Digital Literacy of Rural Areas in Indonesia: Challenges and Opportunities

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Abstract. Adequate digital literacy is essential in the current era. This study utilizes a dataset including 10,000 samples obtained using a multistage random sampling technique conducted across various regions in Indonesia. The primary objective of this research is to investigate the current state of digital literacy in Indonesia. This article aims to provide a descriptive analysis of the key attributes of digital literacy in rural regions of Indonesia, focusing on four primary pillars which are digital skills, safety, culture, and ethic. This study finds that the difference in digital literacy between rural and urban areas is not significant. In addition, the research indicate that rural communities exhibit higher levels of digital ethics, culture, and security, while displaying a somewhat lower proficiency in digital skills. The primary obstacle pertains to the digital infrastructure and the integration of digital technologies into everyday routines.

Keywords: Digital Literacy, Rural, Digital Skills, Digital Safety, Digital Ethics, Digital Culture

1 Introduction

In this modern era, the ability to understand and utilize digital media is very important. The ability to understand the practices of communicating, thinking, and using digital media is called digital literacy [1]. This includes awareness of how digital media and its content influence existing social life [2]. At the next level, digital literacy does not stop at the ability to "operate" but also the ability to adapt to existing changes [3]. Also, there are differences in how urban residents and rural residents use digital technology [4]. These differences cover basic things, including how well the digital reach reaches, the depth of digital skills, as well as knowledge related to digital ethics.

The government has attempted digital penetration in various scopes, including infrastructure, knowledge, and human resources [5]. In the Indonesian context, naturally, people are slowly starting to use various digital technologies in their daily lives [6]. Service offices no longer depend on Customer Service but have started using chatbots [7]. Schools are starting to use multimedia in their learning. Netizens criticize the government easily on social media [8]. Food recipes can be found easily on the internet [9]. Long distance interactions have become

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commonplace with video calls. Playing games while developing them [10]. Indonesian people are familiar with various activities in the digital realm. Data-wise, active mobile phones in Indonesia reach 128% of the population, while active social media users have reached 60.4% [11].

Regarding digitalization, tougher challenges arise in rural areas. In terms of infrastructure, rural areas are certainly not as good as what urban residents get [12]. Where not all places are economically feasible to develop digital infrastructure [13]. Also, regarding digital skills, many development programs still need to be carried out [14]. The speed of incoming digital penetration is often not matched by people's knowledge of the impacts they may encounter in the future [15]. This research will explore how digital literacy is developing in rural Indonesia. This study also presents the challenges that accompany it going forward.

This research will look at the opportunities and challenges of digital literacy in rural areas, especially from two questions, namely (1) what the gap in digital literacy between those is who live in urban and rural areas (2) What are the characteristics of digital literacy for people living in rural areas.

2 Analytical Framework

Referring to Indonesia's Digital Literacy Status by the Ministry of Communication and Information, the discussion of digital literacy relies on 4 (four) pillars, namely digital skills, digital ethics, digital safety, and digital culture [16]. The WeAreSocial report noted that internet penetration in Indonesia reached 77% [11]. Meanwhile, according to the Ministry of Communication and Information, 94% of respondents have internet access, but 81% of them still complain about the poor quality of the signal they receive [16]. Social Capital in Java and Bali is one step ahead in the use of digital technology in Indonesia [4]. There are 3 (three) stages in the development of digital society according to the European Commission (2008), namely: Digital literacy to improve access, promoting user skills, and improving quality of participation [18].

So, after the infrastructure factor becomes the opening access. The next variable that supports digital literacy is digital skills. This is related to how society is able to make the best use of existing technology. At the micro level, SMSEs will be greatly helped by adequate digital skills from the perpetrators [17]. E-commerce and sellers have also spread evenly across various regions [18]. Digital literacy is considered general knowledge related to the digital world, while digital skills are more specific abilities in maximizing the potential of existing technology [15]. According to Van Deursen (2014), digital skills can be categorized into several skills, 1) operational skills, 2) formal skills, 3) information skills, 4) strategic skills, 5) content creation skills [19]. According to Ala-Mutka, digital skills can be described as shown in the following chart:

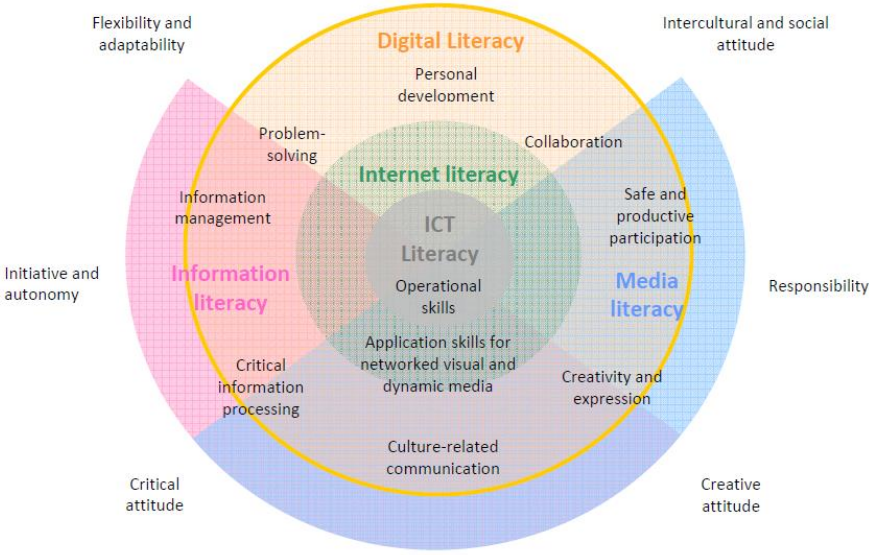

Fig 1. Digital Competence landscape for 21st century (Source: [20])

The next pillar that appears is digital safety. It is important for users to know how safe the activities they do on the internet are. Also, how their data security is guaranteed. The Digital safety pillar according to Eger (2020) needs to focus on some of the weakest points, namely financial activities, online shopping and copyright issues [21].

Other safety issues that need to be considered are sexting, piracy and cyberbullying. This is related to the existing culture. A culture that does not prioritize respect for women, respect for copyright, is carried over to digital. This is in line with the strong penetration of Indonesian digital culture. Where the good and bad of culture that exists in the real world is fully adopted in digital form. Including on the other hand, the spread of religion and culture which is starting to take place in cyberspace [22]. In their book, Jurriens and Tapsell (2015) dissect the penetration of digital culture in Indonesia into 5 (five) issues; connectivity, divergence, identity, knowledge, and commerce [23].

From a digital ethical perspective, the challenges in Indonesia are quite tough. Microsoft's 2021 report on social media politeness places Indonesia as the most impolite ASEAN country on the internet [24]. Digital ethics is related to various ethics on the internet [25]. All activities that are possible on the internet move existing behavior, including well-being and ethics that must be adhered to [26]. Digital Ethics is a way of thinking based on norms, morality and empathy [27].

Someone who has good digital ethics will understand the extent of the impact of what they share digitally. This includes how to maintain privacy, respect other people's property, and speak politely in cyberspace.

So this research compiles digital literacy based on three main things, including (1) Digital skills, to measure people's ability to operate digital devices (2) Digital safety, people's ability to protect personal data and cyber threats (3) Digital Ethics, concern society to be ethical in accordance with Indonesian norms in digital media (4) Digital culture, is an effort by society to reflect good digital culture, including upholding national values.

Table 1. Pillars and Indicator to measure digital literacy of Indonesia

Pillars	Indicators
Digital Skills	1. I can connect my device to the internet network 2. I can download files/apps 3. I can upload files 4. I can search and access data, information, and content on digital media. 5. I could store data, information, and content in media digital 6. I am used to finding out whether the information I find on websites is correct or wrong. 7. I am used to comparing various sources of information to make decisions whether the information is correct 8. I can interact via various digital technology communication devices. 9. I am used to shopping through marketplaces.
Digital Ethics	1. I don't upload photos with other people's children 2. I don't tag friends when I upload content without notifying them my friend 3. I will not make harsh comments if someone makes negative comments my upload. 4. I don't create groups and add people without permission 5. I will not directly share accident information 6. I will not invite people to comment negatively. 7. I will not share screenshots of conversations on social media
Digital Safety	1. On social media accounts, I can control who can see the timeline 2. I know how to report abuse on social networks. 3. I can disable the option to show geographic position. 4. I do not upload personal data on social media. 5. I use the application to find and remove viruses on the device. 6. I can distinguish e-mails that contain spam/viruses/malware. 7. I am used to creating secure passwords with a combination of numbers, letters, etc. punctuation. 8. I back up data in several places.
Digital Culture	1. I adjust the way I communicate so that the second party doesn't feel offended. 2. I consider the feelings of readers who come from other religions.

3. I include the author's name when reposting 4. I consider the feelings of readers who come from other ethnicities. 5. I share traditional and contemporary Indonesian cultural arts digitally 6. I consider the feelings of readers who have political views different. 7. I always consider and am aware of cultural diversity on social media when sharing messages.

3 Data and Method

This research uses data from a digital literacy survey conducted by the Ministry of Communication and Informatics (Kominfo) in 2022. Data collection was carried out in July-August 2022 with a sample size of 10,000 spread throughout Indonesia considering the population and rural and urban areas in each province.

Data was collected using multistage random sampling with randomization using simple random sampling in each sub-district, sub-district, RW, RT, and Family Card (KK). Determination of samples for each KK was carried out using a kish grid. The randomization process included several rural areas with 4,312 respondents or around 43% of the total sample. The determination of urban and rural is carried out proportionally based on the Regulation of the Head of the Central Statistics Agency Number 120 of 2020 concerning the classification of rural and urban areas in Indonesia.

This research will look at two things, including measuring the differences in rural and urban digital literacy indices. A classical independent t-test will be carried out to prove what significant differences there are between digital literacy indices between rural and urban communities. Meanwhile, looking at the characteristics of urban society's digital literacy will be done descriptively.

The independent samples t-test is used to compare the means of two unrelated groups of samples. This suggests that various people are assigning ratings to each group. The goal of this test is to see if the samples differ from one another [28].

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{s^2}{n_1} - \frac{s^2}{n_2}}} \quad \ldots. \quad (1)$$

4 Results

The table below shows descriptive statistics from the survey results based on pillars and rural and urban divisions. This data shows that the digital literacy index in urban areas is 3,540 and in rural areas is 3,542. In general, these differences can be said to be slight.

From the pillar side, rural areas excel in digital skills and digital safety, while urban areas excel in digital culture and digital ethics. This shows that rural communities have better internet ethics and culture, even though their abilities in digital operations and security are lower than respondents in urban areas.

4.1 Differences in Digital Literacy Index (DLI) in Rural and Urban Areas

The table below shows descriptive statistics from the survey results based on pillars and rural and urban divisions. This data shows that the digital literacy index in urban areas is 3,540 and in rural areas is 3,542. In general, these differences can be said to be slight.

From the pillar side, it can be seen that rural areas excel in digital skills, while urban areas excel in digital safety, culture, and digital ethics. This shows that rural communities have better internet ethics and culture, even though their abilities in digital operations and security are lower than respondents in urban areas.

Table 2. Descriptive Statistics
(source: researchers)

	Digital Skills		Digital Safety		Digital Culture		Digital Ethic		DLI	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Samples	4312	5688	4312	5688	4312	5688	4312	5688	4312	5688
Mean	**3.515**	**3.530**	**3.680**	**3.673**	**3.131**	**3.119**	**3.844**	**3.840**	**3.542**	**3.540**
Std. Deviation	0.783	0.764	0.516	0.526	0.832	0.840	0.594	0.572	0.442	0.433
Minimum	1.000	1.000	1.714	1.000	1.000	1.000	1.000	1.000	1.750	1.929
Maximum	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000

Note. Excluded 1028687 rows from the analysis that correspond to the missing values of the split-by variable Cleaned Urban/Rural

Apart from that, the boxplot image below shows that the data distribution for both rural and urban areas have the same pattern. The midpoint, each quartile, even the outlier values have the

same pattern. Descriptively, it can be concluded that there is no difference between urban and rural areas in the DLI context.

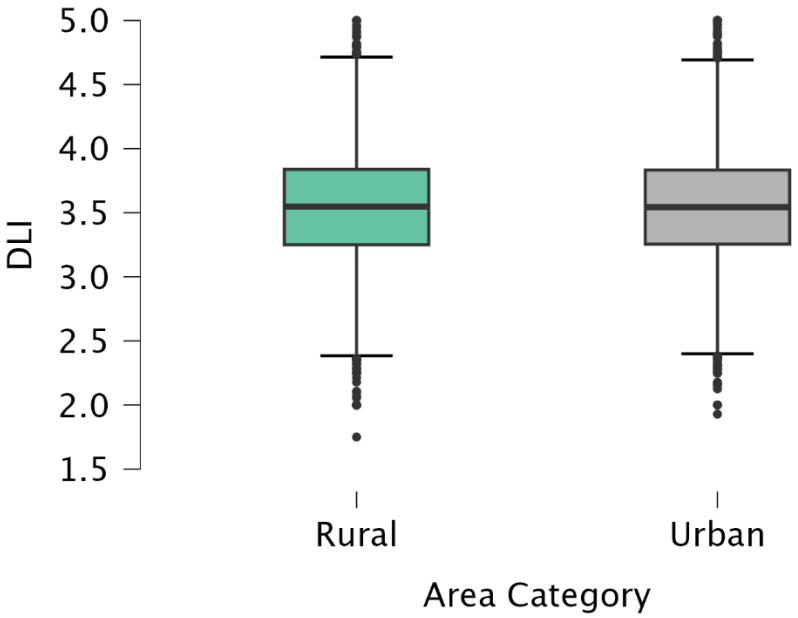

Fig 2. Distribution of DLI value (source: researcher)

Meanwhile, for testing using inferential statistics, the differences can be measured using the independent sample t-test. This test is a nonparametric test, so it requires assumptions of normality and heterogeneity. Apart from the distribution of the sample showing normality values, the equality of variance (Lavene's) test below shows that the two groups have a heterogeneous distribution [28].

Table 3. Test of Equality of Variances (Levene's)

	F	df_1	df_2	p
DLI	1.673	1	9998	0.196

Aside from that, the independent t-test shows that the p value is greater than 0.05, indicating that there is no significant difference between the rural and urban sample groups with a question level of 96%.

Table 4. Independent Samples T-Test

	t	df	p
DLI	0.230	9998	0.818

Note. Student's t-test.

Therefore, it can be concluded that both descriptive and inferential statistics show there is no difference between DLI in both rural and urban areas. Although characteristically rural areas are superior in ethics and urban areas are superior in skills.

4.2 Characteristics in Digital Literacy Index (DLI) in Rural Areas

Rural communities have a pattern of internet use with great intensity. As in the picture below, more than 60% of respondents access the internet for more than 3 hours. Only a small proportion of respondents in rural areas use the internet for less than 1 hour.

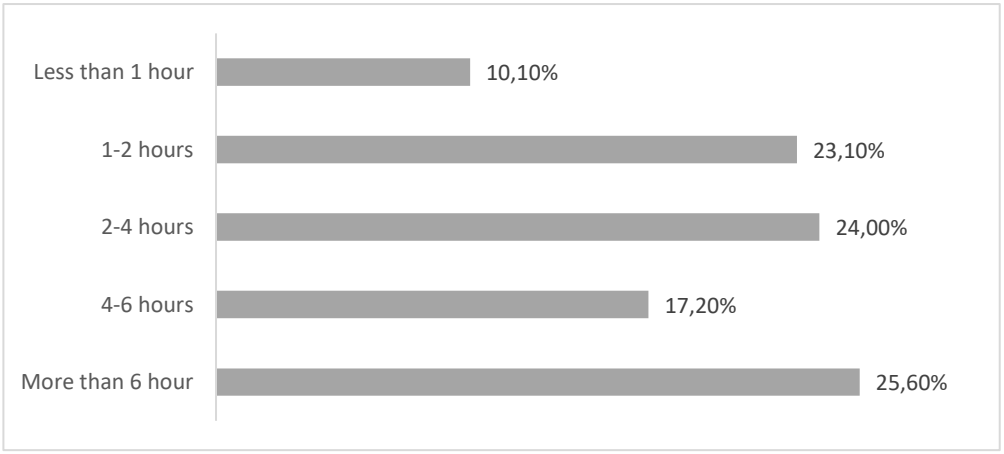

Fig 3. Frequency of internet usage of Rural People

On the other hand, internet use in rural areas has two peak times. First, 38% of respondents will access the internet between 7-10 am. Meanwhile, the second peak time is accessed between 19-21 pm. Meanwhile, the lowest time range is midnight and morning (before 7 am). The intensity ranged from 32-35% of respondents accessing between 10 am and 17 pm.

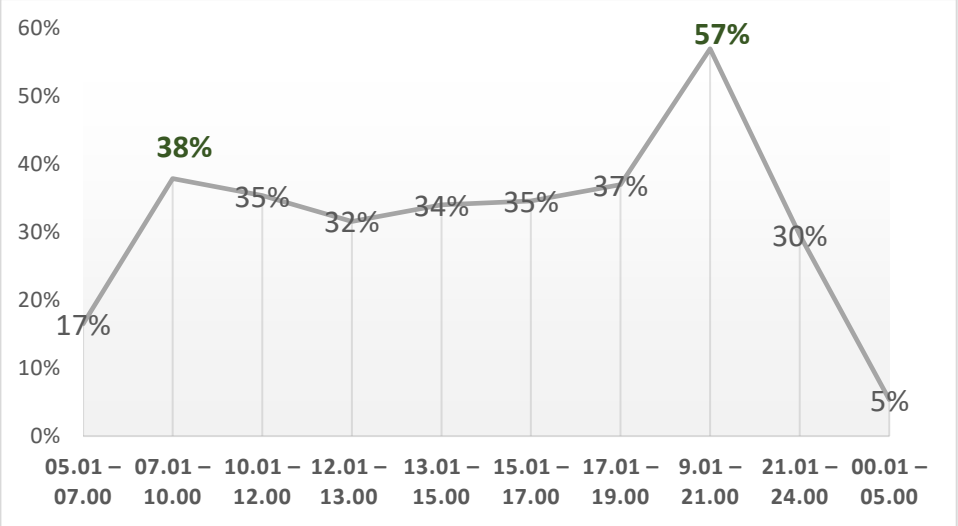

Fig 4. Internet Access Duration of Rural People

On the other hand, internet use in rural areas is not free from problems. Most of those who felt they had problems accessing the internet (47% of the total rural sample) were due to expensive package costs (36%). Meanwhile, other problems are internet coverage (16%) and unsupported devices (36%).

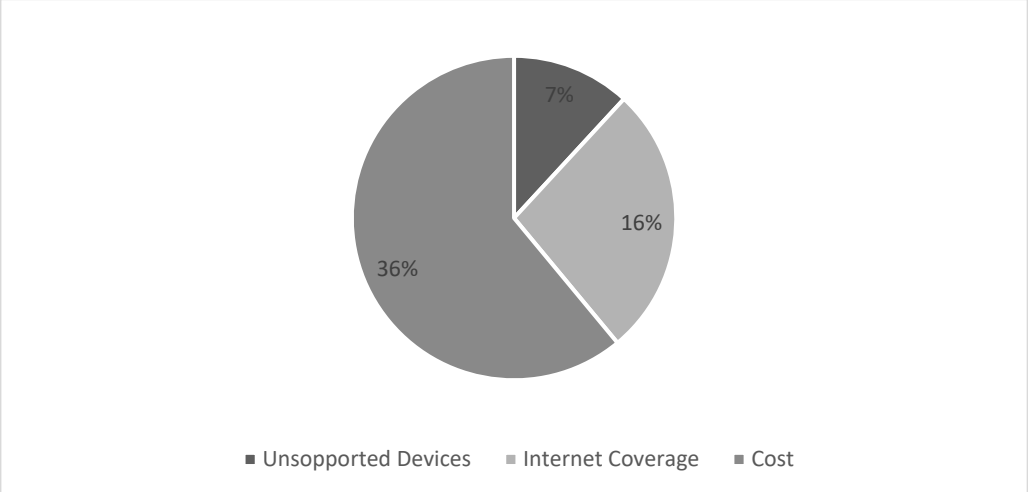

Fig 5. Issues of Access Internet of Rural People

Most rural people use the internet for communication (87%) and socializing (65%). Meanwhile, activities related to entertainment and shopping are the second most accessed activities, such as video streaming (55%), internet browsing (57%), online games (17%), shopping in e-commerce (28%), and reading online news. (24%).

On the other hand, use for productivity at work and school has a small proportion, such as online meetings 24%, communicating via e-mail (11%), accessing educational platforms (7%), and accessing office applications (13%). The lowest category is access to public services, such as access to public health (8%) and public services from the government (such as obtaining a driver's license and ID card (KTP) (6%).

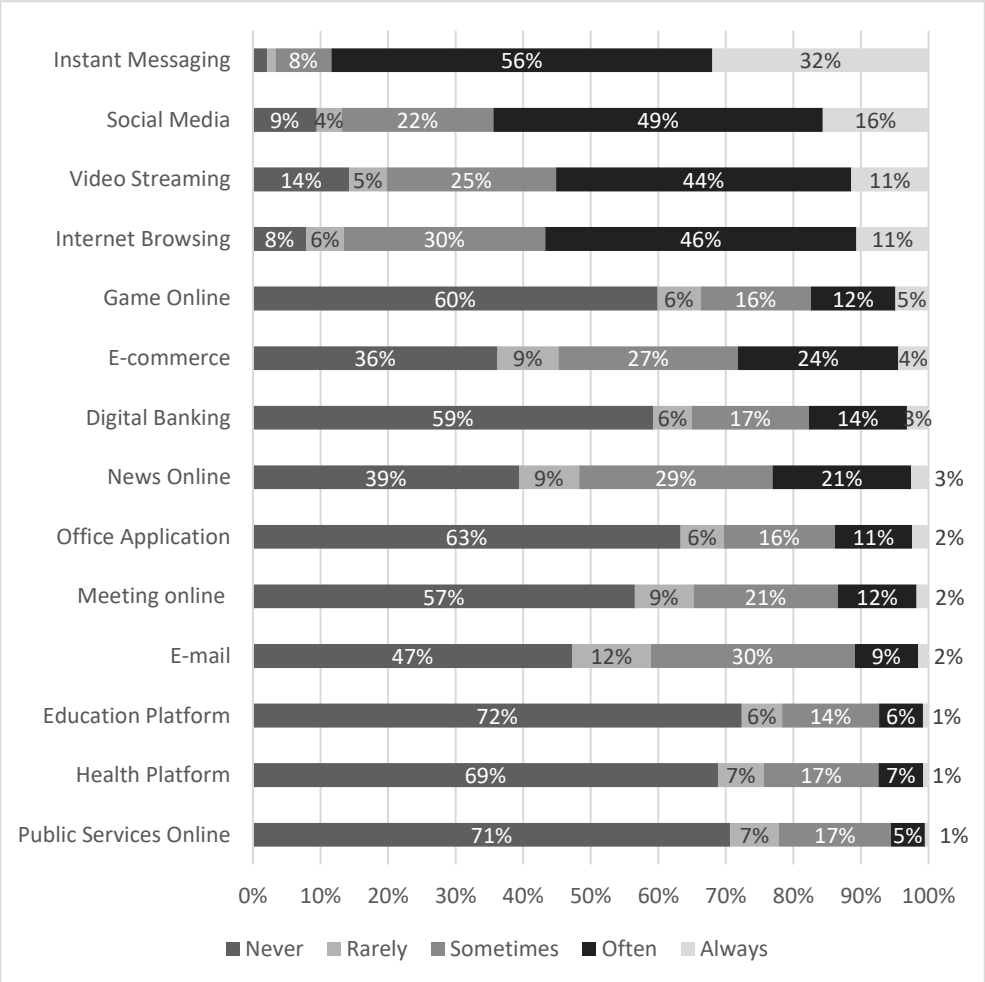

Fig 6. Main internet activity of rural people

The present study, as illustrated in the table provided, examines the current state of digital literacy abilities in Indonesia, highlighting both the potential benefits and problems that lie ahead. The significance of internet access and behaviors in rural areas is substantial, often comparable to that of urban places. Nevertheless, there is room for improvement, particularly in optimizing the utilization of digital gadgets for productive purposes. The utilization of the internet among rural populations primarily revolves around socialization and enjoyment. However, it would be highly beneficial if digital gadgets could facilitate enhanced productivity in both professional and educational endeavors for these individuals.

Table 5. Challenges on Opportunities of DLI in Rural Areas

Opportunities	Challenges
• There is no significant gap between rural and urban • Internet access in rural areas already encompasses individuals of all age group. • The rural population excels in digital ethics, culture, and safety.	• Push internet utilization for productive activity (working and/or studying) • There is a need to improve digital skills • Rural people believe that the internet cost is still a problem • The low use of email in rural areas reflects the low use of complex activities.

5 Conclusion

This research sees no significant differences between rural and urban areas in digital literacy. Indonesia has a good opportunity where internet access can be enjoyed by rural communities as well as urban communities. However, for rural communities, most of the activities are more about entertainment and communication. The challenge for the Indonesian government is to encourage the use of digital devices for more productive activities, for example studying and working.

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