Combining Statistical and Interpretative Analyses for Testing Readiness and IT Adoption Questionnaire

Asrul Sani[1], Titik Khawa Abdul Rahman[2], Aang Subiyakto[2], and Ninuk Wiliani[4]
{asrulsani@kampuswiduri.ac.id[1]}

[1] Department of Information Systems, STMIK Widuri, Jakarta, Indonesia
[2] Departement of ICT, Asia e University, Kuala Lumpur Malaysia
[3] Departement of Information Systems, Syarif Hidayatullah State Islamic University, Indonesia
[4] Departement of ICT, National of Science and Technology Institut, Jakarta, Indonesia

Abstract. A questionnaire is one method that is very widely used for social research and is an essential stage in an information system survey in this case the instrument adopted from previous research. Research in the field of information systems today is highly developed by the context ranging from industry, education, and other areas that are not limited. The objectives of this study were to assess the nature of the psychometric properties of users, in this case, is the level of readiness of users in adopting information technology in SMEs. Respondents were chosen randomly and were active computer users in SMEs, and the questions and statements given could be responded to and understood well so that the perceptions between researchers and respondents were the same. The population used is by taking several SMEs industries in Jakarta. The survey was conducted by interviewing and distributing questionnaires to employees at SMEs. Data processing is done using partial least squares structural equation modeling (PLS-SEM). The results obtained are 13 of the 70 questions were recommended to be rejected. Besides, the findings can be used by other parties in terms of testing a questionnaire as a reference for consideration, and the confirmation results can be used as a reference in revising the questionnaire questions.

Keywords: *statistical analyses; interpretative analyses; SEM, readiness and it adoption questionnaire*

1. INTRODUCTION

At present, the management of a company cannot be denied any more by using and utilizing information technology (IT), including SMEs [1, 2]. In addition to the increasingly competitive level of business competition, the need for efficiency and effectiveness in the management of the company itself requires each company to be ready and adopt the use of these technologies. The development of the company in this case, small and medium enterprises SMEs must be encouraged to follow and take technological developments

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In the use of information technology fundamentally will bring significant benefits to every user who uses it, but this must be proven firsthand in its development success [3, 4]. Another case if the use of information technology is a failure, it will be financially detrimental and will affect the continuity of the operations of the business itself [5]. The purpose of this study was to assess the psychometric properties of the readiness and IT adoption questionnaire and to understand the instrument, in regard to responsiveness and cognition of the respondents. The assessments based on the respondent's perceptions and the exploration using points of view of the researchers were the objectives. Two research questions were then proposed for guiding implementation of the study.

RQ1. Does the readiness and IT adoption questionnaire have a good psychometric property?

RQ2. Does the readiness questionnaire present the responsiveness and cognition of the respondents?

This paper is organized into five sections that will explain the main points of the section. The introductory section will explain the background of the selection of the title, problem statement, and the purpose of writing the paper, questions and research hypotheses. The literature review section illustrates theories that support research related to model development. The third part explains the methodological aspects of this research so that it can be used as a reference in subsequent writing.

2. METHOD

In this study, the researcher developed technology readiness and IT adoption (TRIA) model (Fig.1) by adopting the technology readiness model parasuraman [6, 7] and e-business or IT adoption model Zhu [8, 9], combining both models. The technology readiness model consists of 4 variables comprising optimism [OPT], Innovativeness [INV], Discomfort [DSC] and Insecurity [ISC]. The variables of this model will be combined with the adaptation of the adoption model which consists of 6 variables namely Technology Competence [TEC], Firm Scope [FSC], Firm Size [FSZ], Consumer readiness [CRD], Competitive Pressure [CPR], and Lack of trading partner readiness [TPR] and will produce a variable namely IT Adoption [ITA].

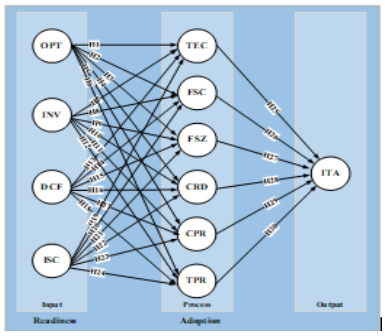

Figure 1. The Developed Model [5]

Table 1. List of the variables [5, 10]

Codes	Names	Definitions
OPT	Optimism	The level of confidence in believing that technology adoption might occur.

Codes	Names	Definitions
INV	Innovation	The level of confidence in seeing that adoption technology is part of a system.
DCF	Discomfort	The level of confidence in knowing that technology is uncomfortable.
ISC	Insecurity	The level of confidence of distrust that technology adoption can be properly implemented and concerns about potentially harmful consequences
TEC	Technology Competence	The level of confidence of technologies (hardware) that enable an organization to develop processes
FSC	Firm Scope	The level of confidence of horizontal expansion of an enterprise's operations
FSZ	Firm Size	The level confidence of which to a larger company may have a competitive advantage over its smaller counterparts
CRD	Customer Readiness	The level of confidence of a combination of consumer willingness and Internet penetration
CPR	Competitive Pressure	The level of confidence to affect the industry structure, and leverage new ways to outperform rivals, thus changing the competitive environment
TPR	Lack of Trading Partner Readiness	The level confidence of status of its trading partners along the value chain, since for an electronic trade to take place, it is necessary that all trading partners adopt compatible electronic trading systems
ITA	IT Adoption	The level of confidence to which a company adopts a technology for the development of its industry

This study also uses the assumption of the logic model input Process Logic (IPO Logic) [11] which is adapted for the same purpose in measuring the quality of a system. Based on the research methodology that was developed, there are 4 stages of the process that will be passed. Starting from the initial concept in the form of design preparation and ending with reports writing. The second and third stages are the most important stages of this research, namely data collection and data analysis. In collecting data, the researcher collected 29 respondents who distributed the questionnaire directly to find out the shortcomings of the questions and statements on the questionnaire sheet. In addition, researchers also got 25 respondents whose questionnaires were distributed through the Google form application.

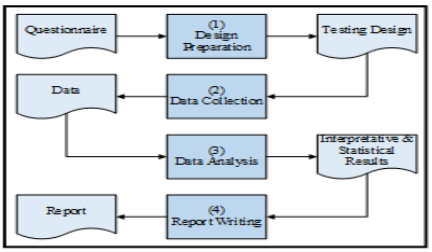

Figure 2. The Research Methodology

The results of calculations carried out will be used as input references for interpretative assessment. Also, there is also information from the respondents' demographics as well as aspects of the respondents that can be taken into consideration in the analysis phase in

interpretive assessment. The statistical results and interpretative analysis then make confirmation references which, after going through the analysis process, will be used as findings and recommendation.

3. RESULT AND DISCUSSION

On table 3 below explained four characteristic respondent's demographics, i.e., gender, education, readiness level for IT use, and readiness factor influences IT usage

Table 2. Respondent's demographics

Characteristic	Group	n	%
Gender	Male	37	68.5
	Female	17	31.5
Education	High School	25	46.3
	Diploma	5	9.3
	Bachelor	22	40.7
	Master	2	3.7
Readiness level for IT Use	Strongly Ready	7	13.0
	Ready	13	24.1
	Unready	33	61.1
	Strongly unready	1	1.9
Readiness Factor Influences IT Usage	Strongly Influential	20	37.0
	Influential	26	48.1
	Less Influential	4	7.4
	Uninfluential	2	3.7
	Strongly Influential	2	3.7

The method most often used by researchers in the field of SEM to measure the model through confirmatory factor analysis is to use the Multi Trait-Multi Method approach by testing convergent and discriminant validity [12].

Based on the statistical examinations, the results show that 13 of the 55 indicators were rejected (Table 4).

- The indicator reliability assessment, it is found that there are three of the 55 indicators (i.e., OPT3, DCF4 and ISC 4) are rejected because of the values unfulfilled the requirements of loading factors, namely 0.6 - 0.7 [13-17]
- The consistency reliability, it is found the reliability composite (CR) of eleven variables are above 0.7
- The examining convergent validity, the value of Average Variance Extracted (AVE) of eleven variables is greater than the threshold value of 0.5
- The discriminant validity assessment, there are ten indicators (i.e., OPT1, INV3, INV4, DCF2, DCF5, ISC5, FSC5, FSZ1, FSZ3, and FSZ4) which must also be deleted according to Fornell and Lacker rules [31-35], namely, cross loading above 0.7

Table 3. The statistical analysis results

Var	Indic	OL	CL										
			OPT	INV	DCF	ISC	TEC	FSC	FSZ	CRD	CPR	TPR	ITA
OPT	OPT1		*Rejected*										
	OPT2	0.86	0.87	0.41	0.10	-0.01	0.65	0.58	0.45	0.42	0.56	0.47	0.59
	OPT3		*Rejected*										
	OPT4	0.86	0.86	0.39	0.04	-0.07	0.61	0.59	0.39	0.43	0.51	0.52	0.52
	OPT5	0.78	0.78	0.58	0.14	0.13	0.64	0.57	0.42	0.51	0.52	0.36	0.53
INV	INV1	0.87	0.55	0.86	0.16	0.09	0.49	0.47	0.37	0.45	0.36	0.41	0.44
	INV2	0.87	0.55	0.87	0.16	0.09	0.49	0.47	0.37	0.45	0.36	0.41	0.54
	INV3		*Rejected*										
	INV4		*Rejected*										
	INV5	0.85	0.46	0.85	0.19	0.20	0.29	0.43	0.53	0.32	0.24	0.48	0.3
DCF	DCF1	0.88	0.15	0.16	0.88	0.36	0.15	0.24	0.31	0.11	0.09	0.20	0.18
	DCF2		*Rejected*										
	DCF3	0.91	0.15	0.10	0.91	0.13	0.13	0.31	0.35	0.19	0.04	0.03	0.25
	DCF4		*Rejected*										
	DCF5		*Rejected*										
ISC	ISC1	0.92	0.06	0.21	0.18	0.91	0.1	0.12	0.28	0.16	0.15	0.16	0.11
	ISC2	0.82	0.03	0.09	0.30	0.82	0.05	0.12	0.12	0.07	0.04	0.08	0.05
	ISC3	0.93	-0.01	0.04	0.24	0.93	0.12	0.16	0.30	0.18	0.20	0.16	0.14
	ISC4		*Rejected*										
	ISC5		*Rejected*										
TEC	TEC1	0.82	0.53	0.28	0.27	0.01	0.81	0.50	0.51	0.49	0.58	0.62	0.67
	TEC2	0.89	0.63	0.46	0.04	0.22	0.89	0.65	0.56	0.59	0.68	0.53	0.69
	TEC3	0.89	0.61	0.51	0.13	0.12	0.88	0.64	0.51	0.51	0.57	0.48	0.57
	TEC4	0.71	0.54	0.31	0.23	-0.04	0.70	0.43	0.38	0.38	0.49	0.51	0.48
	TEC5	0.87	0.68	0.45	0.08	0.17	0.86	0.72	0.57	0.46	0.64	0.60	0.57
FSC	FSC1	0.80	0.70	0.52	0.26	0.22	0.75	0.80	0.59	0.51	0.52	0.58	0.57
	FSC2	0.71	0.59	0.48	0.18	0.07	0.64	0.71	0.46	0.62	0.59	0.62	0.64
	FSC3	0.87	0.49	0.34	0.30	0.12	0.43	0.87	0.73	0.62	0.49	0.60	0.50
	FSC4	0.87	0.49	0.34	0.30	0.12	0.43	0.87	0.73	0.62	0.49	0.60	0.50
	FSC5		*Rejected*										
FSZ	FSZ1		*Rejected*										
	FSZ2	0.83	0.62	0.42	0.26	0.14	0.63	0.77	0.82	0.69	0.73	0.70	0.72
	FSZ3		*Rejected*										

Var	Indic	OL	CL										
			OPT	INV	DCF	ISC	TEC	FSC	FSZ	CRD	CPR	TPR	ITA
	FSZ4		*Rejected*										
	FSZ5	0.73	0.35	0.34	0.41	0.18	0.45	0.50	0.73	0.44	0.38	0.65	0.53
CRD	CRD1	0.85	0.66	0.48	0.04	0.24	0.64	0.77	0.68	0.85	0.78	0.59	0.61
	CRD2	0.84	0.35	0.26	0.22	0.24	0.4	0.50	0.52	0.84	0.74	0.40	0.39
	CRD3	0.73	0.38	0.34	0.16	-0.01	0.48	0.52	0.47	0.72	0.54	0.47	0.41
	CRD4	0.80	0.29	0.48	0.20	-0.05	0.33	0.55	0.58	0.80	0.60	0.59	0.47
	CRD5	0.85	0.45	0.25	0.23	0.22	0.44	0.58	0.68	0.84	0.69	0.55	0.45
CPR	CPR1	0.78	0.48	0.31	0.12	0.06	0.65	0.57	0.58	0.70	0.77	0.64	0.58
	CPR2	0.92	0.54	0.32	0.05	0.22	0.71	0.55	0.59	0.72	0.92	0.61	0.61
	CPR3	0.85	0.47	0.24	0.12	0.07	0.52	0.55	0.59	0.72	0.85	0.48	0.57
	CPR4	0.87	0.53	0.36	0.06	0.15	0.58	0.50	0.53	0.74	0.86	0.49	0.53
	CPR5	0.76	0.51	0.40	0.06	0.15	0.51	0.52	0.58	0.59	0.75	0.60	0.62
TPR	TPR1	0.86	0.49	0.52	0.32	0.03	0.66	0.71	0.67	0.59	0.59	0.86	0.69
	TPR2	0.77	0.41	0.42	0.18	0.16	0.45	0.61	0.68	0.42	0.45	0.77	0.5
	TPR3	0.82	0.50	0.40	0.23	0.25	0.58	0.66	0.64	0.60	0.64	0.81	0.77
	TPR4	0.74	0.36	0.25	0.16	0.03	0.49	0.37	0.42	0.46	0.52	0.74	0.49
	TPR5	0.73	0.29	0.35	0.16	0.14	0.34	0.53	0.56	0.41	0.41	0.73	0.45
ITA	ITA1	0.86	0.59	0.40	0.13	0.07	0.68	0.65	0.66	0.66	0.70	0.76	0.86
	ITA2	0.87	0.51	0.40	0.25	0.22	0.65	0.60	0.48	0.45	0.59	0.61	0.86
	ITA3	0.85	0.45	0.29	0.18	0.14	0.54	0.49	0.39	0.34	0.48	0.53	0.85
	ITA4	0.84	0.44	0.42	0.32	0.16	0.62	0.58	0.54	0.53	0.55	0.62	0.83
	ITA5	0.87	0.55	0.32	0.18	-0.01	0.59	0.56	0.52	0.51	0.64	0.71	0.87

Indicators OPT1, OPT3, INV3, and INV4 are contributors/positives as well as DCF2, DCF4, DCF5, ISC4 and ISC5 indicators are inhibitors/negatives in the readiness variable. In this study, the nine indicators were rejected. The researcher assumed that the rejection might be related to the respondent's focus when the questionnaire was filled out. Also, the rejection of the nine indicators was due to demographic limitations when the questionnaire was distributed.

Indicators FSC5, FSZ1, FSZ3, and FSZ4 are indicators related to IT adoption where these indicators indicate indicators that are not accepted. This, according to researchers, is most likely due to a lack of understanding of the respondents in answering questions or statements from the questionnaire so that the boundary values that must be accepted are not achieved.

Although of the 55 indicators there are 13 that must be rejected and review the question, the measurement model of the proposed Readiness and IT Adoption model can be justified in statistical calculations as a model that has psychometric properties based on the value obtained [13-15].

4. CONCLUSION

The demographics of the respondents also greatly influence the results of the study, so there are several factors that might be considered in the next study, namely the condition of the respondents when filling out the survey provided. In this study, psychometric and sequential implementation interpretative assessment is carried out to examine and explore the validity and reliability of the questionnaire. And the results showed that 13 of the 70 questions in the questionnaire were recommended for rejection. In addition to the results of the psychometric and interpretative analysis, it is produced the conclusion presentation can also be the second point highlighted in this study. Further research will be developed in the questionnaire, so that when a pilot study is conducted it will get better and more accurate results. The results of the pilot study will provide a detailed description of all the conditions in this study.

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