Innovation and Performance of Enterprises: The Case of SMEs in Vietnam

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INNOVATION AND PERFORMANCE OF ENTERPRISES:

THE CASE OF SMEs IN VIETNAM

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Abstract: Innovation is widely recognized as a key determinant of enterprise performance. It is, however, not clear how innovation affects performance of small-and-medium enterprises (SMEs) in transition economies. Based on data collected from surveys of SMEs in Vietnam from 2005 to 2011 this study shows that the human capital of owners/managers of SMEs, the quality of workers, and public physical infrastructure positively affect innovation and the performance of SMEs. More importantly, the study finds that innovation in products, production process, and marketing is a decisive factor for higher performance of SMEs in Vietnam.

Keywords: Innovation, SMEs, Vietnam

JEL classification: D22, J54, L11, L25, O3

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Introduction

SMEs play a key role in transition and developing countries. According to the OECD (2004), SMEs typically account for more than 90% of enterprises outside of the agricultural sector and generates significant employment that helps reduce poverty. In developing countries in the Asia-Pacific region, SMEs play a central role in promoting economic dynamism, innovation and job creation (UN 2012). Nevertheless, SMEs face many constraints such as limited access to resources such as human resources, poor infrastructure, and complicated procedures in setting up, operating, and growing a business. Therefore, governments of transition and developing countries are supporting the development of SMEs by finding ways to remove these constraints.

It is widely known that innovation is a key to development of enterprises (Freel and Robson 2004; Cefis and Marsili 2006; Hall, Lotti, and Mairesse 2009; Gunday et al. 2011). Many studies have shown that innovation is important for development of enterprises in developing countries because it increases enterprise performance. In a series of studies conducted in industrial clusters in industries such as footwear, garment, shoe manufacturing in Asia and Africa, many researchers find that multifaceted innovation including direct procurement of materials, direct sales of products, establishment of brand names, link-up with traders, internalization of key parts, subcontraction of production,improvement in the quality of materials, and diversity of productsis crucial to the improved performance of the enterprises (Cawthorne 1995; Rabellotti 1995; Nadvi 1999; Schmitz 1999; Gereffi 2001; Giuliani, Pietrobelli, and Rabellotti 2005; Akoten and Otsuka 2007; Sonobe, Akoten, and Otsuka 2007).

However, little is known about the roles of innovation in performance of the SMEs in transition economies like Vietnam. Hansen, Rand, and Tarp (2004) are among the exceptions.

The authors emphasize that innovation has positive and significant effects on survival of SMEs by using data from surveys of SMEs in Vietnam during 1990-2000. According to CIEM (2012) during the period 2009-2011 in Vietnam, larger enterprises and enterprises in urban areas tended to improve existing products more than others. The enterprises that improved products had higher growth in employment and lower exit rates. Nguyen et al. (2008) find that innovation is important for exports of the SMEs in Vietnam. Vu, Sonobe, and Otsuka (2009) analyze an iron and steel industrial cluster in northern Vietnam and show that the enterprises, the majority of which are household enterprises, carry out multifacted innovation and have higher labour productivity and larger operating size measured by value added. Other than these, rigorous studies about the roles of innovation in performance of the SMEs in Vietnam are limited.

This study expects to fill the gap in literature about the importance of innovation for performance of SMEs in a transition economy by using data from surveys of SMEs conducted in Vietnam from 2005 to 2011. It is found that human capital of owners/managers of SMEs, as measured by formal education and prior experience, quality of physical infrastructure, and quality of workers are major determinants of significant innovation in the SMEs product, production process, and marketing. The study also reveals that such multifaceted innovation is important for performance of the SMEs.

The rest of the paper is organized as follows. Part 2 provides an overview of the SMEs in Vietnam. Part 3 presents descriptive analysis and advances testable hypotheses followed by regression analysis presented in Part 4. Part 5 concludes the paper with some policy implications.

2. Overview of the SMEs in Vietnam

In Vietnam, SMEs are defined as independent enterprises with registered capital of no more than 10 billion VND and employing fewer than 300 workers on average over a year. SMEs

in Vietnam include state-owned enterprises, non-state enterprises, and foreign invested enterprises, the majority of which are non-state enterprises (Figure 1).The SMEs are in various industries and a large number of the SMEs are in trade, manufacturing, and services (Figure 2).

The SMEs in Vietnam are mainly small enterprises but they contribute greatly to the economy. According to CIEM (2012), in the survey of SMEs they conducted in 2011, about 70% of the number of SMEs was micro enterprises, which include a large number of household enterprises, and only about 6% was medium enterprises.[1] Nevertheless, during the last several decades, SMEs have emerged as a dynamic force for economic development in Vietnam (Hansen et al. 2004). According to Table 1, the number of SMEs outweighs other types of enterprises in Vietnam. More than 97% of the total number of enterprises in Vietnam is considered SMEs. SMEs account for half of total employment among all types of enterprises. A fair proportion of total capital was invested by SMEs and SMEs generate about half the total revenue of all enterprises in Vietnam.

Due to the impacts of the global financial crisis during the last few years, the SME sector in Vietnam has faced great difficulties. According to a report of the CIEM (2012), 60% of the surveyed SMEs reported that the crisis negatively affected their businesses and they have reduced new investment and innovation in 2011 compared to 2009. Out of more than 2,500 SMEs that participated in the survey in 2009, about 20% have closed by 2011 for reasons including increasing difficulty in accessing credit, increasing inventories, and difficulties in employing skilled labor. During the first 9 months of 2012, about 42,000 SMEs closed and 60% of the SMEs surveyed have reduced their number of employees.

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[1]SMEs include micro, small, and medium enterprises. Micro enterprises have 1-9 workers. Small enterprises have 10-49 workers. Medium enterprises have 50-299 workers.

3. Descriptive analysis and testable hypotheses

Data

This study is based on a dataset from four surveys of manufacturing SMEs in Vietnam in 2005, 2007, 2009, and 2011. These surveys were jointly conducted bythe Central Institute of Economic Management (CIEM) under the Ministry of Planning and Investment (MPI), the Institue of Labor, Science and Social Affairs(ILSSA) under the Ministry of Labour, Invalids, and Social Affairs (MOLISA), The University of Copenhagen, UNU-WIDER, and the Embassy of Denmark in Vietnam. The total number of observations in these four surveys is 10,667. Each year, a number of new SMEs were added to the survey to replace the SMEs that have exited. Due to missing values, we dropped 80 observations and, thus, a total of 10,587 observations remain for the analysis in this study. The dataset contains data on characteristics of the owners/managers of the SMEs and data on innovation activities, cost, revenue, and other related information of the sampled SMEs in Vietnam.

Characteristics of the owners/managers of surveyed SMEs

Table 2 presents characteristics of oweners and managers from surveyed SMEs. According to Table 2, most of the owners/managers of the SMEs in Vietnam have their ages ranging from 40 to 50. Most of them are male and belong to the group of Kinh ethnicity, which is the majority in Vietnam.[2]Regarding formal general education, about 60% the owners/managers of the SMEs in Vietnam have completed upper secondary school.[3] The percentage of the owners/managers who completed upper secondary school increased slightly

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[2] In Vietnam, Kinh ethnicity accounts for about 86% of the total population (Vien Dan Toc 2013).
[3] There are four main levels in the education system in Vietnam: primary school from grade 1 to grade 5; lower secondary school from grade 6 to grade 9; upper secondary school from grade 10 to grade 12; and university level, which is often 4 to 5 years.

from 2004 to 2010. The percentage of the owners/managers who have completed university study, however, increased substantially from 2.1% in 2004 to 24.2% in 2010, suggesting that the owners/managers of the SMEs in Vietnam have become more educated overtime. In the literature, formal education is an important determinant of innovations and performance of enterprises, especially enterprisesin industrial clusters in developing countries (Akoten, Sawada, and Otsuka 2006; Iddrisu and Sonobe 2006; Mengiste 2006; Akoten and Otsuka 2007; Sonobe et al. 2007; Nichter and Goldmark 2009; Vu, Sonobe, and Otsuka 2010). Therefore, we advance the following hypothesis:

H1: The more highly educated owners/managers of the SMEs carry out more innovation and perform better than others.

In a developing country like Vietnam, practical experience of the owners/managers can be another key to the development of the SME sector because it is complementary to formal education. In this study, we measure experience of the owners/managers by whether they used to be workers in and/or managers of manufacturing or service enterprises before establishing their own businesses. According to Table 2, about one fourth of the owners/managers have previous experience working in state-owned and non-state enterprises and managing service enterprises, while a smaller percentage of them used to be managers of manufacturing enterprises. We will explore the effects of this factor on innovations and performance of the SMEs in the regression analysis.

There is a small percentage of owners/managers who belong to at least one enterprise association and who are also members of the Communist Party (Table 3). Similarly, less than 10% of the owners/managers of the SMEs used to be officials in governmental agencies at communal, district, or provincial levels and/or war veteran. Being a member of an association

and a member of the Communist Party or as someone who used to work for governmental agencies may expand the business networks of the owners/managers. Such expanded networks are far from representing social capital of the owners/managers. They may, however, reflect possible benefits that the owners/managers can gain from their business networks. Thus, the regression model incorporates these variables, which acts as a proxy for social capital, in estimating innovation and performance of the SMEs.

Characteristics of the SMEs

Table 4 presents characteristics of the SMEs including years of operation, conditions of infrastructure where the SMEs are located, and quality of the workers of the SMEs. The average number of years of operation is about 16 in 2010. A large proportion of the SMEs are located in areas where physical infrastructure is in good condition. That is, there is a main paved road leading to the SMEs and/or the SMEs have easy access to railways. It is noted that in a developing country like Vietnam physical infrastructure is often poor or non-existent. Thus, the enterprises that are located near to roads and railways tend to enjoy better conditions for growthpossibly due to having better access to raw materials and easy transports of finished products to customers. As a result, we postulate the following hypothesis:

H2: SMEs that have better access to physical infrastructure tend to innovate more and perform better than others.

Quality of the workers of the SMEs is also presented in Table 4. We measure the quality of the workers by the ratios of highly educated and skilled workers to total regular workers. Quality of the workers is higher if workers have either higher formal education or more practical experience. To reflect the quality of the workers formed through formal education we take the ratio of workers who hold college/university degree(s) to total regular workers as an indicator.

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The quality of the workersformed through their practical experience is proxied by the ratio of foremen and supervisors to total regular workers and the ratio of masters to total regular workers. Foremen and supervisors in the SMEs are those who have a lot of technical knowledge, which is accumulated through technical education and production experience. A foreman or a supervisor is often a leader of a group of workers and is responsible for technical issues during his/her production shift. In many household enteprises in industrial clustes in Vietnam, the priprietors of the enterprises told us that they rely on foremen and supervisors for not only technical issues such as controlling the quality of finished products or adjusting and repairing machines but also labor management. In many cases, foremen and supervisors are even more knowledgable than the proprietors of enterprises in managing their daily production activities (Vu et al. 2009). A master of production may not be a leader of a group of workers or a supervisor in the enterprises but he/she is also as knowledgable about production techniques as a foreman or a supervisor. Production masters are important workers in small enterprises, especially in household enterprises, because they are often responsible for improvement in products and production process.

According to Table 4, the ratio of workers with college/university degree(s) to total regular workers and ratio of foremen and supervisors to total regular workers are both small. The ratio of production masters to total regular workers is higher but not large. This fact shows that the quality of the workers is not high and manufacturing knowledge and skills are scarce in SMEs in Vietnam. Possession of workers who are highly educated and skillful is an essential condition for the SMEs to carry out innovation in products, production, and marketing. Therefore, we advance the following hypothesis:

H3: *SMEs that have workers who are more educated and have more experience are more likely to carry out innovation than others.*

Specific industries where the SMEs are doing businesses in 2010 are shown in Table 5. The sampled SMEs are in various industries but concentrated in a few labor-intensive industries including food processing, metal products, products of wood, wearing apparel, and furniture products.

Important information about types of innovation and performance of the SMEs is presented in Table 6. In the dataset, we are able to identify multifaceted innovation of the SMEs including whether or not the SMEs have introduced new product groups, improved existing products, introduced new production processes or new technologies, imported materials directly from abroad, or exported their products directly. Importing materials directly from abroad can be considered as one type of marketing innovation because often the imported materials cannot be produced domestically. In the context of Vietnam, imported materials are also of higher-quality than domestically produced materials. Thus, importing materials from abroad is important for the SMEs in Vietnam to carry out product innovation such as producing new products and improving exisiting product quality. Similarly, exporting products is always more difficult than selling them domestically for the SMEs in Vietnam. Exported products tend to have higher quality than the products that are sold domestically. Therefore, importing materials and exporting products can be considered as two typicaltypes of marketing innovation of the SMEs in Vietnam.

In this study, we combine the first two innovation activities, i.e. introduction of new product groups and improvement of existing products, to be product innovation. We will

therefore focus on three typical innovation types of the SMEs namely product innovation, process innovation, and marketing innovation.[4]

According to Table 6, the SMEs carried out more product innovation and process innovation than marketing innovation activities during the period 2004-2010. The difference in the percentage of the SMEs that carried out product and process innovation and the percentage of the SMEs that carried out marketing innovation is statistically significant. This finding is not supprising because the ability to carry out marketing innovation of the Vietnamese enterprises in general and the SMEs in particular is limited due to lack of resources, knowledge about markets, and practical experience. The percentage of the SMEs that carried out all types of innovation reduced gradually from 2004 to 2010, which may be partly explained by negative effects of the global financial crisis starting in 2008.[5] The reduction in product and process innovation was more than that in marketing innovation. Nevertheless, only the reduction in process innovation was statistically significant between 2004 and 2010. It is likely that due to the tightening of loans from commercial banks the SMEs were not able to make investment to improve production processes, resulting in a sharp reduction in process innovation. Meanwhile, most of the exported products of the SMEs in Vietnam are of low-quality and low-price, thus, not having been seriously affected by the reduction in the world demand due to the global financial crisis.

Table 6 also reports the average real gross profit of the SMEs. From 2004 to 2010, the average real gross profit of the SMEs increased slightly. The difference between the profit in

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[4]It is noted that the data in Table 6 only reprenset the percentage of the SMEs that have carried out corresponding innovations. These data do not tell us in details about these innovations such as how the innovations are carried out or how much it was spent on carrying out these innovations. As such, the data do not allow us to anlyze further into these innovations. Nevertheless, Table 6 does provide us with a general picture about innovation activities of the SMEs in Vietnam.

[5] During the crisis, the SMEs in Vietnam were facing great difficulities due to the shrinkage of demands in the world and the domestic markets leading to the pile up of inventories and the tightening of bank loans leading to shortage of working capital and capital for long-term investment.

2010 and that in 2004 is, however, not statistically significant. Thus, the performance of the SMEs measured by gross profit did not statistically change during the study period. Based on these observations, we advance the following hypothesis:

H4: *Multifaceted innovations in product, production process, and marketing contributes positively to the performance of the SMEs.*

We are going to test these hypotheses by applying appropriate regression models, which will be presented in the next part.

4. Regression analysis

Regression strategy

We would like to analyze the effects of innovation on performance of SMEs. Innovation is, however, endogenous in the regression of performance of the SMEs.[6] To deal with the endogeneity problem, we shall apply the 2SLS model.

First of all, we would like to analyze the roles of various factors including characteristics of the owners/managers, characterisitics of the enterprises and conditions of physical infrastructure on innovation activities and performance of the SMEs measured by gross profit. In other words, we are going totest the first three hypotheses postulated in the previous section. We, thus, regress the innovation activities and gross profit of the SMEs on the same set of independent variables in the first stage. We use the OLS model with a robust stadard error for the regression of gross profit. Because the variables for innovation take on the values of 1 if the SMEs carried out innovation and 0 otherwise, we apply the Logit model in the regressions of innovation.

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[6] Technically we have detected the endogeneity problem in the regressions for the performance of the SMEs.

Secondly, we apply the 2SLS model to test the forth hypothesis about the effects of innovation on performance of the SMEs. The application of the 2SLS method amounts to identifying an instrumental variable, which affects innovation but does not affect performance of the SMEs directly. Fortunately, we are able to find such appropriate instruments for the endogenous variables. Those instruments are proxies for the quality of the workers, i.e. the ratios of highly educated workers and workers who have high production skills to the total regular workers. It is reasonable to assume that the high quality workers affect innovation in products, production process, and marketing but not gross profit of the SMEs. We have three instruments corresponding to the three ratios already presented in the lower part of Table 4. Thus, we face the issue of overidentification. We conducted the overidentification tests and the Hansen's J results show that the instruments are valid (Table 8).

For all of the regressions, we pool data in the four years together and included three year dummies. Apart from interested explanatory variables representing the characteristics of the owners/managers, characteristics of the enterprises, conditions of infrastructure, and networks of the owners/managers, we included dummy variables for industries as presented in Table 5 and nine dummy variables for the provinces where the SMEs are located.[7]

Results of the first-stage regressions

The regression results of the first-stage are presented in Table 7. Variables representing formal education of the owners/managers are positive and significant in many regressions. The coefficients of the dummy variables for general education of the owners/managers are positive and significant in the gross profit, product innovation, process innovation, and direct imports of materials. The coefficients of the dummy variables for the highest level of general education, i.e.

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[7]Out of these provinces, Ha Tay was merged into Hanoi. Nevertheless, for the consistencey we still consider Ha Tay as province that is different from Hanoi.

completing upper secondary school, are highly significant in all of these regressions. These findings indicate that the owners/managers with higher general education tend to innovate more and perform better than others and, thus, supporting our hypothesis H1. The same regression results are for variables representing technical education of the owners/managers. The dummy variables for the owners/managers who have received college/university degrees are positive and highly significant in all regressions of innovation and gross profit, suggesting that knowledge acquired from higher education is one of key determinants of innovation and better performance of the SMEs in Vietnam.

Moreover, Table 7 shows that the variables representing previous production and management experience of the owners/managers are positive and significant in a number of regressions for innovation in products, production process, and exports of products, indicating that production and management experience of the owners/managers is important for innovation in the SMEs in Vietnam. These findings support our hypothesis H1 and indicate that human capital of the owners/managers of the SMEs in Vietnam are scarce and, thus, invaluable for the development of the SMEs.

In Table 7, the infrastructure variables are positive and significant in many regressions. The coefficients of the variable representing easy access to a main road by the SMEs are especially positive and highly significant in all innovation and gross profit regressions. This finding indicates that easy access to roads is an important determinant that encourages the SMEs in Vietnam to carry out multifaceted innovation and have better performance. As a result, this finding supports our hypothesis H2 and suggests that lack of good physical infrastructure is one of impediments to the development of the SMEs in Vietnam.

It is interesting to observe in Table 7 that many of thevariables representing quality of the workers have positive coefficientsin the regressions of innovation and gross profit. The coefficients of the variables are, however, only statistically significant in the regressions of innovation and not in the gross profit regression. The ratio of workers who have graduated from college/university to total regular workersis positive and highly significant in all of the regressions of product innovation, production process innovation, direct imports of materials, and direct exports of products, while it is positive but not significant in the gross profit regression. Except in the regression of direct imports of materials, the ratio of formen and supervisors to total regular workers is also positive and significant in the regressions of product innovation, production process innovation, and direct exports of products. These findings suggest that quality of the workers is one of the keys for innovation, while it is not necessarily an important factor of higher performance of the SMEs in Vietnam. Findings about the importance of worker quality to innovation of the SMEs support our hypothesis H3. These findings also confirm the validity of our choice of instruments for the 2SLS regression in the next step.

Apart from these findings, the regression results in Table 7 also reveal that networks of the owners/managers contribute to innovation and performance of the SMEs. The variable of member of associations has positive and highly significant effects on both innovation and performance of the SMEs.Possible networks formed through previous jobs of the owners/managers also have positive effects on innovation and performance in some regressions. These findings show that apart from human capital social capital of the owners/managers contributes to innovation and performance of the SMEs.

Results of the 2SLS regression

To estimate the effects of innovation on performance of the SMEs, we apply the 2SLS model to correct for the endogeniety of the innovation variables. For each of the regression function, we use only one endogenous variableout of four variables for innovation of products, innovation of production process, direct imports of materials, and direct exports of products. The regression results are presented in Table 8. It is shown that all of the variables representing innovation have positive and significant coefficients in the regressions. This finding supports our hypothesis H4 that multifaceted innovation in products, production process, and marketing contributes positively and substantially to the performance of the SMEs in Vietnam. In these regressions, the explanatory variables as presented in Table 7 and ananlyzed in the previous section are no longer significant, suggesting that human capital of the owners/managers, public physical infrastructure, and quality of workers affects performance of the SMEs through facilitating innovation.

5. Conclusion

Despites many studies reporting the importance of innovation to performance of enterprises, little is known about the roles of innovation in performance of the SMEs in transition economies. This study inquires into the effects of multifaceted innovation on performance of the SMEs in Vietnam. The findings of the study reveal that various factors affect innovation and performance of the SMEs. Among others, formal education and experience of the owners/managers are essential factors. Additionally, quality of the workers, which is also measured by their formal schooling and technical experience, is of no less importance for the SMEs to carry out innovation. Public provision of education and training to the owners/managers and the workers of the SMEs in Vietnam shall, thus, warrant their development. Moreover, the

study finds that the physical infrastructure, especially the road system, contributes greatly to innovation and performance of the SMEs. As such, it is potential for the public sector to supply adequate physical infrastructure to effectively support the development of the SMEs.

Most importantly, the study shows that multifaceted innovation in products, production process, and marketing is the key for better performance of the SMEs. This finding suggests that the SMEs should carry out innovation to grow. It also implies that favorable conditions for innovation should be created by the public sector to help the SMEs recover from the crisis and promote theirsustainable development.

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Figure 1: Ownership structure of Vietnamese SMEs
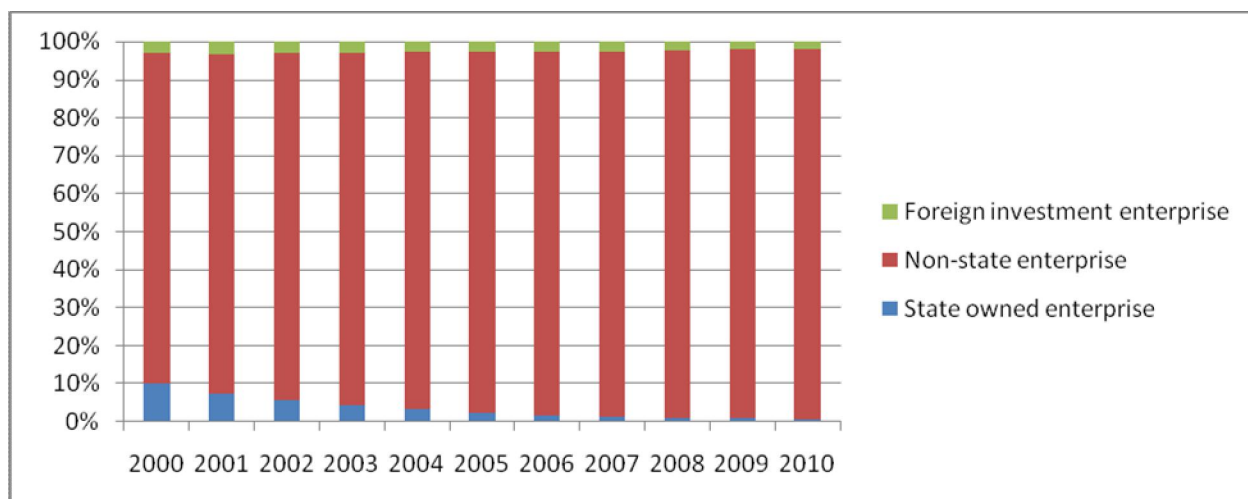
Source: authors' calculation from data collected fromGeneral Statistics Office of Vietnam

Figure 2: Sectoral structure of Vietnamese SMEs
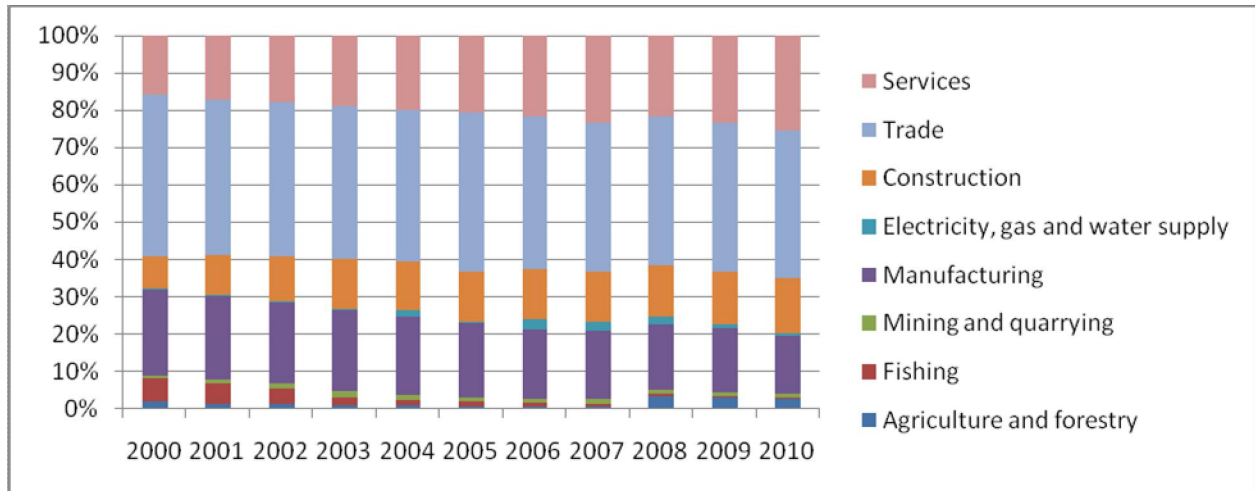
Source: authors' calculation from data collected fromGeneral Statistics Office of Vietnam

Table 1: SMEs in the economy of Vietnam

	2005	**2006**	**2007**	**2008**	**2009**	**2010**
Total number of enterprises (1000)	112	129	156	206	249	286
Percentage of number of SMEs	97	97	97	98	98	98
Average number of workers per SME	23	22	21	19	18	17
Percentage of employment by SMEs	41	44	43	47	50	50
Percentage of capital of SMEs	32	50	36	38	42	47
Percentage of revenue of SMEs	48	54	53	57	59	54

Source: authors' calculation from data collected fromGeneral Statistics Office of Vietnam

Table 2: Characteristics of the owners/managers of surveyed SMEs

	2004	2006	2008	2010
Average age of the owners/managers	44.7	51.3	45.7	45.7
Percentageof Male owners/managers	69.4	66.8	65.6	62.7
Percentage of owners/managers who are Kinh ethnicity	93.4	93.5	93.3	92.9
General education: % who completed primary school	7.5	8.2	9.0	8.4
General education: % who completed lower secondary school	31.8	31.3	28.0	27.9
General education: % who completed upper secondary school	57.9	56.0	59.2	62.2
Professional education: % who have technical certificate	18.7	18.3	15.4	17.6
Professional education: % who completed college / university / post-graduate	2.1	1.3	20.8	24.2
Percentage of owners/managers who used to be:				
worker in state-owned enterprises	25.9	30.2	26.4	20.2
worker in non-state enterprises	25.2	19.7	22.9	26.2
manager of manufacturing enterprises	8.9	9.1	8.5	8.7
manager of service enterprises	19.5	14.2	16.2	18.5
Number of enterprises	2,802	2,615	2,642	2,528

Source: authors' calculation from the dataset

Table 3: Networks of the owners/managers of the SMEs

	2004	**2006**	**2008**	**2010**
Percentage of the owners/managers who belong to at least one enterprise association	9.6	10.2	10.2	7.6
Percentage of the owners/managers who are a member of the Communist Party	9.3	7.6	7.2	9.5
Percentage of the owners/managers who used to be:				
village/commune/district/provincial officials	6.3	4.6	4.6	3.1
war veteran	7.0	8.5	6.8	8.0
Number of members in the family	4.9	4.8	4.7	4.5
Number of enterprises	2,802	2,615	2,642	2,528

Source: authors' calculation from the dataset

Table 4: Characteristics of the SMEs

	2004	2006	2008	2010
Years of operation	11.5	13.4	14.5	15.6
Percentage of SMEs where there is a main paved road leading to	77.1	76.2	78.1	77.7
Percentage of SMEs that have easy access to rail	77.1	37.7	57.9	51.2
Quality of the labor force (ratio to total regular workers - %):				
of professionals with college/university degree	3.8	3.2	3.7	3.6
of foremen and supervisors	1.8	1.2	1.1	1.4
of production masters	48.5	29.2	19.8	22.4
Number of enterprises	2,802	2,615	2,642	2,528

Source: authors' calculation from the dataset

Table 5: Percentage of the SMEs in various industries in 2010

	2010
Food products	29.7
Metal products	17.5
Products of wood	10.0
Wearing apparel	9.5
Furniture products	7.1
Rubber and plastics products	4.8
Non-metallic mineral products	4.7
Paper and paper products	2.8
Leather and footwear	2.0
Electrical and electronics products	1.9
Chemicals and medicines	1.8
Machineries and equipment	1.1
Motor vihcles and transport equipment	1.0
Other products	6.1
Number of enterprises	2,528

Source: authors' calculation from the dataset

Table 6: Innovations and performance of the SMEs

	2004	2006	2008	2010
Multifaceted innovations of the SMEs:				
Percentage of the SMEs that carried out product innovation	63.8	45.2	41.6	40.4
Percentage of the SMEs that carried out process innovation	29.5	15.5	13.9	13.3
Percentage of the SMEs that imported materials directly	4.1	3.1	3.5	3.3
Percentage of the SMEs that exported products directly	4.6	4.4	4.3	3.9
Average real gross profit (million VND)*	211	235	249	255
Number of enterprises	2,802	2,615	2,642	2,528

* Real gross profit is calculated by adjusting nominal gross profit with the CPI index collected from the General Statistics Office of Vietnam in corresponding years.

Source: authors' calculation from the dataset

Table 7: Determinants of innovation and performance

	Gross profit (OLS)	Product innovation (Logit)	Process innovation (Logit)	Imports of materials (Logit)	Export of products (Logit)
Gender (Male=1)	-0.123*	0.051	0.071	-0.181	-0.128
	(0.06)	(0.05)	(0.06)	(0.12)	(0.11)
Age of owners/managers	-0.004*	-0.015**	-0.012**	-0.004	0.008
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)
Ethnicity (Kinh=1)	0.214**	0.090	0.105	-0.185	0.137
	(0.07)	(0.10)	(0.13)	(0.24)	(0.24)
Completed primary school	-0.002	0.341*	-0.078	14.707**	-0.452
	(0.02)	(0.15)	(0.23)	(1.94)	(0.74)
Completed junior secondary school	0.004	0.308*	0.125	14.290**	-0.242
	(0.02)	(0.14)	(0.21)	(2.62)	(0.62)
Completed upper secondary school	0.050*	0.501**	0.561**	15.196**	0.967
	(0.02)	(0.14)	(0.21)	(2.34)	(0.60)
Having technical certificate(s)	0.029	0.421**	0.280**	0.346	0.222
	(0.03)	(0.06)	(0.08)	(0.26)	(0.20)
Completed college/university	0.376**	0.533**	0.529**	1.505**	1.030**
	(0.07)	(0.08)	(0.09)	(0.26)	(0.21)
Worker in state-owned enterprise	0.075	0.151*	0.008	0.249	0.451*
	(0.05)	(0.07)	(0.09)	(0.21)	(0.18)
Worker in non-state enterprise	0.057	0.246**	-0.025	0.298	0.278

	(0.05)	(0.07)	(0.08)	(0.19)	(0.19)
Manager of manufacturing enter.	0.062	0.122	0.024	0.515	-0.102
	(0.03)	(0.09)	(0.11)	(0.29)	(0.30)
Manager of service enter.	0.059	0.220**	0.210*	0.063	0.120
	(0.06)	(0.07)	(0.09)	(0.23)	(0.20)
Used to be a cadre	-0.129**	0.238*	0.076	-0.436	-0.304
	(0.04)	(0.10)	(0.13)	(0.36)	(0.27)
Veteran	0.002	0.266**	0.122	-0.468	-0.105
	(0.04)	(0.09)	(0.11)	(0.32)	(0.24)
Member of communist party	0.148*	-0.152	0.022	0.061	0.198
	(0.07)	(0.09)	(0.11)	(0.21)	(0.20)
Member of an association	0.437**	0.706**	0.729**	1.175**	1.568**
	(0.13)	(0.08)	(0.08)	(0.15)	(0.13)
Years of establishment	0.005	-0.001	-0.003	-0.019*	-0.033**
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)
Ratio of college/univ. graduates	0.516	1.195**	2.608**	2.816**	2.628**
	(0.29)	(0.34)	(0.36)	(0.57)	(0.56)
Ratio of formen & supervisors	0.233	1.861**	2.459**	1.513	2.938**
	(0.39)	(0.62)	(0.60)	(0.95)	(0.94)
Ratio of masters	0.110	-0.040	-0.062	-0.168	-0.043
	(0.07)	(0.08)	(0.10)	(0.24)	(0.21)
Access to main road	0.073**	0.195**	0.318**	0.635**	0.406*
	(0.02)	(0.06)	(0.08)	(0.23)	(0.17)

Access to rail	-0.010	0.248**	-0.053	-0.068	-0.221
	(0.05)	(0.05)	(0.07)	(0.16)	(0.14)
Number of people in household	-0.010	0.008	0.018	-0.020	-0.014
	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)
Constant	-0.122	-0.602*	-1.353**	-19.317**	-5.880**
	(0.20)	(0.24)	(0.33)	(2.21)	(0.80)
Number of observations	10.570	10.570	10.570	10.570	10.570

Note: All of the regressions include 13 dummy variables for industries, nine dummy variables for provincial locations, and three year dummy variables. Figures in the brackets are absolute values of standard errors.* and ** indicate significant levels at 5% and 1%, respectively.

Table 8: Effects of innovation on performance (2SLS)

	Gross profit	Gross profit	Gross profit	Gross profit
Product innovation	1.509*			
	(0.71)			
Process innovation		1.048*		
		(0.46)		
Imports of materials			3.069*	
			(1.44)	
Exports of products				3.577*
				(1.63)
Gender (Male=1)	-0.059	-0.043	-0.020	-0.035
	(0.04)	(0.04)	(0.04)	(0.04)
Age of owners/managers	0.002	-0.001	-0.003*	-0.004*
	(0.00)	(0.00)	(0.00)	(0.00)
Ethnicity (Kinh=1)	0.148*	0.138*	0.098	0.086
	(0.07)	(0.06)	(0.08)	(0.08)
Completed primary school	-0.092	0.017	-0.016	0.017
	(0.06)	(0.02)	(0.02)	(0.02)
Completed junior secondary school	-0.068	0.013	-0.001	0.018
	(0.06)	(0.03)	(0.02)	(0.03)
Completed upper secondary school	-0.097	-0.005	0.028	-0.011

	(0.08)	(0.03)	(0.02)	(0.04)
Having technical certificate(s)	-0.135*	-0.035	0.007	-0.007
	(0.07)	(0.03)	(0.02)	(0.03)
Completed college/university	0.166	0.233*	0.123	0.099
	(0.13)	(0.09)	(0.15)	(0.15)
Worker in state-owned enterprise	0.009	0.064	0.073	0.019
	(0.06)	(0.05)	(0.05)	(0.05)
Worker in non-state enterprise	-0.049	0.022	-0.014	0.002
	(0.06)	(0.05)	(0.05)	(0.05)
Manager of manufacturing enter.	0.012	0.052	0.035	0.054
	(0.04)	(0.03)	(0.03)	(0.03)
Manager of service enter.	-0.066	-0.015	0.040	0.022
	(0.05)	(0.05)	(0.06)	(0.06)
Used to be a cadre	-0.182**	-0.118**	-0.076	-0.064
	(0.06)	(0.04)	(0.04)	(0.05)
Veteran	-0.100	-0.034	0.007	-0.008
	(0.05)	(0.04)	(0.04)	(0.05)
Member of communist party	0.181*	0.134*	0.158*	0.131
	(0.07)	(0.07)	(0.07)	(0.07)
Member of an association	0.218	0.290*	0.223	0.051
	(0.17)	(0.15)	(0.17)	(0.22)
Years of establishment	0.004	0.004	0.005*	0.006**
	(0.00)	(0.00)	(0.00)	(0.00)

Access to main road	-0.002	0.024	0.038	0.020
	(0.04)	(0.03)	(0.02)	(0.03)
Access to rail	-0.103	-0.025	-0.020	0.014
	(0.05)	(0.04)	(0.05)	(0.05)
Number of people in household	-0.007	-0.008	-0.006	-0.005
	(0.01)	(0.01)	(0.01)	(0.01)
Constant	-0.764**	-0.420*	-0.092	0.053
	(0.29)	(0.18)	(0.19)	(0.23)
Hansen's J	3.006	3.406	3.957	2.668
Number of observations	10.570	10.570	10.570	10.570

Note: All of the regressions include 13 dummy variables for industries, nine dummy variables for provincial locations, and three year dummy variables. Figures in the brackets are absolute values of standard errors.* and ** indicate significant levels at 5% and 1%, respectively.