

Knowledge Creation, Innovation and Financial Performance of Firms: Evidence from Vietnam

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Abstract

Drawing on the knowledge-based perspective and Nonaka's theory of knowledge creation, this study proposes a model linking firms' knowledge creation, innovation, and financial performance. The model is tested in a sample of 529 Vietnamese firms. The results show that firms' knowledge creation has significant impacts on three out of four types of innovation, including product innovation, organizational innovation, and marketing innovation. Product innovation is also found to contribute significantly to the firm's financial performance. The results improve our understanding of innovation at the firm level under institutional uncertainty and resource-deficiency and provide some important implications for managers and policy makers.

Keywords: knowledge creation, product innovation, process innovation, organizational innovation, marketing innovation, financial performance

1. Introduction

The importance of innovation is undeniable. Previous studies have pointed out that innovation is the key to an enterprise's success (Baldwin, 1995; Marques & Ferreira, 2009; Yamin, Gunasekaran, & Mavondo, 1999; Jin et al., 2015) and a driving force behind the development of an economy (Shipp, Stone, Rose, & Lal, 2009). Innovation at the firm level has been the subject of study for decades.

The rising of knowledge-based economies has led to the development of the so-called 'knowledge-based view'. This view posits that knowledge is the main source of competitive advantage and the ability to create knowledge is one of the most important abilities of firms (Grant, 1996, 1997; Kogut & Zander, 1992, 1993; Nonaka, 1994). Firms could be considered as knowledge creating entities (Kogut & Zander, 1992; Nonaka & Takeuchi, 1995).

The increasing popularity of the 'knowledge-based view' has created a wide interest to the knowledge-based perspective of firm innovation. The 'knowledge-based view' can be a useful framework to study firm innovations (Castro, Lo'pez-Sa'ez, & Delgado-Verde, 2011; Di'az-Di'az, Aguiar-Di'az, & DeSaa'-Pe'rez, 2008). This is because the innovation process is considered the most knowledge-intensive business process (Adamides & Karacapilidis, 2006; Nonaka & Takeuchi, 1995) and knowledge assets contribute to improving the innovative capacity of an organization (Lerro, 2012; Subramaniam & Youndt, 2005; Teece, 2000, 2007).

While theories suggest that knowledge creation enables firms to innovate (Jin et al., 2015; Kogut & Zander, 1992, 1993; Nonaka, 1994), empirical research bridging the two constructs is generally lacking. As emphasized by Castro et al. (2011, p. 872), 'even though the basic link between firm knowledge and innovation is on the whole persuasive, more remains to be understood about its precise and complex nature'. Moreover, not only is the relationship between knowledge creation and innovation not clearly understood; scholars have also disagreed on the impact of knowledge creation on financial performance of firms. While some authors (e.g. Li, Huang, & Tsai, 2009; Song, 2008) found that knowledge creation has direct influence on firms' financial performance, others (e.g. Akhavan, Ramezan, Moghaddam, & Mehralian, 2014) observed no significant relationship. We suspect that the relationship is more complex than theoretically assumed and could be mediated by variables such as innovation.

The literature on knowledge and innovation has been dominated by studies in developed countries. In emerging countries, firms' access to information is limited and their property rights are not well protected (Peng, 2003; Welter & Smallbone, 2011). They have neither resources nor capacities to follow their counterparts in developed countries for innovation. The innovation systems in these countries are weak and fragmented, research is in nascent stage with limited resources (Dai & Liu, 2015; Tran, 2007). This presents a challenge to our theorizing of how, in the absence of market institutions and resources, managers of these firms can promote knowledge creation and innovation (Tajasom, Mui Hung, Nikbin, & Sean Hyun, 2015).

To address these gaps in the literature, we ask two questions in this paper: First, in the context of emerging economies, do knowledge creation practices lead to firm innovation? Second, what are relationships between knowledge creation practices, innovation and firm financial performance? We focus on organizational practices, rather than investment on R&D, as a potential antecedent of innovation. We employ the knowledge-based view and Nonaka's knowledge creation theory (Nonaka, 1994) to propose a model linking knowledge creation, innovation and financial performance of firms and then, test the proposed model in the context of Vietnam, an emerging economy.

This paper is structured as follows: the next section is the theoretical background and hypotheses. We then briefly describe Vietnam, the research context. The subsequent section is methodology of the research, then the research results. Finally, the paper is concluded with a discussion and research implications section.

2. Theoretical Background and Hypotheses

2.1 Innovation

Rogers (2003, p. 12) describes innovation as 'an idea, practice, or object that is perceived as new by an individual or other unit of adoption.' To Bessant and Tidd (2007, p.29), innovation is a 'process of translating ideas into useful—and used—new products, processes and services'. Innovation is also defined as 'the application of knowledge in a novel way primarily for economic benefit' (Shipp et al., 2009, p. 17). Innovation relates to new products and services, production methods and procedures, production technologies, as well as administrative changes (Fay, Shipton, West, & Patterson, 2015).

The Organization for Economic Cooperation and Development (OECD, 2005, p. 46) has proposed a comprehensive definition of innovation at the firm level as follows:

'An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations.'

This definition is widely accepted in the academic community and will also be employed in our study. Specifically, we will focus on four types of innovation, as classified by OECD: product innovation, process innovation, organizational innovation, and marketing innovation. 'Product innovation is the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses' (OECD 2005, p.48). Process innovation is 'the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software' (OECD, 2005, p. 49). Organizational innovation refers to 'the implementation of a new organizational method in the firm's business practices, workplace organization or external relations' (OECD, 2005, p. 51), meanwhile marketing innovation is 'The implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing' (OECD, 2005, p. 49).

2.2 Knowledge and Organizational Knowledge Creation

Nonaka and Takeuchi (1995, p. 15) define knowledge as 'a dynamic human process of justifying personal beliefs as part of an aspiration for the truth'. According to the authors, knowledge is created by human being, it is personal 'belief', and this belief needs to be justified as 'truth' through social interaction. The definition emphasizes the dynamics and subjectivity nature of knowledge.

Knowledge creation refers to the development of new and useful ideas and solutions in organizations. Knowledge creation is about creating a novel idea and innovation is about successful implementation of that idea (Andreeva & Kianto, 2011).

To discuss the organizational aspect of knowledge creation, Nonaka noted that while new knowledge is created by individuals, organizations play a critical role in articulating and amplifying that knowledge. Organizational knowledge creation, therefore, could be defined as 'a process that 'organizationally' amplifies the knowledge created by individuals, and crystallized it as a part of the knowledge network of organization' (Nonaka, 1994, p.

17).

2.3 Nonaka's Theory of Knowledge Creation

Our study builds on the theory of knowledge creation originated by Nonaka (1994) and advanced by Nonaka and Takeuchi (1995), Nonaka and Toyama (2003), and Nonaka (2007). This is one of the most prominent theories in the knowledge-based view and perhaps the most widely accepted theory of knowledge creation.

At the heart of Nonaka's theory, knowledge is classified as being comprised of two types: explicit knowledge and tacit knowledge. Explicit knowledge is knowledge that can be codified, articulated, and is easy to be communicated through words and numbers. It can be shared in the form of hard data, formulae, and principles. An ISO-based quality management process, a guide book on safe foods preparation, a lecture by an expert on the quality requirements of the market are examples of explicit knowledge. In organizations, explicit knowledge rests on a company's policies, systems, guidelines, and procedures.

In contrast, tacit knowledge is the type of knowledge that is very difficult to be expressed in words, numbers or in other forms of languages. It is often intuitive and unclear. Tacit knowledge is highly context specific and has a personal quality, which makes it hard to formalize and communicate (Nonaka, 1994). Examples of tacit knowledge include subjective insights, intuition, and hunches. These are known to some people but it is very hard for them to explain to others.

According to Nonaka, organizational knowledge is created through a continuous dialogue between tacit and explicit knowledge. He identified four modes of knowledge conversion: (1) from tacit knowledge to tacit knowledge (socialization), (2) from tacit knowledge to explicit knowledge (externalization), (3) from explicit knowledge to explicit knowledge (combination), and (4) from explicit knowledge to tacit knowledge (internalization). The model is simply referred to as the SECI model.

First, socialization refers to the process of sharing experiences among individuals to create shared mental models and technical skills. When interacting with other people, individuals can acquire tacit knowledge through observation, imitation and practice.

Secondly, externalization is the process in which individuals express and articulate their own knowledge through the use of language, metaphors, analogies or other forms of communication. Through this process, one can 'externalize' their tacit knowledge into a form that is understandable to other people.

Thirdly, combination involves the use of social processes to combine different bodies of explicit knowledge embedded in documents, email, databases or the like. After exchanging and sharing, explicit knowledge held by individuals and groups is combined in a way that new knowledge can be created.

Fourthly, internalization is the process through which individuals acquire, understand, absorb explicit knowledge and eventually make it becomes his or her own tacit knowledge. Through this process, organizational or group knowledge is transferred to individuals.

While each of the four modes can independently create knowledge, the organizational knowledge creation process takes place when all four modes are organizationally managed and dynamically interacted. The process constitutes a 'knowledge spiral', which is highly iterative and occurs mainly through informal networks of relations in the organization, begins at the individual level, moves up to the collective (group) level, and then to the organizational level. The result is a 'spiraling effect' of knowledge accumulation and growth.

An organization can create knowledge by regularly practicing SECI. The higher the frequency of SECI practice is, the more opportunities for knowledge creation the organization has. New knowledge created would enable the organization to engage in creative activities that can bring about innovation. As noted by Nonaka and Takeuchi (1995), knowledge creation enables continuous innovation. Nonaka (2007, p. 2) wrote:

'The knowledge-creating company is much about ideals as it is about ideas. And that fact fuels innovation. The essence of innovation is to re-create the world according to a particular vision or ideal. To create new knowledge means quite literally to re-create the company and everyone in it in a nonstop process of personal and organizational self-renewal'.

Thus, innovation is a natural outcome of knowledge creation. Andreeva and Kianto (2011) pointed out that, among all knowledge management processes, knowledge creation is the most important for organizations' innovation. Consequently, the following hypotheses are proposed:

Hypothesis 1: A firm's practice of knowledge creation activities (SECI) is positively associated with its innovation. Specifically, SECI practice is positively associated with:

- a) *The firm's level of product innovation (Hypothesis 1a).*
- b) *The firm's level of process innovation (Hypothesis 1b).*
- c) *The firm's level of organizational innovation (Hypothesis 1c).*
- d) *The firm's level of marketing innovation (Hypothesis 1d).*

It is expected that innovation would improve firm financial performance (Bigliardi 2013; Yang & Chen, 2014). Several theoretical perspectives could help in explaining this innovation-performance relationship. These include, but not limited to, the Schumpeterian perspective, the dynamic capabilities perspective, the bundles and complementarities perspective, and the marketing orientation perspective.

The Schumpeterian approach (Schumpeter, 1934) is closely related to the notion of 'first mover advantage': new products or processes developed by an organization are protected from imitation for a certain period of time. This differentiation or uniqueness in the firm's products and services generates a proprietary competitive position that can deliver superior financial performance. In other words, a firm's product innovation leads to its financial performance. The dynamic capabilities authors (Teece, 2007; Teece, Pisano, & Shuen, 1997) argue that a firm's dynamic capabilities would support its superior long-run business performance. Since the firm's process innovation is qualified as dynamic capability (Piening & Salge, 2015), we can expect that process innovation leads to a higher level of financial performance. Proponents of the bundles and complementarities approach (e.g. MacDuffie, 1995; Whittington, Pettigrew, Peck, Fenton, & Conyon, 1999) argue that organizations achieve higher levels of financial performance by implementing a number of complementary changes or innovations, rather than a single action. New organizational methods in the firm's business practices or work place organization such as those in organizational innovation may well reflect these complementary changes because they involve new ways in which work tasks can be re-configured and re-combined. Thus, level of organizational innovation will positively affect firm financial performance. Finally, the marketing orientation authors (e.g. Han, Kim, & Srivastava, 1998; Narver & Slater, 1990; Xu et al., 2015) suggest that market orientation is necessary to achieve superior organizational financial performance. A firm's innovation in marketing activities shows its orientation towards marketing. In this case, the firm stays in touch with the market, cares about and commits to delivering higher values to customers. It is expected that a firm's marketing innovation positively affects its financial performance. Taken together, the following hypotheses can be proposed:

Hypothesis 2: A firm's innovation is positively associated with its financial performance. Specifically:

- a) *The firm's level of product innovation is positively associated with its financial performance (Hypothesis 2a).*
- b) *The firm's level of process innovation is positively associated with its financial performance (Hypothesis 2b).*
- c) *The firm's level of organizational innovation is positively associated with its financial performance (Hypothesis 2c).*
- d) *The firm's level of marketing innovation is positively associated with its financial performance (Hypothesis 2d).*

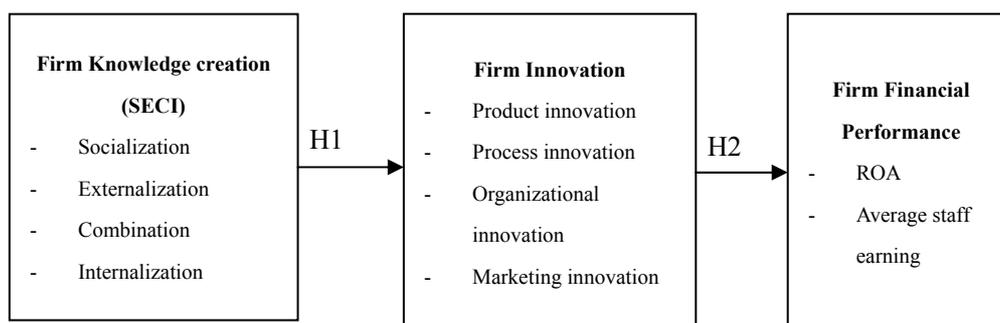


Figure 1. Represents the proposed research model

3. Research Context

Vietnam has recently been known as an important player in the international market. Over the last three decades, since the implementation of the Vietnamese government 'open-door policy' in 1986, the country has turned itself from a food importing nation to the world's second largest rice exporter and a major supplier of tea, seafood,

textiles, and recently, telephones and spare parts (Grant Thornton Vietnam, 2013). Despite the world economic downturn, the country's annual growth rate of GDP still averaged at 6.48 percent from 2000 until 2015 (GSO, 2015). Vietnam became an official full member of the World Trade Organization in January, 2007.

Vietnam offers a rich context for studying how firms create knowledge and promote innovation under institutional uncertainty and resource-deficiency. Despite recent administration reform, a number of studies have shown that firms in Vietnam are operating under high uncertainty, a weak legal system, and without developed market institution (e.g. Nguyen, Le, & Bryant, 2013; Nguyen & Rose, 2009). This type of environment could impede firm innovation by blocking flow of information, making commercialization and protection of innovation extremely difficult. In addition, the vast majority of Vietnamese firms are small with little resources. These firms need to be creative in promoting innovation. This lends a practical significance to the degree of knowledge and innovation these firms could develop through organizational routines and practices.

4. Research Methodology

Data used for this research mainly come from our own survey and the survey of General Statistics Office of Vietnam (GSO, 2012). Firm background and financial data are available from GSO database. Data on knowledge creation practices and innovation are obtained from our survey. We then match the two sources of data based on the firms' tax codes. This matching of the data helps eliminate common method variance in the survey research.

4.1 Sampling and Data Collection

The sampling frame used in this research is the list of manufacturing enterprises that are included in the nation-wide enterprise survey conducted by the Vietnamese General Statistics Office (GSO, 2012). By far, the GSO enterprise survey is the most official and nearly complete source data on enterprises operating in Vietnam with more than 328,000 active enterprises included in the survey. The target of our survey is all manufacturing firms located Hanoi, Hochiminh city, and Danang city, which are the three biggest economic centers of the country. These include state-owned and non-state-owned enterprises of different sizes. The target informants are senior managers and middle managers who are responsible for product/service development, marketing & sales or human resource management. For each firm, a representative is asked to fill in a questionnaire that represents the firm's knowledge creation and innovation situation.

We use the stratified random sampling method to generate the list of enterprises to be contacted. The number of enterprises generated after applying this sampling technique is 300 in Hanoi, 300 in Hochiminh city, and 150 in Danang city. These numbers more or less reflect the relative importance of each city in Vietnam economy. After contacting the enterprises over telephone, the questionnaires are delivered directly to the targeted informants by the field researchers who are staff of Hanoi Statistical Office, Hochiminh City Statistical Office and Danang Institute for Socio-Economic Development. In total, 550 appointments are made, of which 529 turn out to be successful, yielding a final sample size of 529. Of the 529 responded firms, 201 are headquartered in Hanoi, 218 are from Hochiminh city and the rest are located in Danang city.

4.2 Variables and Measures

Measure for SECI practice is taken from the study of Sabherwal and Becerra-Fernandez (2003). This measure includes 16 questions asking respondents to indicate how frequently their enterprises practice 16 activities related to the four knowledge creation processes in the SECI model using a scale from 1 to 7 (1 = very infrequently and 7 = very frequently). Examples of activities (questionnaire items) included are: Modeling based on analogies and metaphors, Capture and transfer of experts' knowledge, Web-based access to data, Employee rotation across areas, and on-the-job training. Cronbach's alpha for these items is 0.925. However, Nonaka and his colleagues conceptualized these SECI as spiral process of knowledge creation in which the activities are overlapping, reinforcing each other, and repeating at higher levels (Nonaka, 1994, 2007; Nonaka & Takeuchi, 1995; Nonaka & Toyama, 2003). Theoretically, it would be hard to separate SECI into distinct constructs. Empirically, our data show that these processes have very high correlations (from .486 to .788), raising a concern on multi-collinearity problem. Consequently, an overall index for SECI practice is calculated for subsequent analyses.

The measures for innovation are adapted from the Community Innovation Survey's questionnaire version 15 (Eurostat, 2012) that is developed based on the approach recommended in the Oslo Manual (OECD, 2005). Specifically, on a scale from 1 to 7 (1 = strongly disagree and 7 = strongly agree), the respondents are asked to rate the extent to which they agree with statements describing different facets of their firms' product, process, organizational, and marketing innovation over the last 3 years period, up to the time of the survey. A total of 11 questions are included, in which the number of questions for product, process, organizational, and marketing

innovation is 1, 3, 3, and 4 respectively. Since this measurement model for innovation are formative, testing internal consistency is not necessary (Jarvis, Mackenzie, & Podsakoff, 2003; Petter, Straub, & Rai, 2007). The next step, therefore, is to calculate a composite index for each type of innovation, including process, organizational, and marketing innovation.

Firm financial performance is measured by the firm's Return on Asset (ROA) and average staff's earning in 2012. ROA and staff earning figures are taken from the survey data of GSO.

A number of control variables are also included in the model. The first one is location of the enterprises since provinces in Vietnam have different law implementation effectiveness (Nguyen et al., 2013). This variable is measured by two dummy variables: Danang (Firms in Danang city = 1, others = 0) and HCM City (Firms in Hochiminh city = 1, others = 0). The second one is firm's ownership, also measured by two dummy variables: Firms with State capital (Firms that have state capital = 1, others = 0) and Firms with foreign capital (Firms that have foreign capital = 1, others = 0). The third one is whether the firm operates in high or low technology sector or 'High-tech' (Firms in high technology sector = 1, others = 0, based on Vietnam's Prime Minister Decision, 66/2014/QĐ-TTg, dated 25/11/2014). The fourth one is Firm age, measured by the firm's number of years in operation, up to the time data were collected. The fifth one is firm assets; the sixth one is the firm's total number of employees. The latter two variables are taken from GSO's survey data while data on all other variables are obtained from our own survey.

For the model explaining relationship between SECI practice and innovation, 3 additional control variables are also added, including (1) the percentage of employees with college degrees in 2013, (2) The firm's percentage of employees who engaged in R&D activities in 2013, and (3) the average labor turnover rate of the firm in the period from 2010-2013. Data on these variables also come from our own survey. All these variables are included in the model as 'control' variables because previous literature (e.g. DeTienne and Koberg 2002; Piening and Salge 2015) had pointed out that they are related to innovation and/or performance of firm.

4.3 Data Analysis

First, bivariate relationships among variables are explored via correlation analysis. Then, multiple regression analyses are performed to test the proposed hypotheses. The Statistical Package for the Social Sciences (SPSS) is used to support the analyses.

5. Research Results

5.1 Correlation Analysis

Table 1 presents the correlation matrix assessing the bivariate relationships among the variables in this study.

Table 1. Correlation matrix

	Mean	SD	1	2	3	4	5	6	7	8
1. Da Nang	.17	.38								
2. HCMC	.43	.50	-0.39							
3. State capital	.10	.31	.09*	-0.1						
4. Foreign capital	.20	.40	-.12**	.19**	-.17**					
5. High-tech	.04	.19	-0.03	-0.04	0.06	.10*				
6. Firm Age	12.64	7.86	0.05	-.21**	.44**	-.09*	0.02			
7. Asset (BVND)	62.01	290.8	-0.05	.09*	-0.01	-0.01	-0.01	0.01		
8. Employee	261.48	616.60	-.12**	.21**	0.01	0.04	0.01	-0.06	.54**	
9. College Degree	11.30	12.36	.26**	-.31**	.19**	-0.05	.14**	.22**	0.01	-0.05
10. R&D staff	.25	2.63	.19**	-0.08	.121**	0.01	.19**	.15**	0.07	0.05
11. Turnover rate	9.10	41.22	0.01	-0.05	.13**	-0.02	-0.01	0.05	-0.01	-0.02
12. SECI	4.46	1.20	-.20**	0.08	-0.07	-0.02	0.07	0.08	0.01	0.03
13. Product Innovation	4.33	1.49	-0.06	-0.02	-0.08	-0.05	-0.03	-0.05	0.03	0.03
14. Process innovation	4.33	.96	-0.06	-0.01	0.03	-0.01	0.04	0.07	0.04	0.01
15. Organizational innovation	4.37	.93	-.20**	.11*	0.01	0.02	0.07	0.03	0.08	0.08
16. Marketing innovation	4.34	.87	-.24**	0.08	-0.04	0.02	-0.04	0.02	0.04	0.07
17. ROA	.03	.19	0.01	.11*	.12*	-0.05	-0.02	-0.01	.11*	0.06
18. Staff earning	7.68	1.53	-.30**	.33**	0.05	.15**	0.01	-0.03	.38**	.67**

Table 1. Correlation matrix (con't)

	9	10	11	12	13	14	15	16	17
1. Da Nang									
2. HCMC									
3. State capital									
4. Foreign capital									
5. High-tech									
6. Firm Age									
7. Asset									
8. Employee									
9. College Degree									
10. R&D staff	.39**								
11. Turnover rate	-0.02	-0.01							
12. SECI	-0.01	.11*	0.04						
13. Product Innovation	.14**	.10*	-0.04	.13**					
14. Process innovation	0.08	0.04	0.07	0.08	.15**				
15. Organizational innovation	0.03	0.05	-0.04	.22**	.13**	.25**			
16. Marketing innovation	0.01	-0.09	-0.09	.13**	.15**	.13**	.25**		
17. ROA	0.05	.128**	0.013	0.044	0.07	-0.01	0.02	0.052	
18. Staff earning	-.12**	0.06	-0.01	0.05	0.06	0.04	.13**	.11*	.11*

As can be seen, significant correlations are found between the practice of SECI and product, organisational, and marketing innovation. SECI practice is also significantly related to some of the control variables, including the enterprise location and its percentage of R&D staff. Among four types of innovation, organizational and marketing innovation is found to correlate significantly with staff earning. Except High-tech, Firm age, and Turnover rate, all other control variables have significant correlations with one or both measures of firm performance.

5.2 Hypothesis Testing: Innovation Models

Four regression models are used to test the hypothesized relationship between SECI practice and innovation. Table 2 shows the regression results with SECI practice as independent variable and firms' product, process, organizational, and marketing innovation as dependent variables. As can be seen, with the exception of process innovation model, the three remaining models are significant at either $p < 0.001$ or $p < 0.05$. The models explain 5.2%, 3.9%, and 10.2% the variance in product innovation, organizational innovation, and marketing innovation respectively.

Table 2. Regression results with innovation as dependent variable and SECI practice as independent variable

	Product innovation	Process innovation	Organizational innovation	Marketing innovation
Danang City	-.131*	-.083	-.149**	-.251***
HCM City	-.049	-.015	.044	-.017
Firms with state capital	-.026	.008	-.003	-.023
Firms with foreign capital	-.057	-.025	-.013	-.012
High-tech	-.098*	-.001	.047	-.087a
Firm age	-.093a	.058	.055	.081
Firm asset	.015	.050	.060	.002
Number of employees	.008	-.026	.016	.058
Percentage of employees with college degrees	.091	-.003	-.018	-.001
R&D staff	.110*	.025	.063	-.071
Turnover rate	-.039	.069	-.044	-.119*
SECI practice	.138**	.043	.117*	.104*
R ²	.052	.001	.039	.102
F Statistics	2.997***	.81	2.465**	4.933***
N	434	435	436	416

Note. a $p < .1$; *) $p < .05$; **) $p < .01$; ***) $p < .001$.

The results show that SECI practice is positively significantly associated with the firm's level of product innovation ($\beta = .138$, $p < 0.01$), level of organizational innovation ($\beta = .117$, $p < 0.05$), and with level of marketing innovation at $\beta = .104$ ($p < 0.05$). Hypotheses 1a, 1c, and 1d are supported.

5.3 Hypothesis Testing: Performance Models

To examine the relationship between innovation and performance of firms, we performed two regression models. Four innovation variables are entered into the regression equations as independent variables; ROA and Staff earning are entered as dependent variables in each of the models. As can be seen in Table 3, the first model is significant at $p < 0.05$, explaining 3.1% of the variance in ROA of the firm. The second model is highly significant at $p < 0.001$, explaining 63.5% of the variance in the firm's average staff earning.

Table 3. Regression results with performance as dependent variable and innovation as independent variables

	Return on Asset (ROA)	Staff earning
Danang City	.017	-.143***
HCM City	.137**	.161***
Firms with state capital	.146**	.045
Firms with foreign capital	-.039	.089**
High-tech	-.006	-.097**
Firm age	-.038	.031
Firm asset	.117*	-.101**
Number of employees	-.026	.750***
Product innovation	.089a	.080**
Process innovation	-.020	.029
Organizational innovation	-.014	-.007
Marketing innovation	.048	.011
Adjusted R ²	.031	.635
F Statistics	2.166*	61.476***
N	442	419

Note. a $p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$.

The results show that among four types of innovation, only product innovation has positive significant relationship with firm performance ($\beta = .089$, $p < 0.1$ for ROA and $\beta = .080$, $p < 0.01$ for Staff earning), supporting H2a. Meanwhile, there is no evidence to support H2b, H2c, and H2d as the β coefficients for process innovation, organizational innovation, and marketing innovation are statistically insignificant.

We also suspect that SECI practice may have a direct influence on firm performance beyond innovation. Therefore, two additional performance models are performed with SECI as the independent variable and performance as dependent variable. Table 4 shows the results.

Table 4. Regression results with performance as dependent variable and SECI practice as independent variable

	Return on Asset (ROA)	Staff earning
Danang City	.011	-.129***
HCM City	.128*	.136***
Firms with state capital	.149**	.056
Firms with foreign capital	-.040	.079*
High-tech	-.021	-.017
Firm age	-.051	.033
Firm asset	.118*	.039
Number of employees	-.022	.621***
SECI practice	.050	-.022
Adjusted R ²	.029	.507
F Statistics	2.56*	53.08***
N	447	457

Note. a $p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$.

As can be seen, although both models are significant, the relationship between SECI practice and ROA as well as relationship between SECI practice and Staff earning are not significant, indicating that knowledge creation practice does not have direct association with firm performance. Except High-tech and Firm age, all other control variables are significantly related to either one or both measures of financial performance.

6. Discussion and Implications of the Research

This study explores the relationships among firm's knowledge creation, innovation and performance. By proposing a theoretical model illustrating these relationships and testing the proposed model in the context of Vietnam, an emerging economy, the study improves our understanding of knowledge-based theory of firm innovation. The practice of knowledge creation processes itself does not directly influence firm performance. Only when this practice turns into product innovation, can the higher performance of firms be achieved.

This study has two main limitations. First, innovations are measured using subjective assessments of managers. Second, it relies on cross-sectional study; therefore, causal relationships among variables cannot be confirmed. Future research could address these weaknesses by including objective measures of innovation and investigating the phenomenon over a period of time. Despite all the limitations, results of this study still advance our knowledge of firm innovation, its antecedent and consequence. The study has provided some important implications for managers and for policy makers.

6.1 Theoretical Implications

Consistent with the existing literature where knowledge creation is found to be crucial for firms' innovation (e.g. Andreeva & Kianto, 2011; Keogh, 1999), it is found in this study that the practice of SECI processes has positive influences on three out of four types of innovation, including product, organizational, and marketing innovation. While product innovation can be observed easily by outsiders, organizational innovation is more internal-focused. Changes in the firm's business practices or workplace organization cannot be achieved without interactions among individuals in different departments, business units, and work teams. Marketing innovation requires the firm to be sensitive to the market and competitors and this sensitivity can be obtained through connections between the firm and its business partners. Indeed, firms' practices of socialization, externalization, combination, and internalization processes contain necessary communications, exchanges of ideas, and learning that can turn into innovations. The resulted innovations are continuous (Nonaka & Takeuchi, 1995) and may be incremental, which characterized by having small improvements made over time (Dewar & Dutton, 1986; Etlie, Bridges, & O' Keefe, 1984). Incremental innovation is extremely relevant to businesses in Vietnam as firms in this environment may not have sufficient resources and capabilities to implement radical innovation (Phan 2014).

Unexpectedly, we do not find a significant relationship between knowledge creation and process innovation, the type of innovation that involves significant changes in techniques, equipment and/or software that can result in significantly improved production or delivery method. As Choe (2014) out, an alignment patterns of business strategies with knowledge management strategies may be needed for this innovation to be realized. Alternatively, this may due to the specific nature of the research context. As Vietnam is still relatively under-developed in terms of science and technology, this is not what firms in the country strive for. As put out by the CEO of a Vietnamese leading software firm whom we interviewed: "we need not reinvent the wheel because the world is far more advanced than us. It's already good if we can learn and absorb their inventions." Future research should re-test this relationship in different contexts.

In addition to the relationship between a firm's knowledge creation and innovation, we also find a link between the firm's product innovation and its financial performance. This result strengthens our understanding of the widely-recognized yet little-evidenced relationship. As pointed out by Walker (working paper), while innovation is one of the most widely written about subject in the social sciences only a small number of articles empirically examine the impact of innovation on organizational performance. We, nevertheless, do not find a similar link between the three remaining types of innovation and financial performance. These relationships may be more complicated than we previously assumed. A number of variables could mediate the relationship between each of these types of innovation and firms' financial performance measured by ROA and average staff earning. For example, according to OECD (2005), process innovation can help improving product quality and/or decreasing unit cost of production/delivery, marketing innovation can lead to increased sales and market shares, and organizational innovation may improve workplace satisfaction/productivity and/or reduce administrative/transaction costs. These variables may serve as mediating variables between process/marketing/organizational innovation and the firm' ROA and/or average staff earning. Likewise, Gunday, Ulusoy, Kilic and Alpkam (2011) suggested that innovative performance, market performance, and production

performance acted as intermediaries between innovation and financial performance. Future research is needed to re-examine these relationships in different contexts at different times.

It is also found in this study that knowledge creation practice does not have a direct relationship with firm performance. Rather, it contributes to product innovation and product innovation in turn, has positive impacts on firm performance. Managers should gear their firms' knowledge creation efforts to producing new or improved products. Competing on traditional resources such as land or relationships (as often does by Vietnamese enterprises) may no longer be sufficient for today's competitive environment. Higher performance can only be achieved when firms prove that they can offer new and better products to the market.

6.2 Managerial Implication

This study suggests that some innovation can be promoted without an expensive investment from firms. As evidenced by this research, application of SECI practices helps firms enhance product, organizational, and marketing innovation. However, firms often engage in socialization, externalization, combination, and internalization processes but they may not realize that they are practicing them for a knowledge creation purpose. More knowledge and more valuable knowledge can be created if firms have that purpose in mind. Practicing knowledge creation for innovation purpose requires even more from the firms. Since innovation is expensive and risky, firms must have long-term vision and strong determination instead of focusing on short-term gains, which is the case of many Vietnamese firms (Phan, 2014). Having a diverse employee base with complementary knowledge and skills coupled with an open environment in which employees are encouraged and awarded for having new ideas is absolutely needed for knowledge creation and innovation. The firm's leaders should have responsibilities to create and maintain such an environment.

For policy makers, fostering firm innovation has become critical for Vietnam to overcome the "middle income country" trap (Riedel, 2015). As more knowledge can be created through external linkages (with outside experts, customers, suppliers, state agencies, and other stakeholders), firms need to develop these links. The government can help by building a strong national innovation system in which different constituencies including universities, research institutes, and businesses are inter-connected for technology diffusion, information sharing, and knowledge creation.

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