrease in revenue.

### Table 1. Sales Data of PT Zamrud Bumi Indonesia

<table>
<thead>
<tr>
<th>Bulan</th>
<th>2020</th>
<th>2021</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Total</td>
<td>Total</td>
</tr>
<tr>
<td>Jan</td>
<td>1591</td>
<td>1682</td>
<td>18014</td>
</tr>
<tr>
<td>Feb</td>
<td>1555</td>
<td>1704</td>
<td>1994</td>
</tr>
<tr>
<td>Mar</td>
<td>0</td>
<td>207</td>
<td>555</td>
</tr>
<tr>
<td>Apr</td>
<td>1372</td>
<td>1365</td>
<td>625</td>
</tr>
<tr>
<td>May</td>
<td>1405</td>
<td>1405</td>
<td>625</td>
</tr>
<tr>
<td>Jun</td>
<td>1365</td>
<td>1405</td>
<td>625</td>
</tr>
<tr>
<td>Jul</td>
<td>1355</td>
<td>1365</td>
<td>625</td>
</tr>
<tr>
<td>Aug</td>
<td>1405</td>
<td>1365</td>
<td>625</td>
</tr>
<tr>
<td>Sep</td>
<td>1848</td>
<td>1848</td>
<td>625</td>
</tr>
<tr>
<td>Oct</td>
<td>1865</td>
<td>1865</td>
<td>625</td>
</tr>
<tr>
<td>Nov</td>
<td>2308</td>
<td>2308</td>
<td>625</td>
</tr>
<tr>
<td>Dec</td>
<td>16014</td>
<td>16014</td>
<td>625</td>
</tr>
<tr>
<td>Jan</td>
<td>1994</td>
<td>1994</td>
<td>655</td>
</tr>
<tr>
<td>Feb</td>
<td>1744</td>
<td>1744</td>
<td>655</td>
</tr>
<tr>
<td>Mar</td>
<td>2312</td>
<td>2312</td>
<td>655</td>
</tr>
<tr>
<td>Apr</td>
<td>2245</td>
<td>2245</td>
<td>655</td>
</tr>
<tr>
<td>Total</td>
<td>8295</td>
<td>8295</td>
<td>655</td>
</tr>
</tbody>
</table>

Based on Table 1, the target and realization of products sold in April 2020 were worth 0 (zero) because the company decided to take a short break not to carry out production or sales activities. This situation is used to reorganize the company's strategy in dealing with inventory. Therefore, May 2020 is the beginning of the 1st period of the COVID-19 pandemic. The realization of products sold in 2020 is reached 5,639 boxes and the 2020 sales target of 18,014 boxes. The realization of the product sold for 16 months is categorized unable to reach the sales target set by the company. As a result, the turnover of costs incurred during the production process is felt to be stagnant.

PT. Zamrud Bumi Indonesia speculates that the sales target was not achieved due to the declining purchasing power of consumers. Since the Covid-19 Pandemic, public (consumers) have begun to prioritize panic buying such as purchasing health-related goods (products) to prevent the spread of the corona virus. These factors relate to the level of consumer demand for the product, so PT. Zamrud Bumi Indonesia is in a condition of uncertain product demand. The impact of covid-19 that not resolved soon, will be worse and the company could losses in product sales. Business model innovation, can help companies survive on this phenomenon (Baghiu, 2020). Business model innovation is a means to build a business that generates optimal value. This is related to future changes in the business environment, digital transformation is required in the era of the covid-19 pandemic.

From research in hotel, the marketing strategy carried out by the Grand Tjokro Premiere Hotel Bandung generally received good results and feedback (Karina Widia Sari, 2021), then Hotels can cooperate with the local government to be used as a place for quarantine of Covid-19 patients or a transit place for medical personnel. This is used to maintain hotel revenues and operations, so the strategy is to increase the cooperation with government (Syaiifuin et al., 2021), in other research industry in Food and Beverage used various innovations and strategies to survive the Covid19 Pandemic, so the role in innovation is important to survive (Hendriyati & Santoso, 2021), furthermore the use of Business Model Canvas can identified the innovation and competitive advantage in the company such as in the product of e-fishery which have innovation their product as smart fish feeder (Awaluddin et al., 2018).

Based on the description it can be drawn the formulation of the problem in this study is how the strategy applied by the company, how the business model canvas change before and after pandemic and what strategy SWOT should have by this company during the pandemic covid-19?

### Methodology

This study uses a qualitative descriptive approach with in-depth interview techniques to company leaders who belong to the purposive sampling category (Awaluddin et al., 2018). The informants are both from internal and external stakeholders. Internal stakeholder is from
the owner and its director, external is from academician who know the business situation and strategic condition. Observation and in depth interviews use to identify the strengths and weaknesses in internal, opportunities and threat in external company and to make a business model canvas and its strategy.

3 Result and Discussion

PT Zamrud Bumi Indonesia is a manufacturing company engaged in the processing of multipurpose liquid organic agricultural fertilizer. The company was found without intentionality, there is a formulator named Mr. Jahim from Brebes who concocted and sold himself in the form of bottles of used 1 liter mineral water size, which it was sold directly to farmers. Then a relative named Mr. Rusda who is currently the Director negotiated persuasively to cooperate in the development of products that do not yet have a brand. The company as well as lab testing and products authorized under the trademark "Power Bumi" and formed a CV. Bumi Makmur Raya on December 3rd, 2003, and running for approximately 8 years but over time in the market consumers see the packaging and listed on the bottle label is still in the form of a CV. So at the urging of consumers who see products from the brand image formed PT. Zamrud Bumi Indonesia on April 6th, 2020 with certain requirements and permission from the Ministry of Agriculture. Therefore, the change from CV to PT is actually at the request of farmers or consumers.

The core of this business is to produce and sell agricultural products in the form of multipurpose liquid organic fertilizer branded "Power Bumi" with packaging variants of 1/2 liter and 1 liter. PT Zamrud Bumi Indonesia has 13 – 15 permanent employees, which work at production, finance, marketing, operational part, factory and sales marketing. The rest is a freelance employee system, that do a labeling bottles or packing with a daily wage system. Vision and Mission of PT. Zamrud Bumi Indonesia is “Menjadikan Bumi ini Makmur Secara Raya (Nasional) Menuju Kesejahteraan Bersama” with their slogan “Tanah Gembur, Tanaman Subur, Petani Makmur”.

SWOT Analysis

SWOT analysis is a systematic identification instrument of various factors used to formulate corporate strategies (Fatimah, 2020). The SWOT analysis process requires an internal survey of organizational strengths and weaknesses /activities in the organization / something that wants to be studied, as well as an external survey of opportunities and threats.
Table 2. SWOT Analysis on PT Zamrud Bumi Indonesia During Pandemic Covid-19

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw materials are easily available.</td>
<td>PT ZBI has the opportunity to expand its business, especially since the company has implemented the concept of sustainable products and food security (S1, S4, S5).</td>
<td>COVID-19 pandemic has had a major impact on the company, like PSBB and business competition.</td>
</tr>
<tr>
<td>Established relationships with all types of fertilizers and all types of crops.</td>
<td>Social media can be used as a tool for assistance and consultation for consumers (S7, T1, and T2).</td>
<td>Raw materials that are easy to get can reduce production cost, so PT ZBI can get competitive prices (S1, S4, and T4).</td>
</tr>
<tr>
<td>Complete facilities infrastructure</td>
<td>Maximizing marketplace and non-direct marketing can be used to promote the product and reach online consumers (S5, T2).</td>
<td>Social media training for employees (S6, S7).</td>
</tr>
<tr>
<td>Human resources like skilled business and information.</td>
<td>PT ZBI can diversify their products by making solid fertilizers and innovative packaging that are cheaper and more efficient (W1, W3).</td>
<td>Marketing, marketing using indirect marketing. One of the indirect marketing is the digitalization of marketing through various platforms, such as WA, Facebook, and the marketplace (W4, W5, W6).</td>
</tr>
</tbody>
</table>

The strengths of PT ZBI are the licensed product, sustainable product, human resources, assistance and consulting services of product. The weaknesses of PT ZBI are fertilizer products only in liquid form, declining on sales, and cost packaging that quite expensive. Opportunities of PT ZBI are can scale up the business, social media, freelance work system and recycle of agricultural waste helping community in that area. Threat from PT ZBI is that the COVID-19 pandemic has had a major impact on the company, like PSBB and business competition.

Based on these conditions, the strategy implemented by PT ZBI in dealing with the Covid-19 pandemic is diversification strategy (S-T) or ST Strategy. Diversification strategy is strategic that choose by enterprise or corporate after analysed its resources and capabilities (LeH, 2019). Diversification strategy that choose for PT ZBI is market diversification strategy that shift to online consumer and direct marketing. This ST Strategy includes (1) Raw materials that are easy to get can reduce production cost, so PT ZBI can get competitive prices or lower prices (S1, S4, and T4), (2) Social media can used as a tool for assistance and consultation for consumers (S7, T1, and T2), (3) Maximizing marketplace and non-direct marketing can be used to promotion the product and reach online consumers (S5, T2).

Business Model Canvas PT. Zamrud Bumi Indonesia

Business Model Canvas is a mapping method and tool in strategic management that is useful for documenting or developing business models or other companies or organizations. From the results of the interview analysis through the 9 elements of the Business Model Canvas frame of reference, the Business Model Canvas PT. Zamrud Bumi Indonesia as follows:
1. Customer Segments
The market of PT. Zamrud Bumi Indonesia is a segmented market. This means that the market that distinguishes market segments based on their individual needs and problems or based on similar but varied needs and problems. PT. Zamrud Bumi Indonesia includes companies that have consumers with similar needs and problems but vary by segment. Consumer needs are similar in the form of agricultural product needs, namely liquid organic fertilizers and vary in terms of the number of orders and uses desired or based on the treatment of each different market segment.
PT. Zamrud Bumi Indonesia differentiates its market segments into upper, middle class and lower class consumer markets. For the upper classes are usually distributors in major cities who buy up to more than 120 dus. For the middle class it is usually the group of farmers, agents, shops and sales marketing who buy 1 to 10 dus. For the lower class, it is usually consumers who buy units, for example consumers who buy online through e-commerce or who come to stores that sell agricultural products.

2. Value Propositions
The main products offered by PT. Zamrud Bumi Indonesia is a multipurpose liquid organic agricultural fertilizer branded Power Bumi. At an affordable price for consumers, but also still provide high quality to consumers.

3. Channel
PT. Zamrud Bumi Indonesia conveys information to consumers through several stages. It is simply described in the table below.
4. Customer Relationship
The company establishes self-service where the company provides information for consumers to be able to place orders in e-commerce PT. Zamrud Bumi Indonesia Official which then consumers choose their own quantity of desired products, place of delivery and mode of payment. The company implements a service system that allows consumers to communicate with the customer service section to get help during the sales process or after the purchase is completed.

5. Revenue Stream
Revenue Stream PT. Zamrud Bumi Indonesia is obtained based on the sale of liquid organic fertilizer which then income is divided with employees as a form of salary.

6. Key Resources
Key resources describe the most important assets required to make a business. Some of the key resources is 1) Technology, in the form of website use, (2) Human Resources, consisting of 15 staff who come from open recruitment and who have their own abilities based on being in the field of whether the staff is located, (3) Facilities, consisting of warehouses and corporate offices, computers, agricultural production facilities of manufacturing machinery for fertilizer.

7. Key Activities
Activities carried out by PT. Zamrud Bumi Indonesia is working with the leaders of farmers' groups and village devices to conduct counseling on liquid organic fertilizer agricultural products by holding such an introduction seminar on its products and the benefits of these products and providing testimonials from other farmers who have used the product. And also always do coaching to farmers who are just starting to use the earth's liquid fertilizer power as a form of sustainable relationship with consumers both online and offline.

8. Key Partnership
Some parties who are partners of PT. Zamrud Bumi Indonesia is a group of farmers, distributors of materials for the manufacture of organic fertilizers and village devices for the procurement of extensions to their citizens, especially farmers.

9. Cost Structure
Type of cost structure in PT. Zamrud Bumi Indonesia is cost-driven where the company minimizes spending in order to provide affordable prices for consumers. In carrying out its business, the expenditure of funds is carried out for extension...
purposes to farmers groups or to villages and for corporate purposes including the provision of salaries, wages, additional salaries, purchase of materials for fertilizer, and other costs.

**Strategy of PT. Zamrud Bumi Indonesia**

1. **Before Covid-19 Pandemic**

   Before the covid pandemic, one of the strategies carried out by the company was the procurement of socialization or counseling related to liquid organic fertilizer agricultural products, by gathering people such as members of farmers groups, people who have rice fields and owners of shops that sell agricultural products collected in village halls. This strategy is the most effective and efficient strategy in introducing products to the public because usually when counseling is completed many people buy products and have an impact on the company's revenue.

2. **After Covid-19**

   Covid pandemic has a major effect on the strategies that implemented by companies. Because PPKM social restrictions, the company cannot invite and gather people to hold socialization or counseling. The strategy carried out by the company is to store or send products in agricultural stores with a consignment system or pay if the goods have been sold, store in the farmer group and later distributed to the members of the farmer group and also rely on digital marketing. Covid pandemic is very influential but does not occur in all aspects such as distribution, production and human resources aspects. Some aspects affected by the covid pandemic are sales, marketing and finance aspects.

3. **The element of BMC that has been affected by covid-19 pandemic**

   Customer relationship conducted by the company is to provide assistance and guidance by the sales marketing section from the beginning of product purchases to harvest including problems faced such as how to handle pests, fungi and so on. But after the pandemic covid mentoring so rarely and done online through whatsapp media but sometimes sales visit farmers who will start spraying fertilizer and will be videoed by the sales team and the video is uploaded to the Power Bumi Official youtube page and becomes a plus in itself, farmers feel happy because they can learn on youtube channel and tell other farmers if buying Power Earth fertilizer will be accompanied and entered to the youtube page. The other marketing strategy is sell its product in market places such as Shoppe.

   Cost Structure at PT Zamrud Bumi Indonesia during the Covid Pandemic was affected by financial conditions and revenues, where sales decreased because they could not implement an extension or socialization marketing system, although applying other strategies, but the revenue obtained was not as much as when doing counseling. Company must to focus maximizing marketing on digital marketing through Marketplace. The biggest expenses is bottles and boxes that quite expensive.

   Key Partner conducted by the operational field to adapt to the covid pandemic is an agent system because it cannot do counseling as before the covid by storing products as many as 15 dus in each district and in collaboration with BPP (Agricultural Extension Agency) one Kecamatan 15 dus. Before the company's covid strategy is direct to farmers, now the company marketing strategy by BPP Subdistrict. BPP distributed product to farmers in the village. Costumer relationship at PT Zamrud Indonesia before pandemic are direct guidance and consultation and through seminar. After pandemic, digital marketing by a call center as a form to accept the feedback from consumers.
4 Conclusion

Before the covid-19 pandemic, the company's strategy in sales by socializing and counseling farmers, the company give coaching and consulting facilities related to the use of fertilizer from the beginning to ready for harvest. This is a strategy so that consumers feel satisfied in addition to getting a good product also get a consultation facility for free. It's a strategy to attract consumers.

After the pandemic covid strategy carried out by PT. Zamrud Bumi Indonesia is by utilizing digital marketing, use marketplace and e-commerce for online-based. Direct marketing do by a system of storing goods in collaboration with BPP (Agricultural Extension Agency) sub-district level. Coaching and consulting facilities held online by video calls.

BMC of PT Zamrud Bumi Indonesia has changed after covid-19 pandemic, there are 4 element of BMC that being affected, it is consist of key activities which adding of marketing online activity, key partner which adding government, and supplier community, consumer relationship which adding online channel both website, marketplace or social media platform relationship and cost structure which adding the cost of online marketing. The SWOT Analysis of internal and external factors based on SWOT use ST strategy or market diversification strategy.

References

Pinpointing Interpersonal Stances in Threatening Discourse on Indonesian Muslim Clerics: An Appraisal Analysis

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Abstract. Threatening discourse as a genre is fraught with stances of violence and threatener control in which authorial intent-attributive threats possess particular characteristics strengthening both a threatener’s role in and commitment to act shown, among other things, in the deployment of diverse commitment modals and certainty adverbs. This paper purposes, employing resources of Appraisal analysis, aims to figure out the snapshots deriving from texts in which either writers’ commitment to or attitudes about a person or proposition, interpersonal stances, are construed and function in precipitated threats of violence. Threateners are disclosed to avail themselves of manifold strategies of rhetoric to deliver interpersonal meaning and take stances, not only strengthening but also weakening of their discernible commitment level, which is not in congruence with the partiality of threatening language ideologies. It is imperative that further research on stancetaking in threatening discourse be in depth explored.

Keywords: Systemic Functional Linguistics; appraisal analysis; stance; language ideologies; threatening discourse

1 Introduction

Taking a position on an issue so that people know which side you are on, so-called take a stance, is most importantly precipitated, among other things, through lexis or words [1]. They construing a stance are prevalently encountered in a text in which writers or speakers linguistically reveal their emotions or their investment and commitment level about proposition or a person, thus both impacting an audience’s reactions, even emotions and denoting the stancetaker’s discernible level of commitment to accomplish [2]. Moreover, they are of functionality to align or disalign the stancetaker with the readers, or speakers, even proposition; also, they can serve to reproduce and reinforce ideology socially sited, resulting a stance an immensely compelling construct [3].

Apparently there have been a number of researchers highlighting how interpersonal stances are functionally demonstrated across typologies of registers [4], genres [5], language varieties [6], and little attention gained focus, threatening communication [7]. It was, additionally, found out that threats were rife with lexical and grammatical markers of stance; however, adherence of linguistic markers and their corresponding functions to those anticipated in threats are not always of prevalence [8]. For instance, unlike the research findings of threatening behavior replete with profanity [9], merely 24 percent of the threats in investigated corpus truly owned obviously insulting language or profanity [8]. Threats
categorized “high” level possess commanding forms invigorating the threatener’s commitment or investment level, even role to act (e.g. ‘I will shoot him between the eyes’, ‘he will die this Tuesday’); conversely, those demonstrating mitigating or conditional forms, and being short of strengthening forms, thus weakening the threatener’s level of commitment are labelled “low” level (e.g. ‘perhaps we will build a fertilizer bomb’, ‘I may get…’) [10]. Yet, it was figured out that the linguistic forms and their corresponding functions emerged in general with relative frequency in both realized vs non-realized threat category [8]. Therefore, in spite of violent language ideologies, the mitigating forms really occurring in realized threats are entirely disguised or concealed so as to cater us an incomplete portrait of this genre. This erasure process has deterred us from considering the entirety of authorial stances in language threatening as it is intentionally made invisible so as to suit the ideological frames of either an individual or social group [11]. In fact, a threatener and his/her victims play socially situated roles in which the negotiation of interpersonal meanings are construed. Hence, the emergences of stance shall be empirically instead of intuitively examined by employing the discourse analytic system of Appraisal [12][3].

This article was inspired by the previous Gales’ studies of threatening communications, namely ”a socially defined genre with strong ideological links to stance of violence and threatener control [8], searching the disclosure of authorial stance in the lexical, clausal and intra-textual level taking place in a real text of two threat letters threatening Islamic Indonesian Clerics. The empirical analysis using Appraisal systems: attitude, engagement, and graduation may allot a more complete snapshot of how a threatener’s intent and commitment, suspected Indonesian Communists, were manifested, how interpersonal relationships, suspected Communists- Clerics ones in Indonesia, were negotiated and how meanings in this discursive act were construed.

1.1. Systemic Functional Linguistics and Appraisal Systems

Developed in the 20th century and continuously progressed, this language function theory viewing language both as a social practice and interplay result of its systematicity and its functionality, Systemic Functional Linguistics (SFL) [13] [14], is positioned in this study. Relative to this study, the functions of language, ‘to threaten one’ mentioned one of them, gear the manifestations of language form and structure [13]. Afterwards, it is argued that three interconnected layers, namely language – grammar and discourse, social context, and genre encode meaning functioned as language experience [14]. Next, concerning about language dimension, in particular interpersonal meta function (a function of language) is constructed in a clause expressing interpersonal meaning whose the central aspect is stance spread in the text creating “prosody of attitudes or discourse cohesion [15].The linguistically delivered stances are, then, analyzed by Appraisal – a discourse analytic framework unveiling prosodic meaning strewn throughout the text [12]. Essentially, within Appraisal system approach, texts as linguistic resources are systematically constructed, denoting interpersonal meaning so as to much disclose the stance functions, that is author’s underlying positionality and attitudinal meaning [3].

Appraisal comprises three definite systems: attitude, engagement, and graduation. *Attitude* underlies how feelings are figured out within the text; it makes up three categories: *affect* (emotions) encoding positive and negative emotions of happiness, security and satisfaction, *judgment* (ethics) encoding an author’s positive and negative ethical evaluations of behaviors regarding their normality, capacity, tenacity, veracity, and propriety and *appreciation* (aesthetics) evaluating things, phenomena, and process [3]. Analyzing suspected communists-posted threat letters, their authorial attitude, stands a chance of finding out the seriousness of
the threat, the reasons for offering it, and ways the author’s ethical positions feasibly impacting both.

Engagement deals with the characteristics of the writers as they dialogically situate themselves as to their audience or to propositions, statements or questions, that they are referred to within the text. [3]. Two utterance typologies socially conveyed are monoglossic and heteroglossic labelled in that the earlier refer to merely the author’s viewpoints. Monoglossic utterances are identical to bare assertions manifesting factual and taken-for-granted utterances assuming that the hearer is aligned with the speaker. On the other hand, heteroglossic utterances refer to other viewpoints in that they do references to and/or make negotiation of prior stances that other people belong to; meanwhile, they predict stances put forward by novel audiences [16]. Frequently encountered in the case of threats, utterances demonstrating bare assertions uttered are proffered a room for negotiations, thus disaligning the audiences as naturally a threatener keeps a distance/a balance to his/her victim [7]. Additionally, heteroglossic utterances possibly either expand, permitting other voices to take place in the discourse or contract, terminating the debate so as to expect disalignment.

Eventually, the employment of graduation system encompasses the scale up and down of the strength in the authors’ utterances [3]. Graduation can be deployed within attitude and engagement with distinct functions. Authors’ greater or lesser positive/negative feelings (attitude) are exhibited by utilization of graduation, where their intensified or diminished involvement or commitment level is revealed by the use of graduation as well (engagement). In brief, assessing the language functions moved beyond intuitive or ideological base is availed through the analytic systems of Appraisal whose approach towards linguistic resources, threat letters issued by suspected communists in Indonesia, for instance, as systematically constructed meaning. Stances relative to emotions of the writer, the speaker or even the threatener are roughly drafted via attitudes system, whereas stances in connection with the writer’s or the threatener’s commitment or investment to do an act are underscored via engagement system. Then, graduation roles to both attitude and engagement systems; in fact, it performs to scale up or down of evaluative meaning contextually.

2 Methodology

A qualitative approach, a descriptive qualitative case study was employed in this research [17]. It includes a number of such qualitative research characteristics as natural settings, participants’ meanings, interpretative inquiry, theoretical lens [18]. The data were collected from natural setting, namely from the uploaded two threat letters retrieved from on-line media in which the researcher interpreted interpersonal stance –attitudinal, epistemic and stylistic one - of the writer towards the victim employing sub-theory within the theory of Systemic Functional Linguistics (SFL) , particularly stemming from the development of Mood System : Appraisal covering three interrelated systems, namely attitude, engagement and graduation. Next, the paradigmatic discourse analysis method employed social-semiotics [19]. Its paradigm was classic post positivism analysing the Text, threat letters-one form of discourse-with the results of the research from the researcher’s point of views or interpretation [20]. The stances in the linguistics resources were empirically interpreted. Moreover, non-random criteria of purposive sampling or theoretically-based sampling was opted owing to the fact that such sampling method met the aim of the study in that the boundary was determined, then the
focus of the study and the prevalence of pre-determined classification data were theoretically preponderant.

As analysing and comprehending the data, three following aspects shall be profoundly taken into account [3]: Firstly, Compliant Reading Position was the focus of compliantly choosing meanings in the threatening discourse since not only the writer but also the researcher are ideologically and culturally identical. Secondly, Bottom-up Analysis was implemented as clauses were the sources of starting analysis, returning up to the mood of the threatening discourse. Eventually, it was feasibly double-coded attitudinal appraised items. The retrieved primary data are two threat letters upload in on-line mass media (https://www.helmiadamchannel.com/2020/07/viralbukti-surat-ancaman-pki-kepada.html and https://metro.tempo.co/read/1066510/teror-surat-di-depok-inti-10-ulama-yang-terancam-dibunuh); In fact, such linguistics resources containing authorial stances written by suspected communists in Indonesia threatened a number of Indonesian Clerics, embracing Islam and much respected by the Indonesian Muslim communities. Netizens in generally were curiously astounded to juxtapose them as they originated from the same threateners, communists in Indonesia. Under the umbrella of threatening discourse, the authorial stances were unveiled, even compared to figure the linguistic distinction within the analytic discourse of appraisal approach.

3 Findings and Discussion

A letter sent to a charismatic and respected Muslim cleric in Indonesia, Hadji Djauhari in 1953. It was written by a communist party, a political party attracting hundred thousands of participants, in particular farm hands and blue collar workers. Hajj Djauhari was hated by a group of people self-named Rakjat Proletar Tjibeureum. They planned to do harm to him due to his unaccepted religious activities. The threatening discourse was in the generic form of a letter, complete linguistics resources to be analyzed. See the text 1 below

Text 1: A threat letter from Rakjat Proletar Tjibeureum

Tertanggal 25 Djuli 1953
Kepada
H. DJAHARI
Di
Tjibeureum
Bebas!

Dengan ini kami peringatkan kepada kamu, jang mempunjai kedudukan sebagai; Agen Agama ‘Arab, penjebar agama D.I, kawan/pembantu D.I, sebagaimana telah kami peringatkan pada rapat umum PKI di Lapang Oleh Raga Tjibeureum, SUPAJA SETERIMANJA PERINGATAN INI, SUPAJA TOBAT, SUPAJA MENGHENTIKAN SEMUA GERAKNJA, SUPAJA KEMBALI KEPADA AGAMA KARUHUN KITA SILIWANGI. Tentang Tuhan Allah jang kamu takuti tentang Muhammad penipu jang kamu pudja, biarkan kami jang menumpas/melawannja. Kami menunggu bukti tobat kamu; AWAS AWAS, sekali lagi AWAS, Ingatlah pembalasan dari kami kaum PROLETAR.
Dari kami
RAJKAT PROLETAR TJIBEUREUM
However, threats as communicative events denoting purposes do not necessarily share the same typology of schematic categories having easily recognizable characteristics of a genre such as an editorial, an advertorial or even a scientific articles with obvious parts of introduction, method, result and discussion and conclusion [21]. A threat letter below, Text 2 sent by suspected communists doing harm to a number of Muslim clerics residing in Depok, a district in West Java close to the capital of Indonesia, Jakarta. Ten kyai and ustadz were threatened to be killed through a letter accepted by an ustadz in his residence 2018. Public was shocked as the trauma of the past moment as clerics were slaughtered by heartless communists in Indonesia is still ingrained in some people’s mind. Unlike the previous Text, the following showed rather absurd as a letter in spite of the apparent sender written.

Text 2: A threat letter from suspected communists

<table>
<thead>
<tr>
<th>NAMA NAMA TARGET PENCULIKAN TOKO AGAMA</th>
<th>YANG ADA DI DEPOK (X) BUNUH SECEPATNYA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. KH. Qurtubi Nafis</td>
<td>(X) BUNUH</td>
</tr>
<tr>
<td>2. KH. Abu Bakar Madris</td>
<td>(X) BUNUH</td>
</tr>
<tr>
<td>3. Ust. Iwan Gardenia</td>
<td>(X) BUNUH</td>
</tr>
<tr>
<td>4. Ust. Shobur Gardenia</td>
<td>(X) BUNUH</td>
</tr>
<tr>
<td>5. Ust. Solihin Gardenia</td>
<td>(X) BUNUH</td>
</tr>
<tr>
<td>6. Abi Zain bin Qasim Gardenia</td>
<td>(X) BUNUH</td>
</tr>
<tr>
<td>7. KH. Riyono GG Kocen</td>
<td>(X) BUNUH</td>
</tr>
<tr>
<td>8. Ust. M. Syarif Hidayatulloh</td>
<td>(X) BUNUH</td>
</tr>
<tr>
<td>9. KH. Ahmad Zaelani</td>
<td>(X) BUNUH</td>
</tr>
<tr>
<td>10. Ust. Marzan</td>
<td>(X) BUNUH</td>
</tr>
</tbody>
</table>

There were a number of social actors or groups of participants critically examined [22], that was kaum PROLETAR, RAKYAT PROLETAR TJIBEUREUM, PKI, KEADILAN JAYA ABADI belonging to the threateners; others H. DJAHARI, Agen Agama Arab, penjebah agama D.I, kawan/pembantu D.I, TOKO AGAMA, enumerated one by one related to the victims. In text 1, the threateners obviously refer themselves to kaum PROLETAR, RAKYAT PROLETAR TJIBEUREUM, accomplishing a mission to get the people in that district back to their ancestor’s religion, siliwangi. Additionally, in text 1, a threaten refers himself to a larger organization, KEADILAN JAYA ABADI, possessing an implicit mission to enforce justice for all. Those undermining it are about to be terminated.

Attitudinal stances that the threaten exploited were demonstrated to the employment of sorted lexis. Table 1 showed the categories of attitudes encounted in text 1 and text 2.
Table 1. Attitudinal Items in threat

<table>
<thead>
<tr>
<th>Threat letters</th>
<th>Affect Tokens</th>
<th>Judgment Tokens</th>
<th>Appreciation Tokens</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text 1</td>
<td>Bebas, takuti, penipu</td>
<td>kedudukan sebagai agen, penyebar agama D.I, Allah yang kamu takuti, Muhammad yang kamu</td>
<td>Allah yang kamu takuti, Muhammad yang kamu</td>
</tr>
<tr>
<td></td>
<td>Awas, pembalasan, peringatan</td>
<td>Kawan/pembantu D.I, puja, kedudukan sebagai agama, penyebar agama D.I, Menguatkan, kembali, puja,</td>
<td>Kawan/pembantu D.I, puja, kedudukan sebagai agama, penyebar agama D.I, Menguatkan, kembali, puja,</td>
</tr>
<tr>
<td></td>
<td>Peringatan, kawan</td>
<td>menghentikan semua gerakan, kamu takuti, Kamu puja</td>
<td>menghentikan semua gerakan, kamu takuti, Kamu puja</td>
</tr>
<tr>
<td></td>
<td>Menghentikan, pembantu D.I, kawan, puja,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Menumpas, melawan, bukti,</td>
<td>gerakannya, kamu takuti, Kawan pembantu D.I</td>
<td>gerakannya, kamu takuti, Kawan pembantu D.I</td>
</tr>
<tr>
<td></td>
<td>Tobat, pembalasan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Text 2</td>
<td>Bunuh, bunuh (10 times)</td>
<td>Target Penculikan</td>
<td></td>
</tr>
</tbody>
</table>

The above table, the attitudinal tokens in affect and judgments ones were in general labelled negative (-). Likewise, all phenomena occurred and got to be done by the victims were viewed negative (-) by the threateners. Even, encountered in both text 1 and text 2, the same lexis was reiterated deliberately. Such lexis as peringatan tobat, awas, or obviously bunuh uttered ten times in the appearance of eleven ones found in text-2. The repetition, and even the capital letters and red-ink used in the threat letters were intentional to underscore how deep or serious the writer’s feelings on the persons, their attitudes and phenomena. The dominance of (-) propriety also occurred in retrieved texts. For example, “awas” was evaluated to negative behavior of “penyebar agama D.I” or “pembalasan” referred to the attitudes of “Alloh yang kamu takuti” and “Muhammad yang kamu puja” (Text 1). The preponderant subcategory of Judgment tokens was in congruent with the study by Gales in which the terrorist threatened the laymen and professionals in health sectors [7]. To figure out how much the writer or the threatener committed to do an act towards the victims threatened, we could see the table 2 categorizing the kinds of utterances, confirming alignment or disalignment with the readers.

Table 2. Utterance Typologies in

<table>
<thead>
<tr>
<th>Utterance Typology</th>
<th>Utterance Tokens</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monoglossic</td>
<td>Bebas! kami peringatkan kepada kamu, kami peringatkan supaya tobat, kami peringatkan supaya menghentikan semua gerakan, Kami menunggu bukti tobat kamu, Bunuh secepatnya, etc</td>
</tr>
<tr>
<td>Heteroglossic (expand &amp; Contract)</td>
<td>Biarkan kami yang menumpasnya</td>
</tr>
</tbody>
</table>

Heteroglossic utterances were minimally found at all, either at lexical level by the use of modal verbs such as barangkali (perhaps), boleh (can), sebaiknya (should). It was only one known from the lexis biarkan. Then, at clausal one like the emergence of subordinators...
confirming conditions, like walaupun (eventhough, although, despite, in spite of,), jika (if), or karena (as, since, because), etc were not figured out at all. The findings were divergent from gales studies in that the terrorists attacked the victims, despite being poised to them, at times got willing to open up the negotiations by extending discourse proven heteroglossic utterance encounters. [8] [7]. The coming-up question was that whether the writer was aligned with the readers in that the the threateners simply considered all propositions the shared by the victims. The distinctions of monoglossic and heteroglossic were challenged in that while the utterances produced were socially determined to uphold tension [23], yet in the case of threatening genre, such categorization was futile [16].

Finally, graduation, scalling down, scalling up or amplifying was actually manifested through the solid reiteratoration , collocational, semantic and metaphorical of the lexis [23], such as bunuh uttered ten times, and bunuh secepatnya (in text 1), tobat uttered twice, AWAS uttered three times (in text 2). Let’s see table table 3 depicting repetition type exploited by the threateners.

<table>
<thead>
<tr>
<th>Table 3. Repetition Typology in Graduation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utterance Typology</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>Collocational Repetition</td>
</tr>
<tr>
<td>Semantic Repetition</td>
</tr>
<tr>
<td>Metaphorical Repetition</td>
</tr>
</tbody>
</table>

The existence of repetition was typically attached to the characteristics of threatening genre. It was executed intentionally to secure, even enforce the investment or commitment to act. The preference of which tapestry to be used is socially determined. The last part of this article, the essence of this research shall be elaborated.

4 Conclusion

The instances of linguistics resources in the forms of threatening discourse constructed in threat letters inform us the underlying intent of the writer towards the feeling and commitment he precipitates. In the particular case of threats addresses to a number of Muslim clerics in Indonesia, the rooms for negotiations, or weakening linguistics features are not corroborated in the actual context. Interpersonal stances. i.e. authorial ones demonstrated through attitudinal, engagement and graduation items deployed depicted how much hatred the communists have towards kyai or ustadz in Indonesia regarding their attitudes, even the phenomenon they link. Furthermore, by preponderantly delivering monoglossic utterances doesn’t mean that the communists and the suspected ones are aligned with the Muslim clerics, yet the actual tense was apparently construed. Juxtaposing the two letters, they possess identical tenets. Further research in depth is still in the need, though.
References


Effectiveness Of Minimum Competency Assessment Instruments at Level 2

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Abstract. This study aims to describe the effectiveness of the minimum competency assessment instrument at level 2. This research is included in research and development. Research and development procedures carried out in the development of learning curriculum teaching materials for primary school teacher education refer to Borg and Gall's development steps. The steps are grouped into three steps, namely a preliminary study, development, and testing and dissemination. This article only focuses on effectiveness that include in the testing and dissemination stage. The method used to test the effectiveness of the minimum competency assessment instrument at level 2 is the experimental method. The effectiveness test of the minimum competency assessment instrument shows that the minimum competency assessment instrument at level 2 is able to provide information about the literacy and numeracy abilities of students into 4 competency categories. To test the quality of items in the minimum competency assessment instrument level 2 instrument, it has good discriminatory power, and the proportion of questions with an adequate level of difficulty to describe the literacy and numeracy abilities of students. To test the reliability of the minimum competency assessment instrument on the literacy load, it has a range of 0.72. While the numeric charge has a range of 0.81. This shows that the level 2 minimum competency assessment instrument product developed can be said to be very feasible and effective to use.

Keywords: Effectiveness; Minimum Competency Assessment; Numeracy; Literacy

1 Introduction

Development in the field of education plays an important role in improving the quality of human resources. In other words, improving the quality of human resources can be done through improving the quality of education (Sholihah & Firdaus, 2019). One of the ways the government does to improve the quality of education is through a policy of independent learning. Independent learning policy is implemented to accelerate the achievement of national education goals, namely increasing the quality of Indonesian human resources who have advantages and competitiveness compared to other countries (Kemendikbud, 2020). To realize this goal, independent learning provides several offers in reconstructing the national education system (Yamin & Syahrir, 2020). One of the reconstructed systems in the independent learning policy is the evaluation system.

Starting in 2020, the Ministry of Education and Culture has decided to abolish the “Ujian Nasional” which was originally a form of final evaluation of each level of education, to be replaced with the National Assessment in 2021. There are 3 reasons for changing the “Ujian Nasional” to become a national assessment, namely, 1) The “Ujian Nasional” Materials are
too dense so that students and teachers tend to test mastery of content, not reasoning competence, 2) “Ujian Nasional” become a burden for students, teachers, and parents because they are an indicator of student as individuals, 3) “Ujian Nasional” only assess cognitive aspects of learning outcomes, have not touched the character of students as a whole (Kemendikbud, 2019).

Seeing these three reasons, the government is increasingly convinced to replace the “Ujian Nasional” with a national assessment. The national assessment is designed to monitor and evaluate the primary and secondary education systems (Kemendikbud, 2020). The national assessment is held as a basic mapping of the real quality of education so there are no consequences for schools and students on the results of the assessment (Pusmenjar, 2021). Through the national assessment, information about literacy, numeracy, and character of students will be obtained. The information was obtained from the three main national assessment instruments, namely the Minimum Competency Assessment, the Character Survey, and the Learning Environment Survey.

Minimum Competency Assessment in the national assessment is a form of basic competency assessment to develop students' self-capacity and positive participation in society. The implementation of the Minimum Competency Assessment is not based on the ability of student to master the material according to the curriculum as in the “Ujian Nasional”, but is designed to map and improve the quality of education as a whole (Rohim, Rahmawati, & Ganestri, 2021). There are two basic competencies measured by Minimum Competency Assessment, namely reading literacy and mathematical literacy (numbering) (Kemendikbud, 2020). The policy regarding Minimum Competency Assessment is not without reason, based on the PISA score, Indonesia is ranked 72 out of 77 countries, while the mathematics score is ranked 72 out of 78 countries. This condition is due to the lack of emphasis on development for literacy and numeracy.

In addition, based on the results of the Indonesian National Assessment Program (INAP) released by the Ministry of Education and Culture, (2020) it shows that in numeracy skills as many as 77.13% of Indonesian students are in the poor category. Meanwhile, in literacy skills as much as 46.83% of Indonesian students are in the poor category. The results of the (INAP) released by the Ministry of Education and Culture, (2020) further strengthen the fact that the literacy and numeracy abilities of Indonesian students need to be taken seriously. So with Minimum Competency Assessment, the learning process is expected will be more emphasized on literacy and numeracy to deal with these problems.

The Minimum Competency Assessment in elementary schools is divided into 3 levels, namely level 1 (grades 1 and 2), level 2 (grades 3 and 4) and level 3 (grades 5 and 6). Every policy, of course, requires readiness in its implementation. However, in reality, based on the results of interviews with fourth grade teachers at SDN Cikaso, it was stated that schools had never clearly known about Minimum Competency Assessment questions related to literacy and numeracy to be used when evaluating learning activities because this was a new policy that would be implemented. This condition will certainly cause various obstacles because its implementation will be carried out in 2021. Seeing this condition, the development of the Minimum Competency Assessment instrument cannot be avoided. In this case, the Minimum Competency Assessment instrument that has been developed is for level 2.

In developing an instrument, it is necessary to know how far the effectiveness of the instrument is. Effectiveness itself is the ability to carry out tasks, functions (operations, program activities or missions) of an organization or the like in which there is no pressure or tension between its implementation (Mingkit, Liando, & Lengkong, 2017). In the context of
an assessment instrument, the effectiveness of the instrument can be said as the ability to measure the subject according to the initial purpose of the instrument being developed. However, there is no further information regarding the results of the effectiveness test of the minimum competency assessment instrument at level 2. Therefore, research will be carried out with the aim of knowing the minimum competency assessment instrument at level two that has been developed so that it can be applied to a wider scope.

2 Methodology

This research is part of the research and development of the Borg & Gall model. There are ten steps in the research and development of the Borg & Gall model, namely, 1) collecting information and preliminary research, 2) planning, 3) developing the initial product form, 4) conducting a limited trial of the initial product to produce the main product, 5) revising on the main product, 6) conduct a trial of the main product, 7) revise the main product to produce the final product, 8) conduct a field trial of the final product, 9) revise the final product, and 10) disseminate and implement the product (Borg & Gall, 1983). The development procedure used is a modified research and development procedure from Borg & Gall which groups the development research steps into three stages.

a. Preliminary Study
   This preliminary study includes an analysis of the readiness of schools and teachers in implementing the Minimum Competency Assessment policy, stages of student development, and school conditions. The analysis in the preliminary study was carried out by interviews, and literature study

b. Development
   At this stage, the initial product development or model draft was carried out with two categories of trials, namely preliminary trials, and main trials.

c. Testing and Dissemination
   At this stage testing the effectiveness of the product and product dissemination

Based on the three stages presented above. The effectiveness test enters the testing and dissemination stage. The method used to test the effectiveness of the minimum competency assessment instrument at level 2 is the experimental method. We assessed the psychometric properties of the new instrument in terms of its general characteristics, reliability, validity, and usefulness. The characteristics of psychometric measurements are comparisons between the measured attributes and the measuring instrument, the results are expressed quantitatively, and the results are descriptive. The approach used in measuring the effectiveness of this minimum competency assessment instrument is the item response theory approach.

Psychometric characteristics using the item response theory approach consist of 1) reliability, 2) undimensionality, 3) item difficulty index, 4) differential item functioning and 5) item fit order. The population of this study were all fourth grade students at SDN Cikaso.

3 Result and Discussion

Evaluation is an important component in the implementation of education. Through the results of the evaluation, it can be seen the level of achievement of the educational goals. Therefore, evaluation can be used as a recommendation in overcoming a problem encountered
in the education process or the education system that is being implemented (Purnomo & Wulandari, 2019). Evaluation cannot be separated from the use of instruments. An instrument will be said to be good if it is effective.

The effectiveness of the Minimum Competency Assessment Instrument level 2 is measured through 5 stages, namely 1) reliability, 2) unidimensionality, 3) item difficulty index, 4) differential item functioning and 5) item fit order. The following is a discussion of each stage of measuring the effectiveness of the Minimum Competency Assessment Instrument level 2.

a. Reliability

An instrument is said to be reliable if the instrument is reliable, consistent or steady and productive (Purwanto, 2010). So that the reliability test is intended to determine the consistency of the measuring instrument in its use. The following are the results of instrument reliability tests on literacy questions presented in table 1.

Table 1. Results of Reliability Analysis of Literacy Questions

<table>
<thead>
<tr>
<th>R</th>
<th>Information</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.72</td>
<td>High coefficient</td>
<td>Reliable</td>
</tr>
</tbody>
</table>

Based on table 1, it can be seen that the results of the reliability test of the Minimum Competency Assessment level 2 instrument on the literacy get a reliability score of 0.72 because the range of reliability scores is between 0.70 to 0.90, the number 0.72 can be interpreted as a high coefficient in the instrument. Furthermore, the reliability test of the numeration questions Minimum Competency Assessment level 2, was also carried out in table 2.

Table 2. Results of Reliability Analysis of Numeracy Questions

<table>
<thead>
<tr>
<th>R</th>
<th>Information</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.81</td>
<td>Tinggi</td>
<td>Reliabel</td>
</tr>
</tbody>
</table>

Based on table 2, the results of the reliability test of the Minimum Competency Assessment level 2 instrument on the numeric charge got a reliability score of 0.81, because the range of reliability scores is between 0.70 to 0.90, the number 0.81 can be interpreted as a high coefficient.

b. Unidimensionality

Unidimensionality is an important measure to evaluate whether the instrument developed is able to measure what it is supposed to measure (Suminto & Widhiarso, 2015). The Minimum Competency Assessment level 2 instrument is able to fulfill the purpose of the Minimum Competency Assessment instrument, which is to provide information about the literacy and numeracy abilities of students into four criteria for the level of competence of students. The four criteria are presented in table 3.
Table 3. Criteria for Minimum Competency Assessment Competency Level

<table>
<thead>
<tr>
<th>Competency Level</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 12</td>
<td>Need Special Intervention (PIK)</td>
</tr>
<tr>
<td>13 – 24</td>
<td>Basic</td>
</tr>
<tr>
<td>25 – 36</td>
<td>Competent</td>
</tr>
<tr>
<td>37 – 48</td>
<td>Proficient</td>
</tr>
</tbody>
</table>

The results of the literacy measurement of the Minimum Competency Assessment level 2 instrument that have been tested show that the maximum score obtained in the trial of the AKM instrument for literacy content is 32, the minimum score is 9, and the average score is 19. The results of the measurement of the Minimum Competency Assessment level 2 instrument on literacy content can be it was concluded that there were 3 students who needed special intervention (14%), 15 students were at the basic competency level (68%), and 4 students were at the proficient competence level (18%).

Furthermore, the results of the numerical measurement of the Minimum Competency Assessment level 2 instrument show that the maximum score is 28, the minimum score is 4, and the average score is 13. The results of the measurement of the Minimum Competency Assessment level 2 numeration instrument can be concluded that there are 8 students who need special intervention (36%), as many as 12 people are at the basic competency level (55%), and 2 students are included in the proficient competency level (9%).

c. Index Difficulty Item

The calculation of the difficulty level of the question is a measurement of how big the degree of difficulty of the question is. Furthermore, the results of the analysis of the level of difficulty of literacy questions are presented in table 4.

Table 4. Results of the Analysis of the Difficulty Level of Literacy Questions

<table>
<thead>
<tr>
<th>Question Category</th>
<th>Question Number</th>
<th>Number of Questions</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy</td>
<td>9, 15</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td>Medium</td>
<td>1, 2, 3, 4, 5, 6, 7, 10, 11, 12, 13, 14, 17, 18, 19, 20, 21, 22, 24, 26, 28, 29, 30, 32, 35, 41, 43, 47.</td>
<td>28</td>
<td>58%</td>
</tr>
<tr>
<td>Difficult</td>
<td>8, 16, 23, 25, 27, 31, 33, 34, 36, 37, 38, 39, 40, 42, 44, 45, 46, 48.</td>
<td>18</td>
<td>38%</td>
</tr>
</tbody>
</table>

100%

Based on table 4, the results of the analysis of the difficulty level of the Minimum Competency Assessment instrument on literacy content, it can be concluded that there are 2 items in the easy category (4%), as many as 28 items in the medium category (58%), and 18 items in the difficult category (38%). Furthermore, the results of the analysis of the difficulty level of numeracy questions are presented in table 5.
Table 5. Results of the Analysis of the Difficulty Level of Numeracy Questions

<table>
<thead>
<tr>
<th>Question Category</th>
<th>Question Number</th>
<th>Number of Questions</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy</td>
<td>1</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Medium</td>
<td>4,6,14,19,20,23,25,29</td>
<td>17</td>
<td>35%</td>
</tr>
<tr>
<td></td>
<td>,30,34,35,37,38,40,42</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>,44,46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficult</td>
<td>2,3,5,7,8,9,10,11,12,13,15,16,17,18,21,22,24,26,27,28,31,32,33,36,39,41,43,45,47,48</td>
<td>30</td>
<td>63%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>100%</td>
</tr>
</tbody>
</table>

Based on table 5 the results of the analysis of the difficulty level of the Minimum Competency Assessment instrument on numeric content, it can be concluded that there is 1 item in the easy category (2%), as many as 17 items in the medium category (35%), and 30 items in the difficult category (63%). In general, an item evaluation of learning outcomes is declared good if the item is not too difficult and not too easy. Therefore, items that cannot be answered correctly by all training participants (because they are too difficult) can be declared as bad items. On the other hand, items that all of the training participants can answer correctly (because they are too easy) can also be declared as bad items.

Considering the purpose of the Minimum Competency Assessment is to obtain information about the literacy and numeracy abilities of students, it can be said that the proportion of the number of items that are difficult, medium and easy can still be used.

d. Differential Item Functioning
The distinguishing power according to Arifin (2012) is the ability of questions to distinguish between smart students and less intelligent students. The following are the results of the analysis of differentiating power on literacy questions which will be presented in table 6.
Table 6. Results of the Distinguishing Power of Literacy Questions

<table>
<thead>
<tr>
<th>Question Category</th>
<th>Question Number</th>
<th>Number of Questions</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Good</td>
<td>1,13, 2,6,11,12,17,21,23</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td>Good</td>
<td>24,25,26,30,32,33,34,38,40</td>
<td>16</td>
<td>33%</td>
</tr>
<tr>
<td>Sufficient</td>
<td>7,18,19,20,27,28,35,36,42,43</td>
<td>10</td>
<td>21%</td>
</tr>
<tr>
<td>Bad</td>
<td>3,4,5,8,9,10,18,19,20,22,29,31,37,39,41,44,45,46,47,48</td>
<td>20</td>
<td>42%</td>
</tr>
</tbody>
</table>

100%

Based on table 6, the results of the analysis of the distinguishing power of the Minimum Competency Assessment instrument on literacy content can show that there are 2 items in the very good category (4%), as many as 16 items in the good category (33%), 10 items in the sufficient category (21%) and 20 items in the bad category (42%). Further, for the analysis of the power of difference in numeracy questions, it is presented in table 7 below.

Table 7. Results of the Distinguishing Power of Numeracy Questions

<table>
<thead>
<tr>
<th>Question Category</th>
<th>Question Number</th>
<th>Number of Questions</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Good</td>
<td>29,38,40,46,4,6,17,18,20,23,30,33,34,35,37,43,44,48</td>
<td>4</td>
<td>8%</td>
</tr>
<tr>
<td>Good</td>
<td>1,8,19,21,25,26,31,36,2,3,5,7,9,10,11,12,13,14,15,16,22,24,27,28,32,39,41,42,45,47,48</td>
<td>14</td>
<td>29%</td>
</tr>
<tr>
<td>Sufficient</td>
<td>8</td>
<td>17%</td>
<td></td>
</tr>
<tr>
<td>Bad</td>
<td>22</td>
<td>46%</td>
<td></td>
</tr>
</tbody>
</table>

100%

Based on table 7, the results of the analysis of the distinguishing power of the Minimum Competency Assessment instrument on numeric content can show that there are 4 items in the very good category (8%), as many as 14 items in the good category (29%), 8 items in the sufficient category (17%) and 22 items in the bad category (46%).

Based on the results of the analysis of discriminatory power, because the scores of literacy and numeracy abilities of Indonesia nationally and internationally get low percentage results. So, the number of bad categories in the level 2 Minimum Competency Assessment instrument discriminatory test is normal. In addition, based on the results of follow-up interviews, it is known that students have never encountered the types of questions in the Minimum Competency Assessment questions such as complex multiple choice. In addition, when the product is used. Most of the teachers admitted that it was the first time they had seen firsthand
the types of questions that the Ministry of Education and Culture wanted in the Minimum Competency Assessment. This condition of course affects the results of the measurement of the different power of the product. Furthermore, for items fit order in this study can be known through the results of undimensionality.

4 Conclusion

Based on the results and discussion above, some conclusions can be drawn as follows. Minimum Competency Assessment Instrument (AKM) level 2 is declared effective which is based on:

a. Based on the analysis of the reliability test of the AKM instrument, the literacy load that has been tested has a range of 0.72. While the analysis of the AKM instrument questions containing numeration has a number range of 0.81. This shows that the level 2 Minimum Competency Assessment (AKM) instrument product developed can be said to be very feasible to use

b. The AKM level 2 instrument is able to fulfill the purpose of the AKM instrument, which is to provide information about the literacy and numeracy abilities of students into 4 categories, namely special interventions, basic competencies, proficient and proficient. This is evidenced by the fact that 14% of students need Special Intervention (PIK), 68%, students are at the basic competency level, and 18% of students are at the competent competency level in literacy skills. Meanwhile, the results of the numeration measurement show that 36% of students are at the Special Intervention Requirement (PIK) competence, 55% of the students are at the Basic competency level, 9% of the students are at the competent competency level.

c. To test the quality of the items based on the analysis of the level of difficulty of the Minimum Competency Assessment Instrument at level 2 difficulty level of literacy questions with the criteria used, the results obtained are easy questions as many as 2 questions (4%), moderate questions 28 questions (58%), and difficult questions 18 questions (38%). Meanwhile, the difficulty level of numeracy questions with the criteria used resulted in 1 easy question (2%), medium questions 17 questions (35%), and difficult questions 30 questions (63%). Based on the quality test of the items on the results of the difficulty level analysis. This means that the question can still be used.

d. To test the quality of the items based on the calculation of the discriminatory power of literacy questions, there were 20 bad questions (42%), 10 questions enough (21%), 16 good questions (33%), and 2 very good questions (4%). Meanwhile, for the results of the analysis of the calculation of the discriminating power of numeracy questions with the criteria used, the results obtained are 22 questions (46%), only 8 questions (17%), good questions 14 questions (29%), and very good questions 4 questions (8%). So, it can be said that there are quite a number of items that are categorized either on the items of literacy or numeracy.
References


School Information Application Model Design at SMP Negeri 1 Subang Kuningan

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Abstract. The development of technology is increasing and the use of information technology is very much needed by educational institutions. SMP Negeri 1 Subang Kuningan is an educational institution that requires information technology in managing information and school administration to make it easier for schools to inform school activities quickly and accurately. One of the efforts to provide information to students is by using information technology at SMP Negeri 1 Subang. Currently, SMP Negeri 1 Subang has not maximally utilized information technology, the use of technology is only limited to the school environment. In this study, the system development was carried out using the waterfall method. The application is built using the PHP programming language and MySQL database. This research produces an application that is expected to be able to solve problems on school information in new student admissions, school activities and other information.

Keywords: Technology; Information; School.

1 Introduction

Information is one of the important factors in a school, today we encounter many applications of information systems in daily life such as business, hospitals, government, private business activities, education and others. There are many benefits of information and communication technology. In improving the quality of life, it is increasingly demanding that humans carry out various activities needed by optimizing their resources.

The development of information technology has penetrated all aspects of life, including in educational institutions, information technology plays a very important role in the world of education. The information system in schools serves to assist matters relating to non-technical and technical aspects of education. Such as human resource management, budget management and management of educational facilities and infrastructure. Inventory of goods is the recording of data related to goods or assets in the agency.

School is one of the institutions engaged in education, the school consists of several levels ranging from Kindergarten (TK), Elementary School (SD), Junior High School (SMP) and Senior High School (SMA) and Vocational High School (SMK) at the same level as SMA.

SMP Negeri 1 Subang Kuningan is one of the junior high schools located in Kuningan Regency, Subang District. Information management at SMPN1 Subang is done by using information directly through letters or information media at school. With this kind of management, information about school activities is limited to certain circles, information is not widely spread.
2 Theory Basis

Information systems are elements that are mutually integrated and also interact with each other that are useful in achieving certain goals, namely processing data processing into more meaningful and useful information in making decisions now or in the future (Kadir, 2003). According to Jogiyanto (2002), the system life cycle, or abbreviated as SLC is an evolutionary process followed in establishing computer-based information systems and sub-systems. (system life cycle) SLC consists of a series of tasks that closely follow the steps of the systems approach, (system life cycle) SLC is often referred to as the waterfall approach to system development and use.

While the System Development Life Cycle or abbreviated as SDLC (Jogiyanto, 2002) is a traditional method used to build, maintain and replace an information system.

3 Research Methodology

At the analysis stage there are several stages carried out including:

1. Analysis of the current system
   In the current system in schools, the system used by schools in informing school activities is carried out only through internal schools, carried out by means of socialization through meetings and through teachers in the classroom.

2. Business process analysis
   The process of displaying school profile information is carried out by the admin by logging in through the admin account. Admin includes information about the principal's remarks, history, vision, mission, goals and facilities. After the update process is carried out, the information will appear on the user's web page.

   The process of displaying school profile information is carried out by the admin by logging in through the admin account. Admin includes information about the principal's remarks, history, vision, mission, goals and facilities. After the update process is carried out, the information will appear on the user's web page.

   The process of displaying news about schools, updating data is carried out through the admin which will then change the user's web page. In the process of displaying a gallery containing information on photos of activities carried out by the school, the process of updating data is also carried out by the admin.

3. System design
   In designing the system to be built, the steps taken are to design the data flow using a data flow diagram, to describe the relationship between entities in the system using Entity Relationship Diagram.

![Figure 3.1. Information Application Context Diagram](image-url)
4 Results And Discussion

On the start page of this web-based information application, it displays menu information contained in the application, information on school photos through slide shows, news information and gallery. As in Figure 4.1.

By clicking on the gallery menu, visitors can see school photos and school activities. As in Figure 4.2.
The admin page contains information about web applications, menus that can be processed to change data on web pages. The process of changing this data can only be done by the admin. As in figure 4.3.

5 Conclusion

Based on the analysis and design of the Information Application at SMP Negeri 1 Subang, it can be concluded several things as follows:

1. Classification of users into three parts, namely administrators, teachers and the general public with certain access restrictions who have the rights, authorities and obligations of the user concerned.

2. This SMP information system makes it easier for school administrators to provide school information (such as student attendance, student assessments, scheduling student learning activities) to the entire academic community of SMP Negeri 1 Subang quickly and accurately.
3. This SMP information application can be used by school administrators to collect data, students, teachers, employees and alumni.

6 Suggestions

Suggestions for the development of this application are:
1. Applications can be developed by adding features for academic, financial and school administration management.
2. Android-based makes it easier for users to access.
3. Applications can also be added with LMS features.

References

Technology Acceptance Model Analysis on Software E-Financial Solutions

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Abstract. This study examines the perceptions of student behavior interest as prospective accountants towards the use of E-Solution Financial Software by using the Davis Model, namely the Technology Acceptance Model (TAM) approach. This TAM model can explain Perceived Ease of Use and Perceived of Usefulness of E-Solution Financial Software which can affect Attitude Toward Using and Behavior Intention to Use by students who have studied the software. The population in this study were 338 students while the number of samples involved in the study were 184 respondents. The sampling technique used stratified random sampling. Hypothesis testing was conducted by using simple regression analysis. The results provide the evidence that Attitude Toward Using and Perceived of Usefulness influence the Behavior Intention in using E-Solution Financial Software.

Keywords: Attitude Toward Using; Behavior Intention to Use; Perceived Ease of Use; Perceived of Usefulness; TAM.

1 Introduction

Information technology can meet business information needs very quickly, timely, relevant and accurately (Wilkison and Cerullo, 1997). Every entity, both public and private, is currently paying more special attention and developing information technology as a more effective and efficient medium in gathering and disseminating information to various groups. However, in the implementation of information technology among students, it turns out that there are often various obstacles that affect the information process. There are many people who may not be able to operate information technology absolutely, or there may also be errors in the system process so that information becomes irrelevant and untimely. System errors often occur from problematic databases to inadequate personal abilities (Romney and Steinbart, 2003).

User factor is a factor that underlies the success and usefulness of information technology. Users who are able to operate an information technology system well can feel the benefits. The user is a core of a system, with a system based on AI (Artificial Intelligent), someone can get results that are automatically processed by a system, the use of the If command (if-then) can facilitate processing of information, if the user is ready to accept technology information then a system can be said to be successful or not (Mcleod and George, 2009). Because information technology can be used with ease and usefulness factors, the behavior of using
information technology depends on the incidence of how easy and useful information technology is in an entity, so research on the behavior of the use of information technology adapts the use of the Technology Acceptance Model (TAM).

TAM offers a strong and simple explanation for technology acceptance and user behavior (Venkatesh and Morris, 2000). The Technology Acceptance Model (TAM) was developed by Davis (1989) who adopted the TRA model, (Davis, Bagozzi, & Warshaw, 1989) defines perceptions of usefulness as "a level where someone believes that using the system can improve their performance, at work ". The TAM model is a model that is often used to analyze usage behavior in using IT which is formed from two key variables, namely the ease and usefulness variables. The original form of TAM is formed from perceived usefulness, perceived ease of use, attitude, behavioral intention, and actual use (Davis et al., 1989). TAM is used to examine whether perceived of usefulness and perceived ease of use have an effect on behavioral intention of use. TAM (Technology Acceptance Model) is a model that can be used to analyze the factors that influence the acceptance of an information system.

![Original Model of Davis et al. (1989)](image)

Before the TAM model appeared, there was a theory known as Theory of Reasoned Action (TRA) developed by Martin Fishbein and Icek Ajzen (1975, 1980). The two main constructs that distinguish the TRA model and the TAM model are perceived ease of use and perceived usefulness. Perceived ease of use explains how technology users' perceptions of getting the results they expect by relying on the lowest possible effort. Whereas perceived of usefulness is a user's subjective perspective when using a certain system, he feels it can improve his performance in an organization. Factors that can determine the use of a technology are behavioral intention (BI) in which BI is influenced by attitude toward using (A) and perceived usefulness (U). Previously, perceived ease of use (EOU) was used as a hypothesis in research and had a significant effect. Therefore, TAM has two basic mechanisms, namely EOU and U which affect attitude and behavior.

2 Methodology

The research method used in this research is descriptive method and verification method. According to Moh. Nazir (2003: 54) descriptive method is a method in examining the status of human groups, an object, a condition, a system of thought or a class of events in the present.
The descriptive method aims to make a systematic, actual and accurate description of the facts, properties and influences between the phenomena being studied. The descriptive method used in this study is to describe perceived usefulness, perceived ease of use, attitude toward using, and behavioral intention.

While the verification method according to Sugiyono (2013: 6) is a method of research through proof to test the hypothesis of descriptive research results with statistical calculations so that the results of evidence that show the hypothesis is rejected or accepted are obtained. The verification method used in this study is to test the proposed hypothesis, namely to test the effect of perceived ease of use on the perceived usefulness of E-Solution Financial software, the effect of perceived ease of use on attitude toward using E-Solution Financial software, the effect of perceived usefulness on attitude toward using E-Solution Financial software, the effect of perceived usefulness on Intention to use E-Solution Financial software and the effect of attitude toward using on Behavioral Intention to use E-Solution-Financial software.

The population in this study were all active students of the Accounting Study Program at the Faculty of Economics, University of Kuningan for the 2019/2020 academic year who had taken the computer accounting I and computer accounting courses II, namely students in the class of 2017 and 2018. Based on existing data shows the number of active students in the Study Program. Accounting for the Faculty of Economics, University of Kuningan for the 2019/2020 academic year which has taken accounting computer I and accounting computer II courses, namely 338 students of class 2017 and 2018.

According to Sugiyono (2014: 116), the definition of a sample is part of the number and characteristics possessed by the population to be studied. Determination of the sample size in this study using the Slovin formula as follows:

\[ n = \frac{N}{1 + N \times e^2} \]

Based on the Slovin formula above, the sample size in this study was 184 respondents. The sampling technique uses stratified random sampling, which is a stratified random sampling method taking samples based on a certain level. Meanwhile, the data collection technique used in this study was a questionnaire distributed to 184 respondents.

The statements submitted are in the form of positive and negative statements. This study uses a Likert scale. Likert scale according to Sugiyono (2010: 93) is a scale used to measure attitudes, opinions and perceptions of a person or group of people about social phenomena. The respondent's answer to each statement will be given a score.

In data analysis, descriptive analysis is used to find out a description of the perceived use of perceived usefulness, perceived ease of use, attitude toward using, and behavioral intention of students of the Accounting Study Program. Faculty of Economics, University of Kuningan which has taken courses in accounting computer I and computer accounting II and provides information about the characteristics of respondents. The descriptive analysis carried out includes the number of respondents, the maximum, minimum, standard deviation, mean and other values of the respondents as well as the maximum, minimum, standard deviation, mean and other values of each variable.

3 Result and Discussion

The questionnaire used in this study has been tested for validity and reliability. In addition, the questionnaire has passed the classic assumption tests such as normality, heteroscedasticity and autocorrelation. Testing the research model is done by doing the t test. There are 5 simple
regression models presented in this study. All of these models have met the requirements of the classical assumptions so that they can be continued to perform the t test or effect test. Table 1 presents the results of the t test for each of the regression models in this study.

Table 1. T test (Simple Regression Test of Research Model)

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 1</td>
<td>1.690</td>
<td>.193</td>
<td>.538</td>
<td>8.741</td>
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<tr>
<td></td>
<td>EU</td>
<td>.481</td>
<td>.056</td>
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<td>1.303</td>
<td>.181</td>
<td>.645</td>
<td>7.216</td>
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<td></td>
<td>PU</td>
<td>.550</td>
<td>.048</td>
<td>11.373</td>
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<td>.199</td>
<td>.673</td>
<td>6.429</td>
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<tr>
<td></td>
<td>EU</td>
<td>.707</td>
<td>.058</td>
<td>12.282</td>
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<tr>
<td>Model 4</td>
<td>.930</td>
<td>.214</td>
<td>.613</td>
<td>4.340</td>
</tr>
<tr>
<td></td>
<td>PU</td>
<td>.600</td>
<td>.057</td>
<td>10.462</td>
</tr>
<tr>
<td>Model 5</td>
<td>.966</td>
<td>.236</td>
<td>.569</td>
<td>4.097</td>
</tr>
<tr>
<td></td>
<td>ATU</td>
<td>.655</td>
<td>.070</td>
<td>9.331</td>
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</table>

Based on the results of the t test that has been done, Perceived Easy of Use has a positive and significant effect on the Perceived Usefulness of E-Solution Financial Software. This means that the easier it is to use the E-Solution Financial Software, the more useful it will be for its users.

Meanwhile, based on the t test results, Perceived Easy of Use has a positive and significant effect on Attitude Toward Using E-Solution Financial Software. This means that the easier it is to use an information system, the more it will increase the acceptance of the information system by its users.

Furthermore, based on the results of the t test, Perceived Usefulness has a positive and significant effect on Attitude Toward Using E-Solution Financial Software. This shows that the use of the E-Solution Financial Software which is felt to be more useful will lead to an acceptance of the software.

In addition, based on the results of the t test it also shows that Perceived Usefulness has a positive and significant effect on Behavioral Intention to Use E-Solution Financial Software. This shows that the more usefulness of the E-Solution Financial software, the more it will be of interest to its users.

Finally, based on the results of the t test, it shows that Attitude Toward Using has a positive and significant effect on Behavioral Intention to Use E-Solution Financial Software. This shows that an acceptance towards E-Solution Financial Software will further increase the interest of its users. Attitude toward using from users indicates an attitude of acceptance or rejection of a system used. Based on the research results, it shows that most of the users have an accepting attitude towards the E-Solution Financial Software which is used in completing the preparation of financial reports of a business unit. This is because users find it easy to learn and use the software so that it is useful for them to do their job. With the perceived benefits for users, it will show an acceptance of the software and an increased interest from users to continue using the E-Solution Financial Software.
4 Conclusion

Based on the research results described in the previous chapter, it can be concluded that Perceived Easy of Use has a positive and significant effect on Perceived Usefulness of E-Solution Financial Software. In addition, Perceived Easy of Use has a positive and significant effect on Attitude Toward Using E-Solution Financial Software. Furthermore, it can be concluded that Perceived Usefulness has a positive and significant effect on Attitude Toward Using E-Solution Financial Software. Then, Perceived Usefulness has a positive and significant effect on Behavioral Intention to Use E-Solution Financial Software. And it can also be concluded that Attitude Toward Using has a positive and significant effect on Behavioral Intention to Use E-Solution Financial Software.

Based on the above conclusions, the researcher proposes several suggestions. The first suggestion is that because the E-Solution Financial software is felt to be easy to learn and use as well as the benefits felt by accounting students in completing their work as an accountant, it is suggested to the head of the Accounting Study Program at the Faculty of Economics, University of Kuningan to continue using the E-Solution Financial software as a support for accounting computer I and accounting computer II courses. In addition, research on user behavior towards technology acceptance using TAM is expected to be further developed by further researchers by combining other theories from the fields of social, economic, psychology or other fields of science.

References

Investigation Students’ Speaking Obstacles in Speaking Performance Using Whole Brain Teaching

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Abstract. This research has the aim of knowing the students’ speaking obstacles and the factors causing the obstacles in speaking performance in the fourth semester at Kuningan University. The research was conducted by using qualitative research. The researcher implemented Whole Brain Teaching (WBT) to solve the problems found. The subject of the research were students of fourth semester consisting of 52 students. Qualitative data were taken from observation, questionnaire, and interview. In this research, the researcher found that there are some obstacles in speaking they are: linguistic difficulties, mother tongue use, and inhibition. While, the obstacles found were causing by some factors, they are clustering, colloquial language, stress, rhythm, and intonation, environment, students’ confident, and teaching strategy. Besides, the teaching and learning process in implementing WBT (whole brain teaching) ran well. The improvement of the students in implementing WBT (whole brain teaching) shows that in each part there is the improvement of students’ speaking scores. In line with the data, it shows that whole brain teaching method can solve the students’ speaking obstacles in speaking performance.

Keywords: Speaking skill; Students’ Speaking Obstacles; Whole brain teaching.

1 Introduction

Speaking is the most crucial problem that most students face in learning language, especially English. Many students who have graduated from high school or from college cannot speak English well and fluently. [1] states that “students today graduate from high school or even from university without being able to speak English; it is simply because they are not given enough practice in speaking.” In this case, the students should be given enough practice in speaking especially in classroom activities. While students are supposed to to have the ability to speak English, the students may face many problems in speaking activities. According to [2], there are many problems with speaking activities; namely barriers to speaking, a blank mind so that there is nothing to talk about, a low level of participation, and the use of the mother tongue. These speaking problems can affect students’ speaking performance, so it must be found the factors affecting these problems and tried to create the problem solving.

There are many factors causing speaking problems the students faced. [3] states “there are some factors that make speaking difficult such as: clustering, redundancy, reduced forms, performance variables, colloquial language, rate of delivery, stress, rhythm, and intonation, and interaction.” In addition, [4] states that there are some factors which make speaking
difficult namely; the teaching strategies, the curriculum, and the environment. Those factors cause the students’ obstacles in speaking performance in the classroom activities.

Avoiding the barriers of students in speaking, they tend to be down, and prefer to be silent in speaking and they do not make interactive with each other in class. So that students do not hesitate to speak and are comfortable in language clear, “Teachers can set up such connection to the students by showing interest in each student as a person, giving feedback on each person’s progress, openly soliciting students’ idea and feelings, valuing and respecting what students think and say, laughing with them and not at them, working with them as a team, and not against them, and developing a genuine sense of vicarious joy when they learn something or otherwise succeed.” Additionally, Lecturers must provide opportunities for students to express their opinions and ideas in the teaching and learning process. Thus, students have more time to practise their speaking skill. Therefore, in speaking classroom, lecturer has to choose appropriate topic which is the students can practise and enhance their speaking skill.

Speaking more slowly during teaching learning process. By speaking more slowly, the students they would understand what the lecturer was saying, so the students could join the teaching learning process by whole brain teaching. According to [5], “teachers should teach their learners that slow speech with correct pronunciation is much better than fast speech with wrong pronunciation.”

As well as friendly atmosphere also could be an another solution to reduce their inhibition in speaking skill. As claimed by [6], “Likewise, teachers should avoid changing the language could be a better way to make them willing to speak, and be confident. So, they could be braver and not feeling intimidated by their teacher. As stated by [7], “learners’ error in an insensitive manner can reinforce their belief that they are not capable in learning language and might cause them to be unwilling to try again and be less productive.”

Therefore I used Whole brain teaching in investigation students ‘speaking obstacles because whole brain teaching is a teaching method that combines two teaching methods, namely direct teaching and cooperative learning. According to [8], the whole brain is a series of strategies that combine the best attributes of direct teaching and cooperative learning to create an attractive classroom environment for students and fun activities for lecturers. It can be concluded that WBT (whole brain teaching) combines both classroom management and voice teaching pedagogy in one system. Here are the benefits for lecturers who use the WBT method [8].

a. strengthening positive behavior,
b. memory retention,
c. Student involvement Teaching Benefits three main reasons students can benefit from WBT:
d. Motivation
e. student-centered learning
f. learning application

In this research, the researcher not only conducts the research, but also tries to solve every problem. when doing research, In the learning process, the researcher uses whole-brain teaching techniques to solve the problems found. The whole brain teaching technique is an appropriate technique that can be used in solving the students’ obstacle in speaking performance since whole brain teaching technique forces the students to speak up in the classroom activities.
2 Method

This research was conducted in department of English education at Kuningan University, Kuningan- West Java and the participant of this research are 52 students in the fourth semester of English education department. Then there were some instruments used in this researcher they are interview, observation, and questionnaire. In this study, the data collected came from naturalistic observations, interviews and document analysis. Based on [9], “Naturalistic observation means observing individuals in their natural settings, simply observation and records what happens as things naturally occur.” the other data collection method is document analysis. Document analysis is “a technique which enables a researcher to study human behavior in indirect way through an analysis of their communication” [9]. Beside that, in this study used semi structure interview, to find out the second research question about factors affecting the students used oral communication strategies. [9] notes that “Semi-structured interviews are verbal questionnaires. Rather formal, they consist of a series of questions designed to elicit specific answers from respondents. Often they are used to obtain information that can later be compared and contrasted.” Furthermore, to investigate the obstacles students’ speaking, this research employed WBT (Whole Brain Teaching) analysis framework adopted from [10] as cited in [11]. While, to investigate students’ obstacles in speaking affecting the students used oral communication strategies, the researcher used [12] framework used whole brain teaching. In the process of data analysis, the data transcription from the video recording was first carried out which aims to show the types of students' barriers to speaking.

3 Result And Discussion

After analyzing the students' obstacles in speaking performance are found from the research observation. During this research, the researcher did observation and also tried to find out the problem solving by teaching the students by using WBT technique. During the observation while teaching, the researcher found some students’ obstacles in optimizing speaking performance, there were five major speaking obstacles that is encountered by the students they are: linguistic difficulties (lack of Vocabularies, grammar knowledge, and pronunciation), mother tongue use, and inhibition (clustering, colloquial language, stress, rhythm, and intonation, environment, self confident, and teaching strategy. There are five factors that can be taken from a linguistic and non-linguistic point of view. The five factors were included in the questionnaire and observation form, and based on the results of the data, the students experienced difficulties with these five factors with different degrees from one student to another.

Based on these data, it can be seen that the most common speaking difficulty faced by fourth semester students is vocabulary. the number of students who agree that vocabulary is one of the factors that influence students' difficulty in speaking is 18.94% of 36 students who agree most of the students often have difficulty when speaking English, especially in determining the right words, it is very difficult to express opinions or ideas which eventually lead to doubts in pronunciation. so that based on these results the number of students who have doubts or fears due to pronunciation errors is 15.14% of the 29 students who experience this.

the presence of worries or doubts in speaking English such as fear of being wrong, fear of being laughed at by others, so feeling depressed may also be caused by other factors. [3]
suggested that to be able to create an atmosphere that supports students in speaking and fosters self-confidence it is the responsibility of a teacher to help them. In addition, based on the results of these data, there are other problems that were faced by the fourth semester English education students, namely in terms of grammar, and the level of lack of confidence in pronunciation as much as 16.57% of the 32 students who experienced problems in terms of grammar. The same thing also happened to students who experienced problems in pronouncing vowels and consonants, besides that, there were also difficulties in terms of structure and word stress as much as 16.70%. Based on the results of these data, it can be found that pronunciation is very influential on students' English speaking problems, as well as word stress that is difficult to pronounce so that it can cause errors in pronunciation because they cannot pronounce words clearly so that it can be misunderstood. and the last is the problem of lack of self-confidence faced by students as many as 18% of 33 students who experience this so experience doubts or do not want to speak English with other people.

4 Conclusion

This research focuses on students’ speaking obstacles and factors causing the obstacles while WBT (whole brain teaching) method is implemented. The purposes of this research are to find out the students’ speaking obstacles and factors causing speaking obstacles in speaking performance. The data collection of this research are speaking test, observation, questionnaire, and interview.

Based on the findings, this research concluded that students speaking obstacles consist of five major speaking obstacles they are there were five major speaking obstacles that is encountered by the students they are: linguistic difficulties (lack of Vocabularies, grammar knowledge, and pronunciation), mother tongue use, and inhibition (clustering, colloquial language, stress, rhythm, and intonation, environment), self confident, and teaching strategy. During the observation the researcher tries to solve the obstacles by implementing Whole Brain Teaching can solve the obstacles found since there are some improvement in students' speaking performance.

Meanwhile, the students’ obstacles mentioned above causing by some factors. The factors causing students’ speaking obstacles are clustering, colloquial language, stress, rhythm & intonation, environment, self confident, and teaching strategy. Those factors become the students are tend to speak English and influence the students speaking performance. After implementing Whole Brain Teaching strategy those obstacles can solve the obstacles and for getting more information the researcher give the questionnaire to the students that consist of students strategy in speaking. Beside, the result of questionnaire cited from SILL show that the students strategy in learning are good since the percentage of the answers for each statement more that 50%. The lowest score is 63.92% and the higest score of questionnaire is 100%. The conclusion of this research, students have several obstacles in speaking, namely linguistic difficulties, mother tongue and barriers. Then those obstacles causing some factors they are clustering, colloquial language, stress, rhythm & intonation, environment, self confident, and teaching strategy. Those factors mentioned can be solve by implementing Whole Brain Teaching method.
References


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Affecting Financial Performance: Factors In Local Government, Indonesia

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Abstract. This study aims at examining the effect of legislative size, regional government size, and level of regional wealth on the financial performance of district/city government in West Java Province. This study's population is the Budget Realization Report of all districts/cities in West Java Province. The sample was determined by using the Quota Sampling method with the number of 110 observations data. The research data used the secondary data in District / City Budget Realization Reports in West Java Province 2014-2018. This study uses descriptive and verification methods and panel data regression analysis technique. The results showed that the legislative size, the regional government size, and the level of regional wealth have positive and significant effect on local government’s financial performance

Keywords: legislative size; regional government size; regional wealth level; local government financial performance

1 Introduction

The existence of Law No. 23/2014 on regional governance has made city districts own the widest possible authority in carrying out regional autonomy. This forces districts / cities to be capable of exploring their own potential. With this regional autonomy, it is hoped that districts / cities can reduce dependence on the central government in financing development and regional management. According to (Rai, 2008), the way to achieve the progress of an organization is by measuring performance. Bastian (2006) defines performance as a description of the achievement of implementation / programs / policies in realizing the goals, objectives, mission and vision of an organization. Performance appraisal usually uses the financial aspect because many think that the financial situation will reflect the situation as a whole (Samudra, 2008). Regional financial performance is reflected in regional independence, the higher the financial independence of a region, the lower the dependence of the region on government and provincial assistance.

According to Halim & Kusufi (2012) the self-reliance ratio is defined as the ability of local governments to self-finance government activities, development, and services to people who have contributed in fulfilling tax and retribution payment obligations. Independence is determined by the size of the local government revenue (PAD/Pendapatan Asli Daerah) compared to the total transfer income (Halim, 2007). The capacity of the regions in implementing decentralization is reflected in the contribution of PAD. The following table is the results of the Financial Performance calculation of Regency / City Government in West Java Province 2014-2018.
<table>
<thead>
<tr>
<th>No</th>
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<th>2014</th>
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<td>1</td>
<td>Kab. Bandung</td>
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<td>27.37%</td>
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<td>15</td>
<td>Kab. Sumedang</td>
<td>18.42%</td>
<td>17.45%</td>
<td>18.26%</td>
<td>28.60%</td>
<td>21.67%</td>
<td>20.88%</td>
</tr>
<tr>
<td>16</td>
<td>Kab. Tasikmalaya</td>
<td>07.54%</td>
<td>8.49%</td>
<td>9.64%</td>
<td>15.98%</td>
<td>9.69%</td>
<td>10.27%</td>
</tr>
<tr>
<td>17</td>
<td>Kota Bandung</td>
<td>55.95%</td>
<td>59.14%</td>
<td>67.55%</td>
<td>83.81%</td>
<td>78.33%</td>
<td>68.96%</td>
</tr>
<tr>
<td>18</td>
<td>Kota Bekasi</td>
<td>56.00%</td>
<td>65.63%</td>
<td>68.03%</td>
<td>81.72%</td>
<td>81.83%</td>
<td>70.64%</td>
</tr>
<tr>
<td>19</td>
<td>Kota Bogor</td>
<td>45.84%</td>
<td>51.51%</td>
<td>60.41%</td>
<td>75.62%</td>
<td>69.98%</td>
<td>60.67%</td>
</tr>
<tr>
<td>20</td>
<td>Kota Cirebon</td>
<td>34.18%</td>
<td>33.05%</td>
<td>38.45%</td>
<td>49.31%</td>
<td>48.71%</td>
<td>40.74%</td>
</tr>
<tr>
<td>21</td>
<td>Kota Depok</td>
<td>43.05%</td>
<td>50.90%</td>
<td>59.21%</td>
<td>74.80%</td>
<td>61.77%</td>
<td>57.94%</td>
</tr>
<tr>
<td>22</td>
<td>Kota Sukabumi</td>
<td>36.40%</td>
<td>38.13%</td>
<td>36.88%</td>
<td>46.78%</td>
<td>45.55%</td>
<td>40.75%</td>
</tr>
<tr>
<td>23</td>
<td>Kota Tasikmalaya</td>
<td>22.16%</td>
<td>20.85%</td>
<td>21.77%</td>
<td>28.19%</td>
<td>22.34%</td>
<td>23.06%</td>
</tr>
<tr>
<td>24</td>
<td>Kota Cimahi</td>
<td>26.57%</td>
<td>30.62%</td>
<td>32.10%</td>
<td>40.92%</td>
<td>36.57%</td>
<td>33.35%</td>
</tr>
<tr>
<td>25</td>
<td>Kota Banjar</td>
<td>21.40%</td>
<td>23.10%</td>
<td>19.41%</td>
<td>22.00%</td>
<td>19.94%</td>
<td>21.17%</td>
</tr>
<tr>
<td>26</td>
<td>Kab. Bandung</td>
<td>18.40%</td>
<td>21.06%</td>
<td>30.39%</td>
<td>21.50%</td>
<td>21.45%</td>
<td>21.45%</td>
</tr>
<tr>
<td>27</td>
<td>Kab. Pangandaran</td>
<td>5.45%</td>
<td>7.72%</td>
<td>8.33%</td>
<td>9.00%</td>
<td>12.27%</td>
<td>8.55%</td>
</tr>
</tbody>
</table>

Table 1. Results of Financial Performance Calculation of Regency / City Government in West Java Province in 2014-2018

Base on table 1, the average level of regional financial independence in regencies / cities of West Java Province is only 32.32%, while according to the Minister of Home Affairs (Menteri Dalam Negri) Decree No.690.900.327 of 1996 states that the ability of regional financial independence can be categorized as high if it reaches 75%. But in fact the average is still below 75%. Based on the data, it can be seen that in the implementation of regional autonomy, the role of the central government is more dominant than the regions’ role. Based on Law Number 23 of 2014 in the implementation of regional government, they must regulate and manage government affairs and the interests of the community themselves so that the aspirations of the people will be easily channeled, regions become more advanced, independent, can prosper the people and realize good governance.

The financial performance of regional governments according to the Minister of Home Affairs Regulation Number 13 of 2006 is all the rights and obligations of the regions in the context of implementing regional government which can be valued in money, including all forms of wealth related to the rights and obligations of the region. The factors that influence local government financial performance include audit opinion, legislative size, intergovernmental revenue, size, leverage, regional wealth level and regional financial capacity clusters (Ilmiyyah et. al, 2017). Legislative size is defined as the large number of
legislative (DPRD) members who have the task of supervising local governments in planning budgets so that they can be used properly (Noviyanti & Kiswanto, 2016). The number of DPRD members is expected to improve the financial performance of local governments. Meanwhile, the size of local government can be indicated by the amount of assets owned by a region. Maiyora, (2012) states that the large size of the local government will be able to help their operational activities accompanied by increased financial performance of local governments. Apart from the size of the legislature and the size of the local government, another factor that influences regional financial performance is the level of regional wealth. The level of regional wealth is defined as the ability of local government to produce revenue. The higher the level of regional wealth, the better and clearer the information on the financial statements will be as an accountability to the community and show stakeholders that the performance of the local government is high. (Ramdhani in Deka Anugrah Hadi, 2016).

Research on the factors that affect the financial performance of local governments has been carried out with different results. Research related to Legislative Size was conducted by Saragih and Saragih & Setyaningrum (2015), Muflihatin (2016) which stated that Legislative Measures have a positive and significant effect on the financial performance of local governments, the more DPRD members in a region, the better the local government's performance. In contrast to research conducted by Sari et al (2016) and Maiyora (2012) which stated that legislative size has a negative effect on the financial performance of local governments. Research related to Regional Government Size conducted by Maiyora (2012), (Lestari et. al (2019) and (Nugroho & Prasetyo, 2018) stated that the size of local government has a positive effect on the financial performance of local governments. In contrast to research conducted by Noviyanti & Kiswanto (2016) stated that government size has no effect on the financial performance of local governments.

2 Method

The research method according to Sugiyono (2016) "is basically a scientific way to get data with specific purposes and uses". In this research, the method used is descriptive and verification methods. This study’s population is the Financial Statements of Regency / City Government in West Java Province for the period 2014-2018. West Java Province has 27 districts / cities consisting of 18 districts and 9 cities or as many as 27 x 5 = 135 observational data. The Quota Sampling technique was used to obtain 22 districts / cities with a research period of 5 years so that there are 110 sample data. The data used in this study is secondary data. Legislative Size data is measured by the number of DPRD members from the West Java General Election Commission (KPU) obtained from the website http: jabar.kpu.go.id while data on Regional Government Size and Regional Wealth Levels were obtained from the Directorate General of Fiscal Balance, Ministry of Finance by referring to Realization Reports Regency / city government budgets in West Java Province for the 2014-2018 period-obtained from the website www.djpdkemenkeu.go.id. Using data processing techniques, namely descriptive analysis and tool such as Eviews 9.0 for panel data regression analysis.

2.1. Operational Variable

2.1.1. Legislative Size

Based on Law Number 23 of 2014 article 149 concerning Regional Government, DPRD has the function of forming local regulation for district / city, budgeting and monitoring.
DPRD performs a supervisory function to oversee the implementation of regulations and monitor the implementation of budget revenues and expenditures. The indicators used to measure the legislative size can be formulated as follows:
\[ \text{Legislative size} = \text{Numbers of DPRD Members} \]

2.1.2. Local Government Size
According to Patrick (2007) in (Purnama & Alfina, 2019) Regional size is a significant predictor of accounting compliance and is an element of organizational structure. Size can be measured in various ways, including the number of employees, total assets, total income, and production levels. The indicators used to measure the size of local government can be formulated as follows:
\[ \text{Local Government Size} = \text{Total Asset} \]

2.1.3. Regional Wealth Level
Wealth is the ability to meet needs. The level of regional wealth is reflected in the locally-generated revenue (Noviyanti & Kiswanto 2016). According to Law no. 33 of 2004 Article 1, paragraph 18, The level of regional wealth can be measured by PAD. Local government revenue, hereinafter referred to as PAD, is revenue obtained by the region which is collected based on regional regulations in accordance with statutory regulations. The indicators used to measure the level of regional wealth can be formulated as follows:
\[ \text{Regional Wealth Level} = \frac{\text{PAD}}{\text{Total Revenue}} \times 100\% \]

2.1.4. Regional Government Financial Performance
According to the Minister of Home Affairs Regulation Number 13 of 2006 concerning Guidelines for Regional Financial Management, it is stated that “Regional Finance is all the rights and obligations of the region in the context of implementing regional government which can be valued in money including all forms of wealth related to rights and obligations of the area”.
\[ \text{Regional Government Financial Performance} = \frac{\text{PAD}}{\text{Total Transfer Revenue}} \times 100\% \]

To facilitate understanding in this study, the following research paradigm was made:

Figure 1. Research Paradigm
2.2. Research Hypothesis

2.2.1. Legislative Size Has a Positive Effect on the Financial Performance of Regional Government

People's Representative Council (DPRD) is an institution that carries out the oversight function of the implementation of regional regulations and APBD. DPRD as people's representatives must keep the government running according to the aspirations of the people. In carrying out supervision, the DPRD must pay attention to how much income will be received and expenditures that will be used by the local government (Maiyora, 2012). The legislature has a strategic role in supervising regional finances. Judging from the regional finances, it will show the performance of the local government. A high level of willingness to work will affect the achievement of local government performance results. The legislative measure in this research used a proxy for the number of DPRD members. The large number of DPRD members is expected to increase oversight and will increase LKPD disclosure (Purnama & Alfina, 2019).

The more DPRD members, the higher the local government's financial performance become, with the supervision carried out by the DPRD. This is in line with research conducted by Muflihatin (2016); Saragih & Setyaningrum (2015); Setyaningrum & Martani (2018) and Utama et. al (2019) which stated that Legislative Measures have a positive effect on Regional Government Financial Performance. Based on the description above, the hypothesis in this study is formulated as follows:

H2: Legislative Size has a positive effect on Regional Government Financial Performance

2.2.2. The Local Government Size Has a Positive Effect on Regional Government Financial Performance

Size of local government can be seen from the size of the object of the local government, one of which is by knowing the total assets of the local government (Noviyanti & Kiswanto, 2016). Regions with large total assets are expected to have good financial performance compared to regions with small total assets. The large size of the government can make it easier for the government to carry out activities or programs to provide services to the community (Masdiantini & Erawati, 2016). Local governments must manage regional assets properly so that their performance can be achieved (Janah, 2019).

The bigger the size of the local government, the higher the financial performance of the local government will be, because the local government can provide good services to the community. This is in line with research conducted by (Lestari et al., 2019; Maiyora, 2012; Nugroho & Prasetyo, 2018; Pumama & Alfina, 2019; Sari et al., 2016) that the size of local government affects positively on Regional Government Financial Performance. Based on the description above, the hypothesis in this study is formulated as follows:

H3: Local Government Size has a positive effect on Regional Government Financial Performance

2.2.3. The Level of Regional Wealth Has a Positive Effect on Regional Government Financial Performance

Level of Regional Wealth is reflected in Locally-generated Revenue (Noviyanti and Kiswanto 2016). The Locally-generated Revenue received is used as the basic fund of the regional government to defray regional development and efforts to reduce dependence on the central government. The greater the contribution of Locally-generated Revenue to the APBD, the better the performance of the government is (Maiyora, 2012). A high PAD can indicate that local governments have a higher level of regional wealth than regions with low PAD. The
level of regional wealth will certainly have an impact on better performance levels. This is in line with research conducted by Hidayah (2018); Nurdin & Nurkholis (2015); Saifudin (2020); Setyaningrum & Martani (2018); Sunaryo & Ghofar (2015) that the level of regional wealth has a positive effect on regional government financial performance. Based on the description above, the hypothesis in this study is formulated as follows:

H4: The level of regional wealth has a positive effect on the financial performance of local governments.

3 Result and Discussion

3.1 Classical Assumption Test

3.1.1 Normality Test

Based on the results of the Normality Test above, the variables of Legislative Size, Regional Government Size and Regional Wealth Level show the $p$-value of 0.063219 > 0.05 so it can be concluded that the data residuals are normally distributed, so that the data meets the Normality Test.

3.1.2 Multicollinearity Test

Based on table 4.10 it was found that the correlation coefficient value for all the variables is <0.8, means that there is no Multicollinearity in regression model.

3.1.3 Autocorrelation Test

The results of the autocorrelation Test value show the Durbin Watson value of 1.993776, with a number of n: 110, k: 3, the Table Durbin Watson shows that the $d_L$ value: 1.6336, the $Dw$ value: 1.9939, the $d_U$ value: 1.7455, and the 4-$d_U$ value = 4-1.7455 = 2.2545. Then: $d_L$ < $d_W$ < 4-$d_U$ = (1.6336 <1.9939 <2.2545). Based on the results of the criteria that $d_L$ < $d_W$ < 4-$d_U$ (1.6336 <1.9939 <2.2545), it can be concluded that there is no autocorrelation in the regression model.
Table 3. Autocorrelation Test Results

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-squared</td>
<td>0.165407</td>
<td>Mean dependent var 1.34E-16</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.116790</td>
<td>S.D. dependent var 0.029565</td>
</tr>
<tr>
<td>S.E. of regression</td>
<td>0.027785</td>
<td>Akaike info criterion -4.267128</td>
</tr>
<tr>
<td>Sum squared resid</td>
<td>0.079516</td>
<td>Schwarz criterion -4.095279</td>
</tr>
<tr>
<td>Log likelihood</td>
<td>241.6920</td>
<td>Hannan-Quinn criter. -4.197425</td>
</tr>
<tr>
<td>F-statistic</td>
<td>3.402245</td>
<td>Durbin-Watson stat 1.993876</td>
</tr>
<tr>
<td>Prob(F-statistic)</td>
<td>0.004202</td>
<td></td>
</tr>
</tbody>
</table>

3.1.4. Heteroscedasticity Test

Based on the table above, it can be seen p-value obs * Rsquare 0.2024 is > 0.05 then H0 is accepted and Ha is rejected, so it can be concluded that Heteroscedasticity did not happen.

Table 4. Results

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistic</td>
<td>1.546815</td>
<td>Prob. F(3,106) 0.2067</td>
</tr>
<tr>
<td>Obs*R-squared</td>
<td>4.613583</td>
<td>Prob. Chi-Square(3) 0.2024</td>
</tr>
<tr>
<td>Scaled explained SS</td>
<td>6.543025</td>
<td>Prob. Chi-Square(3) 0.0880</td>
</tr>
</tbody>
</table>

3.1.5. Results of Model Selection Test

Table 5. Housman Test Results

<table>
<thead>
<tr>
<th>Test Summary</th>
<th>Chi-Sq. Statistic</th>
<th>Chi-Sq. d.f.</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross-section random</td>
<td>30.668941</td>
<td>3</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Based on the table above, the Chi-Square p-value is 0.0000 < 0.05, then H0 is rejected. Thus, the appropriate model for this study is the Fixed Effect model.

Then the estimation results using the fixed effect model can be formed as the following equation:

\[ Y_{it} = -2.078091 + 0.363934 k_{it}^{bdng} + 0.435805 k_{it}^{bdngbrt} + 0.324334 k_{it}^{kabbs} + 0.276284 k_{it}^{kabbgr} + 0.439143 k_{it}^{kabcnj} + 0.424303 k_{it}^{kabcrb} + 0.462345 k_{it}^{kabindra} + 0.342096 k_{it}^{kabkrwng} - 1.586928 k_{it}^{kabmjl} - 1.474092 k_{it}^{kabpwkt} - 0.779805 k_{it}^{kabsbng} - 1.592627 k_{it}^{kabskbm} - 0.739920 k_{it}^{kabsmdng} - 0.031330 k_{it}^{kotbdng} - 0.350742 k_{it}^{kotbnjr} + 0.327285 k_{it}^{kotbks} + 0.374758 k_{it}^{kotbgr} + 0.299432 k_{it}^{kotcmh} + 0.415009 k_{it}^{kotcrb} + 0.453333 k_{it}^{kotdpk} + 0.419990 k_{it}^{kotskbm} + 0.495903 k_{it}^{kottasik} + 0.260687 k_{it}^{UL} + 0.139554 k_{it}^{UPD} + 1.709200 k_{it}^{TKD} + 641 \]
3.1.6. Coefficient Determination

Table 6. Test Results The coefficient of determination (R2)

<table>
<thead>
<tr>
<th>Cross-section fixed (dummy variables)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RS</td>
<td>0.990974</td>
<td>0.369727</td>
</tr>
<tr>
<td>Adjusted RS</td>
<td>0.988426</td>
<td>0.208355</td>
</tr>
<tr>
<td>S.E. of regression</td>
<td>0.022416</td>
<td>-4.561387</td>
</tr>
<tr>
<td>SSR</td>
<td>0.042710</td>
<td>-3.947642</td>
</tr>
<tr>
<td>Log likelihood</td>
<td>275.8763</td>
<td>-4.312449</td>
</tr>
<tr>
<td>F</td>
<td>388.8466</td>
<td>1.721947</td>
</tr>
<tr>
<td>Prob F</td>
<td>0.000000</td>
<td></td>
</tr>
</tbody>
</table>

Based on the table above, this research model shows an Adjusted R-squared value of 0.988426, which means that 98.84% of changes in Regional Government Financial Performance variables can be explained by the variables of Legislative Size, Regional Government Size and the Level of Regional Wealth, while the remaining 1.16% is influenced by other variables that were not examined in this study.

3.2. Hypothesis

3.2.1. Testing F test / Simultaneous

F test basically shows whether all the independent variables included affect the dependent variable. In addition, the F test can be used to see if the regression model used is fixed or not, provided that p-value <(α) = 0.05 and F count > F table, it means that the model is fixed and can be used to test the hypothesis.

Table 7. Simultaneous Test Results (F Test)

<table>
<thead>
<tr>
<th>Cross-section fixed (dummy variables)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RS</td>
<td>0.990974</td>
<td>0.369727</td>
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</tr>
<tr>
<td>F</td>
<td>388.8466</td>
<td>1.721947</td>
</tr>
<tr>
<td>Prob F</td>
<td>0.000000</td>
<td></td>
</tr>
</tbody>
</table>

Based on the F test in the table above, it can be seen that the Fcount value is 388.8466 with a significant level of 0.000000 and df1 = K4 and df2 = 110 - 3 - 1 = 106, the Ftable value is 2.46. So that Fcount > Ftable (388.8466 > 2.46). This means that the variables of Legislative Size, Size of Regional Government and Level of Regional Wealth have simultaneously affect the Regional Government Financial Performance and a probability value of 0.000000 <0.05 means significant
3.2.2. Test of t/Partial

Table 8. Partial Test Results (t test)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-2.078091</td>
<td>0.572273</td>
<td>-3.631294</td>
<td>0.0005</td>
</tr>
<tr>
<td>UL?</td>
<td>0.260687</td>
<td>0.062380</td>
<td>4.179020</td>
<td>0.0001</td>
</tr>
<tr>
<td>UPD?</td>
<td>0.139554</td>
<td>0.045386</td>
<td>3.074791</td>
<td>0.0028</td>
</tr>
<tr>
<td>TKD?</td>
<td>1.709200</td>
<td>0.123538</td>
<td>13.83545</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Based on the calculation of t-table with the criteria of a significant level of 0.05 and degrees of freedom \(DF = 110 - 3 = 107\), then the t-table is 1.65922. Based on the t test value obtained, the effect of each variable is explained as follows:

a. Variable of Legislative Size has a t count value of 4.179020 and t table value with 0.05 significance level of 1.65922. When comparing the t count > t table which is 4.179020 > 1.65922 with significance level of 0.0001 < 0.05, means that the legislative size has a positive and significant effect on the financial performance of local governments.

b. Variable of Local Government Size has t count value of 3.074791 and t table value with 0.05 significance level of 1.65922. When comparing the t count > t table which is 3.074791 > 1.65922 with significance level of 0.0028 < 0.05, means that the size of the local government has a positive and significant effect on the financial performance of local governments.

c. Variable of Regional Wealth Level has a t-calculation value of 13.83545 and the t table value with 0.05 significance level of 1.65922. When comparing the t-calculation > t table which was 13.83545 > 1.65922 with significance level of 0.0000 < 0.05, means that the level of regional wealth has a positive and significant effect on the financial performance of regional governments.

The Effect of Legislative Size, Regional Government Size and Regional Wealth Level on Regional Government Financial Performance

In accordance with Agency theory, the government acts as an agent. The public sector context states that accountability is the obligation of the trustee (government) to provide accountability, present, report, and disclose all activities that become their responsibility to the party giving the trust (the community) who has the right to hold this accountable.

The Effect of Legislative Size on Local Government Financial Performance

The main objective of the DPRD's oversight function is to enable local governments to allocate existing budgets and use them appropriately. In accordance with Agency theory, it requires local governments to supervise so as to reduce the occurrence of agency problems. This is done by the Regional People's Representative Council (DPRD) which supervises the running of regional government. It is hoped that the supervision carried out by the DPRD can assist local governments in fulfilling their obligations for public services and for the welfare of the community. This means that the more DPRD members in a region, the better the Regional Government's Financial Performance, and vice versa, the fewer DPRD members in a region, the lower the Regional Government's Financial Performance.

The large number of DPRD members who are tasked with supervising local governments is expected to increase supervision and improve the financial performance of local governments. This research is supported by research conducted by (Muflihatin, 2016; Saragih
Setyaningrum, 2015; Setyaningrum & Martani, 2018; Utama et al., 2019) which stated that Legislative Size has a positive effect on Regional Government Financial Performance.

**The Effect of Local Government Size on Regional Government Financial Performance**

Providing the best service to the community is the main objective of local government work programs. To provide good service, adequate resources and facilities are needed. In other words, good resources and facilities are supported by the existence of large assets, this explains that the great size of the local government affects the local government performance enhancement because the local government is able to provide good services to the community, and vice versa. The large size of the local government also indicates a large amount of wealth so that local governments can fund all their government activities independently and the community supervise local government activities more carefully so that the local government will make every effort to improve its performance. This research is supported by research conducted by (Lestari et al., 2019; Mayora, 2012; Nugroho & Prasetyo, 2018; Purnama & Alfina, 2019; Sari et al., 2016) that the size of local government has a positive effect on Regional Government Financial Performance.

**The Effect of the Regional Wealth Level on Regional Government Financial Performance**

Increasing PAD is an access to economic growth. The amount of increase in PAD contribution will greatly play a role for local governments to be more independent, which can be said to be the performance of local governments. Possessing large assets will surely give greater pressure from the community to manage and use their resources in order to improve performance. This explains that the greater the level of regional wealth, the better the performance carried out by the regional government, and vice versa, the smaller the level of regional wealth, the lower the financial performance of the regional government. A high PAD can indicate that local governments have a higher level of regional wealth than regions with low PAD. The level of regional wealth will certainly have an impact on better performance levels. This research is supported by research conducted by (Hidayah, 2018; Nurdin & Nurkholis, 2015; Saifudin, 2020; Setyaningrum & Martani, 2018; Sunaryo & Ghofar, 2015) that the level of regional wealth has a positive effect on regional government financial performance.

4 Conclusion

Legislative Size, Regional Government Size and Regional Wealth Level simultaneously influence the Financial Performance of Local Government in West Java Province. This means that the changes in Legislative Size, Regional Government Size and Regional Wealth Level will affect the Financial Performance of Regional Governments. Legislative Size has a positive and significant effect on the Financial Performance of District / City Government in West Java Province. This means that the greater the number of DPRD members, the higher the performance of local governments will be, and vice versa. The size of the Regional Government has a positive and significant effect on the Financial Performance of Regency / City Government in West Java Province.

This means that the greater the size of the regional government, the higher the performance of regional government, and vice versa. The level of regional wealth has a positive and
significant effect on the financial performance of district / city governments in West Java Province. This means that the higher the Local Government Revenue (PAD), the higher the Regional Government's Financial Performance, and vice versa. Based on the results of the study, it is stated that the Legislative Size, the Regional Government Size and the Regional Wealth Level simultaneously influence the Financial Performance of the District / City Government in West Java Province, so to improve their Financial Performance, the Regional Government must pay attention to Legislative Size, Regional Government Size and the Regional Wealth Level in local government management.

Based on the results of the research, the Legislative Size has a significant positive effect on the Financial Performance of Regional Governments in West Java Province, so to increase the Financial Performance of Regional Governments, it is suggested that the government should increase the DPRD supervision more carefully. The supervision that is carried out by the DPRD, has a function to avoid fraud in the implementation of Government activities. Based on the results of the research, the Size of Regional Government has a significant positive effect on the Financial Performance of Regional Government in West Java Province, so to improve Local Government Financial Performance, they need to increase the total value of its assets.

With large total assets, local governments are expected to be capable of optimizing them so that they will improve the Regional Government's Financial Performance. Based on the results of the research, the level of regional wealth has a positive and significant effect on the financial performance of regional governments in West Java province, so to improve the financial performance of regional governments, the government need to increase and explore the potential of local revenue. This can be done by intensifying and extending local taxes and retributions.

References


Contribution of Metacognition Awareness, Science Process Skills and Vee Diagram in Designing Experiment

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Abstract. This study explores the contribution of metacognition awareness, science process skills, and Vee Diagrams in predicting the experimental design abilities. The statistical population involved students of the third semester Department of Biology Education at Kuningan University. From these, 28 students were selected as samples through purposive sampling. Based on the nature of the subject and the research question, the correlation method was considered the most suitable for this study. Vee Diagram assessment rubric, MAI questionnaire, and Science Process Skills test were used to collect data. For data analysis, Pearson correlation and multiple regression were used. The results showed that metacognition awareness, science process skills, and Vee Diagrams contributed significantly to designing experiments with an R-value of 0.998. Among the components of metacognitive awareness, science process skills and the Vee Diagram were -0.537, -0.742, and 1.948, respectively.

Keywords: Metacognition; Science Process; Vee Diagrams

1 Introduction

One of the applications of the nature of science in science education is in the form of practicum or experiment. Practicum is an integral part of biology education and plays an essential role in achieving the goals of biology education. However, practicum implementation in biology learning, especially in Biochemistry, emphasizes the procedural and structured aspects. Practicum implementation in which each stage was guided like a cookbook intends to utilize mastery of concepts to forget other goals. A practicum performance like this tends only to clarify concepts learned by students[1]. Students are not allowed to develop laboratory activities to understand the concepts obtained is not optimal. It causes a separation between the acquisition of theory and practical activities in the laboratory. Several ways can be done to change traditional experiments in obtaining different objectives so that they are far from the following recipes[2]. Students who only follow practicum procedures which are still cookbooks, result in their science process skills not developing optimally even though they often do the practicum. Students are not trained in formulating problems or designing experiments to answer problems in practicum[3].

Scientific inquiry-based practice can be done, and then students can apply and improve science process skills in the Biochemistry practicum. Determining tools and materials, designing experiments, observing, interpreting data, and submitting new hypotheses related to the subject was part of the science process skills that can be developed in designing
experiments[4]. Vee diagrams are a metacognition tool used to guide laboratory work and facilitate learning and reflective thinking as planned and done in scientific investigations [5]. Vee Diagram helps students in the thinking process by acting as a metacognition tool that requires them to make explicit connections between previously learned information and newly acquired information through scientific inquiry [6]. Students can organize their thinking processes and develop science process skills through investigation activities to seek truth or knowledge through scientific processes that are part of the science process skills. Science learning is a goal-oriented process to deliver students to mastering science process skills, basic skills, and integrated skills. This Vee diagram is a diagram that is formed through a process of scientific inquiry in a laboratory where the science process skills were integrated into it. The application of Vee diagrams in designing experiments in the Biochemistry class is expected to develop metacognitive awareness and student science process skills. It follows the Learning Outcomes Department of Biology Education, where the ability to design experiments was one of biology education students’ competencies. The purpose of this study was to determine the contribution of metacognition awareness, science process skills, and Vee Diagrams to predict the ability of design experiments.

2 Methodology

Based on the nature of the subject and the research question, the correlation method was considered the most suitable for this study. There are two correlational research variables: the independent and dependent variables. The independent variable in this study is Vee Diagram (X1), Science Process Skill (X2), and metacognition awareness (X3), while the dependent variable is the ability to design experiments. The statistical population involved students of the third semester Department of Biology Education at the University of Kuningan for the 2017-2018 academic year. From these, 28 students were selected as samples through purposive sampling. Vee Diagram assessment rubric, MAI questionnaire, and Science Process Skills test were used to collect data. The Vee Diagram assessment rubric consists of 5 categories adapted by Novak and Gowin[5], the MAI questionnaire used was developed by Schraw and Dennison[7], and Science Process Skill Test content validity was reported to be acceptable. This research instrument was distributed among participants, and gathered data were analyzed using Pearson correlation and multiple regression. Pearson Correlation was used to determine whether there is a correlation between vee diagram, science process skills, and metacognitive awareness towards the ability to design experiments. Meanwhile, multiple linear regression was used to predict the variable's ability to design experiments (vee diagram, science process skills, and metacognitive awareness).
3 Result and Discussion

The three variables of metacognition awareness, science process skills, and vee diagrams contribute to the ability to design experiments. The amount of this contribution is presented in table 1 below.

Table 1. Correlation of Variables with the Ability to Design Experiments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vee Diagram</td>
<td>0.892</td>
</tr>
<tr>
<td>Metacognition Awareness</td>
<td>0.573</td>
</tr>
<tr>
<td>Science Skills Process</td>
<td>0.588</td>
</tr>
</tbody>
</table>

The variable that contributed the most to the ability to design experiments was the Vee Diagram, while the variable that contributed the least was metacognitive awareness.

Table 2. The independent variable regression model of the ability to design experiments

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Square</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>5410,061</td>
<td>3</td>
<td>1803,354</td>
<td>1687,117</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Residual</td>
<td>25,654</td>
<td>24</td>
<td>1,069</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>5435,714</td>
<td>27</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The linear model between vee diagram, science process skills, and metacognition awareness with the ability of design experiments shows the significance of the regression equation \( F = 1687,117 \) with significance \( < 0.05 \) (Table 2). These indicate that the regression models of the three independent variables can predict design experiments' ability with an \( R \)-value of 0.998 and adjusted \( R \) is 0.995.
Table 3. The independent variable regression coefficient model of the ability to design experiments.

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficient</th>
<th>Standardized Coefficient</th>
<th>t</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>3 (Constant)</td>
<td>-21,996</td>
<td>1,456</td>
<td>-15,425</td>
<td>&lt;0,005</td>
</tr>
<tr>
<td>Vee Diagram</td>
<td>2,916</td>
<td>0,054</td>
<td>1,948</td>
<td>53,989</td>
</tr>
<tr>
<td>Science Process Skill</td>
<td>-0,995</td>
<td>0,036</td>
<td>-0,742</td>
<td>-27,296</td>
</tr>
<tr>
<td>Metacognition Awareness</td>
<td>-0,655</td>
<td>0,029</td>
<td>-0,537</td>
<td>-22,455</td>
</tr>
</tbody>
</table>

The third regression model can be used to create a regression equation that describes the relationship of the three independent variables (vee diagram, science process skills, and metacognition awareness) to the dependent variable (ability to design experiment) as presented in Table 3. These results indicate that the equation \( Y = -21,996 + 2,916X_1 - 0,995X_2 - 0,655X_3 \) can predict the dependent variable.

The result reveals that Vee Diagram, science process skills, and metacognition awareness can predict the ability of design experiments. The Vee Diagram has the most significant correlation with the ability to design experiments because the process carried out by students in designing experiments is guided by the stages contained in the Vee Diagram. The Vee diagram serves as "thinking" and "doing" [5], [8]. The application of Vee diagrams begins with writing conceptual knowledge, which is the student's initial knowledge on the left side of "V," and writing the experimental procedure to answer the problem on the right side. The starting point of the process is a focus question in the middle of the diagram. Focus questions are an active dynamic bridge between known knowledge and estimates derived from the action. Methodological knowledge described as "doing" is placed on the right-side diagram. When students carry out activities to answer focus questions, they record data during the action and turn it into tables, graphs, etc. Then they write knowledge claims and experiments about the step [9]-[11]. Using Vee Diagrams to design experiments can develop student potential in cognitive, affective, and psychomotor aspects; besides, the implementation of practicum will further develop the nature of science where the values in science can help shape student character [1]. Vee diagrams would still be a valuable context for an explicit reflective approach for functional understandings of the nature of science and scientific inquiry by combining the historical case study with procedural ideas in the laboratory investigations [12].

During designing experiments, with the help of the Vee Diagram, students are allowed to develop procedures, conduct experiments, and come up with ideas to build their knowledge. The experimental design begins with identifying the problem as outlined in the form of a focus question, proposing hypotheses, determining variables, determining tools and materials, and determining work procedures. This process is then continued by conducting experiments whose results are described on the methodological side in notes, data transformation, conclusions, and value claims. This process is a stage for developing science process skills. Therefore, process skills also contribute to the ability to design experiments.

Vee Diagram structure is a diagram equipped with many labels and systematic manual guidelines for students to make reasoning based on the problem context using scientific methods such as formulating hypotheses, submitting variables, and conducting experiments [13]. The stages of the scientific method on the Vee Diagram are part of the science process.
skills. Students' experimental designs in Vee Diagrams accommodate students' science process skills such as formulating hypotheses, asking questions and planning experiments as outlined in the Vee Diagram on the conceptual side. This skill is developed before students carry out practical work. After the experimental design was applied in practicum implementation, the science process skills developed were observing, grouping, interpreting, predicting, applying concepts, communicating, and using tools and materials. Vee Diagram is preferably used to prepare an experiment report, bridging theory and practice and providing analytical views [4]. Vee Diagram is an effective learning technique for developing the science process skills and can provide benefits for the main foundation of science education, one of which is the science process skills [14]. Science process skills need to be developed through direct experience as a learning experience to appreciate better the process or activity undertaken [15]. One form of direct experience in the learning process is designing an experiment, where the stages in designing an experiment are part of science process skills. Therefore, science process skills need to be trained and developed in science learning because science process skills have crucial roles. One of them is to help students develop their minds and help students learn science concepts [16].

Although it slightly correlates with the ability to design experiments, metacognitive awareness also contributes to developing the ability to design experiments. The process carried out by students in designing experiments is a process or activity that is included in metacognitive behaviour. The experimental design made by students was carried out in groups, where members of each group contributed to designing the experiment, starting from determining the focus of the question, proposing hypotheses, planning work procedures, and tools and materials to finally take the experiment. Metacognition awareness that can arise at these stages is evaluating the reasoning of other group members, evaluating their understanding abilities, evaluating their plans, and evaluating laboratory work procedures [17]. The practicum, which begins with designing experiments, allows students to control what they do in the laboratory thoroughly. Students are asked to plan their methods, take experimental data, and draw conclusions. It is where metacognition awareness plays a role in supporting students’ ability to design experiments in planning, monitoring, and reflecting on cognitive learning strategies to interact with their groups and reflect on the experiments they develop. This process helps students control their learning process and become independent learners by planning, monitoring, and evaluating their learning process [18].

Developing metacognitive awareness of students can develop science process skills in terms of identifying variables, designing experiments, and other operational skills that are more compared to practicum in a structured manner like a recipe book [19]. Metacognition awareness can have a positive effect because, in the experiment, students discuss each step of the experiment with other group members, ask questions about problems related to practicum topics and get feedback from the implementation of experiments. It is not surprising that students develop their science process skills in identifying variables and designing experiments which are part of science process skills. Students can build observing skills, submit hypotheses, interpret data in graphs. This explains that designing and conducting experiments allows students to develop their science process skills. If students are accustomed to developing metacognitive awareness about the goals and benefits of their strategies, they will likely be able to generalize these strategies to new situations. Metacognition awareness can develop science process skills and students’ understanding of science concepts to produce a better understanding of concepts and science process skills [20].

The ability of metacognition helps students understand how to acquire knowledge. A student who can solve problems explained how he obtained solutions to these
problems. Students can describe the correlation between conceptual and methodology to answer the problems. Metacognition awareness can help students solve problems through effective design, which involves identifying problems, understanding problems that need to be solved, and understanding practical strategies [21]. This, of course, needs to be accommodated by applying laboratory learning in the form of designing experiments. This metacognition awareness is accommodated through metacognition tools or devices, namely the Vee Diagram. Vee Diagram is a metacognition tool that requires students to connect information previously obtained, namely when lectures with new data are obtained through scientific inquiry in the form of practicum [6]. The ability of metacognition is the highest aspect in the cognitive and psychomotor domains [22]. These two aspects can be developed, especially in designing experiments outlined in the form of Vee Diagrams.

4 Conclusion

Vee Diagram, science process skills, and metacognition awareness can predict the ability to design experiments, where each variable contributes to the ability to design experiments. Vee Diagram has the strongest correlation, while metacognition awareness has the lowest correlation.

References


Antecedent of Competitive Advantage (Case Study: Politeknik Mandiri Bina Prestasi Medan)

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Abstract. Learning organization, e-HRM, service quality, and competitive advantage are the variables in this study. This study made use of explanatory research. Using students as subjects, a private university conducted the study at the Mandiri Bina Prestasi Polytechnic in Medan. Gay and Diehl (1992) said that 10 percent of the population is the required minimum sample size for descriptive research. Because there were 551 students in the population, the total sample size was 55. The information was collected through the use of a questionnaire, and it was examined using both inferential and descriptive statistical methods, specifically multiple linear regression. According to Hypothesis (1): learning organizational features, e-HRM, and service quality all have an impact on competitive advantage simultaneously. Hypothesis 2: Competitive advantage is significantly impacted by organizational learning characteristics. Hypothesis (3): The characteristics of e-HRM have a significant influence on competitive advantage. According to theory, the features of service quality have a significant impact on competitive advantage: Hypothesis (4). The findings demonstrated that all of the proposed hypotheses were accepted.

Keywords: Learning organization; e-HRM; Service quality; Competitive advantage

1. Introduction

Higher education institutions must be more than just a vehicle for the educational process; they must also be learning organizations. In other words, a learning organization is one that consistently improves its ability to adapt and evolve. Organizational learning can be used to create universities that have learning dynamics, the ability to alter organizations, empower people, use knowledge management, and use technology.

Individuals and organizations must learn and be adaptable to the advancement of science and technology. Many things must be planned so that the organization can adjust to changes and retain continuity in order to remain competitive and survive. Technology is a tool that can help and ease access to learning information exchange. e-HRM, for example, can cut organizational expenditures, improve service quality, and raise productivity, all of which are organizational competitive advantages.

2. Literature Review

2.1 Learning Organization

A learning organization is a process of organizational behavior that is always growing and changing in order to meet organizational goals (Marsicks and Watkins, 2015). Meanwhile, A learning organization, according to Garvin (2019), is one that has the capacity to produce, carry out, interpret, and impart knowledge to other people and organizations with the aim of altering actors and enabling them to describe new and distinctive information.
2.2. Learning Organization Dimension

As "The Fifth Discipline," Peter Senge (1994) proposed five disciplines of organizational learning to develop the potential capabilities of individuals in companies.

1) System assessment
   System thinking is a theoretical framework, body of information, and collection of tools that help us perceive the broad picture and decide how to make changes to it.

2) Control over oneself
   Control over oneself is the practice of consistently sharpening and refining our perspective, concentrating our efforts, developing patience, and seeing reality objectively.

3) Images in the mind
   Strongly held assumptions, generalizations, or even concepts or representations, known as mental models, influence how we see and behave in the world.

4) A typical vision
   The capacity to maintain an unified vision of the future we wish to create is the one leadership principle that has propelled organizations for thousands of years. Without firmly embraced goals, values, and missions, it would be difficult to imagine any company that has managed to sustain some level of brilliance.

5) Learning as a group.
   The foundation of team learning is "dialogue," or the team members' capacity to set aside preconceptions and participate in genuine "thinking together." A component of the dialogue discipline is discovering team engagement practices that prevent learning. Team learning is essential because in contemporary organizations, teams—not individuals—constitute the fundamental learning unit.

2.3. Learning Organizations Characteristic

Numerous variables influence the appropriate learning framework. Phillips, (2003) defines strategic thinking and vision as well as will, leadership, communication, learning and growth, creativity and decision-making, change management, management of intellectual capital and information, measurement and assessment, and incentives and recognition. They have also identified two crucial characteristics of learning, one of which is climate and the other being culture. According to Jamali and Sidany (2008), the following five characteristics are the strategic building blocks of a learning organization:

1) Clearness of vision and mission. Each organization and unit must have a clear mission or goal. Employees must grasp this and how their job helps to achieve it. Furthermore, the company must strengthen its employees' dedication to the cause for which it was created.

2) Leadership dedication and empowerment. Leaders must be dedicated to company objectives, particularly learning objectives. Leaders must assist in the identification of performance gaps and then support the pursuit of information that narrows and closes the gap. Almost all authors emphasize the importance of leadership in promoting a learning environment, citing actions such as requesting feedback, being open to criticism, acknowledging mistakes, and allowing their staff to make decisions and take chances (Garvin, 1993).

3) Testing and rewards. Organizational challenges create chances for experimentation. This experimental approach requires the support of organizational structures and processes. The freedom to try out new work methods and processes should be welcomed and promoted (Senge, 1990; Garvin, 1993).
4) Knowledge transfer that is efficient. Communication must be concise, quick, and targeted. Within the organization, information on organizational challenges and possibilities must be transferred across functional and structural barriers.

5) Collaborative efforts and group problem-solving. Individuals in today's complicated world must work together to achieve organizational goals. Organizational architecture and processes must stimulate employee teamwork and group problem solving while reducing reliance on top management. Teams must also be capable of collaborating across diverse functions. Working in teams allows organizational members to share expertise and gain a better understanding of other people in the organization, their requirements, and how they work, while also facilitating knowledge transfer (Senge, 1990; Garvin, 1993).

2.4. Electronic Human Resource Management (e-HRM)

In addition, at least two (individual and/or collective) actors executing HR tasks simultaneously can be supported and networked via e-HRM, according to Strohmeier and Kabst (2014). Similar to this, Ruel et al. (2007) define e-HRM as a technique for implementing HRM strategies, practices, and processes in businesses through the intentional and focused use of online technology-based channels.

System automation has the advantage of increasing productivity, reducing resources lost as a result of rejects or errors, improving consistency, quality, and customer happiness, and maximizing profit (Kaur, 2013). E-HRM technologies, as anticipated, assist in the reformation and simplification of a number of HR processes, including job analysis, recruitment, selection, training, remuneration, and HR planning (Stone and Dulebohn, 2013). Electronic human resource management (e-HRM) has become a significant factor in the generation of HRM value as a result (Ruel and Kaap, 2012).

2.5. Objectives of e-HRM Application

As a result, the goals of implementing e-HRM may be summed into four categories: efficiency improvement, administrative process improvement, customer service improvement, and strategic human resource roles enhancement (Sahar Khiz, 2011). Functions of E-HRM (Swaroop, 2012 and Zafar, 2012):

1) E-selection: The great majority of businesses use internet job search engines to make hiring decisions. The new selection method keeps assessments online while evaluating candidates' knowledge, behavior, and attitude. By utilizing sophisticated IT to conduct all tests online, the firm will successfully hire qualified candidates while also lowering costs.

2) E-learning refers to any educational, training, or training program that develops, manages, and disseminates knowledge using electronic devices, apps, and processes. The use of the internet, computers, virtual classrooms, and online collaboration are all examples of e-learning tools and techniques. The delivery of material across the Internet, intranet/extranet (LAN/WAN), audio- and videotape, satellite transmission, interactive TV, CD-Rom, and other channels are all covered. The training manual is at hand right now.

3) E-learning: The majority of businesses are beginning to see online learning as a more effective approach to deliver training inside the company, making it accessible "anytime," "anywhere," and reducing direct and indirect costs (instructors, printed materials, training facilities) (travel time, lodging and travel expenses, workforce downtimes).

4) According to Hirschman, (2011), e-learning can offer a solution for training in underserved or rural areas as well as learning that is customized to the needs of the individual learner. However, it can also obstruct learning because of hardware limitations, learner isolation, and
technology anxiety.
5) E-performance management system: e-HRM can instruct managers on how to conduct performance reviews, as well as the precise standards and benchmarks to be used for particular roles and responsibilities, as well as examples and models of successful evaluations.
6) Every business, regardless of size, must plan its compensation. Managers use the process of compensation planning to ensure that pay increases are distributed fairly across the company while remaining within budgetary constraints.
7) Accessible at all times and from anywhere: As a web-based HR service system, e-HRM enables you to use the program from any location with IT and an internet connection at any time.
8) Get rid of most HR paperwork: As environmental awareness rises, many firms are looking for methods to "go green." By deploying an e-HRM, we may save money and time by eliminating virtually all paperwork associated with HR tasks.
9) E-leave: it helps to reduce costs by identifying the workforce ahead of time and examining prior data records of employee absence, etc.

2.6. The Role of E-HRM
Ma and Ye (2015), claim that e-HRM technology provides a doorway through which managers, employees, and HR specialists can access, extract, or apply information that is crucial in addressing the organization's most important resources. Heikkila and Smale (2013), assert that computerized strategic human resource (e-HRM) systems are changing the role of human resources by making it simpler for staff members, executives, and other third-party partners to fulfill transaction processing tasks (HR). Organizational innovation is one of the main causes of managers' headaches, which is why e-HRM strategies including e-recruitment, e-selection, e-training, e-performance appraisal, and e-compensations have a significant impact within businesses to assist HR professionals.

2.7. Outcomes of E-HRM
1) High commitment indicates that the workforce is driven, understanding, and willing to communicate with management about changes to the workplace and how such changes may affect the internal structure. This suggests that HR need to be able to drive change.
2) High competence: When referring to employees' capacities to pick up new responsibilities and positions as needed, high competence is meant.
3) Cost-effectiveness includes accepting costs associated with employee opposition, such as those resulting from strikes, as well as competitive salary levels and staff turnover rates.
4) Higher levels of congruence are related to internal planning, compensation structures, and the workforce's "input, throughput, and output," all of which need to be designed to be advantageous to all parties concerned (Soltani and Mirmanejad, 2012).

2.8. Service Quality
A crucial trend is the increase in consumer expectations for organizations to offer higher-quality services (Chen et al., 2019; Osakwe, 2019). To stand out from the competition and get a competitive edge, a firm must provide quality services (Mahmoud et al., 2019). Most statements in the discourse on service quality come from the SERVQUAL model, which Parasuraman et al. created in 1985. According to Parasuraman et al. (1985) "service quality" is the implementation of remarkable or extraordinary business proportional to consumer
expectation”.

Kotler and Armstrong (2007) defined service quality as the ability of a service provider to retain customers. In lower other words, they consider client retention to be the best indicator of a solid service. According to Saghier, and Nathan (2013), service quality is a key idea in the service sector and is crucial for financial institutions that struggle to set their goods apart from that of their clients.

Five factors known as the service quality “RATER” are what define the concept of service quality in connection to customer satisfaction, according to Parasuraman (2001):
1) Response: a willingness to help customers and provide prompt service.
2) Assurance: The ability of a company and its employees to foster consumer trust and confidence is referred to as assurance. This ability is exhibited through an employee's knowledge, demeanor, and the firm as a whole.
3) Tangible: the outward form that buildings, furnishings, gadgets, and communication tools take.
4) Empathy: When banks or service providers treat customers with consideration and individual attention.
5) Reliability: The capacity to deliver the requested service precisely and consistently.

2.8. Competitive Advantage

Kotler and Armstrong (2012), claim that a competitiveness is an advantage over rivals achieved by offering a lower value or by offering greater benefits in exchange for a higher price. In a competitive market, every company wants to surpass its rivals. Hao Ma (2004) combines the four C's of global strategic advantage into the elements of competitive advantage:
1) To compete in the global market, a firm must excel in creativity and innovation. The ability of a business to provide facilities for employees to innovate, efficiently, and continuously learn leads to innovation (Hamel and Prahalad, 1989; Williamson, 1991; Senge, 1990).
2) Competition is a type of reaction to competition that becomes the organization's competitive advantage, which might be in the form of a strong market position or a superior distribution network.
3) The creation and implementation of cooperative agreements with other competitors within the organizational environment is referred to as cooperation. Typically, cooperation aims to get access to clients, supplement partners' resources and talents, learn and gather organizational and technical knowledge, and reap the benefits of economies of scale (Kontraktor and Lorange, 1988; Hamel et al., 1989).
4) Co-option tries to strategically match the values of the strategies formulated with the goals of the other party, possibly providing a competitive advantage through opening new doors of opportunity, removing obstacles from without, or neutralizing threats. To influence the organization's battle with competitors, this is typically done through such a third party. It may also occur between rivals who work together covertly to handle clients, or between contenders and a third rival, In (Porter, 1980).

Competitive advantage can be gained if the organization uses and develops organizational resources in an efficient, effective, and innovative manner, resulting in better human resources. Intellectual resources, according to the Resource-Based View (RBV) philosophy, are vital resources that firms must own since they play a critical role in building competitive advantage (Barney, 1991). The RBV approach emphasizes that in order to acquire and then retain a competitive advantage, it is more vital for the organization's internal resources to be maximally empowered than external variables (Sukma, 2018).
The research hypotheses consist of:
H1: It is hypothesized that e-HRM (X2), service quality (X3), and learning organization aspects (X1) have a substantial impact on competitive advantage (Y).
H2: A strong impact of the learning organization component (X1) on competitive advantage (Y) is hypothesized.
H3: The e-HRM factor (X2) is thought to have a substantial impact on competitive advantage (Y).
H4: A strong impact of the service quality factor (X3) on competitive advantage is hypothesized (Y).

3. Research Methods

A quantitative method of explanatory research is used in this work. A population sample was selected for this study, and the data was gathered via a questionnaire. 551 members of the Mandiri Bina Prestasi Medan Polytechnic class of 2018–2020 make up the research population. A homogeneous population can benefit from a random sample strategy, claims Sugiyono (2018). The act of picking samples at random from a population without taking into account its strata is known as random sampling. Gay and Diehl (1992) determined that a descriptive study requires a minimum sample size of 10% of the population. 55 pupils made up the study's sample as a consequence. To gather data, the questionnaire distribution approach was used. This step is linked to the creation of theoretical hypotheses that lay the groundwork for linking latent variables with one another and with both their indicators and other latent variables. The research, which is also used to test the hypothesis, contains descriptions of the research variables. A good instrument must meet the two requirements of validity and reliability. It is vital to test the validity and reliability.

4. Research Result

A validity test can be carried out using the correlation value between the information on each question and the overall score. By comparing an item's product-moment correlation index (r-count) to its critical or probability value, it is possible to determine whether it is real. This formula will calculate the product-moment correlation value; if the correlation coefficient value has a significance level of 0.05 (= 5 percent) or r-count > r-table (95 percent confidence level, = 0.05), then the research instrument's question item is valid.

The dependability test that is used is Alpha Cronbach's Alpha. Alpha of at least 0.6 is what Arikunto (2012) refers to as dependability. It was determined whether independent factors, such as organizational learning variables (X1), e-HRM variables (X2), and service quality variables (X3), simultaneously and partially influenced the dependent variable, competitive advantage (Y). For the multiple linear regression analysis in this investigation, SPSS was employed.

The value of the multiple correlation coefficients (R) in the test results is 0.726. This demonstrates the strength of the association between organizational learning variables (X1), e-HRM variables (X2), and service quality variables (X3) and competitive advantage variables (Y). Meanwhile, the Adjusted R Square value of 0.511 or 51.1 percent indicates that the organizational learning variable (X1), e-HRM variable (X2), and service quality variable (X3) utilized in this regression equation all contribute 0.511 or 51.1 percent to the competitive advantage variable (Y). Other variables not included in this study contribute 48.9 percent of the total.

Each independent variable that influences the dependent variable of competitive advantage is discussed:
1) Learning organizational (X1)
With a regression value of 0.063, the t-test results demonstrate that organizational learning (X1) seems to have a considerable impact on the 95 percent confidence interval and a negligible impact on competitive advantage (Y). It is conceivable to draw the conclusion that organizational learning will enhance competitive advantage. In other words, when organizational learning strength develops, the competitive advantage grows, and vice versa as organizational learning strong declines.

2) E-HRM (X2)
The results of the t-test show that the e-HRM (X2), with a linear extrapolation coefficient value of 0.054, significantly affects the 95 percent confidence interval and only marginally affects competitive advantage (Y). This suggests that e-HRM strengthens competitive advantage. Or, to rephrase it in another way, the content of the e-HRM has a negative impact on the competitive edge.

3) Service quality (X3)
With a regression coefficient value of 0.034, the t-test findings demonstrate that service quality (X3) has a significant impact on the 95 percent confidence level and a less significant impact on competitive advantage (Y). This shows that service quality has a favorable impact on competitive advantage. In other words, the competitive advantage increases as service quality increases whereas decreasing service quality results in a decrease in the competitive advantage.

Hypothesis 1: According to the F-test, organizational learning (X1), e-HRM (X2), and service quality (X3) all simultaneously affect competitive advantage (Y). H0 is disregarded since the predicted F-value is 31,641 greater than the F-table of 2.72, or sig. of 0.000 is less than 0.05. In light of this, it may be claimed that organizational learning (X1), e-HRM (X2), and service quality (X3) all significantly impact competitive advantage at the same time (Y).

Hypothesis 2: Organizational learning components (X1) significantly impact competitive advantage was evaluated using the t-test (Y). The estimated t-value is 4.761, greater than the t-1.99 table's or sig. 0.000, but less than 0.05, indicating that H0 is not accepted. The organizational learning variable (X1) therefore has a barely detectable impact on competitive advantage (Y).

E-HRM factors (X2) had a considerable impact on competitive advantage, according to Hypothesis 3, which was evaluated using the t-test (Y). The calculated t-value, which is greater than the t-1.99 table's or sig. value of 0.021, which is less than 0.05, shows that H0 is not supported. The e-HRM variable (X2) therefore has a moderately significant impact on competitive advantage, it can be said (Y).

In order to evaluate Hypothesis 4: Service quality characteristics (X3) significantly affect competitive advantage, the t-test was performed (Y). According to the calculated t-value, which is more than the standardized coefficient of 1.99 and much less that 0.05, or sig. value 0.026, H0 is not accepted. Because of this, the impact of the quality of service characteristic (X3) on competitiveness is only marginally significant (Y).

5. Conclusion
Service quality (X3), e-HRM (X2), and organizational learning (X1) all have a big impact on the competitive advantage (Y). The estimated f-value is greater than the 0.05 in the f-value table, being 3.641 > 2.72 with a confidence of 0.000. The significance value or H0 is rejected if learning organization (X1) has had a t-count stronger than just the t-table, which itself is 4.761 > 1.99 and a potential of 0.000 < 0.05, indicating that learning organization (X1) has a
significant impact on competition (Y), assuming the other explanatory variables are constant.

The significance value or H0 is rejected, indicating that the e-HRM component (X2) has a significant impact on the competition advantage variable when the remaining independent variables are maintained constant and the actual impact of the e-HRM attribute (X2) upon that competitive advantage component (Y) has a t-count significantly larger than the t-table, specifically 2.346 > 1.99 and a potential of 0.021 < 0.05. (Y).

If the impact of the e-HRM parameter (X2) on competitiveness (Y) seems to have a t-count significantly larger than t-table, particularly regarding 2.346 > 1.99 and a probability of 0.021 < 0.05, the significance test or H0 is rejected, indicating that the e-HRM variable (X2) has a significant impact on the competitive advantage variable (Y) when another explanatory variables are constant.

If the impact of the quality service variable (X3) on overall satisfaction (Y) has a t-count significantly larger than the t-table, particularly regarding 2.268 > 1.99 and a potential of 0.026 < 0.05, the significance test or H0 is rejected, indicating that the provider variable quality (X3) has an important influence of the competitive favorable position variable (Y) if the remaining independent variables are constant.

To run a learning organization, Mandiri Bina Prestasi Polytechnic needs expert management. In practice, making learning organizations work ideally requires the willingness and commitment of all parties involved in higher education management. Furthermore, it is expected to create a website for each work unit that is integrated into an organization portal in order to boost the institution's performance. The most common issue encountered in the installation of e-HRM is the time it takes to load various programs. This heavy load can be alleviated by boosting the server capacity used for the institution's e-HRM. HR management must also work with IT to ensure the stability of the relationship. In order to increase stakeholder happiness, Mandiri Bina Prestasi Polytechnic should implement standard operational services that are integrated and documented in each major/department, as well as conduct periodic and continual satisfaction measurements.

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Measuring Construct Validity of Instrument for Investigating Teachers in using LMS

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Abstract. This research is aimed at measuring experts’ validation on the use of LMS by Senior High School and Vocational High School teachers in West Sumatera in online learning. The researchers used two validators as the experts in e learning who had done many researches in e learning. Indicators of construct validity were adopted from Gendon Barus, with 16 aspects of instrument quality. The aspects were used to assess each item in the instrument. Data were collected through questionnaire. Then they were analyzed quantitatively by using Aiken’s V. Result showed that the construct validity of the instrument is .712 with the V is .712 > .600. Based on the result, the researchers conclude that instrument is valid so that it can be used in investigating the use of LMS by the teachers.

Keywords: construct validity; LMS; teachers; online learning

1 Introduction

Information and Communication Technology (ICT) has become human necessity in this era and become globalized which can cover all aspects of life. Global advances in technology have dominated all aspects of life in the fields of economy, politics, culture, art and even education. In the field of education, ICT has many roles. Replacing the function of books and teaching systems that were previously conventional into online learning systems.

Online learning significantly improves students’ ability to understand and solve problems and increase initiative in learning [1].

LMS is software functioning as an educational technology resource that supports online teaching and learning activities. LMS can help educational units manage learning and organize content by engaging students to support the learning process [2]. Based on the statistics of the Kruskal-Wallis test, online learning platforms have a significant effect on knowledge transfer at the .05 level so that they can be a component of the effective teaching behavior [3].

The impact of the recent pandemic requires teachers to be better prepared to carry out online learning activities. Online learning is a challenge for teachers in improving their skills and utilizing LMS. In designing online learning with various platforms, teachers need special skills, so that they do not find difficulties in managing LMS.
2 Research Methodology

2.1 Research methods

The terms of method and instrument are usually used in data collection. The two terms have relationship one and another and sometimes they are overlap. According to [4] naturally data collection is the technique used by researcher(s) to gather the data. In this research, the method used is quantitative survey. On the other hand, the instrument used to collect the data in this research was questionnaire which will be used to measure the teachers’ skill in using LMS. The quality of questionnaire was validated by 2 e learning experts to find out the construct validity of the instrument.

2.1 Data Analysis

As stated above, the construct validity was measured through expert evaluation toward the questionnaire [5], followed by focus group discussion (FGD) techniques. Validity is an integrated evaluative assessment of the extent to which empirical evidence and theoretical reasons support the adequacy and appropriateness of conclusions and actions based on test scores or other forms of assessment [6]. Construct validity is the validity that shows the extent to which the instrument reveals a theoretical construct of the instrument to evaluate [6]. In this study, construct validity was measured based on the aspects of construct quality as determined by [7]. Before designing the quality of the construct, the researchers had determined some aspects of construct, followed by writing each item. Moreover, the items were organized by considering the indicators of the construct. There were 16 aspects of the instrument quality had been measured with the score rate “Very Poor (Score 1), Poor (Score 2), Doubtful (Score 3), Good (Score 4) and Very Good (Score 5).” The indicators formulated by Gendon Barus (2011) can be seen in table 1 below:

<table>
<thead>
<tr>
<th>No</th>
<th>Aspects of Instrument Construct Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Clarity of instrument filling instructions</td>
</tr>
<tr>
<td>2</td>
<td>The scope coverage of the instrument construct</td>
</tr>
<tr>
<td>3</td>
<td>Clarity of indicators for each aspect</td>
</tr>
<tr>
<td>4</td>
<td>Clarity of item formulation</td>
</tr>
<tr>
<td>5</td>
<td>Matched indicator with item</td>
</tr>
<tr>
<td>6</td>
<td>Proportion and adequacy of the number of items</td>
</tr>
<tr>
<td>7</td>
<td>The simplicity of the item formulation</td>
</tr>
<tr>
<td>8</td>
<td>Ease of meaning/understanding items</td>
</tr>
<tr>
<td>9</td>
<td>Readability / Ease of reading</td>
</tr>
<tr>
<td>10</td>
<td>Standard notation/font format and layout</td>
</tr>
<tr>
<td>11</td>
<td>Easy way to answer</td>
</tr>
<tr>
<td>12</td>
<td>No multiple interpretations of sentences</td>
</tr>
<tr>
<td>13</td>
<td>Efficiency of time/energy in doing</td>
</tr>
<tr>
<td>14</td>
<td>Grammar and spelling are accepted by Indonesian rules</td>
</tr>
<tr>
<td>15</td>
<td>Avoiding the directed, forced, embarrassed respondents when answering</td>
</tr>
<tr>
<td>16</td>
<td>Creativity in writing instruments to obtain objectivity of respondents’ answers, avoid becoming bias, and motivating respondents to answer each item.</td>
</tr>
</tbody>
</table>

Table 1. Indicators of instrument construct quality aspects.
The construct validation was carried out by 2 experts in the field of e-learning to make sure whether the instrument was valuable to distribute to teachers who were respondents in this study. Previous research was done to measure the construct validity of human relations with environment to find out whether a recreation area in Sweden was feasible [8].

The instrument items used in this research was validated by the two experts using Likert scale and analyzed by using Aiken’s V formula (1985). In this case, the measurement of construct of each item was relevant to the teachers’ behavior in using LMS, because the indicators are the operational attributes of an instrument. The assessment was done by giving a range from 1 (that is, very unrepresentative or very irrelevant) to 5 (that is, very representative or very relevant). Aiken’s V Statistics according to [9] can be formulated as follows:

\[ V = \frac{s}{n(c-1)} \]  

Note: \( s = r - lo \)
\( lo = \) The lowest value of the validity assessment (in this case = 1)
\( c = \) The highest validity rating score (in this case = 5)
\( r = \) number given by an evaluator

The results of Aiken's calculation range from 0 to 1 and the number .6 can be interpreted as having a fairly high coefficient. V value of .6 and above is declared in the valid category.

### 3 Results and Discussion

#### 3.1 Test Validity

The validity test is a test to determine whether the instruments in the questionnaire are valid. The instrument in the questionnaire is said to be valid if the instrument can be used to measure what should be measured in this study. If the instrument on the questionnaire is said to be less valid if it has low validation. The level of validation of the items in the questionnaire shows the extent of the data in question [10]. The validity test used in this study is construct validity which refers to the consistency of all conceptual components and it is seen that the measurement method measures the construct to be tested. If the value of V is .712 > .600 then the instrument on the research questionnaire can be declared valid. Validation of the instrument construct can be seen on table 1 below.

<table>
<thead>
<tr>
<th>No.</th>
<th>Aspect which Rated</th>
<th>Evaluation</th>
<th>Validator</th>
<th>Aiken's V</th>
<th>Note:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>V</td>
<td>V</td>
<td>s</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Item 1</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>.750</td>
</tr>
<tr>
<td>2</td>
<td>Item 2</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>.750</td>
</tr>
<tr>
<td>3</td>
<td>Item 3</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>.625</td>
</tr>
<tr>
<td>4</td>
<td>Item 4</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>.625</td>
</tr>
<tr>
<td>No.</td>
<td>Aspect which Rated</td>
<td>Evaluation Validator</td>
<td>Aiken's V</td>
<td>Note:</td>
<td></td>
</tr>
<tr>
<td>-----</td>
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<td>----------------------</td>
<td>-----------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Item 5</td>
<td>4 4 6 .750</td>
<td>Valid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Item 6</td>
<td>5 5 8 .000</td>
<td>Valid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Item 7</td>
<td>4 4 6 .750</td>
<td>Valid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Item 8</td>
<td>5 3 6 .750</td>
<td>Valid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Item 9</td>
<td>3 4 5 .625</td>
<td>Valid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Item 10</td>
<td>4 4 6 .750</td>
<td>Valid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Item 11</td>
<td>3 5 6 .750</td>
<td>Valid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Item 12</td>
<td>3 4 5 .625</td>
<td>Valid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Item 13</td>
<td>4 4 6 .750</td>
<td>Valid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Item 14</td>
<td>3 4 5 .625</td>
<td>Valid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Item 15</td>
<td>3 4 5 .625</td>
<td>Valid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Item 16</td>
<td>3 4 5 .625</td>
<td>Valid</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jumlah</td>
<td>58 65 91 .712</td>
<td>Valid</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The table shows that the average score of the expert's assessment of the construct quality of the instrument. The use of LMS by teachers is relatively high. The validation was useful because the experts' assessment was carried out on the initial draft of the instrument (not yet revised) and done more accurately and carefully and followed by FGDs. The result of test validity calculation was found that V value is .712. It can be interpreted that .712 > .600, so that the construct validity of the instrument is categorized valid. The validators had given some suggestion to revise some items. Then, after the revision is carried out, the instrument is decided valid and is worth to use.

4 Conclusion

From the background and discussion, the result shows that the validity of the construct instrument is .712 with a V value of .712 > .0600. The average value of the validity is quite high. Thus, it can be concluded that the construct validity of the instrument about the use of LMS by teachers is valid. Thus, the instrument is feasible to use in conducting a survey on the use of LMS by teachers at SMA and SMK throughout West Sumatra.

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308, 2013.


Digital Information System Management For Eco Tourism-Based Entrepreneurs

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Abstract. The rapid development of social media and the increasing number of users has made social media a source of information for many people. Social media has created a new pattern of social communication and participation, this can be seen from the large number of users' involvement in a communication forum or social media platform. The potential of social media as a medium for tourism promotion is enormous. However, the problem is how to make social media known and have a large number of followers so that published content can be accepted by many people. As a result of the presence of the internet as a medium of communication, social media has changed the way people communicate and seek information with existing tourism potential. Several media platforms are used such as blogs, Facebook, Instagram, Twitter, and others. Social media is also used by those in the tourism industry as a marketing landscape. Digital media is relatively cheaper, but massive. Social media is also very engaging and interactive. The use of social media can also be done by encouraging local community participation to become part of the promotion team. For example, by making use of citizen journalists or related citizens.

Keywords: social media; eco tourism; digital information; promotion; entrepreneurs

1 Introduction

Advances in information technology and tourism management are currently growing rapidly, supported by the emergence of the internet (Navio-marco et al., 2021). The use of internet media-based information systems has now been widely adopted because it has advantages in the areas of cost, time and wide reach (Bassano et al., 2019).

The tourist destinations in West Java offer various ecological objects or properties namely rafting in Citumang and Cukangtaneuh, Pasir Putih, Batu Karas, Batu Hiu, Karangnini beach as well as many other tourist attractions. The visiting activities to Pangandaran area is annually increasing. However, a study has shown that there is an emotional bond between tourists and a travel destination that positively influence their perceptions and reactions towards the tourist center [1]. Furthermore, this emotional bond often has many variations based on their experiences. The results showed that the tourist appreciation for Pangandaran is no longer an exclusive construction for local communities, tour guides and managers, also their point of view needed to be considered [2].
Based on the figure above, it was reported that most tourists know about the existence of the destinations in Pangandaran. However, there is a relationship between tourism and the environment [3]. Furthermore, the potential environment is supported by cultural-historical content, which increases the motivation of tourists to re-visit and spread information about the destinations in Pangandaran [4]. The development is very important because it influences economic growth, especially the welfare of the local community [5]. Economic growth can be increased through snack entrepreneurship, selling souvenirs, renting buoys, selling clothes etc. This condition certainly has a positive impact on the local community by reducing unemployment and increasing job opportunities.

The role of all parties is needed in developing tourist destinations, and need not to rely on government performance [6]. Other parties such as community organizations, youth, state-owned enterprises, and government agencies need to participate in developing, and supporting infrastructure for the development of tourism potential in a region.

Most tourists receive verbal information through mass and social media about Pangandaran destinations [7]. Furthermore, the growth of social media has completely changed the way
people interact and communicate [8]; [9]. However, Citumang is a natural tour, which was first introduced by foreigners. It was known by its existence and was previously named Green Valley because it looked like the Green Valley in America, which is located above the Citumang. Furthermore, local tourists also arrived during the development period. Many people flock to the beach, meanwhile, with the presence of citumang, today there are many other options, especially sea tourism. Citumang is often imitated, such as jojogan, ciwayang however, there are human creation, hence it does not last long and begins to break down. In contrast to citumang, the track has not been affected by housing, which was managed from 2008 and booming in 2010, and lastly, it is managed by the youth organization. The citumang tariff itself costs 130,000 rupiah per person including tickets, insurance, life jackets, security, documentation services, guides, and consumption of nasi liwet (an Indonesian dish rice dish cooked in coconut milk, chicken broth and spices), fried / grilled chicken, tofu, and tempeh, fresh vegetable, chili paste, and cah kangkung (the saute of water spinach).

Entrepreneurship is one of the topics that are widely discussed by researchers because small and medium entrepreneurs provide jobs for the lower classes. This is reinforced by the results of research that suggests that entrepreneurship can have implications for improving economic welfare and suppressing the number of social problems, and forming an entrepreneurial-based community [10].

Small and medium enterprises play an important role in economic developments. Other than a source of income for many people, SMEs also provide a work opportunity for the community. Some problems of the SME in improving their businesses would typically be how to secure funds for capital, other than challenges in production techniques, marketing, company management, and technological advancement. To increase SMEs role to contribute to the economic development, they require sustainable coaching with integrated resources on how to tackle SMEs problems, particularly to answer the challenge of limited sources of knowledge, information, and capital [11].

Eco or nature tourism is a tour that is aimed at enjoying wild life or natural areas that have not been developed. The definition of natural tourism is a travel activity carried out by an individual or group by visiting certain places for recreational purposes, personal development, or studying natural attractions by utilizing potential resources, both natural and cultivated [12].

The Citumang youth organization is one of the tourism promoters that play a big role in the advancement of Pangandaran. Meanwhile, the Kompepar (Tourism Promoter Commission), which observe and supervise the tourist area, starting from the potential assessment, and formation until the running process, which handles various problems and pros and cons from the community, especially with the managers. Therefore, the development of tourist destinations in Pangandaran need to be harmonized with the social and economic conditions of the community [13].

Pangandaran has a lot of developable natural potential. In addition to beaches, it has other potentials such as mountains and rivers. Along with the enthusiasm for sports recreation, hence, every tour offers different attractions such as:

Body rafting is a river flowing activity that challenges our adrenaline. Kompepar has eight rafting location in Pangandaran, namely; green canyon, santira, citumang, jojogan, lanang cave, ciwayang, taringgul, bojong waterfall, and margacinta. However, the body rafting in Green Canyon takes 2 to 3 hours, for tourists that cannot swim, which need not to be worried because the Track are divided into two, namely small for children and medium for teenagers and adults. There is also an advanced track specially designed for the prime (mostly young people). Rafting
has been booming for about two years and it is demanded by different groups of children, teenagers and adults.

Tubing is an activity of gliding freely over the surface of a light-flowing river using car tires. For example, Santirah River Tubing is in Selasari Village, Parigi District, Pangandaran, West Java, which is about 15 km from Pangandaran, with its popularity, every weekend it is always crowded with tourist.

In addition, there will also be a body rafting arena in Parakan Manggu, Parigi which is currently still under construction. Tourism itself has its own trends as many tourists were interested in flying the fox chain many years ago and so many places in Pangandaran have become recreational arena. Due to the reduced tourist interest and the changing trends, the place is used as a sports arena for recreation, where it has so far only been visited by a few people. Conversely, it has become a public tourist destination that is sought after by various groups and featured on their social media accounts.

The tourism promoter (Kompaper) promotes tourism in Pangandaran using brochures, templates, etc. which are submitted to the tourism department for data entry, while Kompepar fills the content and helps in other sectors. Once the web documentation is available, Kompepar creates a design plan for each destination and is then further instructed by the travel agency. Because Kompepar has established an association of various travel agencies in Pangandaran called ATAP for some time in order to prepare an organization as a support for advertising. Pak ed/i stated that "Every travel agency needs to display all existing destinations, and need to be committed to the management.” Therefore, tourists that are going to visit Pangandaran can search for more information on the website or search engine effectively.

The presence of the Citumang youth organization unites the young people of Bojong village, due to the management parking lots 1 and 2, which goes to the bodyrafting / citumang tourism location. In conclusion, the organization's presence binds its members in order to create a smooth economic cycle.

The development of tourist destinations need to be carried out under the authority of the Tourism Promotion Commission (Kompepar), which has a significant influence in developing tourism potential, even though it has not been coordinated properly [14]. In this case, the Citumang youth organization acts as a compepar that utilizes and develops tourism potential through the following steps:

- Maintain service quality. To maintain the quality of tourism services, an evaluation is carried out at the end of the month, training, field recognition, and tourism seminars that are required for tour guides in order to add insight in the tourism sector and leadership as a determination of professionalism to achieve legality as a certified tour guide.

- Understanding the tour guides in order to provide good service and serve visitors sincerely. Meanwhile, advertising is carried out through cyberspace, internet and social media. Subsequently, the youth organization cooperates with the community as land owners, for example by involving in community service in order to clean the body rafting route for the cleanliness, sterility and comfort of the visitors.

- Tourist property management is best packaged to provide convenience for the visitors, starting from the language style, conveying words, welcoming, and mastering the terrain as well as providing story telling about local wisdom and content surrounding the Citumang riverbank area. In addition, the area is equipped with complete adequate facilities, ranging from access to facilities that attract tourist such as rest areas, toilets, places of worship, and places to eat and drink.

- Related to the community empowerment, the Citumang youth organization collaborates with society, villagers and the government in building road in order to have access to the tourist
objects. Today, roads that were previously impassable by motorized vehicles can now be traversed by two-wheeled and four-wheeled vehicles.

Development certainly has a positive impact on the environment, both social and natural [15]. The following are efforts that may arise as a result of tourism development and to limit this influence and increase community resilience in handling negative effects of tourism activities, are as follows:

Different cultures, destruction of tourist sites, vandalism, littering etc. In respond to this matter, the youth organization is trying to socialize awareness to remind tourists to protect nature and cleanliness, especially along the rafting Rivers bank. The appeal was accompanied by examples to tourists, such as, throwing the trash in the dustbin*. Lastly, to support cleanliness facilities, at the Citumang tourist attraction, there is a provision of trash cans from Perhutani Corporation in order to maintain cleanliness and beauty, due to its natural conditions.

In conclusion, strategies carried out by youth organizations to maintain cleanliness and environmental order in tourist areas are; a) by means of appeals and giving examples, following oral messages, which does not have a positive effect on tourists. One of the tour guide training materials obtained by youth organizations, which was organized by the government such as PHPI, Kompepar, and the tourism office is how to communicate informatively and persuasively in terms of maintaining cleanliness or providing information about tourist objects in Citumang; b) working with the community in maintaining cleanliness, security and order at the tourist objects, for example through community service activities.

Media-based information management

Promotion is carried out by the Citumang village youth organization by utilizing the use of mass media, namely trans 7, metro tv, trans tv, which come not only to carry out body rafting activities but also coverage. Moreover, Citumang have also been used for filming, such as Buaya Bunting, Mak Lampir, and Ekspedisi Merah. Furthermore, the media spontaneously come to carry out journalism activities, they want to find a unique object. Meanwhile, from the local newspaper, which includes Pangandaran News, and Radar Pangandaran.

In addition to using the mass media, the Citumang youth organization also uses social media and the internet to increase tourism potential and services, such as blogging and the web, as well as posting publication materials on traveloka, facebook, and instagram. Social media continues to experience developments accompanied by media convergence. Media convergence is characterized by the unification of telecommunications, information technology and broadcasting services. It does not only talk about technological developments, but also influences ideology in the industrial, cultural and social fields characterized by changes in how to seek information, and in turn influences changes in lifestyle, career, business, culture and the joints of life [16]. Currently, there are 1000 personal guides on Facebook accounts. while there are many blog websites and individual Instagrams, such as; Web: citumangpangandaran.com; FB: citumang_pangandaran_com; IG: citumang_pangandaran_com. In other words, promotion is carried out through word of mouth, mass media and social media.

The tourists mobility is also improved through advertising on social media. In the past, people sought information about tourist destinations through television programs, magazines or other people experiences. However, over the past 15 years, people have started using the Internet media, including social media in order to search for the information about tourist destinations [17].

The use of social media as an advertising media can provide broad information. Most of the visitors know about the Citumang tourist area from social media. In addition, social media can also be used to provide information and clarification regarding issues related to advertising.
However, there is still the spread of hoaxes on behalf of Citumang, which are detrimental and reduces the number of visitors. For example, in the event of an earthquake, the youth organization needs to quickly provide information and clarification. The following is an excerpt of an interview from the chairman of the Citumang Youth Organization:

“Ketika medsos dibuka kan gempa ga selamanya, kontak dibatalin karena ada gempa, yang tadinya cekh-in ke hotel dibatalin karena gempa, apabila tidak berdampak fatal cepat di klarifikasi, jangan yang buruknya dimunculkan, karena citumang ladang makan kami.”

("The Earthquakes are not last forever, while the contracts and hotels check-in are canceled due to an earthquake. If it does not have a fatal impact, it needs to be quickly clarified, and don't bring up the bad side, due to Citumang is our livelihood land")

It can be said that the use of social media has the most significant effect, for example, is the increasing in numbers of the visitors, and the unlimited distribution of information.

The youth organization carried out communication activities for tourist motivation through socialization. In this activity, a discussion was held about how to improve and advance the Citumang tourism, in order to be known globally. This activity is carried out every week, and is tentative. In the event of a problem, the prompt evaluation is usually carried out once a month. The meeting also usually discuss about how income, expenditure are conveyed to colleagues and the government.

This activity is aimed at strengthening mutual openness, reporting, to strengthen ties, in order to be more compacted, evaluate shortcomings, and maintain target performance. Lastly, the participants involved are elements of the local government through awareness and training, with related institutions or organizations such as water policeman, Kompepar, the tourism office, the ministry and life guard that usually organized activities related to training guide.

One of the interesting interview excerpts from a tour guide:

“Bagaiman cara menyambut tamu supaya citumang itu punya ciri khas, kita terhadap pengunjung itu jangan mencuri dompetnya, tapi kita harus bisa mencuri hatinya, karena mencuri dompetnya kita kaya nya hanya sebentar, tetapi kalo kita bisa curi hatinya mereka mau datang terus kesini, mau itu jalan jelak pasti ingin balik lagi, dan harga berapapun pasti dibayar) kita harus buat pengunjung nyaman”.

(We need to" steal "the visitors' heart instead of their wallet, due to stealing their wallet will only make us temporarily rich but if we can steal their hearts they will come here, even if the roads are broken, and are willing to pay any price , therefore we have to make visitors comfortable.

The material presented in this activities focused on how visitors can be served and how to associate with the visitors. During this activity the youth organization collaborated with the print media, government officials, and law enforcers, therefore, the event ran smoothly. Lastly, the Whatsapp group is used as a communication forum via a smartphone.

Another objective of this activity is to increase public awareness and provide understanding to the community. In this activity, the material provided is not just theory, but also practical. Given the enthusiasm of the community to participate in this activity, it is very important to use indicators of enthusiasm to participate in events organized by youth organizations.

CONCLUSION

The development of river-based tourism objects in Citumang is carried out by the youth organization, by maintaining the quality of the services, and providing good and sincere understanding on the tour guides. Furthermore, Citumang tourist attractions are packaged as well as possible in order to provide comfort for visitors, starting from the style of the language,
conveying words, welcoming, and mastery of the terrain as well as providing story telling related to local wisdom around the riverbank area. Lastly, the characteristics of social media and media convergence affect individual communication patterns and have an impact on various sectors of society including tourism. The community tendency to consume tourism information has shifted quite significantly in line with the social media development.

BIBLIOGRAPHY


The Dialectics Of Local Wisdom-Based Health Communication  
(The Presence of “Indung Beurang” in Kampung Naga Indigenous People during Modern Era)  

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Abstract. *Indung beurang* currently receives good attention from society as shown by the behavior of the pregnant women who will initially check their pregnancy to the *indung beurang* who performs non-medical practices using makeshift equipment and various ingredients from certain plants. Indigenous people have applied this practice for generations by considering prevailing local wisdom. The habit of pregnant women and their families to check the pregnancy by *indung beurang* is a form of adherence to ancestral traditions without any pressure or coercion from any influential people in the community. This practice just flows as a living habit internalized in the community through their attitudes and behavior. This research aims to describe the reality of the health behavior of the Kampung Naga people. The research employed the descriptive method and qualitative paradigms with inductive thinking to find out the inheritance of cultural values in the context of health communication. The research results show that public health behavior, especially the childbirth process, has taken place over generations and still maintains the trust of underground communities. Keeping, obeying, and passing on customs are dogmatic needs, which will eventually shape the community’s personality in accordance with their traditional philosophy of life. Kampung Naga people use myths and ethos as environmental communication through the concepts of *pamali*, living with nature, and good role models. These concepts become the inheritance values to awaken the community and the younger generation and convey traditional events as a manifestation of their belief in nature.

Keywords: local wisdom; traditional medical personnel; indigenous people; health communication

INTRODUCTION  
The role of traditional health workers that were popular in the past among the community is now replaced by modern health workers. *Dukun beranak*, also known as *paraji* or *indung beurang*, are women who traditionally help the childbirth process, pregnancy care, and after-birth care. These practices have been passed over generations (Hastuti et al., 2018). However, along with the development, the community, especially urban communities, starts to forget the role of the *indung beurang*. Moreover, *indung beurang* in rural areas has lost her role. Her main job is no longer to assist the childbirth process because people prefer medical assistance from modern health workers. However, the community still requires the role of *indung beurang* for non-medical matters, such as *ngangsurkeun* which includes fixing the position of the baby to prevent breech, praying for the baby inside the womb to be healthy and protected from calamity and supernatural beings, and massaging the pregnant women.

In the past, the community trusted *paraji* or *indung beurang* to help the childbirth process. However, the Constitution Number 29 the year 2004 concerning medical practices has
prohibited the involvement of *indung beurang* in childbirth processes and traditional health workers in direct handling of the labor process. They only serve as companions in the childbirth process. Nevertheless, their roles are not ruled out because they periodically socialize assistance to the childbirth process to reduce the number of deaths; this program is organized by community health centers. *Indung beurang* who attends the coaching program will receive a training certificate; but this certificate does not legalize their medical practices in the community.

The traditional community of Kampung Naga, Salawu District, Tasikmalaya Regency, still gives a respectable place to *indung beurang* because pregnant women in this village will first check their pregnancy to *indung beurang* although they perform non-medical practices using makeshift equipment and various ingredients from certain plants. The indigenous people have applied this practice for generations by considering prevailing local wisdom.

The habit of pregnant women and their families is getting health care during their pregnancy from *indung beurang*. This habit embodies their adherence to ancestral traditions over generations without any pressure or coercion from anyone influential figures in the community. Moreover, their habit has been internalized in their attitudes and behavior. Moreover, this habit is performed without interference from other cultures and believed as a form of respect for their ancestors [1].

Kampung Naga community has practiced the behavior of getting health care during pregnancy from *indung beurang* for generations. This practice is influenced by the culture of health communication. There is an important relationship between culture and communication; culture is communication, and communication is culture [2]. Someone learns perspective and cultural patterns in the process of communication. Social interaction will make people realize certain values, norms, languages, and cultures. Health behavior practiced by parents will be the role model and initiate the next generation to conduct the same health communication in the families or society.

The inherited health behavior is conducted through formal and informal learning. An *indung beurang* does not get medical training but handles the childbirth process using her experiences inherited by the previous *indung beurang*. Indigenous people of Kampung Naga learn the childbirth process by believing in *indung beurang*; this learning is a hereditary cultural internalization. This internalization is influenced by the role of public figures and families to form healthy behavior [3].

In cultural internalization, health behavior is one of the health communication types that cover information transformation that influences an individual’s or society’s decision-making of health management, in this case, is indigenous people of Kampung Naga [4]. The process of internalizing the cultural health behavior of indigenous people in Kampung Naga cannot be separated from the traditional elders’ role models led by *kuncen*. These practices include the behavior of *indung beurang* to handle health problems of pregnant women, provide after-birth care, and take care family of the pregnant women.

A role model is a method believed to change people's attitudes and behavior, especially the younger generation [5]. *Kuncen* of Kampung Naga states that instructions, orders, and firmness are not required to change the characters and attitudes of a younger generation because they need an exemplary figure who can set an example and provide a model of how one should behave and act. *Indung beurang*'s role model can be seen from her experience as a *paraji* who holds trust and integrity in communicating with pregnant women and is cooperative with modern health workers or village midwives by considering applicable regulations.

This study describes the health behavior of Kampung Naga people. A descriptive method and qualitative paradigms with inductive thinking were employed to find the inherited
cultural values of health communication. The informants were selected using the purposive sampling with the following criteria: 1) knowing the duties and functions of indung beurang in the traditional community of Kampung Naga, 2) participating in and receiving medical and non-medical treatment from the indung beurang, and 3) knowing and carrying out the customs of Kampung Naga. Based on these criteria, the research informants were kuncen Kampung Naga, indung beurang in Kampung Naga, spokespersons, and several mothers treated by indung beurang. Then, a literature study was carried out to investigate research results in published journals that agree with the reality under study.

Local wisdom, cultural inheritance, and dialectics of health communication

Culture is defined as rules of behavior that include values, norms, and civilizations inherited from one generation to the next [6]. The process of inheritance occurs from the smallest environment, namely the family, to the community because the family plays a pivotal educational role. The inheritance of cultural values plays several critical roles, including 1) inheriting cultural values and norms characterizing a particular culture, 2) providing individuals with social signs and general social knowledge as the basis for selecting social roles, and 3) helping individuals to socialize and interact with various different identities in the general society.

Talking about culture, people in Kampung Naga still hold their customs and traditions. For example, they prefer using traditional cooking and farming tools and other daily equipment, not modern equipment. They assume that natural disasters, curses, death, hunger, and other bad things in their lives are the result of human behavior which violates the values of their religious and belief systems. They believe that nature is God's creation and has “welas asih” (mercy) that will not cause a disaster without a reason. A disaster occurs due to human behavior, not God's intervention. Their strong belief has finally created various valid and adhered to traditions [7]; [8].

The behavior of Kampung Naga society is the result of their obedience in carrying out traditions through the process of inheriting socio-cultural values (enculturation) over generations through various orders, prohibitions (pamali), traditional ceremonies, and other rituals to form a solid custom. Obedience, preservation, and cultural inheritance of Kampung Naga community cannot be separated from the role of kuncen — a key figure who becomes a role model, guides, and explains good and bad behavior, obligations, and various taboos [9]. Prohibition (pamali) in Kampung Naga community is a social sign that cannot be asked or bargained for because disobedience will result in disaster. For example, it is not allowed to enter and take something in the forbidden forest (leuweung prohibition).

The concept of health and illness in Kampung Naga society cannot be separated from their attitudes and behavior formed by customs and internalized through inheritance processes for generations. A person is considered healthy or sick by his biological, psychological, and socio-cultural abilities or disabilities to adapt to the environment. For example, a person is considered sick if he suffers from an illness that causes a physical disturbance, such as fever, cough, or flu, but he still can perform his activities; thus, he is not considered sick [10]. Kampung Naga society assumes that illness is a condition in which they are no longer able to carry out physical activities, and this illness is the result of their behavior that violates a prohibition intentionally or not intentionally. There is an expression, “amanat wasiat akibat, upami amanat dan wasiat di langgar, sangsi na kanu ngalanggar”. This expression means “there are rules to apply. If these rules are violated, people will get social and magical sanctions. Illness is one of the consequences of violating the applicable rules.”
Kampung Naga is located on the edge of the province; thus, this village is influenced by modernization from the neighboring villages. Consequently, Kampung Naga society could still maintain their lifestyle because they have a cultural heritage base and a philosophy of living with nature. Nature is God’s creation with natural compassion. Meanwhile, natural disasters occur because of humans’ greedy attitude in treating nature. One of the ways to be grateful for living with nature is to perform *Hajat Sasih* every six times a year to coincide with big Islamic days or months.

Lifestyles of living with nature and adapting to natural changes have enabled Kampung Naga society to use simple equipment without modern technology. Therefore, they prefer using hoes instead of tractors, wood fuel instead of gas stoves, oil lamps instead of electricity, and bamboo for the house walls [11].

The laws and regulations governing the attitudes and behavior of Kampung Naga society are not written but passed by word of mouth across generations in the form of prohibitions, wills, and consequences. The unwritten rules regulate layouts of house constructions, the behavioral patterns of communicating with older people, health behaviors, house directions, clothing, ceremonies, arts, etc. These rules were composed by their ancestors, must be upheld, and cannot be violated. Any violation will not get clear sanctions but consequences.

Kampung Naga people’s behavior in the context of health communication is their trust in *indung beurang* to assist the childbirth process. *Indung beurang* only helps during the pregnancy and after giving birth; in contrast, the labor process is handled by health workers or village midwives [12]. As a traditional childbirth helper, *indung beurang* should work with the village midwife to handle pregnancy health problems. One of the *indung beurang*’s tasks is to motivate the pregnant women to check their pregnancy and have the labor process with the assistance of a midwife; however, some people still ask for *indung beurang*’s help for the labor process [13].

Kampung Naga society considers that an *indung beurang*’s position is more than a health worker. She acts as a parent who gives the people peace and motivation and coddles pregnant women. However, during the childbirth process, *indung beurang* can position herself and accept the task divisions for handling health during childbirth with the village midwife. Cooperation with the village midwife is considered neither violating local traditions nor risking the childbirth [14]. In addition, the *indung beurang* provides non-medical treatment, such as massaging, praying against reinforcements, and giving herbs from plants to provide positive benefits for the mother and her baby. Thus, the community visits the village midwife to give birth because she has credibility certified by the government [15]. At the same time, they visit the *indung beurang* because she has an efficacious "jampe-jampe" to resist reinforcements and reject disasters; thus, a mother who will give birth will feel peaceful [16].

The public trusts *indung beurang* because the inheritance of cultural values is internalized by teaching about childbirth and implemented through various rituals for generations. In addition, the *indung beurang* has effective communication skills that can foster a sense of comfort and security for pregnant women. Society perceives that these skills emerge because *indung beurang* has more experience and attention and more patiently deals with patients than village midwives. As a result, some villagers still ask *indung beurang* to help their childbirth process [17].

**CONCLUSION**

This study concludes that *Kuncen* plays an important role in the process of inheriting traditional culture through various kinds of rituals by providing good role models followed by...
the young generation. Thus, they can recognize and understand the indigenous culture and have a strong cultural foundation to fence off negative influences from other cultures. Role models are believed to be the right and effective method to internalize values and norms for the young generation.

Public health behavior, especially related to the childbirth process, has occurred and been inherited for generations. As a result, the public still trusts indung beurang. Keeping, obeying, and passing on customs and traditions are dogmatic necessities and will eventually shape the community’s personality in accordance with their philosophy of life and traditional characteristics.

Kampung Naga society uses myth and ethos as environmental communication through the concepts of pamali and living with nature. They use these concepts as good role models to inherit valuable values and awaken the community and young generation. These efforts are frequently conveyed at traditional events as a manifestation of their belief in nature.

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