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Research Article

Innovation and firm performance: Is R&D worth it? An empirical case of Vietnam enterprises

Ngo My Tran*, Le Hoang Thuy Tien, Tran Thi Bach Yen

ABSTRACT

This study aims to analyze the impact of R&D and product innovation on firm performance in Vietnam using a sample of 397 firms. The resource-based view is used as the underlying theory the research model. The statistics show that the Vietnamese firms on average extract 5.82% of total revenue to spend on R&D activities. In addition, there are approximately 32% of the Vietnamese firms in the sample has improved or upgraded products as well as developed new services during the last 3 years. This result has implied that the investment in R&D and the activities on product innovation in Vietnam have been at a relatively modest level. Besides, the regression results showed that product innovation positively affects Vietnamese firms' performance in terms of profitable accounting measures. This result implies that launching new products or improving existing products could be the "fuel" for the growth engine of firms and thus could improve the performance for the Vietnamese firms. Also, R&D was found to have a positive impact on firm performance in the Vietnam context. Hence, it could be said that investing in R&D is necessary to improve firm performance in an emerging market like Vietnam. R&D could be a means to help firms create competitive advantages and increase their profits. Moreover, R&D could also be the premise of innovation activities for firms. These results indicated that the resource-based view theory is empirically supported in the Vietnamese context. As a result, this study's evidence calls for the consideration of R&D investment and product innovation to improve the firm performance in this market. Furthermore, the statistical evidence in this study shows that export intensity has positively influenced on firm performance in the Vietnamese market.

Key words: R&D, firm performance, product innovation, Vietnamese firms, ROS

INTRODUCTION

After the reforms in 1986, Vietnam has been acquired various achievements regarding economic perspectives, which proves that Vietnamese enterprises have been successfully managed and controlled their business in recent years. However, in the condition where the market economy has significantly developed, Vietnamese enterprises necessitate to constantly figure out measures to increase their productivity and profitability to compete with their competitors if they want to survive and affirm their success in a long-term period. For that reason, improving firm performance has become a priority for each enterprise. A resource-based view theory [1,2] has mentioned that firms need to take advantage of their resources to strengthen their competitive advantage and performance, create profits and job opportunities, largely contributing to the government's budget. Particularly, to improve firm performance, investing in research and development (R&D) activities and implementing innovation is a solid foundation.

In the era of integration, especially with the unexpected success of the industrial revolution 4.0, Vietnamese firms have constantly been changing, refreshing themselves to catch up with global development. In order to increase competitiveness, many firms from many countries, especially developed ones, have focused on innovation activities, and Vietnam is not an exception. Thanks to innovation, enterprises can quickly adapt to the changeable and flexible environment; specifically, innovation is a "stepping-stone" for them to join the international economic playground. Based on the theory of creative destruction [3], if enterprises just follow the traditional strategies and do not implement innovation activities, they may be left stranded because customers will have more choices from their competitors. Investing in innovation is the way to bring new business potential energy into companies. New innovative products, processes, marketing, and organization will differentiate the firm compared to others. Therefore, innovation activities help firms attract more customers and a better workforce with high-qualified laborers. It is stated that without innovation, firms cannot be successfully developed in this fiercely competitive economy.

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In addition, research and development has been greatly invested in developing and improving the business. R&D is related to market research and customer needs, thereby developing new products and services through innovations to meet customers' increasing needs. At the same time, when investing in research and development activities, firms will have a better understanding of the business environment, which helps them have appropriate strategies and plans to create a competitive advantage. This will help firms increase their profits and reinvest in research and development activities in the future, contributing to constructing a long-term foundation for firms' development.

According to many previous studies from scholars in the economic field, R&D and innovation are the two factors that have a great impact on firm performance. Countries with current booming industries such as the United States, Spain, Turkey, Japan, Korea… all have a common characteristic that they have spent a lot on R&D activities and innovation. In the last two decades, many researchers have proved that innovation and firm performance are closely related [4–6]. Also, the impact of R&D on firm performance has been demonstrated by many authors [4,7–9].

The previous studies have built a theoretical basis and have provided much empirical evidence. However, previous studies have mainly focused innovation or R&D and there are just a few studies that research on the impact of both product innovation and R&D on firm performance, especially in the Vietnamese context. Therefore, the study on the impact of both factor including R&D and product innovation on firm performance will provide more extensive empirical evidence in this field of research. The result could also provide a solid basis to propose some managerial implications related to R&D and product innovation activities to help Vietnamese firms improve their performance.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Resource-based theory

The resource-based view mainly focuses on analyzing firms' internal resources and linking those internal resources with external ones. In addition to building a competitive advantage, resources may help enhance firms' capacity to charge high prices. This contributes to increasing firm performance by helping the firm to appropriate the value linked to competitive advantage. Furthermore, resources may be used to construct entry barriers and increase performance at the industry level [6].

Coff (1999) [10] mentioned that the resource-based view generally assumes a strong link between having strategic resources and firm performance. A resource-based view theory [2,7] is a theoretical foundation for studying the relationship between innovation and firm performance. Firm resources involve all tangible (property, land, products, capital, etc.) and intangible assets (capabilities, skills, processes, knowledge, intellectual property, etc.). The main point of a resource-based view emphasizes that firms tend to sufficiently take advantage of their resources (both tangible and intangible resources) to increase competitive advantage and performance.

According to a resource-based view theory, an enterprise is defined as a place to concentrate and combine the resources more effectively than the market. Enterprises will be successful if they are equipped with appropriate resources and combine those resources properly. Several scholars in the world have applied the resource-based view theory to study the performance of firms [7,11]. The resource-based theory also explains differences in firm performance regarding internal or firm-level factors [2], and the impact of innovation, as a specific resource, on firm performance is often examined in strategy documents.

According to Artz et al. (2010) [4], product and process innovation can help enterprises improve their competitiveness and take advantage of the opportunities offered by international markets. Additionally, Terziovski (2010) [12] and Zawawi et al. (2016) [13] also use resource-based view theory to implement research relating to firm performance, innovation, R&D, or the relationship between innovation and firm performance.

Concept of firm performance

From the first decade of the twenty-first century, organizational performance is defined as capability and ability of an organization to exploit the available resources [14]. Taouab and Issor (2019) [15] compared the word performance as a bag-word because it contains various and different conceptions including growth, return, productivity, profitability, competitiveness, efficiency, etc.

If a firm perform well, it can generate high and long-term profits. A high profit firms could have higher opportunities of employment and better improvements for its employees' income. In addition, better performing firm in terms of financial profitability is believed to be associated with better production units as well as higher quality products for its customers [15].

To evaluate firm performance, some accounting measurements are applied including return on assets

(ROA), return on equity (ROE), and return on sales (ROS) [16,17]. ROA is calculated by dividing profit after tax by total assets, and ROA is displayed as a percentage. ROA is an indicator of how profitable a company is relative to its total assets. ROA gives managers, investors, and analysts an idea to utilize the company's assets to generate earnings. ROA shows the ability that company earns more money on less investment [18]. ROE is the measure of financial performance, measured by dividing profit after tax by average shareholders' equity which is an indicator of how effectively management is using a company's net assets to create profits. However, ROE has some limitations. A high ROE is not always good for companies because it can be indicative of some issues such as inconsistent profits or excessive debt [18]. ROS is equal to profit after tax on net sales which shows how efficiently a company is generating profits from its top-line revenue. ROS is used to evaluate a company's operational efficiency, normally measured the performance of a firm [19].

Role of R&D

R&D has played an important role in the success of many large corporations and companies around the world. According to OECD (2002) [20], R&D is used to refer to creative activities which are carried out on a systematic basis with the aim of creating new human, cultural and social knowledge to create new applications. In the perspective of economics, enterprises conduct R&D activities with the aim of expanding and developing business activities as well as technological capacity [20].

Among the large and multinational exporting enterprises around the world, R&D activities in terms of technology and process innovation could play an important function. R&D activities are responsible for researching and developing products, improving the production of goods according to modern technology to suit the consumption requirements of the importing country, researching and gradually replacing materials, as well as an appropriate technology to increase the technological level for better products [21]. As a result, R&D activities could help promoting firm performance. Firms with more investment in R&D could be at the forefront in the technology market when they are able to invent new products or new processes. Therefore, the investment in R&D will bring firms highly competitive products along with more profitable export strategies [22].

Role of product innovation

According to OECD (2005) [23], the definition of innovation is the "implementation of a new or significantly improved product (good or service), process, a new marketing technique or a new organizational method in business practices, workplace organization or external relations". Also, a product innovation comprises the presentations of new products or services to market, and the improvements of existing goods or services. The improvements can be technical specifications, components and materials, software, or other functional or user characteristics [23].

The methods of production or delivery of products/services could be improved by product innovation [22]. The higher the number of enterprises on the market is, the more choices in terms of products and services that customers have. It is difficult for a firm to survive in such a rapidly changing, flexible and highly competitive environment without innovation. As a result, firm performance could be expected to enhance due to the channel of innovation [22].

Empirical evidence

This section will display the empirical findings of some related research papers in the context of Vietnam as well as in some other countries to help readers have an overview on the research problem.

- Evidence on the effect of innovation on firm performance

Some empirical studies have provided on the positive effect of innovation on firm performance. To keep pace with the continuous development speed of the economy, it is necessary for firms to operate in a more efficient way. A resource-based view theory [2,7] also mentioned that enterprises need to utilize their resources to enhance their competitive advantage as well as their performance to make profits and create job opportunities for employees, as well as contribute to the state budget. From more than three centuries ago, Smith (1776) [24] affirmed the positive relationship between innovation and firm's growth. After that, the concepts of innovation, as well as the impact of innovation on the development of enterprises, have been widely developed and applied by Schumpeter (1934) [3]. In the last two decades, many authors have studied innovation as an important component during the period of firm's development. Through empirical studies, Gunday et al. (2011) [25] argued that the types of innovation, in general, have a positive influence on firm performance of manufacturing enterprises. Also, as clarified by Atalay (2013) [26],

technological innovation (including product and process innovation) has a positive impact on firm performance. In addition, there are also many studies from many scholars proving that innovation and firm performance are closely related [4,5,27,28].

In the context of Vietnam, Phung and Le (2013) [29] pointed out the importance of innovation and its contributions to enhancing the competitiveness of Vietnamese enterprises. The research results show that Vietnamese enterprises have gradually been aware of innovation, but not many firms have issued policies or detailed plans to implement innovation. In addition, innovation is mainly about improving products/services, very few firms develop completely new products/services. In fact, most of the companies surveyed did not have R&D departments. Besides, Nguyen et al. (2019) [30] also mentioned the impact of innovation on firm performance under the context of Vietnam. The authors emphasized the importance of innovation in creating an outstanding competitive advantage for enterprises compared to non-innovators. In other words, product innovation can be seen as a sustainable channel to facilitate economic growth and economic efficiency. If a firm is not actively innovating or updating innovation activities, it could lose its competitiveness, which is very hard for that firm to survive and compete with its rivals.

According to Le (2019) [31], innovation activities have been strongly encouraged by the Government and Vietnamese local authorities to promote sustainable growth of firms. In recent years, the local authorities have set targets to increase the number of innovative enterprises. By using the data from 2,317 processing and manufacturing firms, the results from this study indicated that innovation has affected the profits, value added and production value of the entire manufacturing and processing industries.

- Evidence on the effect of R&D on firm performance

In the context of a European country, Lome et al. (2016) [32] found that firms with a high investment on R&D activities showed a better significant performance than other firms through the late 2000s financial crisis using a sample of 247 Norwegian manufacturers. These authors argued that the development of resources created by R&D activities are unique, rare, immobile and difficult to imitate. As a result, R&D investments are more likely to associate with the improvement of firm performance.

In an emerging market, with a sample 1540 firm-year observations from a balanced panel of 385 privately-owned firms listed on the Shanghai and Shenzhen stock exchanges (China), Leung and Sharma (2021) [33] provided the empirical evidence that R&D intensity influenced long-term (firm value) financial performance. Besides, in another Asia market, the research conducted by Nguyen (2016) [9] on R&D of 150 manufacturing enterprises in Vietnam showed that R&D affects firm performance both directly and indirectly, in which direct influence is more important. This result encourages manufacturing and processing companies to spend more on R&D to improve the performance. Thus, it can be seen that R&D activities are very necessary for firms.

In sum, the empirical review showed that most of the previous studies have only focused on some industries such as manufacturing, automation, and mainly conducted in developed countries. Besides, the research on this research area in the context of Vietnam has mainly focused on only R&D or innovation. The examination of the concurrent effect of both factors of R&D and innovation could give a more extensive evidence on these research issues under the context of Vietnam. As a result, the policy implication related to R&D investment and innovation could be proposed to improve the performance of Vietnamese firms

Hypothesis development

Due to the fierce competition in the market as well as the integration and globalization process, innovation and R&D can be considered crucial activities for firms' survival and development. In recent years, companies have been continuously introducing their new products to meet customers' ever-increasing needs, improving processes to ensure productivity, planning marketing strategies to reach more potential customers, and improving organizational structure to achieve work efficiency, etc. Those activities relate to R&D as well as innovation [21,22]. Furthermore, innovation and R&D also enable companies to take advantage of high-qualified laborers.

Product innovation is creating, introducing new products to customers, or improving versions of existing products that can increase the customers' uses. In other words, many new and different products have been manufactured everyday by different firms, which makes customers have various choices that suit their favour. Consequently, firms need to carry out product innovation in order to create new spaces in a seemingly crowded market and enhance customer needs. Innovating products can help firms increase their sales to the market so that performance levels can be improved as well [21,22]. Through empirical study, Gunday et al. (2011) [25] suggested that the types

of innovation, in general, have a positive effect on the performance of manufacturing enterprises. Other business scholars also indicated that innovation and performance are closely related[4,5]. Then, the research hypothesis is proposed:

Hypothesis 1 (H_1): Product innovation has a positive impact on firm performance.

Currently, Vietnamese enterprises are increasingly aware of the importance of innovating or improving their products to meet domestic consumption demand and meet the export targets. From April 2010 to the end of December 2013, the project "Sustainable product innovation in Vietnam, Cambodia and Laos" aimed to enhance the industry's creativity to improve the environmental and social quality of products manufactured in Vietnam, Laos and Cambodia. This project was implemented with a scale of more than 500 enterprises that included 340 companies from Vietnam with the food - packaging, garment - footwear, interior - handicraft industries. Consequently, 110 Vietnamese SMEs successfully implemented product innovation with the number of newly designed products being 689. Therefore, it is expected that enterprises conducting product innovation (including product improvement) can improve their performance. If the results are as expected, to some extent, this can encourage Vietnamese firms to invest more in innovation.

R&D is related to market research and customer needs, thereby developing new products and services through innovations to meet customers' increasing needs. At the same time, when investing in research and development activities, firms will have a better understanding of the business environment, which helps them have appropriate strategies and plans to create a competitive advantage[21]. This will help firms increase their profits and reinvest in research and development activities in the future, contributing to constructing a long-term foundation for firms' development[34]. For those reasons, R&D is expected to influence firm performance positively.

According to Artz et al. (2010)[4], the more firms invest in R&D, the more likely they are to improve their return on sales (ROS). Nguyen (2016)[9] by surveying 105 processing and manufacturing enterprises in Vietnam proved that R&D positively impacts firm performance. Hence, firms need to increase their budgets to spend on R&D activities. In addition, in some countries such as China, France and some European countries, many other authors have found the relationship between R&D and firm performance[8,34]. Therefore, the next research hypothesis is proposed as follows:

Hypothesis 2 (H_2): R&D has a positive impact on firm performance.

For Vietnamese enterprises, the investment in R&D is expected to help firms increase their performance. In recent years, the investment in R&D activities in Vietnam has started to increase with big brands' emergence. Many enterprises have been successful when spending on R&D activities. For instance, Viettel corporation spends about billion VND 4,500 on R&D each year. Regarding on VNPT, it is estimated to spend about 300 million USD for R&D activities in the period of 2018 - 2025 with the aim of shortening the service delivery to the market. VINGROUP is one of the most developed corporations in Vietnam which also invested strongly in R&D with the establishment of big data research institutes, artificial intelligence, smart phones, car industries...

RESEARCH METHODOLOGY

Data collection

This study uses data from the Vietnam - Enterprise Survey 2015 from the World Bank. This data collected information on manufacturing firms in Vietnam from November 2014 to April 2016. Manufacturing is classified into five groups: food & beverage, garment industry, non-metallic products, metallic products, and other manufacturing industries. There are from 142 to 194 businesses being interviewed in each field. Enterprises surveyed located in 5 areas, including Red River Delta, North Central and Central Coast, Southeast, Mekong River Delta. The Enterprise Survey's goal is to understand the experiences and activities of firms in the private sector. The Enterprise Survey (ES) is an ongoing World Bank project that collects data both based on firms' experience and perceptions of their operating environment. The total number of enterprises extracted from the data (excluding missing values of variables and erroneous data) in this study is 397 enterprises.

This study focuses on researching the impact of R&D and product innovation and considers some control variables such as firm size, firm age, manager's gender, manager's experience, export intensity, and industry on firm performance in Vietnam.

Analysis method

Regression analysis method is mainly used in this study. The proposed research model can be expressed as the following equation:

$$Y_{ROS} = \beta_0 + \beta_1 X_{INNO} + \beta_2 X_{RD} + \beta_3 X_{SIZE} + \beta_4 X_{AGE} + \beta_5 X_{FE} + \beta_6 X_{EXP} + \beta_7 X_{YEARS} + \beta_8 X_{MFIRM} + \varepsilon \ (*)$$

Four following regression models are performed, including 1) Model 1: Regressing control variables (firm size, firm age, manager's gender, manager's experience, export intensity, and manufacturing firm) on firm performance; 2) Model 2: Regressing product innovation and control variables on firm performance; 3) Model 3: Regressing R&D and control variables on firm performance and 4) Model 4: Regressing both product innovation and R&D variables and control variables on firm performance.

Y_{ROS} represents for firm performance measured by ROS which is the ratio of profit after tax and net sales. The main dependent variable in model (*) includes *R&D* (X_{RD}), calculated by the ratio of cost of R&D on total sales[35] and *Product innovation* (X_{INNO}), being a dummy variable, which equals to 1 if the firm has introduced new or significantly improve products or services during the last three years and 0 otherwise[35,36].

Control variables comprises *Firm size* (X_{SIZE}), measured by taking natural logarithm of firms' number full-time employees[16] *Firm age* (X_{AGE}), defined as the length of time during which a firm has been established up to 2015[37,38] *Female manager* (X_{FE}), a dummy variable which equals 1 if the manager is female and 0 otherwise[39]; *Manager's experience* (X_{YEARS}), measured by the number of years since the manager took the position until 2015[40]; *Export intensity* (X_{EXP}), calculated by the ratio of export revenue (direct and indirect) on total sales[40,41]; and *Manufacturing firm* (X_{MFIRM}), a dummy variable which equals 1 if firm belongs to manufacturing industry and 0 if firm belongs to service industry[42].

RESULTS AND DISCUSSION

Descripti ve statistics

Table 1 presents the descriptive statistics of the sample. ROS has the mean value of 25.34%, the max value of ROS of 79.75% and the min value of -0.03%. These statistics show that many enterprises still face many difficulties during the business process besides enterprises with good performance. R&D has a mean value of 5.82%, which means that firms will extract 5.82% of total revenue to spend on R&D activities. This result shows that although R&D activities have not received much attention, many firms have begun to invest in this activity. R&D intensity receives the max value of 57.7%, and the min value is nearly 0. Those figures show a very modest amount of investment. However, this partly reflects the fact that innovative R&D is still new approach to them. In addition, the statistics in Table 1 show that the Vietnamese firms which has introduced new or improve products or services during the last 3 years account for 32.2% of the total sample. Firm age receives the mean value of approximately 13 years. The length of time in which an enterprise has been established ranges between 2 years and 113 years. The fluctuation is due to the difference in the number of years that an enterprise has operated and its experience. The longer an enterprise works, the more reputable and reliable that firm becomes. Firm size is measured by taking the natural logarithm of the number of employees. The mean value of firm size is 3.89, which is equivalent from 185 to 195 employees. The max value and min value are respectively 1.61 and 8.85, equivalent to the min value being 5 employees, and the max value being 7,000. The standard deviation of this variable is recorded as 1.47, approximately 620 employees.

The mean value of export intensity is 21.59%, which is relatively low. This result shows that many firms have had high export intensity while many firms are facing difficulties in exporting goods or not implementing export activities. The highest export intensity is 100%, while the lowest is 0%. It can be seen apparently that there is a huge fluctuation between firms when doing export. The experience of the manager receives the mean value of nearly 17 years. The smallest and the highest number of years that a manager has got the value of 2 and 60 years, respectively. The longer years of experience can make managers accumulate more experiences and knowledge to manage firms better.

The statistics in Table 1 show that there are 19.4% firms in the sample leading female managers. Besides, more than 95% of firms belong to manufacturing sector such as food, fiber, textile, fabric, and apparel industries… The remaining 5% are firms operating in the service sector including automobile repair, information technology - telecommunications…

Regression results

Before estimating the model (*), partial correlations among independent variables are calculated[a]. The results show a rather low value of partial correlation among independent variables which could imply that the multi-collinearity problem could not occur in the model. Then, VIF value are also checked (Table 2). The results indicate that all VIF value of independent variables are smaller than 2, which indicates that there is no multi-collinearity in the research model. In addition, with the significant level being 1%, White test

[a] Due to the limitation on space, these partial correlations are not shown in the paper. They will be provided upon the request

Table 1: Descriptive statistics of all variables

Variables	Mean	Std. Dev.	Min	Max
Firm performance (ROS)	0.253	0.217	-0.030	0.797
R&D	0.058	0.074	0.000	0.577
Product innovation	0.322	0.468	0	1
Firm age	13.375	10.661	2	113
Firm size	3.891	1.473	1.609	8.854
Export intensity	0.216	0.357	0	1
Manager's experience	17.741	9.463	2	60
Female manager	0.194	0.396	0	1
Manufacturing firms	0.960	0.197	0	1

Source: Data processing results from a sample of 397 Vietnamese firms extracted and formulated from WB Data (2020)

gives the result that heteroscedasticity could not occur in the model.

The linear regression results of factors affecting firms' performance in Vietnam are presented in Table 2. Model 4 has the highest values of R^2 and adjusted R^2 which imply that the estimation results of Model 4 better explain the variation of firm performance. In other words, the consideration of both R&D and product innovation variables increases the power of explanation of the model. The R^2 value of 0.0960 implies that the independent variables used in Model 4 could explain 9.60% the variation of firm performance measured by ROS. The results in Table 2 show that product innovation positively impacts firm performance in Vietnam at the significance level at 1% (β_{INNO} = 0.064; p < 0.01). This result is consistent with the expectation of H_1 that product innovation has a positive impact on firm performance. Hence, the resource-based view theory is verified in this context. This finding is also consistent with the results of Terziovski (2010)[12] and Zawawi et al. (2016)[13]. Hence, it could be said that product innovation could help firms improve their competitiveness and enable take advantage of opportunities from international markets[25]. However, although product innovation has a positive effect on the dependent variable, in fact, many firms have not recognized whether conducting innovation will help increase their firm performance or not. Some understand that innovation is essential, yet they do not know how to start or implement innovation activities effectively. This can be explained by many reasons. The concept of innovation is still newly introduced to many Vietnamese enterprises. This concept has only been formed after many multinational corporations and companies landed in Vietnam such as Unilever, Nestle, ... Therefore, the perception of innovation activities is still limited. At the same time, firms still have limitations in finding human resources with in-depth knowledge or understanding of innovation because this is a new field. Currently, many firms have built up innovation departments in the companies, which is a good sign for the growth of this activity in the coming time. However, with the current development situation in Vietnam, firms need to have more experts in this field.

The results in Table 2 also show that R&D has a positive impact on firm performance in Vietnam at the significance level at 5% (β_{RD} = 0.343; p < 0.05). This evidence supports for H_2 and verified the resource-based view theory. When firms know how to take advantage of its limited resources (R&D is one of them), they can improve their performance. This empirical evidence is consistent with Nguyen (2016)[9] after surveying 105 processing and manufacturing enterprises in Vietnam. The evidence found in this study also reinforces the positive effect of R&D on financial performance in Chinese market found by Leung and Sharma (2021)[33].

As a result, this evidence implies for the need to increase firm's budgets to spend on R&D activities. Although the results show a positive impact of R&D on firm performance, not many enterprises really focus on this activity. On the one hand, many firms are awareness of innovation and R&D activities, but they don't know how to start and where to start, or they lack the financial budget to spend on those activities. Therefore, when embarking on implementation R&D, it does not result in the desired effect. It is difficult to

see early results when investing in R&D because the process of R&D can extend many years and requires a lot of investment in both human and financial resources. Most Vietnamese enterprises in general are not bold to invest in R&D activities because investment in this activity could be less effective than investing in other functions. This can be explained because the effectiveness of R&D activities is really low, but it may also be due to the limited ability of business administrators to measure and evaluate the performance R&D. Fortunately, the investment in R&D activities in Vietnam has started to increase with the emergence of big brands such as Viettel, Wilmar, and Vingroup. Hence, it is expected that R&D will be more focused by all enterprises in Vietnam.

With respect to control variables, export intensity is found to be positively correlated with firm performance at the significance level of 1% (β_{EXP} = 0.114; p < 0.01). This finding is consistent with Vo (2015) [40]. Hence, it could be said that firms should focus on export activities to increase export revenue, thereby partly helping firms improve firm performance [16]. Firm size is found to be negatively correlated with firm performance. It can be explained that firm size is not only reflected by the number of employees but also the quality of the employees. Although a firm does not have a large number of employees, high-qualified employees with good productivity, creativity, and abilities to research and develop new products will help firm's development. Conversely, a firm with many employees who have low skills and productivity could destroy firm performance. Moreover, the results also show that service firms are more likely to achieve higher performance than manufacturing firms. The reason for this result could origin from the growth of service sectors such as health, education, entertainment, beauty, tourism, electronic telecommunications in Vietnam recently.

CONCLUSION AND IMPLICATIONS

This study focuses on analyzing the impact of product innovation and R&D on firm performance in the Vietnamese context. The resource-based view theory is based to explain the relationship among product innovation and R&D on firm performance. This study uses a sample of 397 firms extracted from the Vietnam - Enterprise Survey 2015 from the World Bank.

The statistics show that the investment on R&D of Vietnamese firms in the sample is rather modest with 5.82% of total revenue spending on R&D activities. In addition, there are about 32% of Vietnamese firm having introduced new or improve products or services during the last 3 years. The research results from OLS regression show that product innovation has a positive impact on firm performance of firms in Vietnam. This result implies that launching new products or improving existing products could be the "fuel" for firms' growth engine. In the current market economy with fierce competition, most firms will fall into a deadlock if they do not launch new products or improve products to meet customers' increasingly diverse needs. Also, to dominate and expand the market share, firms need to develop their products to keep their competitive advantage to compete with other rivals and meet consumer demands. At the same time, product innovation and product improvement also contribute to bringing values to society such as state budget and social welfare.

In addition, R&D is also found to positively impact on firm performance in Vietnam. In a volatile economy, the needs of customers are constantly increasing and changing. If firms want to grasp the trend to improve the quality of products and services, they need to embark on building R&D departments. The role of R&D is to help firms create competitive advantages and increase the profits for them in a sustainable way. Moreover, R&D is also the premise of firm's innovation activities.

Hence, it could be said that conducting product innovation activities and investing in R&D can partly improve firms' performance in Vietnam. This result reinforces the theory of resource-based view. This result one more time reinforces for the need of more investment on product innovation and building R&D centers or departments. Since then, firms will have more suitable strategies that can increase their position in the market and affirm their competitive advantage. On the other hand, firms can also shorten production time and save a lot of costs. Besides, to develop a firm as a whole, there are many more factors that firms should take into account, for example, manager's qualification or experience, labor's qualifications and export intensity. Specifically, firms can improve their performance by increasing the volume of export to increase export revenue. Investing in human resources is also one of the best and the most sustainable ways to enhance firms' performance. Besides, the results have shown that export intensity positively influences on firm performance in term of ROS. Hence, increasing the intensity of export could be a means of improving the performance of the Vietnamese firms.

This study has also faced some limitations. The source of data is only in the year of 2015; however, from 2015 to the present time, Vietnam's economy has had many

Table 2: Regression results of factors affecting firm performance of firms in Vietnam

Variables	VIF	Model 1		Model 2		Model 3		Model 4	
		Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err
Innovation	1.03			0.061***	0.023			0.064***	0.023
R&D	1.01					0.322**	0.143	0.343**	0.142
Firm age	1.10	-0.001	0.001	-0.001	0.001	-0.001	0.001	-0.001	0.001
Female manager	1.01	-0.029	0.027	-0.027	0.027	-0.028	0.027	-0.025	0.027
Firm size	1.26	-0.018**	0.008	-0.019**	0.008	-0.021**	0.008	-0.021***	0.008
Export intensity	1.13	0.115***	0.032	0.111***	0.031	0.119***	0.031	0.114***	0.031
Manager's experience	1.02	-0.002*	0.001	-0.002*	0.001	-0.002*	0.001	-0.002	0.001
Manufacturing firms	1.02	-0.111**	0.055	-0.116**	0.054	-0.113**	0.054	-0.119**	0.054
Constant		0.460***	0.059	0.448***	0.059	0.449	0.059	0.436***	0.059
R2		0.0654		0.0774		0.0824		0.0960	
Adjusted R2		0.0510		0.0608		0.0659		0.0773	

***, ** and * indicates the significant level at 1%, 5% and 10%, respectively

Source: Data processing results from a sample of 397 Vietnamese firms (2020)

fluctuations, so data collection may involve many differences which leads to different results. Hence, further studies could extend the research period with panel data. In addition, subsequent studies also could compare innovation activities in more specific industries such as pharmacy, wholesale, entertainment, resources... Moreover, there are many other types of innovation such as process innovation, marketing innovation, organizational innovation … and many types of R&D such as labeling R&D, product R&D… Therefore, in the coming time, there should have more specialized researches to help firms know how to take advantage of their strengths.

LIST OF ABBREVIATION

OECD: Organization for Economic Cooperation and Development
R&D: Research & Development
ROA: Return on assets
ROE: Return on equity
ROS: Return on sales

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest

AUTHORS' CONTRIBUTION

- Ngo My Tran is responsible for the content: Conceptualization, methodology, writing - review and editing
- Le Hoang Thuy Tien is responsible for the content: methodology, data analysis and curation, writing—original draft preparation and writing
- Tran Thi Bach Yen is responsible for the content: writing—review and editing
- Three authors have read and agreed to the published version of the manuscript.

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Bài nghiên cứu

Đổi mới và hiệu suất công ty: R&D có thật sự cần không? Nghiên cứu thực nghiệm từ các doanh nghiệp Việt Nam

Ngô Mỹ Trân*, Le Hoang Thuy Tien, Tran Thi Bach Yen

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TÓM TẮT

Nghiên cứu được thực hiện nhằm phân tích sự ảnh hưởng của R&D và đổi mới sản phẩm đến hiệu quả hoạt động ở Việt Nam dựa trên mẫu nghiên cứu gồm 397 công ty. Quan điểm dựa trên nguồn lực được sử dụng làm lý thuyết cơ bản cho mô hình nghiên cứu. Số liệu thống kê cho thấy trung bình các doanh nghiệp Việt Nam trích 5,82% tổng doanh thu để chi cho các hoạt động R&D. Ngoài ra, có khoảng 32% doanh nghiệp Việt Nam trong mẫu nghiên cứu đã thực hiện cải tiến hoặc nâng cấp sản phẩm hay phát triển dịch vụ mới trong 3 năm qua. Kết quả này cho thấy việc đầu tư vào R&D và các hoạt động đổi mới sản phẩm tại Việt Nam còn ở mức tương đối khiêm tốn. Bên cạnh đó, kết quả hồi quy cho thấy đổi mới sản phẩm có ảnh hưởng tích cực đến hiệu quả hoạt động của công ty được đo lường bằng các chỉ tiêu lợi nhuận theo sổ sách. Kết quả này hàm ý rằng việc giới thiệu sản phẩm mới hoặc việc cải tiến các sản phẩm hiện có có thể thúc đẩy cho sự tăng trưởng của doanh nghiệp, từ đó có thể cải thiện hiệu quả hoạt động của các công ty này. Bên cạnh đó, R&D cũng được tìm thấy có ảnh hưởng tích cực đến hiệu quả công ty hoạt động trên thị trường Việt Nam. Do đó, R&D có thể được xem là một phương tiện có thể giúp tạo nên lợi thế cạnh tranh và gia tăng lợi nhuận cho công ty. Ngoài ra, R&D có thể được xem là tiền đề cho các hoạt động đổi mới của công ty. Kết quả này cho thấy rằng các bằng chứng thực nghiệm ở thị trường Việt Nam ủng hộ lý thuyết phụ thuộc nguồn lực. Bằng chứng này ủng hộ việc xem xét đầu tư cho R&D và đổi mới sản phẩm để cải thiện hiệu quả hoạt động của các công ty trên thị trường này. Ngoài ra, bằng chứng thống kê trong nghiên cứu này còn cho thấy cường độ xuất khẩu có ảnh hưởng tích cực đến hoạt động của doanh nghiệp tại thị trường Việt Nam.

Từ khoá: R&D, firm performance, product innovation, Vietnamese firms, ROS

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