Measurement of Readiness in IT Adoption among SMEs Manufacturing Industry in Jakarta

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Abstract. The development of SMEs, especially those based on the manufacturing industry, is highly developed along with the significant market demand. The increasingly important information technology in SMEs will have an impact on increasing productivity, marketing, and efficiency in this research, measurement of readiness level in the adoption of information technology (IT) will be carried out used to explore the level IT application readiness and to examine factors which influences its application. The survey was conducted on stakeholders of Small and Medium Enterprises in Jakarta, which was done using interview and questionnaire techniques with a response (n = 68). Interviews and questionnaires are conducted on policymakers in SMEs companies so that the data obtained will provide accurate results. Data will be processed using partial least squares structural equation modelling (PLS-SEM) software. The results shown by the majority of respondents (54.4%) answered that the percentage of the level of readiness of SMEs towards IT adoption was more than 50%. Meanwhile, 31.7% of respondents stated that for a percentage of more than 75%. Respondents taken were only about five regions of Jakarta. Also, more comprehensive results will be used as a reference when respondent data will cover all regions of Java. From the results of this study can be used for further research related to the level of readiness for IT adoption in SMEs

Keywords: *SEM; Readiness; IT Adoption respondent; SMEs*

1. Introduction

The existence of SMEs is inseparable from the business owner's meet economic needs and improve living standards. The mindset of the doer SMEs are always profitable as long as businesses can running and relying heavily on business instincts in running a business. Available many factors determine that a business can be successful or not. Among them are market opportunities, competitive conditions, and business trends. Therefore, in theory, it is not enough to rely on instinct in making decisions in the business world. More from that, a comprehensive calculation is needed both qualitatively and quantitative of all aspects related to the business to be made. SMEs can be more competitive and have good development prospects, then before establishing a SMEs should be conducted a business feasibility study first [1-3]

This matter useful to calculate the possibility of whether the business can compete and survive among its competitors as well as seeing the possibility of business development in the future seen from various aspects or points of view [4]. With the design of a good information system, quality information will be obtained so that relationships between customers and suppliers can be created and can provide added value to the development of SMEs [5]. Information and communication technology that continues to grow influences in almost all fields of life including in the field of education [6], services and social media [4] and SMEs [2, 7].

Information and communication technology (ICT) gives SMEs a competitive advantage in the new economy. It has the potential to support more efficient decision-making relevant to the performance of SMEs and make them more competitive and innovative, thus generating growth [8-10]. ICT can increase productivity and improve the efficiency of SMEs in different ways, including technical improvement, reducing transaction costs, improving resource allocation, and shifting the production function. It is therefore important for SMEs to strategically position ICT within their organization in such a way that they will maximize its benefits [1, 11, 12]. 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 [13, 14]. And this means that success in the use of information technology will be the first challenge for users before they get the benefits. 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 [15].

The purpose of this study is to determine the effect of the level of readiness on IT adoption, especially the manufacturing industry SMEs and to get the influence factor on IT adoption. Assessment based on the perceptions of respondents who are office owners in the company and exploration using the researchers' point of view is the goal. This study will also discuss two research questions that will be asked to guide the implementation of the research:

RQ1: How does the level of technological readiness influence IT adoption, especially in manufacturing industry SMEs?

RQ2. What are the factors that affect technological readiness in IT Adoption?

The paper was organized into four main sections, which process an explanation of this section. In the introductory section, explain the background selection of the title, problem statement, the objective, questions, and research hypotheses. In the methodology section, literature reviews are explaining supporting theories in research relating to the development of information systems models and explanations of research methods so that they can be used as a reference in subsequent writing. The third section describes aspects of finding and discussion that explain the results of the analysis phase, discussion, boundaries, and suggestions for future research with their achievements. Also, finally, from this paper, there is a conclusion that will later be used as a reference for further research development.

2. Method

According to the study of Zhu et al. [16], businesses using information technology will have the potential to change the organization, change the organizational structure, and significantly modify business processes. Another thing, businesses that have information technology have an impact on relationships with customers, suppliers and other business partners [12, 16-18]. E-business can be described as integration between communication technology (internet), business processes and management practices.

This research is a development that has been done before. Research that combines adopts and adapts from previous models. The first model is the Technology Readiness Index (TRI) which is one of the most popular models in the field of computer science. TRI consists of 4 variables where these variables consist of Optimism (OPT), Innovativeness (INV), Discomfort (DCS) and Insecurity (ISC) [19, 20]. The second model, IT Adoption, is a conceptual framework model proposed under the TOE (Technology-Organization Environment) framework, which was introduced by Tornatzky and Fleiscer [21]. According to this approach, the company's decision to introduce new technology is influenced by technological, organizational, and environmental factors. The TOE concept consists of 6 variables and consists of Technology Competency [TEC], Company Scope [FSC], Company Size [FSZ], Consumer Readiness [CRD], Competitive Pressure [CPR], and Lack of trading partner readiness [TPR] [16, 22]. The final result of this model is the readiness of SMEs in IT adoption (ITA)

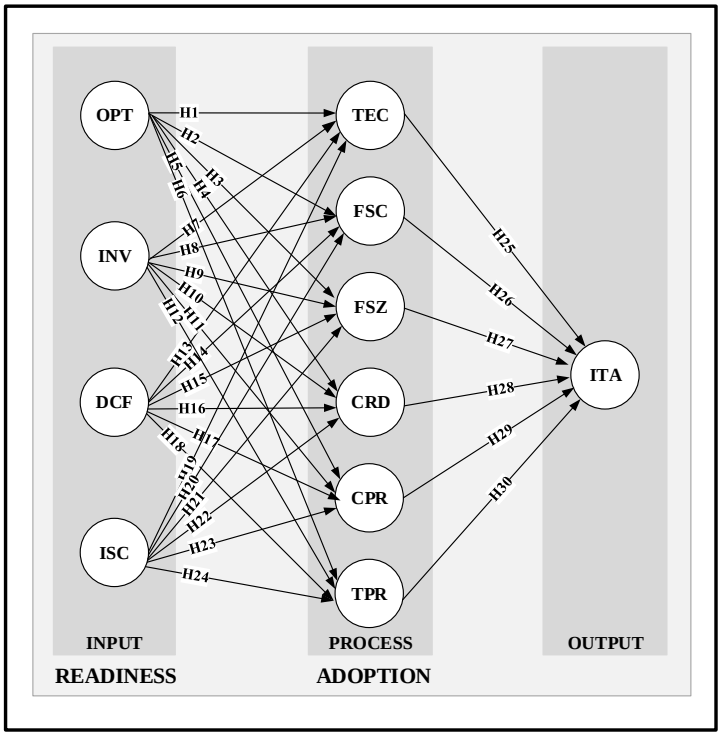

Figure 1. The Developed Model [15, 23]

Table 1. List of the variables and indicators[15, 23]

Variables	Indicators	References
OPT	OPT1; OPT2; OPT3; OPT4; OPT5.	[15, 19, 20, 23, 24]
INV	INV1; INV2; INV3; INV4; INV5.	[15, 19, 20, 23-25]
DCF	DCF1; DCF2; DCF3; DCF4; DCF5.	[15, 19, 20, 23, 24]
ISC	ISC1; ISC2; ISC3; ISC4; ISC5.	[15, 19, 20, 23, 24]
TEC	TEC1; TEC2; TEC3; TEC4; TEC5.	[15, 16, 22-24]
FSC	FSC1; FSC2; FSC3; FSC4; FSC5.	[15, 16, 22-24]
FSZ	FSZ1; FSZ2; FSZ3; FSZ4; FSZ5.	[15, 16, 22-24]
CRD	CRD1; CRD2; CRD3; CRD4; CRD5.	[15, 16, 22-24]
CPR	CPR1; CPR2; CPR3; CPR4; CPR5.	[15, 16, 22-24]
TPR	TPR1; TPR2; TPR3; TPR4; TPR5.	[15, 16, 22-24]
ITA	ITA1; ITA2; ITA3; ITA4; ITA5.	[15, 23, 24]

The research will go through eight (8) stages starting from the concept and initial study in the form of a research program then followed by the model development, research design, instrument design, collecting data, data analyses discussion and finally the writing of the report.

The study will use the assumptions of the logical Input-Process-Output (IPO Logic) model [24], which was adapted to measure the quality of a system. In data distribution, researchers collected 36 respondents who directly filled out the questionnaire to find out the lack of questions and statements on the questionnaire sheet. Researchers also got 32 respondents whose questionnaires were distributed via Google forms.

Data processing uses MS Excel 2013 application and SmartPLS 2.0 partial squares application to display indicators of reliability, internal consistency reliability, convergent validity, and discriminant validity assessment [25-29]

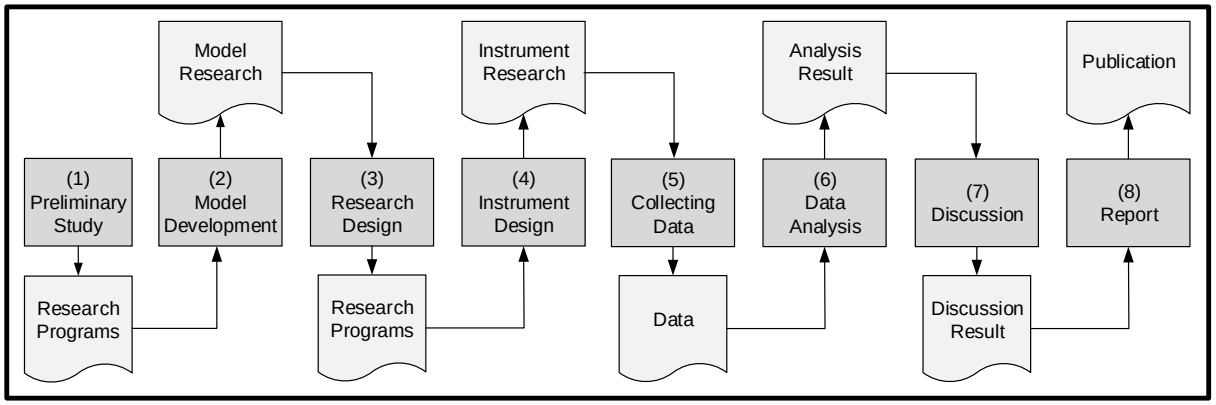

Figure 2. The Research Methodology

The calculation results will be validated with input references for interpretive assessment. There will be information from the respondent's demographics as well as aspects of the respondent that can be considered in the analyses phase in interpretive assessment. Statistical results and interpretive analyzes then make reference confirmations which, after going through the analysis process, will be used as findings and recommendations.

3. Findings and Discussion

In the table below, three demographic respondent categories are explained namely, education, position, SMEs regional, readiness factors influencing and readiness level for IT use.

Table 2. Respondent's demographics

Category	Description	%
Education	Diploma	48.53
	Bachelor	50.00
	Master	1.47
Position	Owner	63.26
	Top Manager	36.76
SMEs Regional	North Jakarta	26.47
	South Jakarta	14.71
	West Jakarta	16.18
	East Jakarta	32.35
	Central Jakarta	10.29
Readiness Factors Influencing	Influential	57.35
	Less Influential	22.06
	Uninluential	19.12
	Strongly Influential	1.47
Readiness Level For IT Use	< 25%	2.94
	25% - 50%	11.76
	50% - 75%	54.41
	> 75%	30.88

Data collected, around 52 paper-based questionnaires distributed at SMEs business meetings in Jakarta with almost 47 (90%) data, can be used. Other than that, the questionnaire was distributed through WhatsApp media using the google form application to around 35 prospective respondents with about 21 (60%) responses.

Referring to the sampling technique used, filling in questionnaires is only done to the owner or top manager in the company. In total there are 70 questions consist of eight questions that are general in general, seven questions are specific and 55 questions on the scale of five Linkert is a fundamental part of the survey instrument.

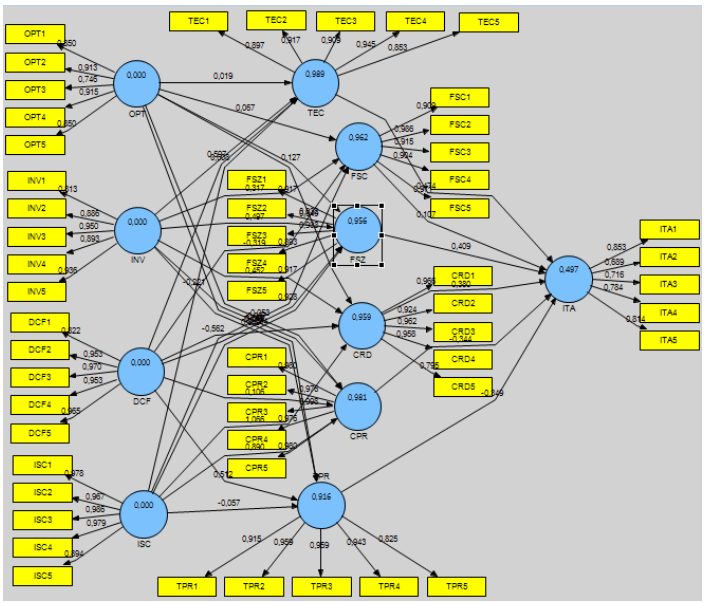

Figure 3. The results of the PLS-SEM assessment

One method often used by researchers in the SEM field is measuring the model through confirmatory factor analysis by testing convergent and discriminant validity [26]. Based on statistical examination, the results show:

- Indicator reliability is seen by observing item relationships indicators and variables that have a threshold of 0.7. Composite Reliability (CR) of variables with a threshold value of 0.7, and cross-item comparisons loading between variables. Fifty-five indicators were accepted based on the three stipulation variables above.
- Internal consistency reliability is seen based on the CR threshold of 0.7 and above. Researchers prefer to use CR rather than alpha Cronbach Alpha (CA) by looking at the CR assumptions on a specific variable. Statistically, the CR value of the study indicator reaches the threshold value. This is not following the objectives of testing internal consistency reliability. The result is the CR values of all variables have met the statistically required to be used
- Convergent validity was assessed with an Average Variance Extracted (AVE) value with a limit value of 0.5 or above. According to this assessment, all indicators are accepted based on this threshold. Discriminant validity was assessed through cross-loading analysis using the square root of AVE to identify which variable was different from the others. AVE ratio is higher than the value of its cross-load

Table 3. Value of Cross Loading and Outer Loading

	Outer Loading	OPT	INV	DCF	ISC	TEC	FSC	FSZ	CRD	CPR	TPR	ITA
OPT1	0.84	**0.84**	0.62	0.64	0.63	0.65	0.60	0.64	0.58	0.64	0.68	0.44
OPT2	0.91	**0.91**	0.77	0.83	0.86	0.79	0.86	0.80	0.85	0.88	0.81	0.49
OPT3	0.74	**0.74**	0.88	0.77	0.77	0.83	0.79	0.83	0.81	0.72	0.72	0.64
OPT4	0.91	**0.91**	0.88	0.94	0.97	0.90	0.97	0.91	0.95	0.98	0.90	0.59
OPT5	0.84	**0.84**	0.62	0.64	0.63	0.65	0.60	0.64	0.58	0.64	0.68	0.44

	Outer Loading	OPT	INV	DCF	ISC	TEC	FSC	FSZ	CRD	CPR	TPR	ITA
INV1	0.81	0.74	**0.81**	0.72	0.73	0.76	0.82	0.82	0.84	0.73	0.68	0.56
INV2	0.88	0.74	**0.88**	0.77	0.77	0.83	0.79	0.83	0.81	0.72	0.72	0.64
INV3	0.95	0.89	**0.95**	0.97	0.96	0.96	0.93	0.94	0.93	0.97	0.93	0.66
INV4	0.89	0.80	**0.89**	0.84	0.82	0.90	0.83	0.80	0.79	0.81	0.91	0.51
INV5	0.93	0.84	**0.93**	0.93	0.91	0.94	0.86	0.91	0.87	0.92	0.91	0.65
DCF1	0.82	0.66	0.73	**0.82**	0.75	0.78	0.72	0.77	0.72	0.75	0.70	0.64
DCF2	0.95	0.89	0.91	**0.95**	0.93	0.93	0.94	0.90	0.91	0.95	0.94	0.58
DCF3	0.97	0.91	0.92	**0.97**	0.98	0.93	0.96	0.93	0.95	0.96	0.90	0.63
DCF4	0.95	0.91	0.92	**0.95**	0.95	0.94	0.90	0.95	0.89	0.95	0.95	0.59
DCF5	0.96	0.87	0.94	**0.96**	0.95	0.96	0.93	0.92	0.93	0.93	0.89	0.68
ISC1	0.97	0.91	0.95	0.97	**0.97**	0.96	0.93	0.96	0.93	0.98	0.96	0.63
ISC2	0.96	0.88	0.90	0.94	**0.96**	0.92	0.94	0.91	0.94	0.97	0.90	0.63
ISC3	0.98	0.91	0.91	0.97	**0.98**	0.93	0.95	0.93	0.94	0.97	0.92	0.61
ISC4	0.97	0.91	0.91	0.97	**0.97**	0.94	0.95	0.93	0.94	0.97	0.92	0.61
ISC5	0.89	0.89	0.86	0.87	**0.89**	0.85	0.89	0.83	0.88	0.83	0.78	0.62
TEC1	0.89	0.80	0.87	0.84	0.82	**0.89**	0.82	0.81	0.78	0.83	0.93	0.48
TEC2	0.91	0.82	0.86	0.91	0.87	**0.91**	0.84	0.91	0.84	0.88	0.83	0.65
TEC3	0.90	0.82	0.93	0.87	0.85	**0.90**	0.84	0.93	0.87	0.85	0.86	0.63
TEC4	0.94	0.83	0.92	0.89	0.87	**0.94**	0.84	0.87	0.82	0.85	0.91	0.59
TEC5	0.85	0.83	0.85	0.89	0.92	**0.85**	0.94	0.84	0.93	0.89	0.79	0.63
FSC1	0.90	0.87	0.85	0.88	0.89	0.88	**0.90**	0.85	0.87	0.90	0.92	0.48
FSC2	0.98	0.90	0.91	0.92	0.95	0.90	**0.98**	0.92	0.98	0.94	0.86	0.63
FSC3	0.91	0.84	0.92	0.92	0.90	0.91	**0.91**	0.88	0.90	0.88	0.84	0.68
FSC4	0.90	0.79	0.88	0.85	0.85	0.86	**0.90**	0.87	0.93	0.87	0.78	0.66
FSC5	0.97	0.89	0.87	0.92	0.95	0.88	**0.97**	0.89	0.95	0.94	0.86	0.64
FSZ1	0.91	0.91	0.88	0.94	0.97	0.90	0.97	**0.91**	0.95	0.98	0.90	0.59
FSZ2	0.84	0.67	0.77	0.70	0.66	0.76	0.67	**0.84**	0.70	0.66	0.67	0.59
FSZ3	0.93	0.82	0.87	0.89	0.85	0.91	0.79	**0.93**	0.79	0.85	0.86	0.63
FSZ4	0.89	0.79	0.93	0.83	0.82	0.88	0.83	**0.89**	0.86	0.78	0.79	0.66
FSZ5	0.91	0.91	0.88	0.94	0.97	0.90	0.97	**0.91**	0.95	0.98	0.90	0.59
CRD1	0.96	0.90	0.92	0.96	0.97	0.94	0.97	0.93	**0.96**	0.99	0.91	0.65
CRD2	0.92	0.76	0.84	0.79	0.82	0.79	0.90	0,80	**0.92**	0.81	0.68	0.66
CRD3	0.96	0.93	9.93	0.97	0.99	0.95	0.97	0,80	**0.96**	0.99	0.94	0.62
CRD4	0.95	0.91	0.88	0.94	0.97	0.90	0.97	0,91	**0.95**	0.98	0.90	0.59
CRD5	0.79	0.67	0.81	0.67	0.68	0.73	0.75	0,77	**0.79**	0.64	0.61	0.60
CPR1	0.98	0.91	0.95	0.97	0.97	0.96	0.93	0.96	0.93	**0.98**	0.96	0.63
CPR2	0.97	0.88	0.87	0.93	0.95	0.89	0.96	0.89	0.95	**0.97**	0.87	0.61
CPR3	0.99	0.93	0.93	0.97	0.99	0.95	0.97	0.95	0.96	**0.99**	0.94	0.62
CPR4	0.97	0.88	0.87	0.93	0.95	0.89	0.96	0.89	0.95	**0.97**	0.87	0.61
CPR5	0.98	0.91	0.95	0.97	0.97	0.96	0.93	0.96	0.93	**0.98**	0.96	0.63
TPR1	0.91	0.83	0.82	0.86	0.86	0.84	0.87	0.81	0.83	0.87	**0.91**	0.50

	Outer Loading	OPT	INV	DCF	ISC	TEC	FSC	FSZ	CRD	CPR	TPR	ITA
TPR2	0.95	0.79	0.89	0.86	0.83	0.91	0.80	0.84	0.77	0.83	**0.95**	0.54
TPR3	0.95	0.79	0.89	0.86	0.83	0.91	0.80	0.84	0.77	0.83	**0.95**	0.54
TPR4	0.94	0.87	0.93	0.94	0.92	0.95	0.87	0.93	0.87	0.92	**0.94**	0.62
TPR5	0.82	0.86	0.75	0.82	0.84	0.78	0.84	0.79	0.83	0.86	**0.82**	0.49
ITA1	0.85	0.58	0.63	0.60	0.60	0.60	0.62	0.59	0.63	0.58	0.55	**0.85**
ITA2	0.68	0.38	0.39	0.40	0.40	0.38	0.45	0.40	0.46	0.41	0.31	**0.68**
ITA3	0.71	0.46	0.46	0.50	0.48	0.47	0.50	0.51	0.50	0.48	0.43	**0.71**
ITA4	0.78	0.53	0.55	0.53	0.50	0.54	0.49	0.55	0.50	0.49	0.49	**0.78**
ITA5	0.81	0.41	0.55	0.52	0.48	0.53	0.48	0.53	0.50	0.47	0.46	**0.81**

The above SmartPLS 2.0 calculation results can be used as a substance for interpretive evaluation by considering the response and cognition of the sample from the respondents' demographics.

All the indicators above show excellent results because the questionnaire questions given are only answered by the owner or top manager who incidentally has a policy approach for a good future. On the other hand, this questionnaire test has been done in previous research , where the study contained 13 indicators that were rejected [23]. Researchers assume the improvement in these results is also due to the manufacturing industry-based industrial industry that has made improvements in the development and use of information technology in its SMEs.

4. Conclusion

Based on the research objectives to be achieved, this research wants to find out the factors that influence the level of readiness towards the adoption of information technology. The resulting analysis is based on questionnaire questions that have been filled out by respondents resulting in this pretty psychometric trait. In total, 70 subjects were asked, and all of them produced excellent grades. All proposed indicators get positive values based on agreed thresholds. This can be seen from all indicators resulting in cross loading> 0.7, composite reliability> 0.7, and AVE> 0.5. Other results shown by the majority of respondents (54.4%) answered that the percentage of the level of readiness of SMEs towards IT adoption was more than 50%.

Meanwhile, 31.7% of respondents stated that a percentage of more than 75%. Respondents were taken from only about five regions of Jakarta, and the demographics of respondents greatly influenced the research. This was demonstrated by previous research. This study also limits its use according to the sample used when distributing questionnaires. The method and questionnaire development model is the result of the creation and interpretation of the researcher in reparation of questionnaire. The results obtained from this study will be the main reference in the development of subsequent research that will take samples for the entire area of Java. Given the diversity of SMEs in the region of Java which is very varied with the Jakarta area and its surroundings

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