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IMPACT OF THE GOVERNMENT'S FINANCIAL SUPPORT POLICY ON TECHNOLOGY INNOVATION DECISIONS OF SMALL AND MEDIUM ENTERPRISE IN HO CHI MINH CITY

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The paper examines the impact of the government's financial support policy on technological innovation decisions in 150 small and medium enterprises (SMEs) in Ho Chi Minh City. The study uses the Binary logistic model to quantify the influence of the government's financial support policies on the decision to innovate technology of enterprises. The survey was collected directly from 150 small and medium sized enterprises in 6 districts of Ho Chi Minh City. Research results show that the government's financial support policy has a positive impact on the enterprises' technological innovation decisions. However, this policy is not effective at high-grossing enterprises. Additionally, the technological innovation decisions are affected by other factors, including the operating time and the volumn of the enterprise, and the market competitiveness. The research findings propose suggestions to improve the effectiveness of this policy on technological innovation decisions in SMEs.

Keywords*: Government policy, financial support, technological innovation, small and medium enterprises*

JEL Classifications*: G32, E62, H32*

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1. Introduction

Recently, technology has had a strong impact on socio-economic development and is the driving force of sustainable economic growth (Boskin & Lau, n.d.; Solow, 1960). The growth model with increasing production input including labor and capital factors will accelerate economic growth, it is at a negative growth rate, however. According to the World Bank analysis in 38 countries and regions in 2008, technological progress contributed about 50% to economic growth in developed countries, and 23% in Vietnam. Technological innovation apparently allows people to have a greater choice of products and services, contributing to the improved quality of life (Schilling & Werr, n.d.). Technology also creates added value for businesses and directly affects the efficiency of productions and businesses. In addition, technology is one of the six important factors including technology, capital, labor, resources, market, and policies that is the essence in the process of business development (Khalil & Wang, 2002). Technological innovation increases the competitiveness of enterprises and satisfies customers' needs in the future (Drucker, 2002). Technological innovation helps improve the competitive position, output and net profit of enterprises (Jiaji, 1998). However, technological innovation is successful if and only if it is commercialized and accepted by the market and society.

To encourage businesses increasing investment and participating in technological innovation, which improves productivity and business efficiency, many countries have implemented various supporting programs and policies. Among them, financial aid is a tool frequently used in the form of direct support such as cash subsidy or interest-free loan, or

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indirect support such as tax exemption or reduction and reduction in land and property renting fees (Schwartz & Clements, 1999). However, the sources of support also brought about mixed results. On the one hand, financial support from the government can stimulate enterprises to spend more on research and innovation activities (Carboni, 2011; González & Pazó, 2008). The financial grants to business can offset potential external losses of R&D activities, thereby alleviating financial pressure and reducing the operating costs of the business (Lach, 2002). The study by Hussinger, (2008) indicates German government subsidies improve the investment in R&D by about 30% in firms that received grants.

On the other hand, in some other studies, it has been found that government subsidies have no effect on technological innovation and even cause crowding-out (Aschauer, 1990; Busom, 2000; Goolsbee, 1998; Yu et al., 2016). For enterprises, receiving financial grants from the government will cost much more than mobilizing financial resources in the capital market. To maximize profits, businesses can use the financial grants to invest in activities other than technological innovation. Research done by Hud & Hussinger, (2015) found that the overwhelming impact of financial support policy in 2009 - the year of the economic crisis - was caused by the reluctance to implement technological innovation of businesses that received financial grants. And when the financial aid is substantial, it will eventually reduce the impact on R&D activities of the enterprise instead of supplementing financial resources (Gorg & Strobl, 2007) .

Besides, the research results of Montmartin & Herrera, (2015) found a non-linear relationship between the level of Government grants and R&D activities of enterprises, including leverage and crowding out effects. Therefore, the impact of financial grant policy also depends on the intensity of financial support. One reason for the ineffectiveness of government grants is the existence of asymmetric information between the government and enterprises. If all the facts about the R&D conditions of enterprises are identified, policy makers can select suitable and targeted enterprises who desire R&D funds and effective R&D activities (Cheng&Tao, 1999; Hall & Lerner, 2010). Another important reason is the influence on the heterogeneity of enterprises. Grants provided to businesses with different characteristics have different impacts. Corporate ownership is crucial to the method and the effectiveness of policy governance (Wu et al., 2017).

In Vietnam in general and Ho Chi Minh City in particular, technology has only been at the early stage of research and development both in the public and private sectors (OECD, 2014). Due to pressure from the processes of integration, improving capacity and competitiveness, Vietnamese small and medium enterprises ("SMEs") have increased investment in new technology rapidly (from 73.5% in 2013 to 83% in 2015). According to To Hoai Nam (2018), the majority of Vietnamese SMEs have not been able to participate in the global production value chain and the levels of science and technology and the innovation capacity in Vietnamese SMEs are still low. The number of enterprises operating in the field of science and technology is relatively small. The number of scientists and experts working in companies accounts for only 0.025% of the total number of employees working in the private sector. About 80-90% of machinery and technology used in Vietnamese enterprises are imported, 76% of them are from the 1980s to 1990s and 75% of machinery and equipment has been depreciated. There are very few enterprises interested in investing in technological innovation activities, which is the main cause of the sluggish development in the science and technology market, the stagnant growth rate of technological innovation and the level of technology in industries that has not been improved. Therefore, the Government as well as the People's Committee of Ho Chi Minh City have implemented many programs and policies to encourage enterprises to increase technological innovation. These include Law on Technology Transfer (2017); Decision No. 1481/QĐ-UBND (2016) and Decision No. 3097/QĐ-UBND (2016) of the People's Committee of Ho Chi Minh City or most recently Decision No. 118/QD-TTg of the Prime Minister (January, 2011). However, whether the Government's support policy, especially financial support, affects the decision to innovate technology of SMEs in Vietnam as well as in Ho Chi Minh City, it is necessary to have a tremendous number of experimental studies.

This study aims to evaluate the impact of the government's financial support policy on technological innovation decisions in small and medium enterprises. The study findings show that the government's financial assistance policy has a positive impact on the technology innovation decisions of enterprises. However, the government's financial support for enterprises is only effective when the support is based on the current financial situation and business results of enterprises. For businesses with high profits, the financial support policy has

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little to no impact and this support is only formalistic. Besides, the decision to innovate technology of enterprises during the process of receiving the government's support is also influenced by many other factors such as technical support policies, business operation time, the size of the enterprises, the operating time of the machines in the enterprises, the level of market competitiveness. These controllable factors can change the effectiveness of the government's support policy. The main research findings can be applied not only to small and medium-sized enterprises but also to larger ones. Therefore, from the integrated results of the factors affecting the decision to innovate technology in enterprises, the authors propose some suggestions to improve the effectiveness of the government's support measures, to optimize the use of internal and external resources of the enterprises to improve efficiency in production activities in general and technology innovation activities in particular.

2. Literature review and Theoretical framework

2.1. Characteristics of SMEs related to technological innovation

According to Sudhir Kumar & Bala Subrahmanya, (2010) SMEs worldwide often follow the trend of informal innovation, that is, businesses carry out innovation interspersed with daily production activities. A good reason for this is the limited resources of businesses. In addition, SMEs often implement technological innovation, especially those in th e following industries: automation, electronics. One of the common characteristics as well as an advantage of companies operating in these industries is the workforce with technical backgrounds who finished their undergraduate, postgraduate and Doctotal studies.

In general, the innovation of the world's SMEs can focus on product innovation or process innovation or a combination of both. In which, product-focused innovation includes the introduction of new products and/or improvement of existing products through changes in product design and size or quality improvement in response to customer demands. Process-focused innovation includes the introduction of new technologies to the manufacturing process of existing products or the adoption of cost-cutting engineering practices, and so on. The main objective for technological innovation in SMEs is to improve competitiveness in the form of quantity improvement, reduction of production costs, expansion and replacement of product lines, in addition to international market expansion (M. H. Bala Subrahmanya et al., 2010). The evidence Subrahmanya's study, 2008 is that SMEs that implementing innovation often achieves higher revenue growth than SMEs that do not.

Regarding technological innovation in Vietnam, SMEs are criticized that they are often associated with outdated technology, focusing mainly on assembly and preliminary processing and being difficult to access and adapt to the advanced production technology because most Vietnamese SMEs are family businesses and organizations located in populated areas. Although Vietnamese SMEs are expected to be the main contributors to the development of supporting industries, they have not yet participated in the global production value chain and their levels of science and technology and innovation capacity have not kept pace with other countries in the region and the world.

2.2. Financial support from the government for technological innovation activities of enterprises

Luedde-Neurath, R. (1988) claimed that there are two types of Government's interventions in technological innovation activities of enterprises: direct intervention and indirect intervention to achieve predetermined results by changing the investment and production models in selected industries and intervening to create a favorable environment for businesses. Shen & Luo, (2015) mentioned in more detail the forms in which the Government can intervene such as allocation of funds, VAT, financial subsidies, tax incentives, etc. These policies are implemented through the respective ministries and industries, thereby helping businesses to access technology more easily and quickly.

Government's support for innovation activities of SMEs is provided through a variety of policies at different levels from central to local. SMEs will face disadvantages, especially in terms of finance, leading to limited development capacity. Local authorities, which have a closer relationship with SMEs, are particularly active in designing and delivering innovation programs for businesses. According to (Wilson, 2007) countries should empower local authorities to implement support programs to promote technological innovation in SMEs. However, the role of regulators should be to facilitate businesses to access technology, not dictate, to achieve intended goals. The purpose of Government support for SMEs is ultimately to establish an economy without the support from the Government, so that enterprises can take initiative in activities to improve competitiveness and innovation of enterprises. As a result, the Government automatically provides many financial aid services for SME inno-

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vation such as cutting administrative costs for businesses, financial incentives, and legal consolidation (Wilson, 2007) Korean researchers have proposed the possibility of implementing government financial support systems for the technology-related fields of enterprises in various forms with different criteria Song & Kim, (2009). According to these studies, the table below are the specific support programs from the Government:

Table 1: *Government financial support programs for technological innovation activities*

Authors	*Support types and tools*
Hood (1986)	National budget
McDonnell and Elmore (1987)	Through directives and incentives; institutional capacity building and changes in technological regulatory
Schneider and Ingram (1990)	Through power tools and institutional tools
Keizer et al. (2002), Shefer and Frenkel (1998), Lin et al. (2006), Hall and Bagchi-sen (2002)	Financial resources and human resources
Vedung (2005)	The "carrot and stick" tool
Kim & Do (2004)	Direct and indirect support; financial and non-financial benefits
Kim (2014)	Financial support; direct and indirect support

Source: Kim et al., (2016)

3. Research data and methods

3.1. Research Data

The survey was conducted in 6 districts in Ho Chi Minh city including: Tan Binh, Binh Thanh, Tan Phu, District 6, District 9, Thu Duc district and Binh Chanh district. These districts were selected to ensure the feasibility. In each district, the interviewer contacted the Tax Department in that district to approach businesses. This study identified the sample size as 150, which was chossen by the non-probability sampling method with convenient sampling techniques. Sampling this way may not guarantee the rigorous standards of random sampling, but it is the best the authors can do given the limited time and budget.

3.2. Data analysis

Primary data is cleaned, processed and analyzed based on descriptive and comparative statistical methods. In addition, the study uses the Binary logistic model to quantify the influence of the Government's financial support policies on the decision to innovate technology of enterprises. The model has a dependent variable Y_i representing the decision to innovate technology, taking the value 0 if the firm HAS technological innovation and receiving the value 1 if the firm does NOT innovate. The independent variable (X_k) includes the Government's financial support policies (X_1; gets the value 0 if the enterprise does not receive support; gets the value 1 if the enterprise receives the support); the Government's technical support policies (X_2 ; receive value 0 if the enterprise does not receive support; receive value 1 if the enterprise receives support); the operation period of the enterprise (X_3; years); the size of the enterprise (X_4; number of employees), the profit of the enterprise is converted to the form of natural Logarithms (X_5; thousand dong); the enterprise's debt is converted to the form of natural Logarithms (X_6; thousand dong); ratio of machine operating time (Xi_7; % with i =1,5; 1. Duration of less than 3 years; 2. From 3 to 5 years; 3. From 6 to 10 years; 4. From 11 to 20 years; 5. More than 20 years); interaction between the Government's financial support policy and profit (X_8).

General regression model:

$$Ln\left(\frac{P_i}{1-P_i}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k + u$$

With $\text{Odds} = \frac{P_i}{1-P_i}$

The regression model can be rewritten as:

Specifically, the model applied to examine the influence of the Government's financial support policy on the decision of technological innovation of SMEs in Ho Chi Minh City. Below are the variables:

The research looked at the relationship between the State's financial support policy and profitability affecting enterprises' decisions to innovate technology and give further in the former research gap. On the other hand, the inclusion of interactive variables in the model to evaluate the effectiveness of the State's financial support policy when applied is governed by the profit factor of the enterprise or not.

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Table 2: *Description of variables in the model*

Variable	Description	Expected sign	References
Dependent variable			
TI	Probability in the decision to innovate technology of enterprises		
Explanatory variables			
SUPF	Enterprises received financial aid from the Government	+	Peltz and Weiss (1984); Zhou et al. (2014); Mahendra Adhi Nugroho (2015)
SUPT	Enterprises received technical support from the Government	+	Peltz and Weiss (1984); Zhou et al. (2014); Sung B. (2019)
YR	Operation period of the enterprise	+	Quan Minh Nhut (2013, 2014);
SIZE	Size of the enterprise	+	Zhou et al. (2006); Chang and Robin (2006); Go'mez and Vargas (2009); Autry et al. (2010); Correa et al. (2010); Lin (2014); Marom S. et al. (2019)
PROF	Profit of the enterprise	+	Loury (1979), Fudenberg and Tirole (1985); Temiroy A. (2019)
LOAN	Loan of the enterprise	+/-	Elena Huergo, Lourdes Moreno Martín (2017)
UT_i	Ratio of machine operating time	+/-	Siddharthan and Safarian (1997); Pandit and Siddharthan (1998).
SUPF*LnPROF	Interaction between enterprises receiving financial aid from the Government and the logarithm of profits		

Source: Compiled from previous studies of the authors

4. Research results and discussions

4.1. Current status of technological innovation of SMEs in Ho Chi Minh City

According to the survey results of the research team, the majority of the enterprises in the research subjects are medium-sized enterprises, taking up 51.7%, followed by small-scale enterprises with 38.1% and micro-enterprises account for 10.2%. The results from Table 3 show that the biggest difference between the researched enterprises is related to indicators such as the number of years in operation of the enterprise, the size of the enterprise, the profit and assets of the enterprise, particularly.

The difference in the above criteria reflects the level of technology and the process of improving and developing new products, which also varies among enterprises. Specifically, according to the author's survey results, micro enterprises that

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Table 3: *Statistics of indicators with significant differences*

Indicator	Minimum	Maximum
Number of years in operation of the enterprise	4	58
Size of the enterprise	10	125
Profit of the enterprise	56	9587281
Assets of the enterprise	450	9208618

Source: Study on SMEs in Ho Chi Minh City

improve existing products account for 10.0%; while this percentage in small and medium enterprises is 19.4% and 28.7% respectively. This shows that for medium-sized enterprises with a larger number of employees, larger assets and profits, the ability to apply technology to improve products will have more advantageous conditions. Especially for medium-sized enterprises, the speed of technological innovation is higher, enterprises are constantly improving and developing new products to meet the increasingly competitive demands in both domestic and foreign markets.

4.2. The influence of the Government's financial support policy on the ability of enterprises to innovate technology

In this section, the Binary logistic model will be used to quantify the effects of the Government's support policies on firm's decision to innovate technology. The authors propose two research models: model 1 with factors affecting the decision to innovate technology of enterprises; model 2: the interaction between the Government's financial support policy and the profits of enterprises is measured to consider whether the Government's policy is strongly influenced by the remaining factors or not? Based on that, solutions are proposed to promote the effectiveness of the financial aid policy for the decision to innovate technology in SMEs in Ho Chi Minh City in particular and Vietnam in general.

The study used reversion results for 2 models (model 1: no interaction variable) and model 2 (with interactive variable). The Log likelihood and Pseudo R2 coefficient results of the two models are as follows, respectively:

Thus, model 2 (with the interaction variable) existed a greater Pseudo R2 coefficient, which specified that when the interaction variable has been included, it better described the suitability of the model.

Reversion analysis showed that the variables yr, size UT1, UT2, UT3 UT4 were not statistically significant. Regression results in both models show that the decision to innovate technology in enterprises is affected by many factors other than the Government's financial support policy such as technical support policy, corporate profits and debts. The results obtained were in line with the research's expectations. The strongest impact is the Government's financial support, followed by technical support. However, when implementing the policy, it is also necessary to pay close attention to the profit factor of enterprises because this factor clearly changes the effectiveness of the policy. Specifically, if the Government's aid for enterprises

Table 4: *The evaluation of the suitability for model 1*

Logistic regression	Number of obs = 147
	LR chi2(10) = 41.72
	Prob > chi2 = 0.0000
Log likelihood = -37.423902	Pseudo R2 = 0.4665

Source: Results processed from Stataa 13

Table 5: *The evaluation of the suitability for model 2*

Logistic regression	Number of obs = 147
	LR chi2(11) = 41.82
	Prob > chi2 = 0.0000
Log likelihood = -37.423902	Pseudo R2 = 0.5671

Source: Results processed from Stataa 13

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is not bound by the profit factor, the probability of decision to innovate technology increases 2.78 times higher than that of enterprises that do not receive financial support (model 1). Other factors such as technical support from the Government, debts and profits also positively affect the decision to innovate technology in enterprises.

Considering of model 2, the Government's financial support is correlated with the profits of enterprises, bringing interesting results. Enterprises receiving financial aids from the Government have a higher probability of choosing to innovate technology up to 38.82 times compared to enterprises that do not. However, governmental support for businesses with positive financial status and stable profits will not be effective, as this form of support specifically reduces the probability of technological innovation of enterprises (the probability of technological innovation of enterprises receiving financial support from the Government is only 0.76 times that of enterprises that do not receive support). Apparently, when receiving financial grants from the Government, enterprises are focused on so-called technological innovations, their efficiencies are minimal. The results also reveal the delay in policy implementation, causing the businesses that critically need the grant to seek other financial resources as they need immediate access to new machinery systems for their operations. Those financial resources might be loans from financial institutions, from existing profits of the business (the portion of profits that should be used for other activities). Thus, firms that remain profitable will increase the probability of a decision to innovate by 1.25 times compared with profitable firms that do not innovate.

5. Recommendations

The research result shows that the Government's financial support policy has a positive impact on the technological innovation decisions of SMEs. This result is considered similar to many earlier studies. (González & Pazó, 2008; Xu et al., 2021) have made clear that state financial support can inspire enterprises to invest in technology research and revolution. Therefore, the Government needs to pay attention on reformation the content and financial support programs for SMEs. Also, the Government then needs to strengthen tax and interest rate encouragements for all areas related to technological modernization, in order to create favorable and easy conditions for enterprises accessing and get advantage from privileged policies of the State.

The result also showed that other factors such as Government technical assistance, debt and profitability also positively influenced technological improvement decisions in enterprises. This result, again, is similar to the findings of (Peltz & Weiss, 1984.; Sung, 2019; Zhang et al., 2014). Hence, in order to encourage SMEs to innovate technology, the Government needs to support technological policies and preferential loaning policies in technology investment.

Table 6: *Logistic regression results*

Variable	Model 1 (without interaction variables)		Model 2 (with interaction variables)	
	Regression coefficient	Odds ratio	Regression coefficient	Odds ratio
SUPF	1.025434*	2.788307*	3.658999***	38.82247***
SUPT	1.914021***	6.780296***	1.836368***	6.273711***
YR	0.0238522	1.024139	0.0189981	1.01918
SIZE	0.0019905	1.001993	0.0000445	1.000044
UT1	-0.0078559	0.9921749	-0.0108889	0.9891702
UT 2	-0.032274	0.9682412	-0.0376392	0.9630604
UT3	-0.0460029	0.9550392	-0.0528057	0.9485643
UT4	-0.0473297	0.9537729	-0.0558349	0.9456952
lnPROF	0.1554975**	1.168239**	0.2242752*	1.251415**
LnLOAN	0.1330805*	1.142342*	0.1746729**	1.190857**
SUPF*LnProf			-0.2734846***	0.760724***
Constant	0.1536671	1.166103	0.0415198	1.042394

*Source: Results processed from Stataa 13, *** p<0.01, ** p<0.05, * p< 0.1*

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Data analysing in model 2 shows that the Government's support for enterprises with good financial conditions with stable profits which decreases the probability of technological innovation of those. Enterprises that receive financial support from the Government, however, consume that support for other purposes or invest in technological innovation processes but do not succeed. This is also the result that in Aschauer, (1990); Busom, (2000); Yu et al., (2016) mentioned. Therefore, in order for the Government's financial support policy to be effective, it is necessary to classify enterprises that need financial support, concentrate on looking over by each area, as well as industry and region and specially for the financial situation of enterprises. Accordingly, the Government needs to focus on financial support for SMEs with weak performance to create conditions for these SMEs to capitalize in technological innovation expanding business results.

Last but not least, for businesses, it is crucial to proactively approach supportive policies of the Government, constantly improve their financial capacities through a wide range of channels to actively motivate the process of tehnology innovation. Favorable conditions should be created to increase the competitiveness of enterprises and investments from exernal sources in the field of technology to gradually expand production activities as well as the scale of operations.

Conclusion

The decision to innovate technology in SMEs is influenced by many factors: the Government's financial and technical support policies, the rate of machine operating time, assets and profitability of the business, among which financial support has the strongest influence. However, for this policy to be effective, it is necessary to have a well-organized policy system, which is designed to suit the needs of businesses and implemented in a more-timely manner, especially the current financial situation of businesses should be thoroughly examined before funding. By doing that, it will create a strong motivation for investment activities in technological innovation to gradually help businesses expand their scale and improve their market competitiveness.

This study has some limitations that should be addressed for improvement in future studies. Also, the quantitative was conducted at one time. If it is conducted research on a long period of time may have better results. Beside, there is the use of a non-probability method with a convenient sampling technique that does not show all the insight of the overall study. Therefore, the further research should be conducted with probability sampling techniques and cluster analysis, so as to overwhelme the above limitations as well as to gain more consistent results.◆

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Summary

Bài viết nghiên cứu ảnh hưởng của chính sách hỗ trợ về mặt tài chính của Nhà nước đối với quyết định đổi mới công nghệ tại các doanh nghiệp nhỏ và vừa tại thành phố Hồ Chí Minh. Nghiên cứu sử dụng phương pháp hồi quy logistic với dữ liệu thu thập trực tiếp từ 150 doanh nghiệp nhỏ và vừa ở 6 Quận, Huyện của thành phố. Kết quả nghiên cứu cho thấy, chính sách hỗ trợ tài chính của Nhà nước có tác động tích cực đến quyết định đổi mới công nghệ của doanh nghiệp. Tuy nhiên, đối với những doanh nghiệp có mức lợi nhuận cao thì chính sách hỗ trợ tài chính lại không phát huy hiệu quả. Ngoài ra, quyết định đổi mới công nghệ của doanh nghiệp còn bị tác động có các yếu tố khác như thời gian hoạt động của doanh nghiệp, quy mô doanh nghiệp, mức độ cạnh tranh của thị trường. Từ kết quả phân tích đó, nhóm tác giả đề xuất một số gợi ý nhằm nâng cao hiệu quả của các biện pháp hỗ trợ từ Nhà nước đối với quyết định đổi mới công nghệ của các doanh nghiệp nhỏ và vừa.

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