

ICT adoption in affecting organizational performance among Indonesian SMEs

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Abstract

The objective of this research is to identify conceptually factors affecting ICT adoption and its impact among Indonesian SMEs. The prior studies involve conceptual model of the combination between Diffusion of Innovation (DOI) theory, The technology-organization-environment (TEO) theory, and Iocovou's framework. The prior studies believed the Internal and external factors influencing ICT adoption. This study found that the characteristic of technology, organization, and managerial are included as internal factors in adopting ICT. In the meantime, environment factors also are included as the external factor. Thus, the impact of ICT adoption would gave contributions on the efficiency and effectiveness of the organization as reflected in the organization performance. Hence, the organization performance could be measured based on the performance of business processes (operational performance) and financial performance (final performance). Reducing cost, increasing productivity related to operational performance, and profit margin, market share related to final performance. In brief, this study presents the conceptual framework of ICT adoption among Indonesian SMEs. Reviewing numerous prior studies to develop the research framework of this study is undertaken. However, the empirical study of current paper should be continued in the further research.

Key word: *internal factor, external factor, ICT adoption, organizational performance, operational performance, final performance.*

1. Introduction

Nowadays, the adoption of ICT by industries cannot be denied. Majority of ICT adoption is applied by large companies even SMEs. The ICT adoption development is not avoided by any business organizations. Such as the business activity tend to apply ICT that given the impact on SMEs business process. The large industries have concern with the use of new technologies in supporting the business. Over the past two decades, the using ICT by SMEs has generated a great deal of interest among researchers, governments, and international organizations.¹ However, majority of SMEs is limited usage to adopt of ICT in business activities.²

Several studies argue generally is still the slowness of SMEs to adopt ICT.³ This is supported by several research that exposes many factors affecting the adoption of ICT on SME in developing countries.

Despite the many obstacles of adoption of ICT SMEs in developing countries but slowly began to accept the use of ICT adoption.^{4,5,6,7.} There is still lack of a model and framework used of SME in evaluating SMEs effectiveness and the impact ICT

in developing countries. This is interesting to formulate the framework or model in the context of developing economic.⁴

We will start by presenting the literature review. Then we will suggest a conceptual modal regarding factor affecting ICT adoption and its impact among SMEs. Finally, we will suggest the limitation and the research perspective

2. Literature Review

The key question that we use to organize our perception is "How factors can affecting ICT adoption and its impact on an organization?". In order to answer that question, we think at least that the different concepts have to be clarified in order to present the theoretical background

2.1. Factors affecting ICT Adoption

An important and fast growing technological innovation during this century is computer-based information systems. Information system (IS) and Information technology (IT) an opportunity for business to improve their efficiency and

effectiveness, and even to gain competitive advantage.^{8,9}

The literature shows the diversity of different perspectives toward factors that affect IT adoption process. Most of these perspectives and studies have concentrated on influencing factors such as top management, organizational behavior and characteristics, firms' resources are internal factors, government, customers, supplier and external IT consultant, vendors are external factors.¹⁰

The previous study e-commerce recommend the technology-organization-environment (TOE) framework can absolutely provide an appropriate starting point for studying e-commerce adoption.¹¹ The TOE framework was developed by Tornatzky and Fleischer.¹² Three aspect from TEO framework that affect the process adopts and implements a technological innovation. This framework is consistent with the diffusion of innovation (DOI) theory by Rogers¹³ emphasized individual characteristic and both internal and external characteristics of the organization in study of drivers for new technology.^{10,14} Technology, organisational, and managerial characteristic are internal factors, environment is external factor.

In this research, the influencing of adoption of information system and e-commerce have been adjusted for ICT adoption. In the following section ICT adoption is discussed as the dimensions of technology, organization, managerial characteristic, environment, and organization performance.

Internal Factors

Technology/Innovation of ICT

Technology/Innovation is seen as a necessary measure for adoption, when adopt and use ICT. The other study describe that technological factors will be a technology viable whether it is perceived usefulness and easy of use are considered reasons for adoption.¹⁵ Dimension of technology factors based on DOI (Diffusion of Innovation) model. Rogers (1995)¹³ introduced the DOI model, namely a popular model in investigation of the behavior of users in adopting new technological innovation. This model proposed five perceived characteristics of innovation which consists of *relative advantage*, *compatibility*, *complexity*, *trialability* and *observability*.

Golding et al (2008)¹⁸ argued that *relative advantage* was expressed by perceived benefit. Perceived benefits include reduce transaction cost, improved cash flow, increase productivity, and better customer service.^{16,17,18,19} *Compatibility* included dynamic content, experience and needs of potential adopters, resistance to change, support from the top management, suitability of business processes with suppliers and customers.^{18,19,20,21} *Complexity* measured based on difficult to use, problems with locating desired information, rapid

changes and technological advances, technical constraints, the skills and training required, complex to skill for employee.^{19,20,21,22}

Trialability is defined he degree to which an innovation can be used on a trial basis before confirmation of the adoption must occur.¹⁸ Furthermore, It can be measured in the presence of advice from consultants, opportunity to test the technology, experiment with ICT tools, ability employee, much effort in testing technology, the new technology complicated to use.¹⁸ *Observability* refer to the degree of visibility of the new technology results.²³ These as a measure of observability of technology which included positive results of using ICT, benefit of ICT usage, customer satisfaction, profit, productivity, product quality, and abreast with competition.^{18,21,24}

The DOI model is a popular model to investigate DOI in different sectors of the economy including SMEs. This model is inclined toward investigating new technology and diffusion.¹³ Hence, The main focus this study that it attempt to identify innovative characteristic rather than the whole innovation process.^{23,25}

Beside the five characteristic in DOI, many previous study have recognize ICT *security* (confidentially) and *cost* as significant factors affecting ICT adoption. This is supported by Ghobakhloo et al²⁶ and Irefan et al²⁷, cost of IT adoption is influencing IT adoption in SMEs. Contrast by Al Qirim²⁸, the financial cost of operating and implementing the e-commerce application was not influence adoption. This is supported by Tan & Eze²⁹, ICT cost is not a significant contributor to ICT adoption. According to Ghobakhloo¹¹, IS adoption is also influenced by indirect cost (such as the costs of human factors or training) and direct cost (such as cost of IS adoption and maintenance for IS adoption). In this study using direct cost and indirect cost, so that factors affected cost in ICT adoption are the cost of ICT adoption, the amount money and time of training, maintenance and support fees.

Security, the literature reveal that one of the main reasons that determine innovation adoption was ICT security and confidentiality.^{20,28} The many organizations are reluctant to embrace e-commerce mainly as security issues. SMEs may face security problems in many forms, including payment security, privacy and confidentiality of the information or viruses. The major barrier to wider adoption of e-commerce is security and the ability of organization in the forms of confidentiality, integrity and availability of information assets.³⁰ Based on the above description, measurement of the security in this study was related with business transaction, confidential data, risk of business, and privacy. The table 1 list the factor of technology in previous

Table 1. Factor of technology variable in previous studies

No	Dimension	Definition	Factors	References
1.	Perceive relative advantage	ICT adoption will provide benefits to organization	<ul style="list-style-type: none"> - the cost - customer relationship - productivity 	18,19,21,23,30,35,51,67
2.	Compatibility	ICT adoption is perceived to be in keeping with previous experience and existing values, and with the needs of possible adopters	<ul style="list-style-type: none"> - business need - supplier and customer - support - resistance 	18,19,20,21,25
3.	Complexity	ICT adoption is perceived as relatively difficult to comprehend and use	<ul style="list-style-type: none"> - using - skill - information problem - advance - technical - training - 	18, 21,25,70
4.	Trialability	ICT adoption can be used on a trial basis before confirmation of the adoption must occur	<ul style="list-style-type: none"> - advice - test - experiment - ability - effort - complicated 	18,24,25,51.
5.	Observability	The potential adopter perceives that the results of an innovation are visible to others.	<ul style="list-style-type: none"> - Result - benefit - satisfaction - profit - productivity - quality - abreast 	18,25,51,70.
6.	Cost Investment	Adoption of ICT requires cost investment for implementation	<ul style="list-style-type: none"> - expensive - money and time - maintenance 	10,25,27,30,67
7.	Security	Security and the ability of organisation to ensure confidentiality, integrity, and availability of information assets	<ul style="list-style-type: none"> - transaction - protection - risk - privacy 	29,35.

In this study, these seven characteristic would be dimension of technology variable developed from prior study concerning influence technology adoption.

Organization.

Organization tends to adopt the technology if the consistency with their culture, values, preferred work practices and the availability of the infrastructure. Geographically, organization that has international or global orientation^{31,8} will accelerate the adoption process of ICT.¹⁹The global scope enables the cost efficiency to get the new market, new customer and the distribution of goods and services and also to improve the coordination between suppliers and business colleague.

In using ICT adoption globally, it needs resources. In a company, the most important resources to adopt the new technology consist of finance, human and technology resources (computers, telephone lines, cables, etc).^{32,9,19} Especially in SMEs, if the manager views and think about the important of ICT adoption without followed with the resources that the company had. This part becomes the challenge for the SMEs

in Indonesia to adopt ICT caused by the lack of finance, education, and innovation.³³

As the explanation above, human resource is important. Human resource in a company is the employees. the employee's knowledge is really important to the company's ability in adopting ICT and using it. In adapting with the new technology, it needs the changing in work behavior, qualification and knowledge about the technology itself. One of the reason to not to adopt IC is the lack of the internal skill³⁴, it cause a company postpone the adoption of ICT.⁹ As long as the employee has the knowledge about ICT, so the organization tends to adopt it.^{19,35,36}

Companies or organizations that adopt ICT must be supported by the strategy of the company. This is supported by the statements of ¹⁹, that the orientation of the strategy on corporate organization becomes a factor to influence the adoption of technology. The orientation of the strategy used to see company involvement in the analysis and planning of strategy, so it can be examined from risk strategy and help speed up the adoption process technology.³¹

From the explanation above it can be concluded that there are four dimentions of organizational variable that is knowledge, resources, strategic

orientation, globalization. All dimentions is explained by the below of the Table 2:

Table 2. Factors of organizational in previous studies

No	Dimention	Definition	Factors	References
1	Knowledge	Knowledge and proficiency in using of ICT.	- Knowledgeable - competent - proficience	9,19,35,71
2	Resources	ICT adoption needs the financial resources, human and information technology	- financial - technology - human	9,10,19,32
3.	Strategic Orientation	The use of ICT adoption has the orientation to strategy, coordination and the suitability.	- Sstrategic - coordination - alignment	19,31,72
4.	Globalization	Oriented globalization will help the accelerate of ICT adoption.	- competitiveness - participation - relatedness	19,31,71

The dimensions of the organization's research focuses on corporate strategy and the resources that exist in the company.

Managerial Characteristic

Managerial characteristic in this research explain about people to make decision in SMEs just like owner’s, chief executive officer (CEO) or top manager. A number of research stated that the individual characteristics play a crucial role in the implementation of new technology.^{37,38,39}

The characteristics of the individuals represented by the CEO or owner's on SMEs is an important part in adopting ICT. Some research found that the positive impact of knowledge CEO ICT adoption⁴⁰ and experience of the CEO is

another trait that influence of ICT in SMEs.^{41,42,10,43,44}

According to Jeon in Korea⁷¹ CEO's knowledge largely determine the adoption of e-business. While the research results Huy in Viet Nam¹⁹ knowledge is insignificant against the use of ICT adoption.

Addition the influence of the use of ICT indicated by the attitude of top managers (CEO) or owners.^{18,45} Some of the literature supports the statement above who said that the existence of a strong link between CEOs attitude towards its implementation and success does ICT.^{46,47,19}

Some researchers have also suggested that a positive attitude toward ICT does correlate with the spread of the use of, and development.^{48,49,9,8,19} The table 3 below describes the dimention and factors of the managerial characteristic :

Table 3. Factors of managerial characteristic in previous studies

No	Dimention	Definition	Factors	References
1	Attitude toward innovation	The manager’s positive behavior to the use of technology.	- attitude - receptive - capability - realize	8,9,19,28,71
2	Knowledge of the new IT	The knowledge of the managers about technology.	- Use - awareness - rapid	8,9,10,19

Besides organizational characteristic, the individual characteristics are also importance has been investigated. So that this study have focused on characteristics of the managerial or CEO (owner).⁸In this study, three factors consisting of technological, organizational, and managerial inserted into the internal factors that influence ICT adoption.

External factor; Environment

Environment in research is something that outside their organization and cannot be controlled that is government, customer and suppliers pressure.

The environment have a strong impact of the decision to adopt ICT.³⁹

Government play an important role in the development of the use of ICT in the SMEs. Literature also said there is a significant positive relationship between ICT and government support.^{23,26}Due to its size and lack of resources of SMEs so that the need for support and external resources.⁴⁷ Fink⁴¹ argues the government support facilitates the transfer of information for SMES is increasing gradually. Government support to the adoption of e-commerce in Brunei is still low research based Looi.³⁵ This statement is supported by Teo et al³⁴ that his Government's role in the

Smash in Singapore in adopting on the Internet. In contrast with research^{23,10}, the Government's role is very significant to help and encourage the adoption of ICTs on SMEs.

Beside the government, customers and suppliers also included the factor of environment. Because of the pressure from buyers and suppliers also affect the adoption of ICT in SMEs.^{48,39,49,14,11,22,50}

Table 4. Factors of environment variable in previous studies

No	Dimension	Definition	Factors	References
1	Government	The support from the government to the use of ICT adoption.	- fund - assistance - information - encouragement	10,19,31,35,67,71,77
2.	Customer and supplier	The influence of customers and suppliers to the use of ICT adoption.	- pressure - demand - counterpart	10,19,22,35

This study concentrates on two such factors: government and customer and supplier pressure. Government is critical in supporting the ICT adoption on SMEs in developing countries. The many obstacles on SMEs to undertake the adoption technology.^{51,27} Customer and supplier of pressure will force SMEs to use ICT adoption in order to improve the marketing of its product. External factor in this study is environment due to this factor is outside the organization and difficult to control

in organizational performance toward ICT⁵⁷ is vital to SMEs.⁵⁸

Operational Performance

Operational performance is one of the organization performance in the short time in using of ICT adoption. The impact of operational performance in using measures productivity, cost reduction^{59,60,61}, new products development, services and processes, quality improvement in products and services, and increased speed in product delivery.⁵⁶

2.2. Impact ICT Adoption

A number of studies show the effects of various technologies, that is used and the level of the adoption on the performance of companies with demonstrated complementary between technological and organization change.⁵² Several type of performance measured based on the literature of ICT such as financial performance, and operational performance⁵³, and other impacts.⁵⁴

Additional operational performance can be measured by unit cost of production, product specifications, delivery performance, product development, product innovation, and customer support and services. According to the Lii et al⁶² performance of online marketing which is part of ICT can increase the productivity, efficiency, percentage of new customer, percentage online sales.

The efficient use of ICT in SMEs lead to increased organizational performance, productivity, and access to market.⁵⁵ Organizational performance includes the increase in sales, market share and profitability compared to competitors.⁵⁶ Consequently, a significant positive

So the operational performance in a short-term impact from the use of ICT can enhance the business development does, efficiency and customer satisfaction. The operational performance in this research prioritized on the product and service on SMEs that have used ICT adoption since it is directly related to the consumer

Table 5. Factors of Operational Performance in previous studies

No	Factors	Reference
1.	productivity	52,83
2.	cost	52,60,83
3	new products development	52,85
4	services and processes	82,83,85
6	quality improvement in products and services	52,84.
7	speed in product delivery	52,85.

Final Performace

The company implemented the use of ICT adoption in order to generate positive performance of organizations like the margin of profit and the

profit resulting from the growth of e-commerce that is part of ICT does. The overall impact of the organization measured using margin and profit⁶⁰ and increased market share.⁵² Generally, it shows the final performance is the impact of ICT

does in the long run that will affect the company as a whole.

Table 6. Factors of Final Performance in previous studies

No	Factors	Reference
1	profit	52,60,67,83,84
2	Market share	52,67,84

In this study, the final performance is addressed to the organization's performance related to finance and the ability to dominate the overall market.

3. Conceptual model of research

In the conceptual model we tried to show the factors affecting ICT adoption and its impact to organization performance. The H1a, H1b, H1c concern to internal factors as affecting ICT adoption. H2 is external factor to influence ICT adoption. H3, H4, H5 analyze impact of ICT adoption on organization.

3.1. ICT Adoption

ICT adoption construct in this study focuses on the actual uses of ICT as the use of computers, internet access, use for communication, as well as for marketing. The use of ICT is focused on the use of the organization. Actual of use are shown in search of information, receipt of orders from customers, receiving payments from consumers, consumer service receipts, purchase orders, payments to vendors.^{52,63,64,65,66} Also, the use of ICT by SMEs is indicated by marketing and the communication tools used between company and users, and between customers and business partners.

Some literature shows the use of ICT adoption is influenced by internal and external factors of organizational.^{51,5,10} Internal factors affecting the use of ICT is technology, organization, managerial characteristic whereas eksternalnya factor is environment

Technologies are defined and presented in a variety of dimensions consisting of perceived relative advantage, compatibility, complexity, trialability, observability, cost investment and security. Regarding the perceive relative advantage, past study^{28,67,68,10,69,70,35,25} have shown statistically for significant to use of ICT. Meanwhile, compatability is also reported to have significance with ICT adoption such as business need, supplier and customer, and top management support.^{70,15,10,18,25}

At same time, complexity and trialability have significant to using ICT adoption such as use, skill, technological advance.^{70,22,21,23} In additional, observability has also significant to use ICT such as satisfaction, profit, productivity.^{51,18,70,21,25} Besides

that cost investment and security will effect the degree of ICT adoption.^{28,10,27,35,25} These constructs are necessary in encouraging users to use ICT. The relationship between technology and ICT adoption is presented in the first a hypothesis of this research

H1a : There is the significant relationship between technology factors and ICT adoption among Indonesian SMEs

Organization is also associated with ICT. The literature reported that ICT adoption which may include employee, resources, strategic, and globalization^{71,19,10,31} play a important role in the adoption of new technology^{72,9,73} The study in SME's Vietnam, the determinant of e-commerce adoption is the employees' knowledge and the resources of enterprise.¹⁹ The firm's strategy orientation can play an important role in the adoption of information technology.^{74,73} The global reach of the internet makes more beneficial, as a consequence firms with greater globalization are likely to use e-business.³¹ The above discussion lead to the following hypothesis.

H1b : There is the significant relationship between organization factors and ICT adoption among Indonesian SMEs

We investigate specifically two factors from managerial characteristic i.e attitude toward innovation and knowledge of managers. The literature suggests a clear link between the attitude of the CEO towards IT and successful application of IT.¹⁹ A number of authors have posited that positive attitude toward general IT adoption and e-commerce.^{10,19,8} Manager who has knowledge of information technology has an effect on the adoption of e-commerce⁸, and their knowledge of new technologies and e-commerce has a positive effect on the level of use of e-commerce^{71,32} As a result, we proposed the following hypotheses for the context of ICT adoption :

H1c: There is the significant relationship between managerial characteristic factors and ICT adoption among Indonesia SMEs

The environment (extrenal industry) plays a significant role in the adoption of new technologies and considered in IT innovation adoption in organization.⁷⁵ External industry refer to trading partner (buyer and supplier) and government policies.⁷⁶ According to previous study pressure from buyer and supplier seemed to be logical reason for adopting EDI²⁸, e-commerce^{51,10,19}, and

ICT adoption.⁶⁷ This is supported by⁶⁹ states that supplier and customer had strong influence on IT adoption. Another reason for small businesses to adopt IT comes from government policy. The number of study showing government support for e-commerce^{51,15,71,35,77} and ICT adoption^{67,27} in various develop and developing countries. The second hypothesis presents the relationship between environment and ICT adoption as below :

H2 : There is the significant relationship between environment factors and ICT adoption among Indonesian SMEs.

3.2. Operational Performance

The study of Anh & Matsui, 2011 result that quality management information (QMI) significantly affect the different dimensions of the operational performance of the various countries. According to Bayo et al⁵² reveal ICT resources are positively associated with operational performance. This is supported by Gibbs et al,⁷⁸ E-commerce is an additional channel on the firms for doing business as a means to reduce costs as a means to improve operational performance. Many SMEs have not yet reached a level of maturity that most SMEs expect a short term increase of operating performance.⁷⁹ The relationship between ICT adoption and operational performance are presented in the third hypothesis :

H3 : There is the significant relationship between ICT adoption in Indonesian SMEs and operational performance

3.3. Final Performance

Based on some types of ICT are investigated by Bayo et al⁵² showed a significant relationship between operational performance with the final performance. Type of ICT distinguished on the term of general use, communication and market oriented. This is supported by Paul & Anantharaman⁸⁰ reveal the effective operational performance will affect financial performance of an organization. The relationship between operational performance and final performance are presented in the four hypothesis :

H4 : There is the significant relationship between operational performance and final performance in Indonesia SMEs.

According to Apulu⁵⁸, ICT adoption on SME's Nigeria has been identified may increase profit caused ICT utilization in marketing can increase profit (final performance) in many organization. The various evidence at the firm level as to impact of IT capital on financial performance measures

such as profit and market value (final performance).⁸¹ ICT impact on final performance (market share and profit) occur mainly indirectly by means of the improvement of internal and external communication as through operational performance.⁵² It shows the influence of ICT adoption on the final performance of the company. The fifth hypothesis looks at the relationship between ICT adoption and final performance

H5 : There is the significant relationship between ICT adoption and final performance in Indonesia SMEs

Figure 1 shows proposed conceptual framework that integrates the influences and impacts of ICT adoption. The results of a literature review suggest 7 hypotheses. There are 7 determining factors of ICT adoption consisting of technology, organizational, managerial characteristic, environment, ICT adoption, operational performance and final performance.

4. Implication and research limitation

The finding carry theoretical implications for the ICT adoption literature as they extend the scope of the research on organizational performance. More over, this research allows managers to recognize better how to manage organization the efficiency and effectively and to expand uses ICT adoption ion company with the aim of identifying organization performance.

This research has limited consist of the model is derived from related the literature, combine Tornatzky and Fleischer's model¹², Roger' model¹³, Iocovou model⁸² and is then adjusted to organizational perspective and Indonesia context. ICT adoption in research focus in basic and intermediate uses ICT in SMEs.

5. Conclusion

Nowdays, the adoption of ICT by industries cannot be denied. Majority of ICT adoption is applied by large companies even SMEs. The ICT adoption development is not avoided by any business organization, such as the business activity tend to apply ICT that given the impact on SMEs business process. However majority of SMEs is limited usage to adopt of ICT in business activities. This is caused internal and external factors. This research will look at the factor that influence the use of ICT adoption among SMEs.

Furthermore, In general the use of ICT is also the impacted on organization performance. Organization performance refer to ICT contributions to organization, including cost saving, expanded markets, additional sales, reduced costs, time saving, productivity, profitability, and market

value. In this research, organization performance divided into 2 (two) ; (1) operational performance (

the performance of business process). (2) final performance (the performance of financial)

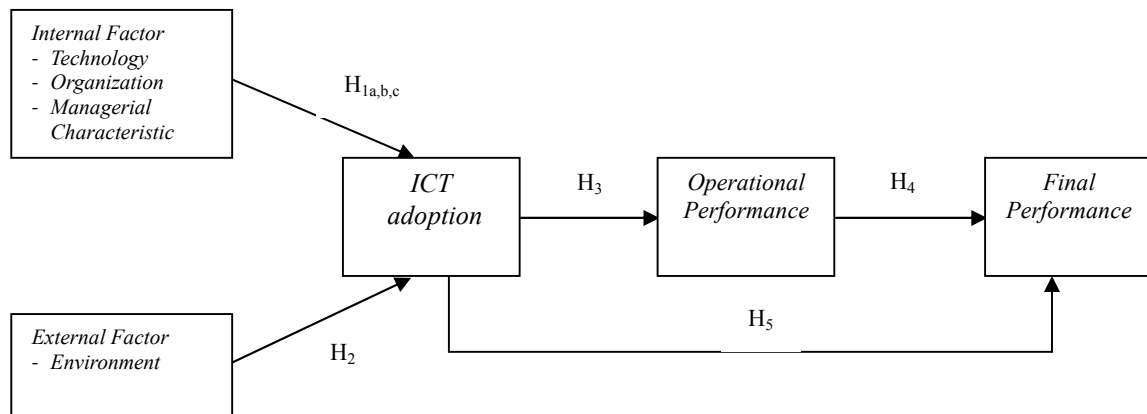


Figure1 : The Proposed Framework of The Research
Source : Iocovou (1995), Roger’s (1995), Tornatzky & Fleischer (1990)

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