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Factors Affecting the Labor Productivity of Garment Firms in Nam Dinh Province, Vietnam

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Abstract

Under the impacts of the 4th Industrial Revolution, garment firms in Vietnam are facing various challenges, and improvement in their labor productivity is one of the important measures to overcome these challenges. This study, therefore, investigated the determinants of the labor productivity of garment firms in Nam Dinh province. The data used for this study were extracted from the Enterprise Survey Dataset in 2021, and descriptive statistics, comparative analysis, and the Cobb-Douglas function in logarithm form were the major methods employed for the study. The study findings underscored the positive impacts of fixed assets and business management costs, average payments to employees, exporting activities, and the utilization of internet resources on labor productivity. The study revealed that firm size, gender composition, and age of firm leaders do not significantly influence labor productivity, emphasizing the complexity and industry-specific nuances of these relationships. Based on the insights gained from the study, several strategic suggestions were proposed to improve the labor productivity of garment firms in Nam Dinh province in the future.

Keywords

Determinants, Garment firms, Labor productivity, Nam Dinh province

Introduction

Labor productivity is one of the crucial factors that significantly influences the competitiveness and operational efficiency of firms, as well as the overall economic performance of each country (GSO, 2021). Labor productivity and the factors affecting it are consistently subjects of evaluation by firms to devise reasonable solutions that contribute to enhancing labor productivity and improving the competitive capacity of firms or the firms' ability to effectively compete

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in their market or industry. Higher labor productivity could enable firms to save costs and increase economic efficiency, while lower labor productivity may lead to various challenges and even the risk of bankruptcy (Bui Thu Ha *et al*., 2023).

Nam Dinh is a province located in the Red River Delta of Vietnam, and has a rich tradition and extensive experience in the production and management of the textile and garment industry. The province has an abundant textile and garment labor force with high-level skills. During the period of 2016-2020, the production value of the textile and garment, leather, and footwear industries in the province grew at an average rate of 14% per year, accounting for 49% of the total industrial production value in the province (Thang Long, 2021). Within the textile and garment industry in Nam Dinh, garment firms constitute the majority, approximately 70% of the total number of firms. However, the garment industry in Vietnam as a whole, and specifically in Nam Dinh, is facing numerous challenges due to the impact of the Fourth Industrial Revolution and the deepening process of globalization. Several garment firms are even operating at a loss and are at risk of ceasing production (Thanh Hai, 2022). To overcome these challenges, it is crucial to focus on improving labor productivity in garment firms in Nam Dinh province since the labor productivity of garment firms in Vietnam has been found to be quite low in comparison with other countries like China and the Philippines (Nguyen Anh Bac, 2015; Le Thi Thu Huong, 2016). Therefore, this study was conducted to analyze the factors influencing the labor productivity of garment firms, and then to propose solutions for enhancing the labor productivity of garment firms in Nam Dinh province in the near future.

Productivity is a key to maintaining competitiveness at both the organization and country levels, and in ensuring sustainable development. In general, productivity is the relationship between the output (goods and services produced) and the inputs or resources such as labor, materials, machinery, and energy that are used in production (Samuelson & Nordhaus, 2009). Though there are various aspects of productivity, including labor productivity, capital productivity, and total factor productivity, labor productivity is very important because labor is a dominant and active factor used in the production process (Sarwar *et al*., 2021). Labor productivity can be specifically calculated by dividing a measure of output by a measure of labor input. Output refers to a quantity of goods and services produced in a given time period, total revenue (i.e. total value of goods and services produced), or gross value added (i.e. total value of goods and services minus the value of inputs used for producing goods and services). In contrast, labor input can be measured as either the number of employees/workers or the number of worked hours of employees/workers (Phyu, 2023).

Many scholars (Sharp *et al*., 2008; Heshmati & Rashidgalan, 2018; Samargandi, 2018; Tekleselassie *et al*., 2018; Phyu, 2023) have made efforts to identify the determinants of labor productivity at the firm level in various industries. Based on those studies, the determinants of labor productivity at the firm level can be grouped into several categories, namely: (1) basic characteristics of the firms (age, type of firm); (2) managerial capacity of firm owners (age, education, gender, professional expertise); (3) labor force and related factors (number of employees, rate of females, rate of trained employees, wage rate); (4) capital and technology (capital intensity, fixed asset value per laborer, application of technology innovation); and (5) other (government and local policies, public infrastructure, and market openness, etc.). The determinants of labor productivity and their extents in the studies are quite various due to the data available as well as the specific characteristics of different industries and firms in the study countries. Heshmati & Rashidgalan (2018) examined labor productivity and its determinants within the manufacturing sector of Kenya. Using cross-sectional data, they found that factors such as wage rate, education, training, and capital intensity were the key determinants that positively impacted labor productivity. Additionally, the presence of a significant proportion of females in the labor

force was associated with a decline in labor productivity. Samargandi (2018) analyzed the determinants of labor productivity in MENA (Middle Eastern and North American) countries, employing panel data spanning the years 1980 to 2014. The research revealed positive associations between labor productivity and factors such as human capital, financial development, trade openness, and capital stock while there was a negative correlation observed between compensation and labor productivity. Phyu (2023) used data from 172 garment firms in Yangon, Myanmar to determine the factors affecting the labor productivity of garment manufacturing firms. The study concluded that the labor productivity of the garment firms in Myanmar is influenced by various factors, including human capital, management practices, the compensation and rewards structure, the implementation of employee welfare programs, and some external factors such as government regulations and policies, public infrastructure, and the national culture.

In this study, we firstly described the garment industry as a whole as well as basic information of garment firms in Nam Dinh province. Secondly, we examined the effects of the various factors on labor productivity of garment firms using the regression model. Finally, we made some implications for improving the labor productivity of garment firms in Nam Dinh province in the future.

Methodology

Secondary data, which included the development status of the garment industry and the number of enterprises in the garment industry in Nam Dinh province, were collected from the Provincial Statistical Yearbook of Nam Dinh and consolidated reports from the Department of Industry and Trade of Nam Dinh province, as well as from publicly available documents. Primary data, which included the basic situation of the enterprises, labor force, and business production results in the garment industry in Nam Dinh province, were extracted from the Enterprise Survey Data of the General Statistics Office in 2021. This survey was conducted to collect data from all the enterprises and cooperatives in Vietnam based on standard questionnaire sets under the supervision of the General Statistics Office in Vietnam. The details of the survey procedures and questionnaire sets were published in the guidance notes for the 2021 Enterprise Survey (General Statistics Office, 2020). Descriptive statistics and comparative analysis were the main methods used to analyze the labor forces, production, and business situations of the garment firms in the province.

To analyze the factors influencing labor productivity in the garment enterprises in Nam Dinh province, we departed from a standard Cobb-Douglas function production as specified in equation: $Y = AK^{\alpha}L^{\beta}e^{\varepsilon}$ (1)

where Y denotes the production output, A refers to the total factor productivity, K and L represent two basic production inputs, with K being the capital and L being the labor used for production, and ε is known as the error term.

From equation (1), the labor productivity was calculated as follows:

$$LP = \frac{Y}{L} = \frac{AK^{\alpha}L^{\beta}e^{\varepsilon}}{L} \quad (2)$$

Taking the natural logarithm of equation (2), we obtained the following equation:

$$LnLP = LN(\frac{y}{l}) = LnA + \alpha Ln(\frac{K}{L}) + (\beta+\alpha - 1)LnL + \varepsilon \quad (3)$$

Labor productivity can be measured by several ways. Based on the available dataset and empirical model, labor productivity of the garment firms in this paper was measured by the ratio of gross value added and total employees in the firms in Nam Dinh province. The independent variables or predictors for estimating their effects on labor productivity of the garment firms in Nam Dinh province were: labor force (or total number of employees); fixed asset value per laborer; and age, gender, professional level, and nationality of firm owners. Based on the general equation (3), and the model used by Papadogonas & Voulgaris (2005) and Pham & Nguyen (2017) for estimating the determinants of labor productivity, in this study we used the empirical model as follows:

Table 1. Variable definitions and measurements

Variable label	Variable definition and measurement
LP (lnLP)	Labor productivity measured by the gross value added (million VND) divided by the total number of employees in the firm (number of persons)
AFC (LnAFC)	Average fixed cost measured by the total fixed cost (million VND) divided by the total number of employees in the firm (number of persons)
AMC (lnAMC)	Average management cost measured by the total management cost (million VND) divided by the total number of employees in the firm (number of persons)
A_PAY (LnA_PAY)	Average payment measured by the total payment (million VND) divided by the total number of employees in the firm (number of persons)
L	Total number of employees in the firm (number of persons)
FR (LnFR)	Rate of female employees in the firms measured by the ratio of the total number of female employees and total number of employees
AGE (lnAGE)	Age of the firm owner (number of years)
GENDER	Gender of the firm owner: equal to 1 if the firm owner is male, and 0 for otherwise
EDU	Education level of the firm owner: equal to 1 if the firm owner has a college degree or higher education, and 0 for otherwise
NATION	Nationality of the firm owner: equal to 1 if the firm owner is Vietnamese, and 0 for otherwise
EXPORT	Exportation status of the firm: equal to 1 if the firm exports garment products, and 0 for otherwise
INTERNET	Status of internet use in the firm: equal to 1 if the firm uses the internet for e-trade or other business transactions, and 0 for otherwise
SOFTWARE	Status of software use in the firm: equal to 1 if the firm uses specific software for business management, and 0 for otherwise
INNOVATION	Status of innovation in the firm: equal to 1 if the firm has innovative products, business model, or procedures, and 0 for otherwise

$$LnLP_i = \beta_0 + \beta_1 Ln\frac{TFC_i}{L_i} + \beta_2 Ln\frac{TMC_i}{L_i} + \beta_3 Ln\frac{T\_PAY_i}{L_i} + \beta_4 LnL_i + \beta_5 LnFR_i + \beta_6 GENDER_i + \beta_7 EDU_i + \beta_8 NATION_i + \beta_9 EXPORT_i + \beta_{10} INTERNET_i + \beta_{11} SOFTWARE_i + \beta_{12} INOVATION_i + \varepsilon_i \quad (4)$$

Then we had:

$$LnLP_i = \beta_0 + \beta_1 LnAFC_i + \beta_2 LnAMC_i + \beta_3 LnA\_PAY_i + \beta_4 LnL_i + \beta_5 LnFR_i + \beta_6 GENDER_i + \beta_7 EDU_i + \beta_8 NATION_i + \beta_9 EXPORT_i + \beta_{10} INTERNET_i + \beta_{11} SOFTWARE_i + \beta_{12} INOVATION_i + \varepsilon_i \quad (5)$$

where the dependent variable is the natural logarithm of labor productivity. The OLS (Ordinary Least Square) method was used to estimate the coefficients of the model. The variable definitions and measurements are presented in **Table 1**.

There were 206 garment firms in Nam Dinh province in the available survey dataset. However, some firms were very small with a labor force of only 1 to 3 persons, and some firms did not have enough necessary data for analysis and modeling. For better securing the confidence of the model estimation, those firms were excluded from the dataset. Finally, the data of the remaining 151 garment firms in Nam Dinh province were used for model estimation.

Results and Discussion

Overview of the development of the garment industry in Nam Dinh province

During the period of 2015-2020, the business performance of garment firms in Nam Dinh province showed quite impressive growth. The total ready-made garment production of garment firms in the province increased from 221.3 million units in 2015 to 307.6 million units in 2020, achieving an average annual growth rate of 6.81% (**Table 2**). The gross revenue and pre-

Table 2. Business performance of garment firms in Nam Dinh in the 2015-2020 period

Indicator	Unit	2015	2018	2019	2020	Growth rate/year (%)
1. Total quantity of ready-made products	Mil. product	221.3	257.5	273.2	307.6	6.81
2. Total capital of the garment industry	Bil. VND	9,337.7	16,271.5	18,619.9	19,580.4	15.96
3. Gross revenue	Bil. VND	12,999.6	21,305.9	24,336.4	22,908.7	12.00
4. Total income of laborers in the garment industry	Bil. VND	2,522.5	4,534.9	5,013.0	5,508.9	16.91
5. Income per laborer per month	Mil VND	4.41	5.96	6.52	7.22	10.36
6. Pre-tax profit of the garment industry	Bil. VND	666.8	992.5	923.5	1308.6	14.44
7. Production index of the garment industry	%	106.51	120.51	114.79	125.45	21.00

Source: Nam Dinh Statistics Office (2021)

tax profit of garment firms also increased at relatively high rates, reaching 12.0% and 14.4% per year, respectively. The average income of laborers in the garment firms increased by 10.36% per year during the period of 2015-2020, reaching 7.22 million VND/person/month in 2020. This income level was higher than the average income of laborers working in enterprises in the province (7.07 million VND/person/month).

Basic information of garment firms in Nam Dinh province

Garment firms were distributed across all ten districts in the province, with a significant concentration in Nam Dinh City (37.5%), Y Yen district (18.6%), Giao Thuy district (7.4%), and Vu Ban district (6.8%). The data of the 151 garment firms showed that the predominant types of firms were private limited liability companies, state-owned joint-stock companies with less than 50% state capital (making up 53.6%), joint-stock companies without state capital (23.2%), and 100% foreign-owned enterprises (18.5%). The statistical results indicated that 83.4% of the firm owners were Vietnamese, and the remaining were Korean, Chinese, Japanese, and Taiwanese nationalities. The majority of firm owners were male, constituting 80.17% of the total. In terms of professional level, 75.5% of firm owners completed college or university or had some form of higher education. The rate of firms that exported their garment products accounted for 35.8% (**Table 3**).

Table 3. Basic information of the garment firms in Nam Dinh province

Variable label	Mean	Std. Dev.	Min	MAX
LP	102.292	48.7	13.8	278.2
AFC	477.017	754.7	8.6	4710.1
AMC	28.349	29.7	0.2	171.8
A_PAY	68.584	30.1	11.5	176.7
L	401.267	1162.0	4.0	10821.0
FR	0.764	0.1	0.2	1.0
AGE	47.272	9.5	30.0	76.0
GENDER	0.801	0.4	0.0	1.0
EDU	0.755	0.4	0.0	1.0
NATION	0.834	0.4	0.0	1.0
EXPORT	0.358	0.5	0.0	1.0
INTERNET	0.695	0.5	0.0	1.0
SOFTWARE	0.444	0.5	0.0	1.0
INNOVATION	0.264	0.4	0.0	1.0

In recent years, many garment firms in Nam Dinh have applied advanced technologies in production, marketing, and management. The firms that used the internet for e-public services, e-commerce, product marketing, and e-payment accounted for 35.8%, while 44.4% of the firms used specific software for business management. However, the firms' investments for using and maintaining specific software were still quite small as 66.7% of the firms invested less than 25 million VND per year on software. The survey data also showed that the rate of firms having innovative activities in production or management made up 26.4% of the total.

The average number of employees in the garment firms in Nam Dinh was 401 persons per firm. However, the numbers were quite varied among the firms with a range between 4 and 10,821 persons (Song Hong Garment Join-Stock Company). The firms with fewer than 30 employees accounted for 39.07%, between 30-100 employees was 21.2%, between 100-500 employees was 23.2%, between 500-1000 employees was 7.3%, and over 1000 persons was 9.3%. The rate of female employees in the firms accounted for the majority with an average of 76.4%.

The fixed cost per employee was 477.0 million VND on average while the business management cost per employee was 28.3 million VND. The average total payment for one employee in the firms was 68.6 million per year, but ranged from 11.5 to 176.7 million VND. The labor productivity of the garment firms was 102.3 million per person per year, and was also various among the firms (between 13.8 and 278.2 million VND).

Determinants of labor productivity of the garment firms in Nam Dinh province

The OLS regression model was used for identifying the factors affecting the labor productivity of the garment firms in Nam Dinh province. The results of the model are presented in **Table 4**. The value of F (41.26) and the Prob > F from the regression confirmed the statistical significance of the model (at the 0.001 level). The adjusted R-squared value of 0.7772 means the high goodness of fit of the regression model, or, in other words, the input variables in the model could explain 77.72% of the labor productivity, and the remaining of 22.28% could be affected by other factors.

Table 4. Estimated effects of factors on the labor productivity of the garment firms

Variables	Coef.	Sta. Err	t	*P* > |t|
Constant	1.01580 **	0.501643	2.02	0.045
Ln(AFC)	0.06506 ***	0.019397	3.35	0.001
Ln(AMC)	0.23218 ***	0.021916	10.59	0.000
Ln(A_PAY)	0.59454 ***	0.044683	13.31	0.000
Ln(L)	0.02012	0.015424	1.30	0.194
Ln(FR)	-0.00161	0.091950	-0.02	0.986
Ln(AGE)	-0.04862	0.114015	-0.43	0.670
GENDER	0.02834	0.054849	0.52	0.606
EDU	0.10365 *	0.055433	1.87	0.064
NATION	-0.05180	0.067633	-0.77	0.445
EXPORT	0.07865 *	0.043683	1.80	0.074
INTERNET	0.09942*	0.050614	1.96	0.052
SOFTWARE	-0.07896	-0.052499	1.50	0.135
INNOVATION	-0.01358	0.050105	-0.27	0.787
No. of Observation			151	
F(13, 137)			41.25	
Prob > F			0.0000	
R-Squared			0.7965	
Adjusted R-Squared			0.7772	

*Note: * Sig at 90%, ** Sig at 95%, *** Sig at 99%*

It was hypothesized that the fixed asset value per laborer likely has a positive impact on labor productivity since labor productivity tends to improve when a firm invests more in physical capital. In this study, the fixed asset value per laborer was also found to have a positive impact on labor productivity with the coefficient of 0.065 (a statistical significance of 99%), implying that the labor productivity will rise by 0.065% if the value of the fixed asset per labor in the firm increases by 1%. This positive effect is consistent with the studies by Papadogonas & Voulgaris (2005), Firouz *et al*. (2011), and Pham & Nguyen (2017).

Management practices play a vital role in explaining differences in business performance (Bloom *et al.*, 2014). Better management practices could help to increase labor productivity. In this study, the business management cost per laborer was considered as one of the factors affecting labor productivity in the empirical model. The estimated results showed that the business management costs per laborer had a positive impact on the labor productivity of the garment firms in Nam Dinh province at the statistical significance of 99%. If the average business management cost per laborer increases by 1%, the labor productivity of the garment firms in Nam Dinh will rise by 0.232%. This finding is also consistent with the study results of Hjort *et al.* (2022).

The average payment for employees (or average wage) is one of the important determinants of labor productivity. Many studies have shown that higher than average payments could result in higher labor productivity (Firouz, 2010; Arranz-Aperte, 2014; Pham & Nguyen, 2017; Ahn *et al*., 2023). Similar to those studies, the results of the regression model in this study also confirmed the positive correlation between the average payment and the labor productivity of the garment firms in Nam Dinh province. The coefficient of 0.595 means that if the average payment increases by 1%, the labor productivity of the garment firms will be improved by 0.595% at the statistical significance of 99%.

The relationship between the number of employees in the firms or the firm size in terms of employed laborers and labor productivity has been investigated by many scholars around the world such as Muwanga (2017), Aleksandra & Magdalena (2019), Vo *et al.* (2021), and Ahn (2023). However, the results from those studies were various. The findings from Muwanga (2017) and Ahn (2023) showed a positive relationship between firm size and labor productivity. On the contrary, Taymaz (2005) and Vo *et al*. (2017) revealed a negative effect of the firm size on labor productivity at the firm level. In this study, the firm size was found to have no statistically significant effect on labor productivity. The model results also revealed that the female rate in the garment firm did not significantly affect productivity. This is possibly because there were not many differences in the female employee rate among the garment firms.

The management capacity of firm leaders can possibly have impacts on firm performance as well as on labor productivity (Aleksandra & Magdalena, 2019; Vo *et al*., 2021; Hjoirt *et al*., 2022). In this study, age, gender, and professional degree of firm leaders were proxy variables reflecting the management capacity. Previous studies have provided support for positive effects of the firm leader's educational level on firm performance (Cheng *et al*., 2010; Darmadi, 2013). In this study, it was found that the education level was one of the factors positively affecting the labor productivity of the garment firms in Nam Dinh province at a statistical significance of 90%. This means that the firms with leaders having a college degree and higher education tended to have higher labor productivity. This could be explained by the fact that higher educated leaders/CEOs were more open to change and more likely to seek new opportunities, and were more aggressive in applying advanced technologies into practice, thus resulting in higher labor productivity. However, the impacts of the garment firm leaders' gender and age on labor productivity were not statistically significant. These are similar findings to the study of Vo *et al*. (2021). The nationality of the firm owner was also found to have no clear effects on the labor productivity of the garment firms in Nam Dinh province.

Considering the firm's export status, we found it to have a positive and significant impact

on the labor productivity in the garment firms in the province. This means that the exporting garment firms had higher productivity than the non-exporting firms. A similar conclusion was also reported in the study by Aleksandra & Magdalena (2019). The firms using the internet for e-trade and other business transactions were also found to have higher labor productivity at a statistical significance level of 90%. However, there was not a significant impact between software use or innovation status and labor productivity in the firm. This was probably because the investments for software use and for innovation in the firms were still quite small as mentioned above.

Conclusions and Implications

This study investigated the multifaceted landscape of labor productivity within the garment firms of Nam Dinh province, Vietnam. Labor productivity, a critical factor shaping the competitiveness and operational efficiency of firms, is particularly pertinent in the context of the garment industry facing challenges from the Fourth Industrial Revolution and globalization. The research identified various determinants of labor productivity, encompassing factors such as the fixed asset value per laborer, business management costs, average payment for employees, firm size, educational level of firm leaders, export status, and utilization of internet resources.

The findings underscored the positive impact of investing in fixed assets and sound business management practices on labor productivity. Higher than average payments to employees also correlated positively with enhanced productivity, aligning with existing literature on the subject. Business management costs per laborer and the management capacity of firm leaders also had positive impacts on the labor productivity of the garment firms in Nam Dinh province. Moreover, the research highlighted the positive influences of exporting activities and the utilization of internet resources on labor productivity, showcasing the importance of global market participation and technological integration. Interestingly, the study revealed that firm size, gender composition, and age of firm leaders do not significantly influence labor productivity, emphasizing the complexity and industry-specific nuances of these relationships.

Based on the insights gained from the study on labor productivity within Nam Dinh province's garment firms, several strategic suggestions can be proposed to enhance operational efficiency and competitiveness. These implications include investment in fixed assets and technology, implementation of efficient management strategies, provisions of competitive compensation packages, global markets engagement, integration of internet resources into their operations, continuous innovation, and providing educational support and training opportunities for leadership in the firms. However, the application of these strategic suggestions should be based on specific conditions of the garment firms for high efficiency.

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