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Impact of technology on structural change of labor in the manufacturing and processing industry of Vietnam

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ABSTRACT

This study examines the effects of technological advancements on changes in the labor structure within Vietnam's manufacturing and processing industries. The study utilizes a panel dataset that combines each year's enterprise census data from 2012 to 2018 with the enterprise statistics of technology data provided by the Vietnam General Statistics Office throughout the same timeframe. This study highlighted four key aspects that contribute to technology-related challenges. These factors include external technology purchasing, research and development activities, absorbability of technology, and the influence of Foreign Direct Investment firms. The study tested the endogeneity in the model, overcame the defects of the model, and selected the fixed effect model to assess the four factors affecting labor structural change. The Lilien index is used to measure the level of structural change in labor in the manufacturing and processing industries of Vietnam. The results show that external technology acquisition and R&D activities had a positive effect on the Lilien index. Moreover, compelling data indicates that the location of technology acquisition has a contrasting influence on labour structural change, with varying effects observed in enterprises that employ high versus low levels of technology. The findings will serve as a significant indicator for governmental entities and management in formulating policies aimed at enhancing the overall efficiency of firms and facilitating labour restructuring initiatives.

Contribution/Originality: This study is the first to examine the effects of technological advancements on change in the labor structure within Vietnam's manufacturing and processing industries using a dataset of six years from 2012 to 2018 provided by the Vietnam General Statistics Office.

1. INTRODUCTION

The industrial sector has historically been a significant driver of economic growth in many countries. The major technical advancements that occurred in Britain during the latter part of the 18th century left a profound impact on both current and subsequent observers. Britain emerged as the pioneering nation in the process of industrialization, afterward establishing itself as the foremost technical forerunner within the global economy. Manufacturing became the main engine of accelerating economic growth in the nineteenth century in the United States; its followers were European countries such as Germany, Switzerland, and France. Asia countries such as Japan in the mid-twentieth century or the miraculous development of newly industrialized countries in the second half of the twentieth century (Hoang, Do, & Trinh, 2021; Naudé & Szirmai, 2012). The growth model mainly based

on increasing investment capital and using cheap labor and non-renewable natural resources is no longer appropriate in the context of the modern scientific and technological revolution. A new growth model based on science and technology, excellent human resources, and knowledge development must be created in order for it to make sense in the given context. The advent of technology has resulted in enduring advancements in labor productivity growth, thus leading to significant transformations in the composition of the labor force (Maddison, 2001).

Enterprises can access technology from internal sources through R&D activities and from external sources through technology transfer, technical licensing agreements, or the import of means of production (Tambunan, 2009). Due to high risks, high costs, and limited time (Bach, Ly Dai, Nguyen, & Le, 2022), enterprises cannot afford to develop or create all necessary strategic technologies through in-house R&D activities (Whangthomkum, Igel, & Speece, 2006). Meanwhile, technology can be purchased from domestic enterprises, universities, or foreign enterprises, which could help businesses avoid incurring costs and risks associated with domestic development (Jones & Jain, 2002). In addition, it addresses customer requests for timely and better services in order to enhance product complexity and maintain competitive advantage in the context of increasing competitive pressure (Jagoda, Maheshwari, & Lonseth, 2010).

In the current trend of international economic integration, the technology factor market has been formed to meet the technology supply and demand of countries. For developed countries with industrial economies playing a dominant role since the beginning of the 20th century, technology has become the biggest contributor to economic growth and development. Therefore, the current concern of these countries is to promote research and development (R&D) activities to innovate and improve technology levels towards technologies that save resources and protect the environment. These countries will find ways to transfer outdated and uncompetitive technologies to less developed countries in order to innovate in production technology.

In Vietnam, there are not many related studies, especially quantitative studies, to assess the impact of technological factors on labor restructuring. This study aims to assess the impact of technology on labor restructuring in Vietnam's manufacturing and processing industries, clarifying technology trends that promote positive restructuring in the coming ears. From there, understand and grasp the impact mechanism of technology factors to make scientific-based policy suggestions on technology to promote labor restructuring, increase labor productivity, and increase economic growth.

2. LITERATURE REVIEW

2.1. The Relationship between Technology and Business Performance

A number of studies suggest that technology has a positive impact on business performance. Technology has emerged as a major activity in many developing countries, and business performance has changed fundamentally (Naudé & Szirmai, 2012). According to Sun, Yu, Wang, and Fang (2023), external technology acquisition is frequently adopted as a strategy to facilitate technology innovation and enhance firm performance. Zahra (1996) has also shown that external technology acquisition is positively related to firm performance. In addition, research by Han and Lee (2013) has demonstrated the positive impact of technology acquisitions on the market value of companies. On the contrary, studies suggest that technology acquisition has a negative impact on business performance. Specifically, Jones, Lanctot Jr, and Teegen (2001) found that technology acquisition has a negative impact on product development, market, and corporate finance, but internal resources have a complementary effect on technology purchasing, thereby increasing the enterprise's product productivity.

Kang, Jo, and Kang (2015) argue that technology acquisition has an inverse U-shaped relationship with technology innovation performance and does not complement internal R&D. While research by Hung and Chou (2013) indicates that external technology acquisition is positively related to firm performance under high internal R&D investment. Williamson (1975) points out the role of external technology acquisition on innovation activities

and firm performance, whether it is positive or negative, and that purchasing that technology can also be a supplement or a substitute for internal R&D activities.

The aforementioned studies demonstrate that the fundamental components of technology encompass the technology obtained or products derived through research and development endeavours. The acquisition of technology and investment in research and development (R&D) can have both complimentary and alternative impacts, which can either enhance or diminish the effectiveness of technology's influence on corporate performance.

2.2. The Impact of Technology on Labor Restructuring by Industry

In terms of demand, many studies believe that it is science and technology that directly affect labor demand, leading to labor movement between sectors of the economy. A study by Acemoglu and Restrepo (2018) in the auto manufacturing industry shows that new automation technologies led to a change in market structure, which may impact the demand for labor both directly and indirectly. Pabst Jr (1943) shows that labor restructuring is one of the causes leading to structural changes and changes in labor productivity in the industry as well as the economy as a whole. This is explained by the emergence of new or improved industries and fields and the technological innovation of enterprises, which will create new jobs and absorb a reduced share of labor in out-dated industries and fields. Fourastie (1949) argues that it is technological progress that directly affects labor requirements and real per capita income (Krüger, 2008). A study by Galor and Stark (1991) indicates that qualified workers will move from industries with lower technology to industries with more advanced technology. Industries with high productivity growth and technological progress will attract more workers than industries with low technology and productivity growth. In addition, Charles, Hurst, and Notowidigdo (2013) and Jaimovich and Siu (2012) added that technological progress has led to a steady decline in jobs in manufacturing and has led to some industries disappearing from the labor market.

There have recently been a number of case studies with the aim of assessing the factors affecting labor restructuring in Vietnam, such as research by Vu (2017) and Phi (2014). Vu (2017) used the enterprise survey data set to estimate the evaluation model of factors affecting labor restructuring within the manufacturing industry; however, the study has not evaluated the role of technology. The study of Phi (2014) is based on an analysis of the overview research and the current situation in the study area. The research findings point out 5 factors that affect the trend of labor restructuring: economic growth rate, economic restructuring, labor productivity, professional and technical qualifications, population factors, and international integration factors.

Most of the studies show technology will create change in labor in industries, from the agriculture sector to the industry and services sectors; from agriculture and industry sectors to service sectors at a higher stage of development; or from low-tech to high-tech industries. However, the mechanism leading to this transition is approached differently. Specifically, the technological factor can cause the emergence of new industries or the technology that helps to expand the production scale. Increasing the demand for labor will lead to the trend of labor shifting to these industries. Despite that, research on the impact of technology on changes in labor structure remains scarce.

3. THEORETICAL FRAMEWORK AND RESEARCH METHODS

3.1. Theoretical Framework

3.1.1. Theory of Technology and Factors Affecting the Ability of Enterprises to Absorb Technology

Technological innovation has long received the attention of many economists with different approaches. Investments in and the adoption of particular technologies can enable innovations, either by improving processes or by enabling the firm to offer new products or services to its customers (Koellinger, 2008). Studies have shown factors affecting the ability of enterprises to adopt technology, such as economic incentives when applying new technologies, enterprise size, R&D activities, market share and structure of the market, and type of enterprises

ownership (Griliches, 1957). Parcharidis and Varsakelis (2007) state that R&D activities and the implementation of technologies are used in order to provide differentiation that can yield a competitive advantage and lead time over rivals. In addition, there are a number of factors that hinder enterprises' ability to access new technology, such as financial difficulties or import barriers.

In addition, Watanabe, Zhu, Griffy-Brown, and Asgari (2001) suggested that evaluation of the impact of technological factors can be influenced by two elements: (i) absorption capacity, which represents the ability of a business to absorb technology from other enterprises; and (ii) assimilation capacity, which represents the ability of enterprises to understand and use the technology absorbed from other enterprises. These factors are often influenced by education level, regional innovation, economic development and financial markets, the quality of human resources, and the technological gap (Cohen & Levinthal, 1989). This is why the group of variables that interact between technology and technology absorptive capacity was chosen to be included in the research model.

Additionally, a company's R&D activities may have an impact on the influence of technological factors. Research by Sharma (2012) indicates that the performance of foreign firms operating in the industry is more sensitive to R&D activities than that of local firms, which means that foreign firms are more affected by R&D activities. Research by Kang et al. (2015) indicates that internal R&D activities have a negative impact on the acquisition of external technology by enterprises. In contrast, Tsai and Wang (2008) conclude that the positive impact of technology increases with the level of R&D efforts of enterprises. In the same opinion, research by Ceccagnoli and Higgins (2008) suggests that external technology acquisition is an additional strategy for companies to improve the efficiency of their R&D activities.

3.1.2. Measuring Technological Change and Labor Restructuring

3.1.2.1. Measuring Technological Change

Studies show that technological change can be understood in two different ways. First, many studies suggest that technological change is the ability to produce more products with the same amount of input. Changes in the quantity and caliber of inputs cannot account for the Total Factor Productivity (TFP) composite factor productivity, which measures this type of technology. Second, technology can be understood as machines and equipment for the production process. To measure this type of technology, the study introduces the technology acquisition variable and the firm's R&D activity. According to Capon and Glazer (1987), a firm's technology acquisition is the total value of technology acquired from other firms. Therefore, the total expenditure on technology acquisition is defined as either technology demand or technology acquisition in this study. Furthermore, businesses can acquire technology from other businesses, research centers, and universities. The study focuses on the second measurement method to avoid the limitations of the TFP measurement method.

3.1.2.2. Labor Restructuring Index – Lilien Index

The Lilien Index measures the relative standard deviation of regional employment growth relative to overall regional growth. However, this study focuses on the change in labor structure across sub-sectors in Vietnam's manufacturing industry, so the Lilien index represents the degree of change from employment growth in sub-sectors to the manufacturing industry.

3.2. Research Methods

3.2.1. Labor Restructuring Model with Dynamic Array Data

Usually, for the array data regression model, studies conduct Hausman tests to determine whether the regression model is a fixed effect model or an explanatory model and whether there is a random error, from which the author chooses to use the fixed effect model or the random effect model. However, these models have not yet expressed the idea that current labor restructuring can be affected by past labor restructuring. Modeling this idea is

very important in policymaking because a policy decision related to labor restructuring in this period may affect labor restructuring in a later period. The question is, how much of an impact is that? This can only be answered through the dynamic array data model.

Therefore, the study proposes the following model:

$$Y_{it} = \delta Y_{i,t\_1} + (\alpha + u_i) + X'_{it}\beta + v_{it} \quad (1)$$

Equation 1 presents the intra-industry labor restructuring in province i at time t. In which, δ is a scalar and $Y_{i,t-1}$ is the lagged variable of the variable measuring intra-industry labor restructuring.

3.2.2. Research Models

Based on the research of Van Reenen (1997), which aimed to explain the role of technological factors on labor demand, the study shows that it is necessary to include the lagged variable of labor change, or structural change of labor, into the model due to the change in adjusted costs in the net change in employment. In addition, technological change is a dynamic and lasting process. That is, the number of a firm's past patents is used as a tool for current innovations. In this view, past patenting activity should not be a determinant of current employment but should have an effect on current ability to innovate technology. Finally, due to the existence of an endogeneity problem since the lagged dependent variable is correlated with random error. Besides, the theoretical framework also shows that the impact of technology factors can be influenced by factors such as technology absorption and assimilation ability.

Therefore, a specific model to assess the impact of technology factors on labor restructuring in Vietnam's manufacturing and processing industries is proposed as follows:

$$LI_{it} = \delta LI_{i,t\_1} + \alpha_0 + \alpha_1 BT_{it} + \alpha_2 TP_{it} + \alpha_3 SP_{it} + \alpha_4 AT_{it} + \alpha_5 RD_{it} + \alpha_6 Contr_{it} + c_{it} + u_{it} \quad (2)$$

Equation 2 presents the level of intra-industry labor restructuring in province i at time t. In which:

- IJT is the i^{th} industry in province j at time t.
- LI_{it}: The Lilien index measures the level of intra-industry labor restructuring in the manufacturing and processing technology industry in Vietnam.
- $LI_{i,t-1}$: is the lagged variable of the variable LI_{it}
- *BT*: The value of technology acquisition of the industry is measured by the value of technology investment, taking the natural logarithm.
- *TP*: Total patents of the enterprise.
- *SP*: is the vector representing the variables specific to the industry or the province.
- *AT* include: *devctr* variable (import technology from developed countries); variables representing domestic technology purchases include purchases from state-owned enterprises (*SO*), FDI enterprises (*FDI*) and joint stock enterprises (*JS*).
- *RD* The dummy variable takes on a value of 1 if the firm does R&D and 0 otherwise.
- *Contr*: is the vector representing the control variables.
- $c_{it}+u_{it}$: measurement error - is assumed to have an independent distribution. To overcome the deviation When regressing cross-sectional data, the author uses the array data regression method.

Model (2) has a lagged dependent variable, which gives rise to the problem of endogeneity. For processing, the study uses systematic Generalized Method of Moments (GMM) estimation. In particular, model 2 will be used for the general processing and manufacturing industry (model 2a), the processing and manufacturing industry using high technology (model 2b), the processing and manufacturing industry using moderate technology (model 2b), and the processing and manufacturing industry using low technology (model 2c).

3.3. Data

The empirical model is based on the annual enterprise survey data set by General Statistics Office of Vietnam (GSO) and the survey data on technology use in production of enterprises in the manufacturing industry in the period 2012-2018, adjusted for inflation.

Besides, based on the technology classification table from the United Nations Statistics Division (UNSTATS), the UN of the OECD (Organisation for Economic Cooperation) has classified the industries in the manufacturing industry into 2 groups: high-tech industries (sectors 23, 26 to 36) and low-tech industries (sectors 15 to 22). Specifically, the study uses an array dataset including 2,667 businesses over a 7-year period from 2012 to 2018 (with 9,415 observations). In addition, the study also uses some provincial data, such as the provincial competitiveness index (PCI).

4. RESEARCH RESULTS AND DISCUSSION

The results of the model fit test from Table 1 and Table 2 are as follows: the presence of first-order correlation is accepted, while second-order autocorrelation is not accepted. Besides, the reasonableness of the tools used was tested by Hansen-J with the p-value in the models always greater than 10%. Therefore, the estimated models presented in Tables 1 and 2 are valid.

The systematic GMM model's (SGMM) estimation results show that most of the estimated coefficients of the variables are in line with what was expected and have statistical significance at the 1% and 5% significance levels. As follows:

4.1. Lagged Variable of Coefficient LI

The fact that the coefficient of the lagged variable of the dependent variable LI is positive and has a high level of statistical significance, with the exception of the model (2b) results, demonstrates that labor restructuring in the previous period will continue to promote labor restructuring in the following period.

Table 1. Regression results on the impact of technology on labor restructuring.

Variable	Manufacturing and processing' industry	Manufacturing and processing' industry use high technology	Manufacturing and processing' industry use average technology	Manufacturing and processing' industry use low technology
	2a model	2b model	2c model	2d model
Lagged variable of LI				
L.LI	0.338* (0.188)	0.435*** (0.09)	0.772*** (0.07)	0.596*** (0.14)
1. Technological variables				
BT	0.097* (0.050)	0.049* (0.03)	-0.029** (0.01)	0.090** (0.04)
TP	-0.003 (0.011)	-0.014*** (0.01)	-0.029 (0.02)	-0.002 (0.02)
2. Sector/province-specific variables and policy variables				
AVIC	3.093* (1.633)	-0.397 (1.68)	1.131 (1.35)	0.120 (1.04)
AVIC2	-1.776* (0.961)	0.792 (1.49)	-0.662 (1.06)	-0.056 (0.49)
Trd	0.033 (0.158)	-0.142 (0.12)	0.001 (0.10)	0.121* (0.06)
Size	0.160 (0.219)	-0.117 (0.09)	0.039 (0.12)	-0.119 (0.10)
Avcap	0.031 (0.244)	0.213 (0.14)	-0.275*** (0.09)	0.138 (0.16)
PCI	0.264** (0.125)	0.191** (0.09)	0.066 (0.09)	0.227** (0.09)

Note: ***, ** and * represent significant regression at the 1%, 5% and 10% levels, respectively.

4.2. Technological Factors of Enterprises

- $LI_{i,t-1}$: is the lagged variable of the variable *LI*.
- *BT:* The value of technology acquisition of the industry is measured by the value of technology investment, taking the natural logarithm.
- *TP:* Total patents of the enterprise.
- *Trd:* Measure by the total value of imports and exports over the total value of goods, taking the natural logarithm.
- *AVIC:* This variable is the difference in the average income of labor between the secondary industries in the manufacturing and processing industries, which is measured by the ratio between the standard deviation of the average income of the sub-sector i compared with the major industry j, and the level of average income of workers in a large industry j.
- *AVIC2:* Square of the variable AVIC (average income of labor).
- *Avcap:* Express the capital intensity as measured by the natural logarithm of capital per worker (KL).
- *Size:* Express the size of the industry as measured by total industry labor and taking the natural logarithm.
- *PCI:* Provincial Competitiveness Index.

Table 2. Regression results on the impact of technology interaction variables on labor restructuring.

Variable	Manufacturing and processing' industry	Manufacturing and processing' industry use high technology	Manufacturing and processing' industry use average technology	Manufacturing and processing' industry use low technology
	2a model	2b model	2c model	2d model
1. The group of interactive variables represents the origin of technology				
BTsx_ptr	-0.426 (0.831)	0.897* (0.51)	0.064 (0.38)	-1.723*** (0.57)
BTtt_ptr	-5.814 (6.571)	7.683 (7.53)	-7.6527* (4.20)	1.838 (3.61)
BTsx_VN	15.765 (15.261)	27.593 (20.97)	-9.816 (31.31)	5.476 (9.46)
BTtt_VN	2.560 (25.020)	-11.690 (32.95)	13.447 (29.63)	-4.034 (9.75)
BT_PT	1.791** (0.897)	1.337* (0.83)	-0.509 (0.39)	1.123* (0.58)
BT_CPT	-2.125*** (0.766)	-0.404 (0.49)	-0.416 (0.32)	-1.271** (0.51)
2. Interaction variable between technology acquisitionvalue and control variables				
BT_RD	0.869* (0.538)	0.389* (0.21)	-0.119 (0.21)	-0.223 (0.32)
BT_FDI	-1.254 (1.086)	1.466** (0.60)	-0.152 (0.45)	-0.447 (0.81)
Constant	-14.201*** (5.212)	-3.646 (3.06)	-3.323 (2.73)	-5.006* (2.66)
Number of observations	1.427	419	287	725
Number of industry	625	156	136	333
GMM	YES	YES	YES	YES
Number of tools	124			
AR1 (p-value)	0.000	0.000	0.003	0.001
AR2 (p-value)	0.316	0.544	0.181	0.427
Hansen-J test (p-value)	0.134	0.488	0.498	0.664

Note: ***, ** and * represent significant regression at the 1%, 5% and 10% levels, respectively.

- *sx_ptr:* Dummy variable takes the value 1 if machinery and equipment are imported from developed countries and 0 otherwise.
- *tt_ptr:* Dummy variable takes the value 1 if advanced communication technology is imported from developed countries and 0 otherwise.
- *sx_VN:* Dummy variable takes the value of 1 if machinery and equipment are purchased from a Vietnamese enterprise and 0 otherwise.
- tt_VN: Dummy variable takes the value of 1 if advanced communication technology is purchased from a Vietnamese enterprise and 0 otherwise.
- *PT:* Dummy variable takes a value of 1 if the production technology is advanced and modern and 0 otherwise.
- *CPT:* Dummy variable takes a value of 1 if the communication technology is advanced and modern and 0 otherwise.

The coefficients of the technology acquisition variable (BT) are statistically significant in all 3 models, but the coefficients in the models (2a) and (2b) have a positive effect, while the model (2c) has a negative sign. There is a clear difference in the impact of technology acquisition on labor restructuring in the manufacturing and processing industries in the groups of high-tech enterprises and low-tech enterprises, with the acceleration of the shift in the high-tech industrial group and vice versa in the low-tech industrial group. This is completely consistent with the theory of labor restructuring of Fourastie (1949), when it is said that the impact of technology will attract labor to the high-tech industry rather than the low-tech industry.

In contrast, the variable number of patents (TP), representing the R&D activities of the enterprise, has a negative estimator in two models (2a and 2b). This makes perfect sense given the fact that R&D activities at enterprises in the manufacturing and processing industries in Vietnam have not yet developed. The number of patents is very low, the rate of R&D activities is only about 50%, and the ability to transfer technology from R&D activities is also very low (only about 1%).

4.3. Group of Variables Showing the Ability to Absorb Technology

The first group of absorptive variables is a group of variables, with the interaction variables being dummy variables to show where to buy technology from, including buying from developed countries (BTsx_ptr), buying domestically, and buying from different types of businesses, including state-owned enterprises (BT_SOEP), joint stock enterprises (BT_JS), and FDI enterprises (BT_FDI). From the estimated results, it is shown that technology acquisition from FDI enterprises and from developed countries has the effect of promoting the transformation of labor structure within the industry, while buying from domestic joint stock enterprises inhibits the process of labor restructuring. In fact, while developed countries continuously innovate technology, promote R&D activities, and have a need to transfer outdated technology, developing countries, with the goal of "taking a shortcut" in technology, reuse technology from developed countries. As a result, the technology supply of developed countries can meet the technology demand of developing countries, including Vietnam. In contrast, statistics show that the technology of domestic joint-stock and private enterprises only meets a very small part of the technology needs of other enterprises—only about 1.5% of the enterprises. Businesses care about the technology needs of other businesses, so acquiring technology from these businesses does not accelerate the transition.

The second group of absorptive variables is a group of variables, with the interacting variables being dummy variables representing the type of technology that enterprises purchase, including advanced production technology (BT_PT) and advanced communication technology (BT_CPT). The estimated coefficients of the variables in all three models are negative; that is, the more modern the technologies purchased by enterprises, the less they will promote labor restructuring. Due to the low level of labor in Vietnam, it takes time to learn, comprehend, and be

proficient with this kind of technology. Therefore, the results will make the process of changing the labor structure within the industry take place more slowly.

The BT_RD variable has a positive coefficient, showing that the additional R&D activity for technology acquisition by the enterprise increases the efficiency of technology use, thereby having a positive impact on intra-industry labor restructuring. This result further confirms the findings of Nguyen, Dang, and Phung (2018) when they state that " the technological inventions of enterprises in the manufacturing and processing industries in Vietnam are complementary to the demand for enterprise technology".

4.4. Group of Control Variables for the Type of FDI Enterprises

The estimated results show that technology acquisition or R&D activities, if carried out by FDI enterprises, will promote the transformation of labor structures within the manufacturing industry, in which the impact of technology acquisition far outweighs the impact of R&D activities. This shows the increasingly important role of FDI enterprises in economic growth in general and labor restructuring in particular in Vietnam.

Statistics show that the amount of investment capital dedicated to technology acquisition by FDI enterprises in the processing and manufacturing industries has continuously increased over the years (with an average growth rate of 36.5% per year), especially in 2018. In 2018, the value of technology acquisitions by FDI enterprises increased by more than 40% compared to 2017. Besides, the number of patents, although accounting for a low proportion, has begun to increase rapidly since 2016.

Especially in model (2c), which looked at how technology affects the reorganization of low-tech businesses, most of which are in the textile, footwear, and food industries, the estimated coefficient of the variable BT_FDI is positive and has a high statistical significance. In the period from 2012-2015, the amount of investment capital for technology by FDI enterprises increased by an average of 22.5% per year, but in 2016, this value increased rapidly (more than 2.5 times) compared to 2015 and continued to increase steadily in the following period.

This shows that the goal of FDI enterprises is to focus on low-tech industries that take advantage of Vietnam's labor resources, thereby increasing business efficiency and creating motivation to promote labor restructuring within this industry group.

4.5. Group of Enterprise-Specific Variables

The coefficient of the variable LC, the average income of labor, has a positive sign and is statistically significant in the model (2b). This indicates that the increase in income is an attraction for labor to move to industries that bring higher income and, in this case, will promote labor restructuring for the high-tech enterprises group.

In addition, the coefficient of the variable Voncn showing the level of workers by province has a positive sign, indicating that the locality with a better educational environment and a high rate of vocational training will promote labor restructuring.

The coefficient of the PCI variable has a negative sign, showing that the current policies of the province are not aimed at promoting labor restructuring in the manufacturing and processing industries in Vietnam.

5. CONCLUSION

The study's results indicate that the acquisition of external technology has a beneficial effect on labor restructuring within the business. The labor restructuring process for low-tech industry groups is adversely affected by the acquisition of external technology from developed countries due to their reliance on outdated machinery and technology. Consequently, the promotion of technological change in the labor restructuring process becomes unattainable. Furthermore, it is seldom for firms operating in the processing and manufacturing industries to engage in research and development (R&D) endeavors.

The study states that the impact of external technology acquisition on intra-industry labor restructuring is influenced by enterprises ability to absorb technological factors. If Vietnamese enterprises purchase machinery and technology, including advanced production and communication technology, it will inhibit the process of restructuring the labor structure within the industry, whereas if they purchase it from domestic private sector, it will have the opposite result.

Another finding indicated that the purchase of additional technology for the enterprise's R&D activities will promote the process of internal labor restructuring. In addition, the efficiency brought by technology acquisition and R&D activities of FDI (foreign direct investment) enterprises is shown in the study.

In order to address these challenges, it is imperative for the government to provide a comprehensive education and training infrastructure that effectively generates skilled individuals capable of fulfilling the labor demands of various firms. Simultaneously, it is imperative for organizations to have policies that foster and facilitate an environment wherein people are motivated and provided with opportunities to enhance their skill sets during their tenure. Furthermore, the selection of technology that a firm should acquire must be carefully evaluated in accordance with the unique circumstances of each individual organization. In conclusion, it is imperative for the government to formulate laws that incentivize foreign direct investment (FDI) firms to use their substantial capital resources in order to foster research and development (R&D) endeavors. This strategic approach is expected to yield positive outcomes in terms of enhancing overall company performance and facilitating labor restructuring initiatives, specifically.

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