

# Knowledge Sharing Capability, Absorptive Capacity, and Innovation: An Empirical Study of Indonesia's Information and Communication Technology Industries

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## ABSTRACT

*This research investigates the relationships between knowledge sharing capability, absorptive capacity, and innovation. We propose statistical hypotheses and Structural Equation Modeling to study these relationships based on the data sampled from 104 companies of Indonesia's information and communication technology industries, including, telecommunication service provider, support service provider, network vendors, and consumer devices vendors. By testing three hypotheses, this study finds that absorptive capacity is the intervening factor between knowledge sharing capability and innovation. It also shows that potential absorptive capacity has a positive effect on realized absorptive capacity, and realized absorptive capacity has positive influence on product and process innovation.*

## Keywords:

*knowledge sharing capability, absorptive capacity, innovation*

## 1 INTRODUCTION

Globalization impact facilitated by the use of information and communication technology results in increasing tightness of interfirm competition. This circumstance demands every company to increase its competitive advantage continuously in order to survive and be able to win the competition. According to Barney (1991), there are many ways that can be undertaken by the company to achieve competitive advantage; however, the most important aspect required in the dynamic environment is the success in generating innovation.

The company's ability in generating innovation continuously is viewed as the main source which could sustain the company's competitive advantage and could avoid the risk of being eliminated from the market. Choo (1998) reinforces that companies which manage to survive in and manage to continuously develop its business in a long term not determined by their size from the size or the fortune of the company, but it is because the company is able to perform its capacity to adapt faster and to continuously innovate. The resource to generate innovation is the knowledge proprietary. An organization's available knowledge is

becoming an increasingly important resource (Hooff & Weenen, 2004). To make knowledge available, it is crucial that individuals and departments are involved in the process of knowledge sharing (O'Dell & Grayson, 1998).

Previous research claim that knowledge has a relationship with absorptive capacity. The company's absorptive capacity has a significant influence on the ability to innovate. For example the research in conceptual level conducted by Zahra and George (2002) investigates the relationship among knowledge, absorptive capacity, and competitive advantage. Quinn et al. (1996) states that the foundation of a company's competitive advantage is to make use of its absorptive capacity to develop unique competitive ability. However, in line with Liao et al. (2007), current related studies present little discussion on how to improve or develop the company's absorptive capacity.

This study investigates the relationships among knowledge sharing capability, absorptive capacity and innovation in Indonesia's information and communication technology industries. In this research, we define absorptive capacity as the company's ability to acquire and assimilate knowledge (potential absorptive capacity) and the ability to transform and explore the knowledge (realized absorptive capacity) Zahra and George (2002). We use LISREL on the sampled data from 104 companies of Indonesia's information and communication technology industries. These firms include telecommunication service provider, support service provider, network vendors, and consumer devices vendors.

## 2 LITERATURE REVIEW

### 2.1 Knowledge sharing capability

Szulanski (1996) defines knowledge sharing as the exchange or transfer process of facts, opinions, ideas, theories, principles and models within and between organizations including trial and error, feedback and mutual adjustment of both the sender and receiver of knowledge. Hooff and Ridder (2004) states that knowledge sharing is a concept defined as process where individuals exchange their knowledge (tacit and explicit knowledge) and collectively create new knowledge. This definition implies that every knowledge sharing behavior consists of bringing (donating knowledge) and getting (collecting knowledge).

Bringing is behavior of communicating one's personal intellectual capital to others and getting is individual behavior to consult to other individuals on one's intellectual capital. The two behaviors are distinguished as active processes, both in communicating or consulting. The two behaviors are distinct in nature and pose different impact. Following Hooff and Ridder (2004) and Hooff and Weenen (2004), we label the two central behaviors as knowledge donating and knowledge collecting. Knowledge sharing capability in this conceptual review is defined as the employees' ability to conduct knowledge donating and knowledge collecting on experiences, ideas, expertise, and information.

## 2.2 Absorptive capacity

The basic concept of absorptive capacity is originally stated by Cohen and Levinthal (1990), they defined absorptive capacity as the firm's ability to identify, assimilate, and exploit knowledge from external environment. According to Cohen and Levinthal (1990), a firm must continuously acquire, absorb and create new knowledge. Zahra and George (2002) conducted absorptive capacity (ACAP) reconceptualization as a dynamic capability in creating and using knowledge that leverage the firm's ability to acquire and sustain competitive advantage. Zahra and George (2002) remarked that ACAP emerges as two subset potential absorptive capacity (PACAP) consisted as knowledge acquisition and assimilation, while realized absorptive capacity (RACAP) consisted as knowledge transformation and exploitation.

Acquisition refers to the firm's capability to identify and acquire externally produced knowledge. Assimilation refers to the firm's routines and processes that allow the examination, interpretation and understanding of the information obtained from external sources. Transformation refers to the firm's capability to develop and refine the routines that facilitate 'combination' processes. Exploitation involves routines that allow firms to refine, extend, and leverage existing knowledge by incorporating it into its operations (Zahra and George, 2002).

## 2.3 Innovation

The definition of innovation is often intertwined with the definition of invention. Therefore, the early discussion is started by comprehending the difference between innovation and invention. Invention is the first event resulting from a new idea, process, or product. Meanwhile, innovation is the first attempt to realize it. In other words, invention is a new product, while innovation is a new value (Szmytkowski, 2005). West and Farr (1990) define innovation as the intentional introduction and application within a role, group, or organization of ideas, processes, product or procedures, new to the relevant unit of adoption designed to significantly benefit the individual, the group, organization or wider society. Walker, Jeanes, and Rowlands (2002) make distinctions between product and process innovations. *Product innovations*, defined as new products or services.

*Process innovations*, defined as new elements introduced into an organisation's production or service operations and processes. Examples are rules, roles, procedures and structures, communication and exchange among organizational members and between the environment and organisational members.

## 3 RESEARCH FRAMEWORK AND HYPOTHESES

### 3.1 Knowledge sharing and potential absorptive capacity

There is an assumption that performance in various parts of department will increase when the people within the department have the desire to conduct knowledge sharing in terms of sharing information, effective practices, insights, experience, preferences, and other things they have already learned. Knowledge sharing creates high potential to the knowledge stock owned by every employee to result in new understanding.

Knowledge transfer or sharing processes are mostly drawn in an analogy of a communication process of text message transmission which is from the source or the sender to the receiver. Husman (2001) stated that in successful knowledge transfer process, the knowledge senders (S) will have an increase in the level of knowledge stock owned by not causing a reduction on the sender's knowledge stock (S). The knowledge stock value of the knowledge sender (S) remains constant if the knowledge receiver (R) uses and doesn't misuse the transferred knowledge. The knowledge sender (S) also still has control over the transferred knowledge. The knowledge sender (S) only transfers knowledge and still has the knowledge shared, thereby the transfer will not affect the sender's (S) knowledge stock level. The receiver's (R) knowledge stock level increases as prior to the transfer; the receiver has no clue of the knowledge what so ever. Meanwhile the receiver's (R) knowledge stock will remain constant even though the transfer fails.

The above statements provide description of the increase of knowledge stock for transfer process will happen to the receiver. When both parties conduct active processes, thereby the increase of knowledge stock will be gained by both parties; the sender and the receiver since the interaction already took place. In fact, interaction can result in new understanding which can be the new power source. This power can be in the form of collective decision on problem solving which in turn could even generate new knowledge.

#### Hypothesis 1 :

The employees' ability to perform knowledge donating and knowledge collecting with other employees has a positive influence on the company's ability to develop its potential absorptive capacity (PACAP).

### 3.2 Potential absorptive capacity and realized absorptive capacity

Potential absorptive capacity (PACAP) plays important role in updating the company's base knowledge and expertise required to compete in dynamic market. The firms which are flexible in using their resources and capabilities can reconfigure their basic resources in order to gain benefit from the emerging strategic opportunity. Acquisition and assimilation components can lead to maintaining competitive advantage when it is used and integrated properly with other assets and resources in order to overlap one another (Zahra & George, 2002).

Potential absorptive capacity (PACAP) and realized absorptive capacity (RACAP) have separate but overlapping roles. Companies are not possible to exploit knowledge without acquiring it first. As such, companies can acquire and assimilate knowledge but possibly not having the capabilities to transform and exploit knowledge. Thereby, high level of PACAP not necessarily implies high performance. RACAP involves transformation and exploitation of assimilated knowledge by integrating it into the companies's operation, thus improving its performance.

#### Hypothesis 2 :

The company's ability to acquire and assimilate knowledge (potential absorptive capacity-PACAP) has a positive influence on the company's ability to transform and exploit the knowledge (realized absorptive capacity - RACAP).

### 3.3 Realized absorptive capacity and innovation

Several research has paid attention to the relationships between absorptive capacity and the firm's performance. Among others are Zahra and George (2002), they state that competitive advantage is the outcome of absorptive capacity. It includes strategic flexibility, innovation, and performance. Meanwhile, Cohen and Levinthal (1990) link absorptive capacity to a company's outcome which includes innovative capability and innovative performance. Innovation is considered an output over the company's ability to exploit the acquired external knowledge. Zahra and George (2002) confirm that realized absorptive capacity (RACAP) tends to influence the company's performance by means of product and process innovation, after going through transformation and exploitation capabilities that constitutes RACAP, thus the companies will gain the knowledge that leverages and recombines the expertise to pursue the product line extension or new product development (Zahra and George, 2002).

#### Hypothesis 3 :

Realized absorptive capacity (RACAP) has a positive influence on the company's ability to generate competitive advantage by means of product innovation and process innovation.

The research framework is shown in figure 1.

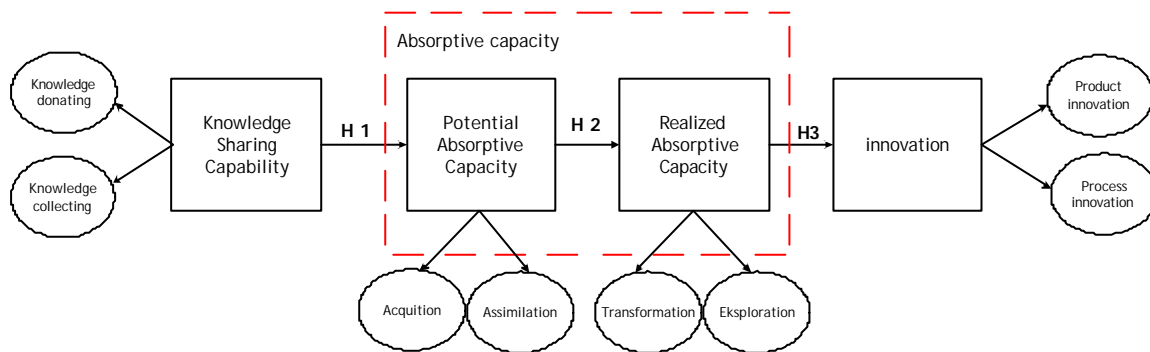


Figure 1 Research framework

## 4 RESEARCH METHODOLOGY

### 4.1 Variable Operations

In this research, in order to translate or to operate variables into measurable variables, the variables are disentangled from concepts, dimensions and elements (Sekaran, 2003). There are three concepts which are translated into measurable elements, namely knowledge sharing capability, absorptive capacity, and innovation.

The first concept is knowledge sharing capability. In this research framework, knowledge sharing capability is an independent variable that describes the employees' ability in

conducting knowledge sharing with other employees in the company. This study employs the concept of Hooff and Weenen (2004), who use knowledge donating and knowledge collecting to measure the degree of knowledge sharing between employees in a firm. However, different from Hooff and Weenen (2004) that uses the term intellectual capital, this research uses the term knowledge which is divided into tacit knowledge, which consists of working experience, ideas, and expertise, and explicit knowledge, which comprises contextual information. Operationally, knowledge donating is defined as the employees' ability in giving their knowledge which includes working experience, ideas, skill, and contextual information to other employees. Knowledge collecting is the employees'

ability to obtain knowledge from or to consult to other employees, in order that they are willing to share their knowledge which includes working experience, ideas, and contextual information to other employees. Some of the original questions from the original measurements from Hoof and Weenen (2004) were modified.

The second concept which is the moderating variable in this research is absorptive capability. Absorptive capability (ACAP) used in this research refers to the concept given by Zahra and George (2002). In addition, due to the limited empirical testing of this concept, it is very much relevant to this research's objective which is to know the firm's ability in acquiring, assimilating, transforming, and exploiting knowledge. Zahra and George (2002) describe ACAP in two subsets, namely *potential absorptive capacity* (PACAP) which consists of knowledge acquisition and assimilation, and *realized absorptive capacity* (RACAP) which consists of knowledge transformation and exploitation. Operationally, the ability to acquire knowledge is defined as the firm's intensity and speed to identify and obtain the knowledge required for the operational activities which is acquired from external environment. The ability to transform knowledge is the firm's ability to sort or examine the existing knowledge, synthesize knowledge, and combine the externally acquired knowledge. The ability to transform knowledge is the firm's ability to develop and improve the routines that facilitate the incorporation of the existing knowledge and the new knowledge. And the ability to exploit knowledge is the firm's ability which is based on the routines that enable the firm to improve, expand, and leverage the existing competence or creating a new one by incorporating the acquired knowledge.

The last concept is innovation. The definition of innovation concept used in this research is the company's success in generating product innovation and process innovation as the embodiment of the company's ability in managing the existing knowledge. In order to make it measurable, the operational definition provided is the company's achievement in generating product innovation, which is refinement, product modification, or new services, and the company's achievement in generating process innovation including the company's success in performing improvement, moderation, and operational activity changes or administration processes or creating new working procedures for service activities.

At Table 1 can be seen formulation of dimension and elemen this research.

Table 1 Dimension and elemen

Variable	Dimension	Elemen	
Knowledge sharing capability	Knowledge donating	D1 D2 D3 D4 D5 D6 D7 D8	
	Knowledge collecting	C1 C2 C3 C4 C5 C6 C7 C8	
Absorptive capacity	P A C	Acquisition	Q1 Q2 Q3 Q4
		Assimilation	A1 A2 A3
	R A C	Transformation	T1 T2 T3
		Eksplotation	E1 E2 E3
Innovation	Product innovation	N1 N2 N3	
	Process innovation	N4 N5 N6	

## 4.2 Measurement

The collected data by means of conducting survey is the respondents' perception towards the indicators of interfirm knowledge sharing capability, the firm's absorptive capacity, and the firm's achievement in generating product innovation and process innovation. The data is measured by questionnaires with seven point scale (1 = totally disagree, 6 = totally agree, 7 = do not know). An empirical study is conducted to explain the developed model. The research model is operated and based on the operational process a set of survey questionnaires is developed.

## 4.3 Sample design

The population of this research is the companies in information and communication business in Indonesia. The clustering applied is based on the classification provided by Indonesian infocom society. These companies including 8 telecommunication operators, 24 companies internet service provider, 3 broadcast companies, 41 support service provider, and 21 capital and consumer devices vendors. To ensure sufficient variation in classification, the sample design used is disproportional stratified sampling. This choice of design is based on consideration that in spite of the difficulties encountered in obtaining the accurate information on the number of the companies of Indonesia's telecommunication provider business, however, each classification could be represented.

## 4.4 Reliability and validity

Confirmatory factor analysis was performed to investigate reliability and validity. The results are shown in Table 2. In the reliability analysis, the Cronbach's  $\alpha$  are greater than 0.7 and the composite reliability (CR) values are all higher than 0.6, meeting the benchmark of Bagozzi and Yi (1988) that CR values should be higher than 0.6. The goodness of fit index (GFI) values are between 0.86-0.98. Although the root mean square error of approximation (RMSEA) results are somewhat higher than 0.05, the questionnaire measurements still show consistency. The RMSEA = 0.05 indicates close

fit, while  $0.05 < RMSEA = 0.08$  indicates good fit (Brown and Cudeck, 1993). McCallum (1996) further elaborates this cut point by adding that the RMSEA in range of 0.08 and 0.10 shows marginal fit.

Table 2 Reliability and validity of the questionnaires

Variable	Dimension	a	GFI	RMSEA	CR
Knowledge sharing capability	Knowledge donating	0.88	0.86	0.078	0.87
	Knowledge collecting				
Absorptive capacity	P	0.73	0.95	0.085	0.73
	A				
	R	0.78	0.97	0.086	0.78
	A				
C	Transformation	0.82	0.98	0.00	0.81
C	Eksplloitasi				
Innovation	Product innovation	0.82	0.98	0.00	0.81
	Process innovation				

## 5. DATA ANALYSIS AND RESULTS

The analysis of structural model covers will be explains in the following section.

### 5.1 Overall fit

As a method, Structural Equation Modeling (SEM) does not have the capability in statistically testing the prediction power of the model. Therefore some Goodness of fit or GOF measures are developed. The three measures used are namely absolute fit measures, incremental fit measures, and parsimonious fit measures. We have taken into account several indexes to be used as testing considerations.

Table 3 Goodness Of Fit result

Variable Relationship		Goodness Of Fit				
		Absolute fit measures		Incremental fit measures		Parsimonious fit measures
		GFI	RMSEA	CFI	AGFI	Normed Chi-Square
KSC	PAC	0.79	0.077	0.82	0.82	1.77
PAC	RAC	0.87	0.094	0.89	0.81	1.90
RAC	INO	0.91	0.074	0.95	0.85	1.56

The overall fit of the model can be seen from the Goodness of Fit statistics in Table 3. Absolute fit measures comprise of GFI (Goodness of Fit Index) and RMSEA (Root Mean Square Error of Approximation). GFI is a measure of model accuracy in generating observed matrix covariance. The GFI coefficient ranges from 0 (poor fit) to 1 (perfect fit). The  $GFI \geq 0.90$  is a sign of good fit, while  $0.80 \leq GFI < 0.90$  is a sign of marginal fit (Joreskog and Sorbon, 1984). In Table 3, the GFI ranges from 0.79 – 0.91. RMSEA is the most informative fit model indicator. RMSEA measures the parameter values deviation in the model by the covariance matrix of the population (Brown and Cudeck, 1993). The  $RMSEA \leq 0.05$  indicates a close fit, while  $0.05 < RMSEA \leq$

0.08 indicates a good fit (Brown and Cudeck, 1993). In Table 3, the resulting RMSEA value is between 0.077 – 0.094.

Incremental fit measures consist of CFI (Comparative Fit Index) and AGFI (Adjusted Goodness of Fit Index). CFI is an expansion of NFI (Normed Fit Index). Betler (1990) revised this index, because NFI tends to lower the fit level on a small sample. The resulting CFI is between 0.80 – 0.93. In which the parameter recommended by the values ranges from 0 – 1, in which higher values is better. The CFI value  $\geq 0.90$  is good fit,  $0.80 \leq CFI < 0.90$  constitutes marginal fit. As can be seen in Table 3, the resulting CFI is between 0.80 - 0.93. AGFI is an extension of GFI adjusted to the degree of freedom influence out of the hypothesized model. The recommended parameter is between 0-1, where a higher value is better. AGFI value = 0,90 constitutes Good-fit, while  $0,80 = AGFI < 0,90$  constitutes marginal-fit. In Table 3 it can be seen that the resulting AGFI ranges from 0.81 – 0.85.

Parsimonious fit measures by using Normed Chi-Square ranges from 1.56 – 1.90. Normed Chi-Square is a ratio between Chi-Square and the degree of freedom. The suggested values: lower threshold = 1.0, upper threshold = 2.0 or 3.0 (Hair et al., 1988). From the GOF indexes shown in Table 3 it can be concluded that the overall fitness of the model is considered good.

### 5.2 Causal Analysis

SEM is an effective tool to explore and to contrast hypothesis on causal relationship among the variables by using the observation data. Structural Equation Modeling (SEM) is an analytical technique that enables the researcher to investigate the relationship among complex variables in order to get a thorough description of the overall model. In order to figure out the significance of the intra-variables relationships in the structural equation, thus t value has to be higher than the t value in the table to a certain degree depends on the sample size and certain significance level. In 0.05 significance level, the sample size is 104 companies, therefore the t value from the structural equation has to be 2.00. Table 4 shows the interpretation result of the structural equation.

Table 4 The interpretation results of the structural equation

Variable	Variable	?	?	t	Interpretasi Requirement :  t  > 1.96
Knowledge sharing capability	Potential absorptive capacity	0.77	0.13	5.99	H1 is proved.
Potential absorptive capacity	Realized absorptive capacity	0.93	0.17	5.45	H2 is proved.
Realized absorptive capacity	Innovation	1.00	0.16	6.43	H3 is proved.

From Figure 2 and Table 1 it can be seen that RACAP has more constitution to process innovativeness compare to product innovativeness.

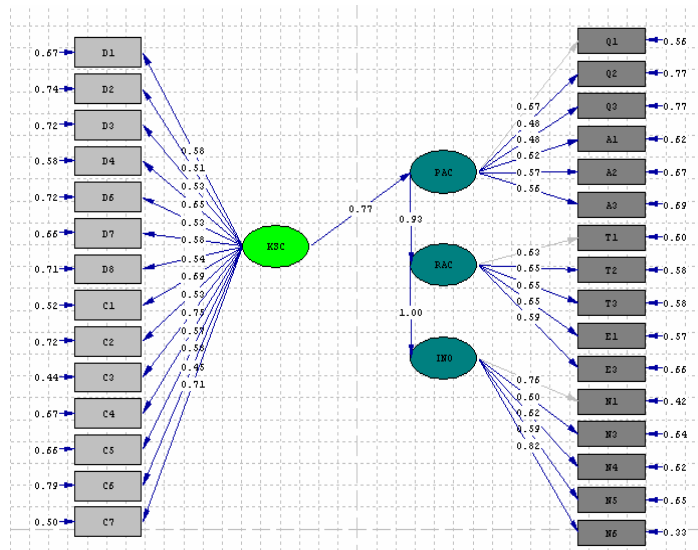


Figure 2 Result of model

## 6 CONCLUSION

The research demonstrates that there is positive influence from the employee's ability to perform knowledge donating and knowledge collecting to other employees towards the company's ability to develop its potential absorptive capacity. There is also positive influence from the company's ability to acquire and assimilate knowledge (potential absorptive capacity) towards the company's ability to transform and exploit knowledge (realized absorptive capacity). As well as positive influence from the company's realized absorptive capacity towards the company's innovation; especially influences process innovation.

Based on the surveyed companies, the employees' knowledge collecting is more dominant than the knowledge donating, meaning that the sharing behavior remains passive; they share when they are asked. In the knowledge donating dimension, the most dominant element is the employees' behavior to provide explicit knowledge compared to provide tacit knowledge. Meanwhile, when they employees are asked, they dominantly share their skills to other employees.

This research is restricted only to Indonesian ICT industry, thus the results might be distinctive to other areas of expertise due to the difference in terms of the environment and other characteristics. This research can be further developed by not only investigating the knowledge sharing capability viewed from the behavior factor, but from the viewpoint of the available technological tools.

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