LABOR PRODUCTIVITY OF SMEs IN VIETNAM

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Abstract: *This study attempts to unveil and prioritize the factors affecting the labor productivity of SMEs in Vietnam. We employ data from the Small and Medium-Sized Manufacturing Enterprises Survey, conducted through research cooperation between Vietnam and Denmark in 2015, to analyze the determinants of labor productivity in SMEs. We find that several firms' and owners' characteristics, including firm age, revenue, total asset, investment, innovation, owner age, gender, member, and education are associated with labor productivity. Policy implications are discussed.*

1. Introduction

Labor productivity is the decisive factor in improving the competitiveness of the economy and enterprises. It holds significant importance for promoting long-term economic growth. Increased labor productivity is the primary goal of countries worldwide aiming to escape underdevelopment and become modern industrial nations. For a developing economy, it becomes even more critical when inputs such as capital, land, and natural resources become scarce. Additionally, the labor force is affected by the future trend of population aging.

In the context of Vietnam, during the period 2011-2015, the increase in labor productivity raised GDP from 54.84% to 97.84%. On average, in the same period, the increase in labor productivity contributed to a 4.60% rise in GDP with a contribution rate of 74.53%. In 2020, the increased labor productivity boosted GDP by 4.79%, corresponding to a contribution rate of 167.02%. According to GSO (2023), during the period 2016-2020, increased labor productivity contributed to GDP by 97.00%. The average 10-year contribution of labor productivity to GDP is 85.87%, indicating its great importance and an increasing trend, demonstrating that the economic growth of Vietnam is aligning with the direction of sustainable development.

However, Vietnam's labor productivity remains among the lowest in the Asia-Pacific region. Labor productivity in Vietnam is nearly 15 times lower than that of Singapore, 11 times lower than Japan, and 10 times lower than South Korea. In comparison to neighboring ASEAN countries with similar average income levels, Vietnam's labor productivity is only 1/5 of Malaysia and 2/5 of Thailand. Therefore, improving labor productivity is a crucial task for Vietnamese firms, enabling them to narrow the development gap with other countries in the region and adapt to global trends.

In this paper, we contribute to the existing literature on the determinants of labor productivity by examining the case of Vietnam. Our research question is "What factors affect the labor productivity of SMEs in Vietnam?" Utilizing a sample of 2389 SMEs, we identify two groups of variables - firms' and owners' characteristics - that are relatively associated with labor productivity. Furthermore, we delve into the examination of the individual effects of each factor on SMEs' productivity.

The paper is organized as follows: Section 2 reviews the current literature. Section 3 presents the data and provides the research methods. Section 4 highlights descriptive and empirical results. Section 5 concludes with the findings, implications, and limitations of the research.

2. Literature review

Labor productivity reflects the ability to create wealth, specifically, the efficiency of labor in the production process. It is measured by the number of products or the amount of value created in a unit of time or the amount of time it takes labor to produce one unit of a product. According to the Organization for Economic Cooperation and Development (OECD), labor productivity is calculated by considering the number of final goods and services produced per unit of labor participating in production activities. In particular, the final goods and services created by

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the economy constitute the Gross Domestic Product (GDP). Labor participating in production activities contributes to the creation of GDP, reflecting the time, effort, and skills of the workforce. This is usually calculated based on the number of workers or working hours.

The topic of labor productivity has been widely discussed in the previous literature. Human capital investment affects labor productivity through output, profitability, and competitiveness (Black & Lynch 1997, Honig 2001, Blundell et al. 1999, Barron et al. 1989, Blackmore and Hoffman 1988). Lynch and Sandra (1996) show that there is a positive relationship between a worker's years of schooling and productivity.

Cin, B.C., Kim, Y.J. & Vonortas, N.S. (2017) also confirm that capital intensity is positively related to labor productivity. Increasing capital intensity will increase the labor productivity of Korean small and medium manufacturing enterprises. According to Nguyen Van Dong (2016), investment capital has a positive impact on the productive capacity of businesses in Vietnam. Nguyen Thanh Hai and Nguyen Thi Le Hoa (2016) point out that businesses that implement R&D projects and have investment capital for R&D activities have higher labor productivity than businesses that do not focus on this investment activity.

Previous studies have shown several factors affecting labor productivity. Employing the firm-level dataset of the Science, Technology, and Innovation Survey of 2011 and 2014 in Ecuador, Quijia-pillage et al. (2021) highlight the significant impacts of internal factors, including education, multiplant status, and investment, as well as external factors such as agglomeration economies and competition on labor productivity by adopting a multiple regression model.

In the case of Korea, Woo, C., et al. (2013) also confirm the effects of green innovation on labor productivity. The rich dataset sourced from the Korea Innovation Survey is used in the analysis. Their findings mean that firms need to engage in green innovation activities to improve their performance. This relationship also changes due to the size of the firm, with larger firms benefiting more from environmental activities than their counterparts. These findings are confirmed by Nicolas B., et al. (2006) in a study of European countries, where the authors analyze the impact of information and communication technology on productivity per employee. The authors find that technological innovation positively affects labor productivity.

In the same vein, Rakhmawati, P., & Karsinah, K. (2021) use both primary and secondary data in the artificial eyelash industry to explore the impact of independent factors such as education, wages, age, and work experience on labor productivity. By applying Multiple Linear Regression analysis, the results show a positive and significant effect of education, wages, age, and work experience simultaneously on labor productivity. However, work experience does not have a significant impact on labor productivity.

In the case of Middle East and North Africa (MENA) countries, Nahla Samargandi (2018) examines several determinants of labor productivity, including compensation, human capital, oil rent, trade, financial development, innovation, and industrialization, using dynamic OLS and fully-modified OLS to analyze the panel dataset. They discover that labor productivity is positively correlated with capital stock and human capital but negatively correlated with employment size. Additionally, labor productivity is significantly boosted by trade openness, oil rent, financial development, and industrial value addition. Ultimately, innovation plays a significant role in raising labor productivity. In the context of Italy, Velucchi, M., & Viviani, A. (2011) employ the original panel data from the Italian National Institute of Statistics at a micro-level (firm level) to provide evidence on the influence of firm characteristics on Italian firms' labor productivity. Results emphasize the roles of innovation and human capital in boosting labor productivity, especially in low-productive firms compared to their counterparts with higher production.

Islam, S., and Syed Shazali, S.T. (2011), investigate the same topic in the manufacturing industry. They find that productivity and skill level have a positive correlation, although not a strong one. According to the study, having a good work environment also shows a positive correlation with productivity. Nonetheless, a strong positive association is discovered between productivity and technology. The study concludes that investing in technology, maintaining a good working environment, and enhancing the level of skills are crucial components of a labor-intensive manufacturing process, which is positively correlated with productivity.

Using the 2018 World Bank enterprise data, a study by Cyprian Amutabi and Anthony Wambugu (2020) provides evidence of the effect of firm size on labor productivity in the context of Kenya's private service sector. The results also show that labor productivity

is favorably and considerably impacted by managers' experience, high school education, capital intensity, and employee wages.

To the best of our knowledge, there are very few studies examining a comprehensive view of the determinants of labor productivity, encompassing both firms' characteristics and owners' characteristics. Therefore, our study aims to investigate the impacts of these two groups of variables on labor productivity, determined as output per labor input. This research makes a significant contribution to bridging the gap in the literature regarding the factors affecting labor productivity, which is the most important factor for enterprise development.

3. Data and methods

3.1. Data

We sourced data from surveys on SMEs in Vietnam conducted by a collaboration of several parties, including the Central Institute for Economic Management, the Institute of Labour Science and Social Affairs, the Development Economics Research Group at the University of Copenhagen (Denmark), and the United Nations University's World Institute of Labor Science and Social Affairs. Data were collected in 2011, 2013, and 2015 from approximately 2,500 manufacturing small and medium enterprises in nine provinces and cities in Vietnam, including Hanoi (including Ha Tay), Hai Phong, Phu Tho, Nghe An, Quang Nam, Lam Dong, Khanh Hoa, Ho Chi Minh City, and Long An.

This survey includes various firm-related issues, such as firm performance, total assets, revenue, access to credit, credit history, innovation, investment, and more. This dataset has been widely used in previous literature (Archer, 2021; Canh et al., 2019; Giang et al., 2019). Following the main idea of the research, we removed any observations with missing values for the variables used. The final sample consists of 6,080 SMEs observations.

3.2. Methods

3.2.1. Variable measurements

As discussed in Nguyen et al. (2016), we choose a set of independent variables, including firms' characteristics and owners' characteristics. Firms' characteristics variables are firm age (L_AGE) which is defined as the logarithm of firm age, revenue (L_REV) which is defined as the logarithm of total revenue, total assets (L_ASSET), investment (INV), innovation (TECH). Owners' characteristics variables are owner's

age (L_OAGE) which is defined as the logarithm of age, gender (MALE), party member (MEM), and education (EDU).

A dependent variable is labor productivity (L_LP) which is measured as the logarithm of the ratio of sales to the number of laborers of a firm in 2015.

The list of all variables along with the description and their measurement is in table 1

Table 1. Variables definition

Variable(s)	Definition
Dependent variable	
Labor productivity	The logarithm of the ratio of revenue to total employees of a firm.
Independent variables	
Firms' characteristics	
Firm age	The logarithm of the age of firm
Assets	The logarithm of total assets.
Revenue	The logarithm of total sales.
Investment	Dummy variable, taking 1 if a firm has made any investment since the last survey and 0 otherwise.
Innovation *Owner's characteristics*	Dummy variable, taking 1 if a firm has innovation activity and 0 otherwise.
Party member	Dummy variable, taking 1 if the owner is a member of the Communist Party and 0 otherwise.
Owner's age	The logarithm of age of the owner/manager
Gender	Dummy variable, taking 1 if the owner's gender is male and 0 if female.
Education	Dummy variable, taking 1 if the owner completed an undergraduate or a postgraduate program and 0 otherwise (No professional education, Vocational education, Technical secondary education).

3.2.2. Methods

We use an Ordinary Least Square regression model to examine the factors affecting the labor productivity of SMEs in Vietnam. Our base-line regression model is given as follows:

$$L\_LP_i = \beta_0 + \beta_1 L\_AGE_i + \beta_2 L\_REV_i + \beta_3 L\_ASSET_i + \beta_4 INV_i + \beta_5 TECH_i + \beta_6 L\_OAGE_i + \beta_7 MALE_i + \beta_8 MEM_i + \beta_9 EDU_i + error$$

Where variables are defined as in table 2.

Previous literature (Velucchi, M., & Viviani, A., 2011; Islam, S. and Syed Shazali, S.T., 2011; Woo, C., et al, 2013; Nahla Samargandi, 2018; Quijia-pillage et al, 2021) shows that several firm characteristics such as investment, debt ratio, firm age, firm's total assets are significantly related to labor productivity. Therefore, we expect our coefficients to be significant and positive.

4. Results

4.1. Descriptive statistics

Table 2 shows the descriptive statistics for all the variables used in our paper, including mean, standard

deviation, maximum and minimum values. It indicates that the mean of the logarithm of labor productivity was 11.388, while the average firm size was 13.650. SMEs have an average age of around 16 years, which is not considered young. Regarding innovation activities, approximately 58.2% of total firms were involved in innovation, while approximately 54.3% made investments.

Table 2. Descriptive statistics of variables

Variable	Mean	Std. Dev.	Min.	Max.
Dependent variable				
L_LP				
Independent variables	11.388	1.332	-0.059	18.135
Firm characteristics				
L_AGE	2.804	0.469	1.609	4.190
L_ASSET	13.650	1.824	4.595	19.567
L_REV				
INV	0.582	0.493	0.000	1.000
TECH	0.543	0.498	0.000	1.000
Owner characteristics				
L_OAGE	0.684	0.809	0.000	2.000
MALE	0.669	0.471	0.000	1.000
MEM	0.095	0.293	0.000	1.000
EDU	0.250	0.433	0.000	1.000
Number of observations	6,080			

Table 2 further indicates that male executives owned 66.9% of firms. Approximately 0.95 percent of them were members of the Communist Party. Twenty-five percent of the owners completed their undergraduate degree or above.

4.2. Empirical results

Correlation matrix

Table 3: Correlation matrix

Variables	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
1.L_LP	1.000									
2. L_AGE	0.354*	1.000								
3. L_REV	-0.101*	0.017	1.000							
4. L_ASSET	0.128*	0.152*	-0.071*	1.000						
5. INV	0.086*	-0.026	-0.047	0.491*	1.000					
6. TECH	0.035	0.002	0.034	0.078*	0.069*	1.000				
7. L OAGE	0.160*	0.157*	-0.052*	0.065*	0.072*	-0.031	1.000			
8. MALE	-0.166*	-0.289*	0.120*	-0.080*	0.007	0.069*	-0.077*	1.000		
9. MEM	-0.053*	0.067*	0.012	0.048	0.005	0.013	-0.040	0.005*	1.000	
10. EDU	-0.210*	-0.151*	0.065*	-0.124*	-0.126*	-0.041	-0.097*	0.179	0.145*	1.000

*Note: * p < 0.05*

The variable correlation matrix is shown in Table 3. The results demonstrate that, at a 5% significance level, several variables are significantly correlated with labor productivity (L_LP), including firm age (F_AGE), total revenue (L_REV), total asset (L_ASSET), investment (INV), technology (TECH), owner's age (O_AGE), male (MALE), member (MEM) and educational level (EDU). Each pair of variables' correlation value is less than 0.8, indicating that there is no multicollinearity in this mode. There is no correlation between independent variables: technology (TECH) with labor productivity.

Regression results

Table 4: OLS regression results

Variables	Coefficient	S.E.	t-stats
L_AGE	-0.005***	(0.002)	-2.630
L_REV	0.015**	(0.010)	1.420
L_ASSET	-0.021***	(0.015)	1.340
INV	0.073**	(0.042)	1.760
TECH	0.057*	(0.038)	1.480
O_AGE	-0.004**	(0.002)	-2.270
MALE	0.051*	(0.042)	1.230
MEM	0.147*	(0.087)	-1.690
EDU	0.101**	(0.119)	-0.850
Obs.	6,080		
F(31, 6071)	13.15***		
Adj. R-squared	0.201		

*Notes: * p<0.1; ** p<0.05; *** p<0.01. Standard errors are in parentheses.*

Table 4 denotes the results of OLS regression to scrutinize the relationship between independent variables and labor productivity. The results show as follows: Our results demonstrate a negative coefficient of firm's age (*coef.= -0.005*) with the level of significance at 1%, implying that firms having a long-term history tend to be less productive. This is also highlighted in a study by Rand (2007) who find older firms have lower access to credit than younger firms, which leads to decrease firm performance.

In regard to revenues, we find a positive relationship between revenue and labor productivity at the significant level of 5% (*coef.=0.015).* Holding other things unchanged, firms having better revenue are likely to have a higher level of labor productivity than their counterparts by 1.5%. Our finding is in line with results in previous studies highlighting that firms with greater sales tend to present the highest propensity of productivity.

As seen, the coefficient of assets is negative (*coef.=-0.021*) and significant at 1% level, suggesting that larger firms tend to perform better in productivity than smaller ones by 2.1%, holding other factors fixed. Our finding is consistent by a study by Rand (2007) who found a positive relationship between firm's size and firm performance. As well, results show a positive and significant coefficient of investment (*coef=0.073, sig.=5%*) suggesting that firms performing investment activities are more likely to have higher labor productivity than those without investment by 7.3%. This finding is similar to the finding by Velucchi, M., & Viviani, A. (2011) and Islam, S. and Syed Shazali, S.T. (2011) in regard to a positive and significant

association between investment and productivity, confirming the importance of investment in firm performance.

Likewise, we find significantly positive relationship between technology and productivity (*coef.=0.057*) at the significance level of 10%, which is emphasized in the literature. Our findings suggest that those applying innovation activities in operation tend to be more productive than their peers by 5.7%, holding other factors fixed.

Regarding to owner characteristics, results show that the coefficient of owner age is negative (*coef.=-0.004*) and significance at 5% level, which implies that firms having younger leaders are more likely to have better productivity by 0.04% than their counterparts when keeping other factors unchanged. This finding is in line with literature who find that labor productivity is strongly positively influenced by owner age.

Adversely, male-owned firms tend to be more innovative than female-owned firms by 5.1%, shown through the positive and significant coefficient (*coef.= 0.051, sig.=10%*). Our findings that labor productivity is positively affected by owner's gender are consistent with the literature (Fairlie and Robb, 2009) who find that male owners often have more work experience and are willing to take risks to invest in venture alternatives to make better revenue.

The coefficient MEM is significant and positive (*coef.=0.147, sig.=10%*), showing that businesses having owners as members of the Communist Party are less productive than those without by 14.7%. This is probably because owners could take advantage of their networking to help businesses improve their labor productivity.

The educational level of the owner is found to have a positive relationship with labor productivity. Accordingly, firms whose owner finished their undergraduate or above perform a better level of labor productivity by 10.1% than those had no professional education, or graduated from a college or high school. This finding is consistent with Akoten et al., (2006) and Tran and Santarelli., (2013) who state that owner's qualifications and degrees might help firms improve their business strategies and management.

5. Conclusions

This study brings forth several key empirical findings and contributions to the existing literature on factors affecting labor productivity. First, labor productivity is influenced by a set of firm characteristics such as age, revenue, assets, investment, and technology.

Second, we find that owner characteristics, including membership, education, and gender, have a positive effect on labor productivity. Firms with a male owner, an owner who is a member of the Communist Party, or an owner with a higher educational level perform better in productivity than their counterparts in the case of SMEs in Vietnam. Conversely, owner age has a negative impact on productivity.

Our findings shed light on investigating determinants of labor productivity in SMEs, suggesting policy implications to enhance the labor productivity of SMEs. Local governments may support firms in doing business through an investment channel as a foundation for firms to improve their innovative level. They could also encourage enterprises to undertake innovative activities by improving existing products or introducing new technology or new products. These policies can be helpful in enhancing a firm's labor productivity.

The major limitation of the study is the lack of data. We only employ data on SMEs in Vietnam in 2015. The database covers about 2,500 firms in only nine provinces/cities in Vietnam. Thus, future studies can expand the scope by using panel data from the SME Survey.

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