Potential Absorptive Capacity and the Sustained Competitive Advantage of Firms:

Evidence from Indonesia

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ABSTRACT

This paper examines impacts of absorptive capacity and potential absorptive capacity (PACAP) on firm performance in the context of an emerging economy. It offers an empirical application of the resource-based view of the firm, based on an analysis of data for 52 publicly owned companies listed on Indonesia's stock market. In 2006 their market capitalization accounted for 38% of total market capitalization. The results of the study indicate that firms with well-developed PACAP sustain their competitive advantage through flexibility in reconfiguring and deploying their resources. These findings support the view that the successful development of the capabilities of public firms through external knowledge acquisition and assimilation is an important source of competitive advantage.

Keywords: potential absorptive capacity, resource-based view, public firms, Indonesia, emerging economies

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INTRODUCTION

This paper examines the impacts of acquisition and assimilation as elements of potential absorptive capacity (PACAP) and of transformation and exploitation as elements of realized absorptive capacity (RACAP) on firm performance in the context of a major emerging economy. Since Cohen and Levinthal (1990) introduced the concept of absorptive capacity (ACAP), there has been growing attention in the academic literature. Lane, Koka and Pathak (2006) identify a tendency in the literature to reify the concept. However, they argue that few researchers actually understand the assumptions and definition of the construct they believe they are using. A few studies have sought to redefine, extend, and elaborate the underlying process of ACAP, such as Szulanski (1996), Dyer and Singh (1998), Lane and Lubatkin (1998); Van den Bosch, Volberda, and De Boer (1999); Van den Bosch, Van Wijk, Volberda (2006); and Zahra and George (2002). They propose to view absorptive capacity as a capability; bring back the original assumptions underlying the concept; replicate and empirically test it; explore it in non-R&D contexts; and also to put more emphasis on longitudinal studies.

This study seeks to fill some of the gaps in the existing literature by applying the resource-based view of the firm (RBV) and bringing institutional factors into the analysis. Placing the study in the context of Indonesia is highly relevant due to the significant improvements in the country's business climate following the financial crisis of 1997-98, as

well as increasing positive impressions of institutional factors such as political stability and better commitment to the rule of law, and strong average economic growth of almost 6% per year during the 2000s. In addition, few studies have been conducted regarding the development of firm capabilities using Indonesia as a single country study, except for Dieleman and Sachs (2006) who study business groups and Mursitama (2005, 2006a, 2006b) who studies how absorptive capacity matters to firms in emerging economies. In this light, this study pioneers the assessment of ACAP development using Indonesian public firms as a sample.

THEORY AND HYPOTHESES

Following Zahra and George (2002: 186), this study defines absorptive capacity as a set of organizational routines and processes by which firms acquire, assimilate, transform, and exploit knowledge to produce a dynamic organizational capability. These authors distinguish four capabilities of ACAP in two dimensions. First, potential absorptive capacity (PACAP) consists of acquisition and assimilation capabilities. Second, realized absorptive capacity (RACAP) comprises transformation and exploitation capabilities. Zahra and George (2002) argue that this definition makes it possible to analyze the stocks and flows of a firm's knowledge. They relate these variables to the creation and sustainability of competitive capabilities. In addition, these four capabilities of ACAP – acquisition, assimilation, transformation and exploitation – are complementary in nature and build upon each other to produce ACAP that is necessary to build other organizational capabilities. Hence, it yields competitive advantage.

This logic implies that it is appropriate to apply the RBV in this research, particularly within the 'process' stream *vis-à-vis* the 'structural/content' stream of RBV (Schulze, 1994).

As RBV seeks to explain sustained competitive advantage of the firm by identifying key differences in the resources and capabilities of firms, the 'process' stream of RBV argues that differences in firm performance are based on the relative ability of firms to integrate, build and reconfigure internal and external competences to address rapidly changing environments (Teece, Pisano and Shuen, 1997: 516). This is the so-called 'dynamic capability' framework that intends to explain how firms can develop, deploy and protect combinations of competences and resources. Eisenhardt and Martin (2000: 1107) extend this framework as the organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve, and phase out.

This extension of the framework is mainly built on works of, among others, Penrose (1959), Wernerfelt (1984), Dierickx and Cool (1989), and also Barney's Value-Rarity-Imitability-Organization (VRIO) framework that argues firm's resources should be valuable, rare, inimitable, and non-substitutable in order to be sources of competitive advantage (Barney, 1991). Since original VRIO framework was criticized as rather static, Barney later extended it (Barney and Hesterly, 2006). In addition to having VRIO resources, a firm also needs to be organized in such a manner that it can exploit the full potential of those resources in order to attain competitive advantage. Barney's work is based on previous studies that try to clarify relations between the resources that firms possess and their performance. An example is Mahoney and Pandain (1992) who substantiate the importance of firm's distinctive competence in making better use of its resources; such resources must be better leveraged (Peteraf, 1993) or managed (Henderson and Cockburn, 1994).

Newbert (2007) assesses the contribution of RBV and proposes the coexistence of these two streams of research by explaining that the 'structural/content' stream of research underlines the resource heterogeneity approach, whereas the 'process' stream of research can be considered as a dynamic capability approach. He found that the latter is the least employed

approach and that it only received mixed levels of empirical supports. As ACAP is a bundle of knowledge-based capabilities, the main argument of this paper is that it can be a source of sustained competitive advantage through the prism of the dynamic capabilities approach within the RBV.

Absorptive Capacity and Competitive Advantage

Zahra and George (2002) argue that ACAP can be a source of a firm's competitive advantage but its effect on performance differs between PACAP and RACAP. They propose that firms with well-developed capabilities of acquisition and assimilation are likely to be more adept at continually revamping their knowledge stock by tracking changes in their industries more effectively. Therefore, firms with well-developed capabilities of acquisition and assimilation can facilitate the deployment of necessary capabilities such as production and technological competencies. In addition, well-developed PACAP reduces the sunk cost of investments in changing the firm's resource positions and operational routines.

Furthermore, transformation capabilities help firms to develop a new perceptual schema or changes to existing processes through the process of bisociation, *i.e.* a process whereby decision makers employ imagination and intuition (Zahra and George, 2002; Jansen, Van den Bosch and Volberda, 2005). Finally, exploitation capabilities cover newly acquired knowledge into new products (Kogut and Zander, 1996) that can enhance performance (Liebeskind, 1996). Therefore, firms with well-developed RACAP will be more likely to advance their competitive advantage on the basis of product and production innovations that are outcomes of their absorptive capacity.

The imperative to distinguishing clearly between these two elements of ACAP and the outcomes of ACAP underlines the coexistence of two streams of research in the RBV literature (Schulze, 1994). This is in line with Cohen and Levinthal (1989, 1990), who mention both knowledge outputs such as general, scientific, technical, and organizational outputs, and commercial outputs such as products, services and patents (Lane *et al.,* 2006). PACAP is related to flexibility in reconfiguring resources and represents the 'process' or capability stream in RBV research. RACAP is related to product development or innovations and represents the 'structural/content' stream in RBV research.

Based on our reading of the literature, we propose the following two hypotheses:

Hypothesis 1: Firms with well-developed capabilities of knowledge acquisition and assimilation (*i.e.* potential absorptive capacity) are more likely to sustain competitive advantage because of greater flexibility in reconfiguring their resources.

Hypothesis 2: Firms with well-developed capabilities of knowledge transformation and exploitation (*i.e.* realized absorptive capacity) are more likely to sustain competitive advantage through innovation and product development.

METHODOLOGY

Setting and Data Collection

To test these two hypotheses, this study uses a sample of public companies listed on the Jakarta Stock Exchange (JSX) in Indonesia. In recent years, JSX has been recognized as one of the dynamic stock markets in the region, compared to those in Singapore, Thailand, Philippines and Malaysia. At the end of 2005, the JSX index reached a peak of 1,800, then the highest in JSX history, and its continued to rise until late-May 2013 (Nehru 2013: 155).

Following the financial crisis that hit Indonesia in 1997-98, the financial market in Indonesia clearly stabilized as economic conditions improved.

A sample of firms was obtained from the *JSX Fact Book 2006*, which contained information on the contact addresses of Indonesian publicly-listed companies. The total number of publicly listed companies in 2006 was 336. The selection of a sample was based on the criteria that the sampled firms had an address in the Greater Jakarta Area (Jakarta, Bogor, Tangerang, Depok and Bekasi) in order to be able to conduct interviews at the firms in a manageable way. This criterion brought the number of sample firms down to 296 firms, spread over a variety of industries such as manufacturing, transportation services, communication, banking and financial services.

The data for the study were collected during August 2006 until January 2007 on the basis of the following steps. First, the lead author sought research collaboration with The Center for Japanese Studies at the University of Indonesia, which is a leading research institute that focuses on several aspects of Japan's business presence in Indonesia, as well as Japan-Indonesia relations. Then, a research team was assembled, led by a research project manager who was assigned by the executive director of the center. The research project manager worked directly with the lead author. This team comprised four field supervisors and ten well-trained field interviewers. The main task of this team was to collect data using a set of questions provided by the lead author by conducting interviews with respondents.

Second, the lead author held a day-long research meeting with all members of the research team to explain the research framework and questionnaire, and also to give specific training related to this research project in July 2006. Other research meetings were coordinated by the project manager. The lead author was directly involved in the data collection process during September and December 2006.

Third, all firms in the sample were contacted by phone, fax and email to explain the research theme, objective, framework, and the benefits of the research project and asked for their participation. Firms were promised a summary of the outcomes of the research project, and also that interviews would be conducted on the basis of anonymity of the managers interviewed in order to ensure confidentiality and to increase their willingness to participate. When they agreed to cooperate in this research, a date for the interview was set and the interviewer would come to see the respondent on the agreed date.

Fourth, the respondents were managers or senior managers responsible for product development/research and development/human resource development, or the person who was most familiar with the process of knowledge management in the firm.

Fifth, all returned questionnaires were checked by the field supervisors and in a few cases where there were unanswered questions, the field supervisor contacted the respondents directly. The field supervisor also had responsibility for verifying whether the interview had been conducted properly by confirming this directly with the respondent. This mechanism was intended to ensure high quality and reliability of the answers. As a caveat, it is generally difficult to achieve a high response rate in the context of emerging economies, as well as ensure that the answers are reliable when the research merely depends on a mail-out survey. For that reason, this research project sought to deal with this problem by using the approach described above.

The final usable sample comprised 52 firms, which corresponds to an almost 18% response rate. Twenty firms in the sample were among the 50 leading firms in terms of market capitalization in year 2005, altogether accounting for 38% of total market capitalization. The mean company tenure of respondents was 8.3 years. A first glance at the data reveals that 47 firms were innovative and 37 firms were doing both product and process

innovations, while only 5 firms were doing either product innovation or process innovation only.

Measurement and Validation of Constructs

This research utilized existing scales from prior studies. Specifically, this research adopted the scales for potential and realized absorptive capacity developed by Jansen *et al.* (2005). It did so with a view to replicating existing empirical studies but also extending their analysis and findings with additional constructs and placing the study in a different research context. The first draft of the questionnaire was written in English and then translated into the Indonesian language by the lead author. Pilot testing was conducted in Jakarta in July 2006 through in-depth interviews with five managers. They gave comments on substance, the phrasing of items and the layout of the questionnaire with the aim of making the questions more easily understood. The lead author also conducted discussions with industry expert and peers to enhance the quality of the final version of the questionnaire.

The possibility of non-response bias was checked by comparing the characteristics of respondents and non-respondents. The calculated t-values for assets (t=1.19, p<.263), liability (t=1.13, p<.286), leverage ratio (t=.88, p<.404), and ROI (t=-.13, p<.900) are all statistically insignificant, suggesting that there are no essential differences between sample and non-sample firms. All dependent explanatory and control variables used in the statistical analysis are described in detail in the Appendix.

Dependent variable

Sustainable competitive advantage. This research blends objective and perceived performance measurements in relation to sustainable competitive advantage. First, *ROI* (return on investment) is defined as the geometric mean of ROI for 2003-2005, which is taken as an indication of the impact of innovation activities of the firm during the previous three years. The second set of measurements is *Financial Performance* and *Product Performance*. These measurements are based on the question 'What was the performance of your company during the last three years compared to that of your competitors?' for each measure of performance. Financial performance comprises five items: sales, profitability, return on investment, sales growth, and market share. Product performance consists of five items, *i.e.* the overall performance of the product, features of the product, durability, its function, and the reliability of the product. Principal component analysis (PCA) is conducted in order to capture more interpretable of the items from both measurement of performance. The reliability of financial performance is high (Cronbach's alpha = .90) while product performance is also reliable (α =.84).

Explanatory variables

Potential absorptive capacity. The first set of explanatory variables comprises the dimensions of absorptive capacity, which are acquisition and assimilation (both elements of PACAP). Each dimension is a construct based on Jansen *et al.* (2005) and measured by a six-point Likert type scale. Acquisition comprises six items that capture the intensity and direction of effort in identifying and acquiring external knowledge. This scale is quite reliable (α =.67). Assimilation consists of three items underlying the process of analyzing and understanding new external knowledge. This scale is reliable (α =.79). The second set of explanatory variables comprises *Flexibility Deployment.*

To test hypotheses 1 and 2 (well-developed PACAP), interaction terms were created between *acquisition x flexibility deployment; assimilation x flexibility deployment;*. The indicator of *Flexibility Deployment* was created by asking the respondent the question 'to what extent is your company more flexible than your competitors in reconfiguring its resources?' (1 = much worse; 6 = very much better).

Control Variables

Based on prior studies, this research employs several control variables. *Firm age* is created by counting number of year since the foundation up to year 2006 on the assumption that age may influence a firm's knowledge acquisition and exploitation (Autio, Sapienza and Almeida, 2000; Jansen *et al.,* 2005). The *R&D unit dummy* variable takes the value 1 for firms that possess R&D facilities, and 0 otherwise, on the assumption that the existence of an R&D unit indicates the firm's prior knowledge and represents the stock of a firm's knowledge. The *Past performance* variable is included because it is likely that a firm has invested in building absorptive capacity if it has a good history of high performance (Jansen *et al.*, 2005). It is measured as the geometric means of Returns on Investment (ROI) during 1999-2002. This is an indicator from the accounting information from annual reports of firms, A large firm is likely to have greater resources, and therefore opportunities to acquire and assimilate external knowledge (Jansen *et al.*, 2005). A large firm may also perform better than smaller firms (Chang, 2006). As a proxy for size, the variable *Assets* is calculated as the value of a firm's total assets in the year 2005. A firm with a higher leverage ratio may have better access to finance for investment in resources that enhance its performance (Chang, 2006). The variable *Leverage ratio* is calculated as the ratio of total firm debt and total firm assets in 2005. This research also controls the industry effects based on the well-known Pavitt taxonomy (Pavitt,

1984), which is extended by incorporating the service industry (Kristensen, 1999). A *Supplier dominated industry dummy* variable is created, which takes the value 1 if a firm operates in the paper, apparel and lumber industries, and is 0 otherwise. A *Specialized supplier industry dummy* variable takes the value of 1 if a firm operates in the agricultural industry, and is 0 otherwise. A *Scale intensive industry dummy* variable is included, which takes the value of 1 if a firm operates in the food, tobacco, consumer goods, automobile, mining, metal, cement, cable, and plastic packaging industries, and is 0 otherwise. The *Science based industry dummy* variable takes the value of 1 if a firm operates in the pharmaceutical, electronic equipment, chemical, and telecommunication industries, and is 0 otherwise. The *Information intensive industry dummy* variable takes the value of 1 if a firm belongs to the banking, credit, securities, insurance, and retail industries, and is 0 otherwise. The *Service specialized supplier industry dummy* variable takes the value 1 if a firm is part of the transportation service, property, and construction industries, and is 0 otherwise. The *Supplier dominated industry dummy* variable is used for reference.

RESULTS

The first part of these results discusses the effects of PACAP and RACAP on firm performance. Table 1 reveals the descriptive statistics and the correlations matrix. Financial performance as one of performance indicators is positively correlated with ROI (p<.05). This shows that this perceived performance indicator can be alternated with an objective performance indicator such as ROI.

[Table 1 about here]

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Table 2 shows the OLS analysis of the effects of PACAP on competitive advantage with three dependent variables: ROI, Financial performance, and Product performance. Models (1) and (2) show the positive and statistically significant impact of the *acquisition x flexible deployment* and *assimilation x flexible deployment* variables on ROI at p<.10 and p<.05, respectively. The impacts of the *acquisition x flexible deployment* and *assimilation x flexible deployment* variables on Financial performance and Product performance are positive and high statistically significant at p<.001 as shown in models (3), (4), (5) and (6). These findings suggest that firms with well-developed PACAP may have higher performance by possessing the flexibility to reconfigure and deploy their resources. Therefore, Hypothesis 1 is supported.

[Table 2 about here]

In fact, the positive correlation between financial performance and ROI and its statistically significant value suggests that perceived performance is comparable with more objective measurements, despite the fact that the entire PACAP interactions variable does not show any statistically significant value in the models that have ROI as the dependent variable. These findings of the impact of PACAP on competitive advantage underline the notion that the outcomes of ACAP can be in the forms of both organizational and commercial outputs (Cohen and Levinthal, 1989; 1990; Lane *et al.*, 2006). The positive results of these interactions underline the relevance of using the dynamic capability approach, as this research did, to gauge the factors that influence a firm's ability to build other organization capabilities (Zahra and George, 2002), as well as the importance of complementarity issues (Teece, 1986).

CONCLUSION AND DISCUSSION

This research has offered an empirical assessment of the impact of PACAP and RACAP on sustained competitive advantage within the context of an emerging economy, using a dynamic capabilities prism. The contribution of this research can be summarized as follows.

First, the study provides empirical and important evidence in the area of absorptive capacity research through the specific operationalization of ACAP and focusing it on routines and processes (*e.g.* Zahra and George, 2002; Jansen *et al.*, 2005). The results of this research revealed evidence of the positive impact of well-developed PACAP on firm performance through its outcomes. In particular, firms with well-developed PACAP may sustain competitive advantage through flexibility in reconfiguring resources and its deployment (*e.g.* Zahra and George, 2002). Therefore, this research contributes to opening the black box of ACAP capabilities development in which elements of PACAP (acquisition and assimilation) can also be a source of competitive advantage despite innovations as product of transformation and exploitation capabilities (elements of RACAP) that already have been recognized as a source of competitive advantage in the relevant literature (Lane *et al.*, 2006).

In sum, these results support the relevance to firms of the underlying process of ACAP development from the RBV perspective, specifically the dynamic capabilities approach or 'process' stream of research (*e.g.* Dyer and Singh, 1998). In addition, this research brings institutional factors into the analysis, and it therefore also contributes to the possible integration of RBV and institutional development theory in business studies. Furthermore, this research addresses the tendency of reification of ACAP already identified by Lane *et al.* (2006).

The second contribution of this research concerns the methodology of collecting data in the context of emerging economies. In such economies, well-developed and extensive archival data are not necessarily readily available, or are only available to a degree. This research blends available archival data provided by the JSX authority with the results of a questionnaire-based survey that was administered through direct face-to-face interviews with respondents in order to maximize the number and quality of responses. This method indeed ensured a high reliability of answers, particularly *vis-à-vis* a mail-out survey questionnaire.

Despite the contributions this research has made, it has some limitations that merit discussion. First, the collected data is derived from a single informant for each company. Therefore the possibility of a common method bias cannot be totally ruled out. Second, the rigid and unique method used in this research is resource-intensive in terms of time to administer the survey for what was still a relatively modest sample of firms. One of the caveats is that it is quite difficult to encourage sampled firms to participate. Some firms were quick to agree to participate, because they had the impression that this project would be of direct interest to them. Some of them only agreed to cooperate after many follow-up reminders. Most of contacted firms left us with uncertain answers about whether they were willing to participate, by not informing us whether they were available for further contact, asking for more time to make a final decision, or referring us to another person who was not able to give a decision when we followed up with them. Therefore, we decided to exclude the last type of firms because of limitations of time. Future studies, if they use Indonesian public-listed firms as a sample, may consider increasing the sample of participating firms across industries as it is likely to enrich the heterogeneity of observations with respect to competitive advantage.

Future research could also examine under what conditions firms are able to improve their PACAP and RACAP for the purpose of achieving superior performance by combining

antecedents of ACAP. Jansen *et al.* (2005) also suggests that a combination of moderation effects of organizational antecedents is worth to be examined. Lastly, for practical reasons, this research does not examine the role of social integration mechanisms and the efficiency factor in ACAP as suggested by Zahra and George (2002), even though these can be important issues to enrich our understanding of underlying process of ACAP.

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	Variable	Mean	s.d	1	2	3	4	5
	Table 1: Descriptive statistics and correlations							
1	ROI	3.12	13.32					
2	Performance: Financial	3.47	0.75	0.33*				
3	Performance: Product	3.22	0.84	0.06	0.52***			
4	Acquire x flexible deployment	14.23	4.49	0.15	0.62***	0.49		
5	Assimilate x flexible deployment	14.69	5.25	0.19	0.69***	0.52***	0.89***	

†$p<0.10$; *$p<0.05$; **$p<0.01$; ***$p<0.001$

Table 2: The Impact of PACAP on Sustainable Competitive Advantage

Variable	ROI		Performance: Financial		Performance: Product	
	(1)	(2)	(3)	(4)	(5)	(6)
(Constant)	-18.88	-20.34	1.41	1.37	1.59	1.67
	(-1.75)†	(-1.99)*	(2.55)**	(2.83)**	(2.19)*	(2.41)*
Acquisition x flexible deployment	0.79		0.13		0.11	
	(1.88)†		(5.84)***		(3.81)***	
Assimilation x flexible deployment		0.79		0.12		0.09
		(2.31)*		(7.15)***		(3.98)***
Firm age	0.24	0.24	0.01	0.01	0.01	0.01
	(2.72)**	(2.80)**	(2.60)**	(2.78)**	(1.55)	(1.45)
R&D unit	11.57	12.73	-0.07	0.08	-0.10	0.01
	(2.06)*	(2.28)*	(-0.23)	(0.32)	(-0.27)	(0.02)
Past performance	0.25	0.25	0.00	0.00	0.00	0.00
	(1.65)†	(1.68)†	(0.52)	(0.59)	(-0.10)	(-0.09)
Leverage ratio	-9.84	-9.72	0.04	0.04	0.24	0.24
	(-2.54)**	(-2.57)**	(0.18)	(0.24)	(0.92)	(0.93)
Assets	0.00	0.00	0.00	0.00	0.00	0.00
	(-1.07)	(-1.19)	(-1.24)	(-1.43)	(-0.60)	(-0.52)
Specialized supplier industries	7.75	7.49	0.34	0.34	0.36	0.39
	(0.59)	(0.58)	(0.49)	(0.55)	(0.41)	(0.45)
Scale intensive industries	-7.26	-7.15	-0.18	-0.14	-0.42	-0.38
	(-1.08)	(-1.09)	(-0.51)	(-0.45)	(-0.94)	(-0.85)
Science-based industries	-4.98	-5.54	-0.31	-0.37	-0.17	-0.22
	(-0.65)	(-0.74)	(-0.78)	(-1.06)	(-0.34)	(-0.43)
Information intensive industries	4.58	4.96	0.11	0.14	-0.23	-0.22
	(0.66)	(0.73)	(0.30)	(0.43)	(-0.49)	(-0.47)
Service specialized supp industries	2.75	2.57	0.08	0.07	-0.07	-0.07
	(0.36)	(0.35)	(0.21)	(0.20)	(-0.14)	(-0.14)
R²	0.42	0.44	0.52	0.61	0.33	0.35
Adjusted R²	0.25	0.28	0.38	0.5	0.15	0.17
No. Obs	52	52	52	52	52	52
F-test	2.58**	2.83**	3.88***	5.61***	1.79†	1.93†

†$p<0.10$; *$p<0.05$; **$p<0.01$; ***$p<0.001$

Appendices

A. Dependent Variables: Potential Absorptive Capacity (Jansen *et al.*, 2005)

No	Element	Measurement
1	Acquisition	Six items capturing the intensity and direction of effort in identifying and acquiring external knowledge. Reliability: $\alpha=.67$.
2	Assimilation	Assimilation consists of three items underlying the process of analyzing and understanding new external knowledge. Reliability: $\alpha=.79$.

B: Dependent Variables: Sustainable Competitive Advantage

No	Element	Measurement
1	Return on Investment (Objective)	Annual average of ROI during 2003 – 2005
2	Financial Performance (Perceived)	'How was performance of your company in the last three years comparing to your competitor?' (sales, profitability, return on investment, sales growth, and market share). Principle Component Analysis (PCA). Reliability: $\alpha=.90$.
3	Product Performance (Perceived)	'How was performance of your company in the last three years comparing to your competitor?' (overall performance of the product, features of the product, durability, its function, and reliability of the product). Principle Component Analysis (PCA). Reliability: $\alpha=.84$.

C. Explanatory Variables: Potential Absorptive Capacity (Jansen *et al.*, 2005)

No	Element	Measurement
1	Acquisition	Six items capturing the intensity and direction of effort in identifying and acquiring external knowledge. Reliability: $\alpha=.67$. (1) Our unit has frequent interactions with corporate headquarters to acquire new knowledge. (2) Employees of our unit regularly visit other branches. (3) We collect industry information through informal means (*e.g.* lunch with industry friends, talks with trade partners). (4) Other divisions of our company are hardly visited, (reverse-coded). (5) Our unit periodically organizes special meetings with customers or third parties to acquire new knowledge. (6) Employees regularly approach third parties such as accountants, consultants, or tax consultants.

2	Assimilation	Three items underlying the process of analyzing and understanding new external knowledge. Reliability: α=.79.
		(1) We are slow to recognize shifts in our market (e.g. competition, regulation, demography), (reverse-coded)
		(2) New opportunities to serve our clients are quickly understood.
		(3) We quickly analyze and interpret changing market demands.

D. Control Variables

No	Element	Measurement
1	Firm Age	The number of years since the foundation until 2006.
2	R&D Unit Dummy	Takes the value 1 for firms possessing R&D facilities, 0 otherwise.
3	Past Performance	Annual average of return of investment 1999 – 2002.
4	Firm Size (Assets)	Firm total assets in 2005.
5	Leverage Ratio	Total firm debt divided by total firm assets in 2005.
6	Industry Dummy (Pavitt Taxonomy, 1984; Kristensen 1999)	*Supplier dominated industry dummy* (paper, apparel and lumber industries). *Specialized supplier industry dummy* (agriculture industry). *Scale intensive industry dummy* (food, tobacco, consumer goods, automobile, mining, metal, cement, cable, and plastic packaging

		industries).
		Science based industry dummy (pharmaceutical, electronic equipments, chemical, and telecommunication industry).
		Information intensive industry dummy (bank, credit, securities, insurance, and retail industry).
		Service specialized supplier industry dummy (transportation service, property, and construction industry).
		Supplier dominated industry dummy is used for reference.