

The Relationship between International Quality Certification and Technology Innovation in Vietnamese SMEs

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Abstract— This research focuses on the relationship between international quality certification and technology innovation at small and medium Vietnamese enterprises (SMEs). Logit regression is used with a rich panel dataset of 2469 small and medium Vietnamese enterprises. The results show that international quality standards have a positive effect on technology innovation. From the results, some recommendations have been suggested in order to increase the technology innovation of Vietnamese SMEs.

Keywords— SMEs, international quality certification, technology innovation.

I. INTRODUCTION

Nowadays, technology innovation is developing strongly in the world. However, this issue is challenging, especially at small and medium-size Vietnamese enterprises. According Ministry of Science and Technology, in 2015, more than 90% of firms in Vietnam (nearly 600,000) are small and medium-sized enterprises that mostly use technology that lags behind the world two to three generations. According to the World Economic Forum's 2014 Global Competitiveness Report (WEF, 2014), Vietnam's technology level currently ranks 99/144 surveyed countries. While technology innovation has a positive impact on firm performance such as productivity, revenue, profit, etc. (SMEs, 2015). The proposed questions are why the percentage of Vietnamese firm's technology innovation is low and what the factors affecting technological innovation are. In this research, the authors focus on the relationship between international quality certification and technology innovation. Moreover, the research is to examine whether the enterprises having international quality certification will apply more technology innovation than the ones without the international quality certification.

II. LITERATURE REVIEW

According to Elisa Calza et al. (2019), international quality standards have been measured by organization innovation. A previous study implied that organizational innovation leading to administrative and structural renewal is a facilitator for the other types of innovation (Damanpour et al., 2009). Organizational innovation can create better intra organizational coordination and cooperation mechanisms toward effective environmental management, through structural improvements. Therefore, organizational

innovations are able to contribute to a fitting environment conducive to the development of technological innovations. For instance, Staropoli (1998) verified the importance of organizational innovation in enhancing technological innovations in the pharmaceutical industry. Moreover, Cheng et al., (2014) added to the innovation literature by uncovering the underlying innovation development process of which organizational innovation is fundamental for building technological innovations.

Besides the Quality Certification factor, the model has suggested two factors that are firm size and government. Many studies have confirmed the impact of business size on innovation. Raisch and Birkinshaw (2008) proposed that large companies often have the resources to effectively carry out activities related to idea creation and implementation, while small businesses have little resources to select and may not pursue a strategy to enable the company to innovate. In addition, larger companies with better finance, marketing, stronger research capabilities and deeper product or process development experience will facilitate the conversion of creative ideas into new products and processes (Branzei and Vertinsky, 2006; Azadegan et al., 2013).

According to Guo et al. (2018), the government's supports through research and development funds positively affect innovation in Chinese businesses. Jugend et al. (2018) did research on a Brazilian company to conclude that the support of the political side is very important in the application of innovation. Both financial support and non-financial support are also important. Therefore, the authors propose a model as below:



Fig. 1. Research model

III. RESEARCH METHOD

A. Research Method

Because the dependent variable is qualitative variable (there are two types: innovative firm and non-innovative firm), Logit or Probit regression models can be used to analyze the data. According to Gujarati (2004), there is no significant difference in regression between Logit and Probit models. Therefore, the authors use the Logit regression method to determine the relationship between internationally quality standards and technology innovation in Vietnamese small and medium-sized enterprises. The dependent variable is named TI (Technology Innovation), which will receive a value of 1 if the business introduced new technology and will receive a value of 0, otherwise.

Independent variables include International quality certification (INTER_CER), Domestically quality certification (DOM_CER), Firm type (TYPE), Firm size (SIZE), Inspected by Government (INSPECT), Technical assistance (ASSISTANCE).

According to Gujarati (2004), logit regression models are presented as follows:

$$\ln\left(\frac{P_i}{1-P_i}\right) = \beta_1 + \beta_2 X_i + u_i$$

$P_i = \Pr(Y_i = 1/X_i)$ is the probability that Y_i assumes value 1 with a given X_i value or probability for an enterprise to innovate with given characteristics of the enterprise. X_i is the vector of independent variables, β_1 is constant and β_2 is the vector of regression coefficients, u_i is the error. The detailed description for encoding the variables is shown in the following table.

TABLE 1. Explanation of the variables used in the model

Name	Factors	Explaining/Encoding
TI	Technology Innovation	1: Innovative 0: Non-innovative
INTER_CER	The firm has an international quality certificate.	The firm has an internationally recognized quality certification 1: Certified 0: Non-certified
DOM_CER	The firm has a domestically quality certificate.	The firm has any quality certification recognized domestically (only in Vietnam) 1: Certified 0: Non-certified
TYPE	Type of firm	1: Household establishment/business 0: Others
SIZE	Company size	Measures by the total labor force in the company
INSPECT	The number of government inspections	How many times (in 2014) was your firm inspected by government officials for Technical compliance inspections.
ASSISTANCE	Technical assistance by government	Did firm receive technical assistance from the government? 1: Yes 0: No

Source: Authors' summary

B. Data

The research use data that was surveyed by the Central Institute for Economic Management (CIEM), the Institute of Labour Science and Social Affairs (ILSSA), the Development Economics Research Group (DERG) at the University of Copenhagen in 2015. This is the sixth time that the collaborative small and medium enterprise (SME) panel survey has been conducted among formal and informal manufacturing firms in Vietnam. The survey in 2015 consisted of face-to-face interviews of over 2,600 small and medium-sized non-state enterprises operating in the manufacturing sector conducted in 10 provinces, namely the cities of Ha Noi, Hai Phong, Ho Chi Minh City and Ha Tay, Phu Tho, Nghe An, Quang Nam, Khanh Hoa, Lam Dong and Long An provinces. The survey structure consists of three parts: (i) the main enterprise questionnaire for owners or managers; (ii) an employee questionnaire administered to a random subset of employees in a quarter of randomly selected enterprises; and (iii) an economic accounts module. While the enterprise-level survey solicits information on firm performance, enterprise history, employment, business environment, and owner/manager background characteristics, the employee survey collects data on educational background, work experiences and training, union membership, and household characteristics of employees. The economic accounts module lists revenues, costs, assets, and liabilities.

IV. RESEARCH RESULTS

A. Descriptive Statistics

The following graphs give us a clearer understanding of the research result.

Figure 2 illustrates the quantity of Vietnamese small and medium-sized firms which were innovative and non-innovative in 2014. There were 2520 enterprises (roughly 95.1%) which did not apply new technology while only 129 firms had been innovated.

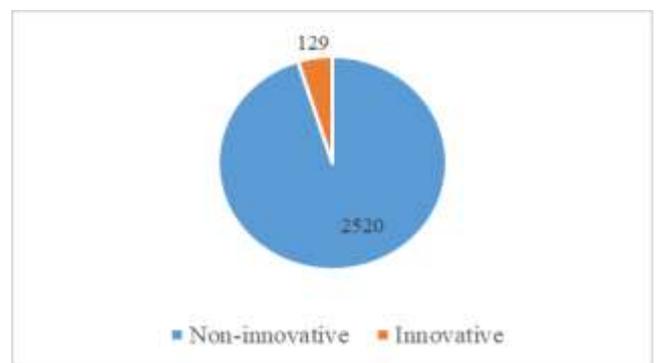


Fig. 2. The number of technology innovation applications.

Source: Authors' summary

Figure 3 shows the relationship between internationally quality standard and technology innovation. The percentage of applying technology innovation of the firms which have an international quality certification was 9,9% that is twice higher than the companies without the international quality certification.

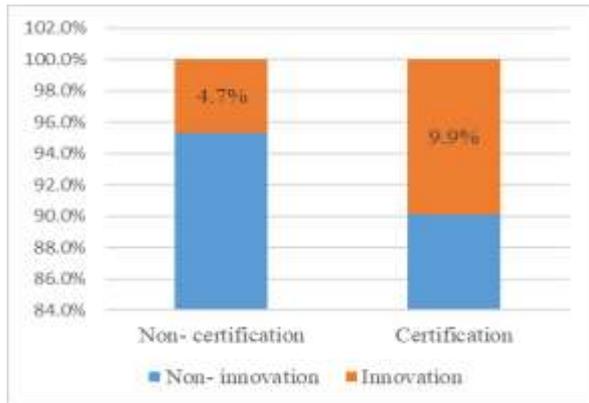


Fig. 3. The relationship between Certification and Innovation

Source: Authors' summary

B. Logit Regression Result

The authors analyze the logistic regression with the dependent variable TI and the result is shown in Table 2. This table gives information about the relationship between the dependent variable and the independent variables.

TABLE 2. Regression analysis result

Term	Coef	P-Value	VIF
Constant	-0.2977	0.000	
Firm size (revenue)	0.05457	0.000	1.04
Inspected by government	0.01469	0.023	1.16
Technical assistance	0.2099	0.000	1.01
Firm type	0.01237	0.181	1.19
International quality certification	0.0376	0.094	1.10
Domestically quality certification	-0.0183	0.145	1.05

Source: Authors' summary

The regression analysis result shows that there is a positive connection between international quality certification and technology innovation appliance. For specifically, if the firm has an international quality certified, it will have the ability of technology innovation application more than the firm that did not certify. This result is similar to the results of many previous studies. When a company has an international quality certificate, it manages system operation well and the processes are standardized. That helps businesses run smoothly and easily implement improvements in production and technology. Therefore, a firm having an international quality certificate is easier to change technology than others.

Besides, other variables also affect the technology innovation of Vietnamese small and medium-sized enterprises. Those factors are firm size, inspected by the government, technical assistance while firm type and domestically quality certification do not have an impact on technology innovation.

The higher the turnover of an enterprise is, the higher the ability to innovate in technology is, which has been explained by previous researchers that it is easier for companies with better financial resources, stronger research capabilities, and better-operating systems make to innovate technology than other companies. Furthermore, government technical assistance is important in technological innovation at SMEs in Vietnam. If the government has support for businesses, SMEs will easily have access to new technologies, change outdated

technologies to be able to produce quality products that meet customer needs.

The next variable affecting technological innovation is the number of technical inspections by authorities. Technical inspections help to increase the firm's ability to innovate technology. This result shows that the inspection and supervision policies of the authorities have a positive meaning, in order to help rising businesses' technology innovation, ensuring a good working environment as well as product quality. These policies will be really effective if the inspection is transparent, fair and accurate.

V. RECOMMENDATIONS

From the results of the study, there are four factors that affect the ability to apply technology innovation. Therefore, in order to improve the ability of technology innovation applications by enterprises, policy-makers can apply the following suggestions.

Firstly, the higher the attainment of international quality certification, the more likely the business is to apply technology innovation. In Vietnam, companies often achieve international standards such as ISO 9001, ISO 14001, ISO 22000... depending on their field. However, the rate of Vietnamese small and medium enterprises having this certificate is low because of many reasons including application cost. Hence, the authors suggest that the enterprises should apply integrated quality management systems (integrated quality management system - ISO 9001, environmental management system - ISO 14001 with safety management system Occupational Health-OHSAS 18001). A safety-health and environment management system will give the company many benefits such as cost savings, pollution prevention, and mitigation, minimization of safety and health incidents and the environment, helping the company reduce the pressure of waste treatment, improve human health, convenience in contracting with partners, the credibility of customers and stakeholders.

Secondly, government support has a great influence on the decision of the businesses to have technological innovation or not, hence, the government is recommended to have many policies to stimulate SMEs to innovate technology based on application and technology transfer. Since then, SMEs can master key technologies, improve productivity, quality and competitiveness of products, apply advanced quality management systems, productivity and quality improvement tools. Governments should support the creation of chain networks where SMEs can share technology with each other, promote technological innovation, and improve productivity and quality.

Due to limited resources, Vietnam could focus on supporting a few key fields, for example, the foodservice sector, the hotel restaurant and travel services. The number of SMEs operating in these fields is quite large, and the customer demand in these fields is increasing. Technology innovation will bring tremendous competitive advantage in these potential fields.

Finally, besides supporting, inspection and supervision are also very important. There are many experts who show that

Vietnam is leading to become the world's technology landfill. Outdated technologies, which caused environmental pollution banned by foreign governments, were imported to Vietnam. The import of obsolete machines, technologies and waste does not only directly threaten the environment and energy security, but also hinder the process of modernizing the country's industry and reducing its value national competition. Therefore, the improvement of the legal framework as well as strict regulations in the inspection and supervision of technological innovation are concerned issues.

Further research on this topic can consider using other models to analyze then compare with the result analyzed by the regression logit model. Another possible extension is to analyze data in different periods of time to see the variation of time-dependent variables.

REFERENCES

- [1] Azadegan, A., Patel, P.C., Parida, V., 2013. Operational Slack and Venture Survival. *Prod. Oper. Manag.* 22 (1), 1–18.
- [2] Branzei, O., Vertinsky, I., 2006. Strategic pathways to product innovation capabilities in SMEs. *J. Bus. Ventur.* 21 (1), 75–105.
- [3] Colin C.J. Cheng, Chen-lung Yang, Chwen Sheu (2014), The link between eco-innovation and business performance: a Taiwanese industry context, *Journal of Cleaner Production*, 64 (2014), 81- 90.
- [4] Damanpour, F., Aravind, D., 2006. *Product and process innovations: a review of organizational and environmental determinants*. In: Hage, J., Meeus, M. (Eds.), *Innovation, Science, and Institutional Change*. Oxford University Press, Oxford, pp. 38- 66.
- [5] Elisa Calza, Micheline Goedhuys & Neda Trifković (2019), Drivers of productivity in Vietnamese SMEs: the role of management standards and innovation, *Economics of Innovation and New Technology*, 28:1, 23-44
- [6] Gujarati. (2004). *Basic Econometrics*. McGraw-Hill.
- [7] Guo, Y.; Xia, X.; Zhang, S.; Zhang, D. (2018). Environmental Regulation, Government R&D Funding and Green Technology Innovation: Evidence from China Provincial Data. *Sustainability*, 10, 940.
- [8] Jugend, D., Jabbour, C. J. C., Alves Scaliza, J. A., Rocha, R. S., Junior, J. A. G., Latan, H., & Salgado, M. H. (2018). Relationships among open innovation, innovative performance, government support and firm size: Comparing Brazilian firms embracing different levels of radicalism in innovation. *Technovation*.
- [9] Raisch, S., Birkinshaw, J., 2008. Organizational ambidexterity: antecedents, outcomes, and moderators. *J. Manag.* 34 (3), 375–409
- [10] SMEs (2015), Report “Characteristics of the Vietnamese business environment: Evidence from a SME survey in 2015”, access at 20/09/2019, at link: <https://www.wider.unu.edu/publication/characteristics-vietnamese-business-environment>
- [11] Staropoli, C., 1998, Cooperation in R&D in the pharmaceutical industry the network as an organizational innovation governing technological innovation, *Technovation*, 18 (1), 13-23.