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THE EFFECT OF HUMAN CAPITAL ON INNOVATION OF SMALL AND MEDIUM-SIZED ENTERPRISES IN VIETNAM

Mai Bao
Faculty of Human Resources Economics and Management, National Economics University, Hanoi, Vietnam

Abstract: This study aims to examine the effect of human capital on innovation of small and medium-sized enterprises in Vietnam in the competitive environment. The study uses the data collected by Central Institute for Economic Management (CIEM) in 2011, 2013 and 2015. By using the Tobit model, the results show that human capital positively influence innovation of Small and Medium-sized Enterprises (SMEs). Base on the findings, small and medium firms in Vietnam need to adopt an effective training program as well as developing a virtuous labour network in order to enhance human capital as a result motivating companies' innovation output, which embrace new products, new process and modified products.

Keywords: Human capital, innovation, small and medium-sized enterprises (SMEs)

Introduction

Small and medium-sized enterprises (SMEs) have been playing a crucial role in the development of the economy since they have accounted for a mass proportion of total firms in Vietnam, approximately 98.1% (GSO, 2017). However, SMEs, especially manufacturing sector, has experienced a low level of productivity since 2011 (Calza & et al., 2018). Many studies have proved that innovation is a key factor contributing to firm growth and productivity (Cefis and Marsili, 2006; Ganotakis, 2012). In Vietnam, Nguyen et al. (2008) also found that innovation has an important role to play in exports of SMEs. According to CIEM (2012), firms that introduced new or improved products had higher level of employment growth and lower exit rates. Human capital has long been proven to be a determining factor of innovation. It has a significant effect on innovation and economic growth since humans in a company can create new products, technologies and services (Elena, 2017).
Nonetheless, there are a few studies on the relationship between innovation and human capital while the need for studies on innovation and human capital is pressing (Vixathep et al. (2015). This study was conducted with the purpose of filling the gap in the literature by using data from surveys of SMEs taken place in 2011, 2013 and 2015.

The remaining of the paper is organized as follows. Section 2 will present brief literature review of innovation, human capital as well as the relationship between those two variables. The descriptive analysis and results will be shown in section 3 of the study. Finally, we will discuss findings of the research and suggest some implications.

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Literature Review and Hypothesis

Innovation (INNO)

Innovative literature shows that any company needs innovation to succeed and survive in a competitive market (Bell, 2005). Innovation is understood in many different ways, but in its broadest sense, the term comes from Latin, which refers to the creation of new (Tuan et al., 2016). On the other hand, the UK Ministry of Trade and Industry (2007) argues that innovation is a process of turning opportunities into new ideas and putting these into practice for widespread use. In this study, the definition by OECD (2015) is used as a basic reference to describe and classify innovation at the enterprise level. Specifically, innovation is defined as "implementation of a new or significantly improved product (goods or service), process, a new marketing technique or a new organizational method in business practices, workplace organization or external relations". This definition is also used by many scholars (Tuan et al., 2016) and shows that it is reasonable and effective.

Human Capital (HC)

Human capital refers to the competence of each employee in an organization (Roos, 1998). Later, Bontis et al. (2000) also asserted that human capital is based primarily on individual's competencies, knowledge, talents, educational skills and experience of employees in companies. At the same time, this is an intangible resource for firms and an important element in the process of converting information into valuable knowledge, which will enhance the performance of companies. Besides, according to Estrin et al (2016), human capital includes knowledge, skills and behaviors of employees to meet the work in the enterprise. From a national point of view, OECD (2001) introduced the concept of human capital considering individual knowledge, skills, competencies and characteristics in order to create individual benefits and economics of a country. To fit the context in Vietnam, our research uses the definition of Estrin et al. (2016).

The Impact of Human Capital on Innovation

Innovation is essential for economic growth in developed countries. One of the most important sources of innovation is human capital (Rasa et al., 2016). In addition, human capital can have a direct impact on the economy by increasing labor productivity and indirect effects on economic growth based on increased innovation capacity. This hypothesis is supplemented by many empirical studies such as Benos et al. (2015); Coe et al. (2009), all of which highlight countries that are far from the technological frontier that can sustain their growth by adapting to innovations. However, the rate of adaptation depends on the level of human capital in these countries. Many researchers think that the process of investing in human capital, especially higher education, is more meaningful to the development of domestic innovation (Vandenbussche et al. 2006).

In addition, a study by Simonen & McCann (2008) addressed the core factors that influence innovation at an enterprise level including human capital, firm size and business activities. This is evidenced in Foss's study (2007) because the knowledge of a company's employees is closely related to the products and services they create. Therefore, the ability to produce new products and expand its organizational capabilities is inextricably

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linked to its human capital. These opportunities can only be created by valuable human resources, which are positively associated with product innovation through identifying new markets. Employees are likely to be willing to test and apply new knowledge to grow their organizations (Taggar, 2002). Furthermore, previous research on innovation has identified the importance of expertise and personal knowledge that allows employees to create new ideas and create innovations (Anand et al., 2007). Therefore, human capital has a positive impact on innovation.

Hypothesis: Human capital has a positive impact on innovation

Method

Measurement

Variable		**Measurement**
Innovation		Innovation is a dummy variable which equals 1 if firm has one of these innovative activities including: introducing new product, improving existing product, applying new manufacturing process, equals 0 if the company has none of those.
HC		= Value added/ Total labor cost
Control variables	Export	Whether the firm exports their goods (1=Yes, 0= No)
	LnLabor	Ln (the total number of firms' employees)
	Ownership	Ownership is divided into 5 forms: households, private sectors, cooperatives, limited companies, joint-stock companies.
	LnFirmage	Ln(fiscal year – established year)
	Trend	Trend = 1 when the SME's survey took place in 2011 Trend = 2 when the SME's survey took place in 2013 Trend = 3 when the SME's survey took place in 2015

Table 1: Variable Measurements

Data

The data source of this study is from SMEs surveys. SMEs surveys are jointly carried out for every two years by University of Copenhagen, General Statistics Office (GSO) of Vietnam, Vietnamese Institute of Labor

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Science and Social Affairs (ILSSA), and Central Institute for Economic Management (CIEM) of Vietnamese Ministry of Investment and Planning. The sample includes about 2600 firms located in 10 Vietnamese provinces including Ha Noi, Phu Tho, Ha Tay, Hai Phong, Nghe An, Quang Nam, Khanh Hoa, Lam Dong, Ho Chi Minh City and Long An. For example, the 2011 survey consists of 2552 firms while the figures for 2013 and 2015 surveys are 2575 and 2649 firms, respectively.

Variable		**Observations**	**Mean**	**Standard Deviation**
Innovation (INNO)		4,812	.3534913	.4781032
HC		4,812	27.07081	47.65225
Control variables	Export	4,812	.0644223	.2455292
	LnLabor	4,812	1.892969	1.150693
	Ownership	4,812	1.862635	1.34322
	LnFirmage	4,812	2.605234	.6015798

Table 2: Descriptive Analysis

From the summary statistic of the sample represented in Table 2, on average, when a firm increases 1000 VND of their labor cost, they will gain 27000 VND value added. In addition, roughly 35.34% of studied firms carried out innovation activities from the whole sample. Regarding to export, there is just roughly 6.44% of firms exporting their goods to other countries.

Data Processing

Although the data is generally structured as a cross-sectional structure for each year, a subgroup of SME firms is repeatedly interviewed from year to year. This advantage enables us to construct a panel sample of manufacturing firms from 2011 to 2015 for this study following these steps:

- Firstly, the data was collected from three different SMEs surveys taken place in 2011, 2013 and 2015.
- Secondly, we calculated and extracted necessary indicators for the study based on the given data sources.
- Next, we eliminated observations which have insufficient information and negative value added (VA).
- Finally, as the studied period is from 2011 to 2015, we select companies that have been working continuously during the given time.

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Therefore, the final data includes 1604 firms from each survey, which means there are 4812 researched organizations in total. The regression equation is as follow:

$INNO_{i,t} = \alpha_0 + \alpha_1 HC_{i,t} + \alpha_2 Control_{i,t} + \varepsilon_i$

While $HC_{i,t}$ measures the effectiveness of human capital within a firm in a year t , $INNO_{i,t}$ denotes innovation activities that are employed by a firm i, in a year t. Innovation activities include a wide range of activities that are carried out by a firm over the previous years. Additionally, $Control_{i,t}$is a vector of control variables for firm characteristics from the main specification. Control variables include (1) whether a firm exports their products (2) the total number of workers (3) form of ownership (4) firm age (5) trend.

Result

To analyze the impact of human capital on innovation, we ran a correlation table (Table 3) to evaluate the strength of the relations. In addition, with the intention of getting further quantitative analysis, we used Probit model, the results are indicated in Table 4.

	INNO	**HC**	**Export**	**LnLabor**	**LnFirmage**
INNO	1.0000				
HC	0.0387	1.0000			
Export	0.1141	0.0345	1.0000		
LnLabor	0.1694	0.0332	0.4026	1.0000	
LnFirmage	-0.0606	-0.0613	-0.0292	-0.1844	1.0000

Table 3: Correlations between Studied Variables

Table 3 indicates the correlations between all variables in the study. It is clear, with the exception of firm age, the remaining correlations between innovation and variables are positive, which means that the more effective human capital is within an organization, the more innovative activities are to be implemented. In terms of control variables, it is noticeable that the relationship between LnLabor and INNO is the strongest one (the figure is 0.1694). Meanwhile the figure for LnFirmage is negative (-0.0606), which indicates the longer a firm exists in the market, the less innovative it will be.

	INNO		
	coeff	Robust Std. Err	P_value
Probit			
HC	.0007611	.0004464	0.088
Export	.2826905	.0829757	0.001
Trend	-.0805829	.0240731	0.001
Ownership			

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Private sectors	.1959719	.0782261	0.012
Cooperatives	-.0687146	.12633	0.586
Limited companies	.0989727	.0646446	0.126
Joint-stock companies	.0264771	.1109466	0.811
LnLabor	.1369119	.0237373	0.000
LnFirmage	-.0199839	.0353276	0.572
Cons	-.5046917	.103605	0.000

Table 4: Probit Result The regression model is:

$INNO_{i,t}$ = -.5046917+ .0007611*$HC_{i,t}$ +.2826905*$Export_{i,t}$ +.1959719* Private $sectors_{i,t}$ -.0687146* Cooperatives i,t +.0989727* Limited companies $_{i,t}$+.0264771* Joint-stock companies $_{i,t}$+ -.0199839*$LnFirmage_{i,t}$+ .1369119*$LnLabor_{i,t}$-.0805829*Trend From table 4, authors come to some significant conclusions:

Firstly, the positive influence of human capital on innovation activities has been proved with statistical meaning at 10% (p-value = 0.88). In particular, if human capital within a firm increased by 1 unit, the probability of which the organization would put innovative activities into practice, would rise approximately 0.76%.

Secondly, most control variables are proved to have a positive impact on innovation. For example, the coefficient between Export and INNO is .2826905 > 0, which means that when a firm exports their goods and services to other countries, the likelihood of implemented innovative activities is 28.26% higher than that does not. Moreover, this conclusion has statistical meaning at 1%. On the other hand, some variables indicate a negative effect on innovation. For instance, the coefficient between firm age and innovation is -.0199839 <0, which means that if a firm existed 1 more year in the market, the possibility that it carried out innovative activities would be 1.9% higher than that in the previous year. However, due to pvalue = 0.572, this relationship has not yet significant.

Discussion and Conclusion

The results of this study indicate that human capital has a positive impact on innovation of SMEs in Vietnam. This finding agrees with some previous research. Elena (2017), using annual data during 2000 and 2015 issued by UNESCO, proved a positive influence of human capital on innovation in Romania. A similar result has been proved in Daniel et al. (2016) as the researchers found that human capital is positively related to the creation of innovation generation in Australian firms. Unlike most previous studies that examined the impact of human capital on innovation in one given country, Dakhli et al. (2004) developed a global view of the impact of human capital role on companies' innovation in 59 different countries. However, Dost et al. (2016) has proved that human capital does not have significant influence on innovation, otherwise, it needs to be interacted with social capital.

In conclusion, research results show that human capital has a positive impact on innovation. Therefore, in order to improve the innovation ability for businesses, we need to implement certain measures to develop human capital. Firstly, firms should improve training programs and develop human resources for businesses. This will help employees accumulate more updated knowledge, actively present more ideas and innovation at work. Secondly, it is crucial for companies to expand its network of business partners and fostering relationships between employees. By improving these practices, the work force will be motivated to learn further and create an efficient working atmosphere, by this means, promoting innovation. Due to the limitations of data, this study has measured only the output innovations without understanding the input innovation in the enterprise. Therefore, authors acknowledged the needs to further research the input innovations of companies to get more accurate and conclusive results.

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