Factors influencing the participation of Vietnamese enterprises in global value chains: insights from automobile production and assembly, electronics and textile industries

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Abstract
This study aims to examine factors influencing global value chain position of enterprises from main industry sectors of Vietnam. In order to attain such objectives, the panel data analysis was conducted based on 208 observations from 52 enterprises in the automobile production and assembly, electronics and textile industries during the 2016 to 2020 period. The multiple linear regression model is utilized to analyse the factors influencing the participation of such industry sectors in the global value chain. The results indicate that technological capability has the most significant positive influence on the participation of Vietnamese enterprises in the global value chain, followed by FDI and business size. In contrast, the factor of business age does not seem to have a discernible effect. These findings bring some policy implications on the improvement of the country's position in the global value chain, focusing on selected industries including automotive, electronics and textile.

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**Keywords:** Global value chain, Business position, Automobile industry, Electronics industry, Textile industry

### 1. Introduction

In the 10-year period from 2010 to 2020, Vietnam has become one of the countries whose industry obtained medium-high global competitiveness (Nguyen & Chaudhary, 2019). At the same time, Vietnam's key sectors are integrating more and more profoundly into the global value chain. Particularly in the electronics and automobile component manufacturing industries in Vietnam, businesses not only engage in low-valued stages like processing and assembling but also, in some cases, produce the end products by themselves based on their own designs, which results in higher returns (Nguyen & Chaudhary, 2019). In 2011, the exports of electronics, computers, and components only accounted for 4.8% of the total export turnover. However, by 2021, this proportion will increase to 15.2% (GSO, 2022). Similarly, by implementing closed-loop supply chain models, Vietnam's textile and garment industry currently makes up 4%-5% of the global textile and garment market share (Ngo, 2018).

In terms of value creation, Vietnam's manufacturing industries, however, still focus mainly on production activities in the assembly line and product processing stages (Tran, 2019). Typically, the auto industry only participates in the low segment of the automotive value chain and has not yet mastered core technologies such as engines, control systems, and powertrains. Besides, there currently is no system of large-scale material suppliers and component manufacturers in the automotive industry (Tran, 2018). In addition, Vietnam's electronics industry has a low domestic rate (5%-10%) and is still at an early stage in the electronic production chain. As a result, it is significantly dependent on FDI enterprises. Vietnam's textile and garment industry in Vietnam, meanwhile, mainly focus on the processing stage. This partly explains why the participation level of Vietnam's manufacturing sector is still relatively low compared to other countries in the region despite its tremendous integration into the global supply chain (Dang, 2017). The next challenge is identifying the factors influencing businesses' positions in Vietnam's key industries.

A literature review on factors affecting industry/enterprise's participation in global value chains reveals that this field has been noticed by many organizations and scholars worldwide such as OECD (2015), IMF (2016), Tinta et al. (2018), Kotturu & Mahanty (2017), Krammer et al. (2018), Jurowetzki et al., (2018) and Hofstetter et al. (2021). The findings suggest that there are two categories of elements that affect how much an industry sector participates in the global value chain: non-policy or structural factors (e.g., enterprise participation degree, enterprise scale, corporate ownership) and policy factors (such as trade performance indicators) (Song & Wang, 2017; Tinta et al., 2018).
Several studies have also demonstrated the significance of these factors for promoting the local industry sectors’ participation in GVCs, such as gaining access to technical knowledge and fostering their learning and innovation capabilities (Kotturu & Mahanty, 2017). A mixed-method approach employing quantitative and qualitative methodologies is used widely in studying the chief factors driving GVC involvement. This method has also been used in analyzing GVC participation in several industries, including Vietnam's manufacturing and agricultural sectors (Tran et al., 2013; Torres de Oliveira et al., 2021). Other significant sectors of Vietnam are electronics, textiles, and automobile components manufacturing. Although the Vietnamese government has been actively promoting these industries in recent years, their position in the GVC remains very modest. Synthetic studies on the factors affecting the position of these sectors in the GVC are also limited and are mainly investigated by industry (Monteiro et al., 2013; Nguyen & Chaudhary, 2019; Tran & Hoang, 2020; Urata & Baek, 2020). Continuing previous findings, this study pays special attention to analyzing and evaluating the elements exerting a great influence on global value chain participation of chief sectors, which crucially contribute to positioning Vietnam in the global value chain. Specifically, the research questions posed in the article are: (i) What are the factors influencing GVC participation of enterprises in major industry sectors of Vietnam? (ii) How should these sectors take advantage of the opportunity of GVC participation?

In order to accomplish this, the structure of this study is as follows. Following the introduction, Section 2 provides the literature review of factors influencing the GVCs participation. Subsequently, the authors propose a conceptual framework on factors influencing the GVCs in the current context of Vietnam. Section 3 describes the data collection process and the method used to analyze data collected from automobile production and assembly, electronics and textile enterprises, which are the most crucial industries in Vietnam. Section 4 presents key research results and discussions. Based on this, recommendations on governmental policies to help enterprises ameliorate those factors and improve their position in the GVCs are proposed.

2. Literature Review

The concept of value chain was firstly introduced by Porter (1985) under the context of a single country's industrial sector. It could be interpreted as all the activities working harmoniously to manufacture and sell products at the highest profit. Thanks to the rapid development of the global economy after World War II, the application of this concept, however, has extended over the years and is no longer limited to just one country. Instead, industry sectors/enterprises in different countries, with their own advantages, gradually become participants in various stages in the value chain. This has resulted in the formation of a value chain that operates based on cooperation between enterprises from different economies, which is called "global value chain" (GVC) (Kaplinksy &
Readman, 2001). A global value chain refers to the movement of a product or service from conception, design, raw material procurement, and intermediate entry stages to manufacture, marketing, distribution, and delivery to end users (ESCAP, 2009). Furthermore, APEC (2010) describes GVCs as value chains that operate in multiple economies. Global value chains are different from traditional value chains in terms of the geographical scope where the value is created, such as regions or countries.

At the early stage of GVCs research at the enterprise level, the work of Harvie et al. (2010) was a pioneer study focusing on enterprises, especially small-to-medium enterprises (SMEs). Using data from large-scale field surveys carried out among firms in several Asian countries, such as Indonesia, the Philippines and Vietnam, and the People's Republic of China (PRC), these authors examined the determinants of SMEs that encourage enterprises to participate in GVCs. The research results indicate that a firm will engage in GVCs if it satisfies the accompanying two circumstances: (1) it supplies at any level in a GVC; (2) it either imports transitional sources or exports a portion of its products. Besides, high efficiency, foreign possession, propitious monetary access, dynamic development movement, and positive and testing administrative-enterprising perspectives are fundamental for SMEs to join GVCs.

GVCs participation by firms can also be typically measured by using enterprise import and export data. More specifically, it is assumed that enterprises participate in global value chains when they import inputs and export outputs from/to the other countries. Wignaraja (2012) analyzed the elements influencing SME’s participation in GVCs in five ASEAN nations, specifically Thailand, Malaysia, Indonesia, Philippines and Viet Nam by employing the regression model with data provided by the World Bank’s. Assessment results illustrate that foreign ownership and firm size are significantly positive, while enterprise age is negatively correlated in every regression. Besides, for all enterprises and SMEs in GVCs, credit accessibility has a positive effect and is statistically significant.

When examining the factors affecting the degree of GVC participation at the enterprise level, the authors have synthesized some highly typical studies in this field, as summarized in the table below:

<table>
<thead>
<tr>
<th>Study</th>
<th>Research focus</th>
<th>Sample Size</th>
<th>Analysis Method</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urata and Baek</td>
<td>The important factors of participation in global value chains,</td>
<td>111 countries and 38,966 enterprises in Asia in the period of 2009-</td>
<td>Factor analysis and SEM</td>
<td>In terms of enterprise-related factors, enterprise size, foreign ownership, high-tech capabilities and high labor productivity, are important to enterprises. With regard to country-</td>
</tr>
<tr>
<td>Reference</td>
<td>Title</td>
<td>Sample</td>
<td>Methodology</td>
<td>Findings</td>
</tr>
<tr>
<td>-----------</td>
<td>-------</td>
<td>--------</td>
<td>-------------</td>
<td>----------</td>
</tr>
<tr>
<td>Arudchel van &amp; Wignaraja (2015)</td>
<td>Characteristics of SMEs that have an impact on participation in GVCs of Malaysian firms</td>
<td>234 importers and exporters in Malaysia in 2012</td>
<td>Factor analysis and SEM</td>
<td>The technological capability of an enterprise, as captured by the ownership of a foreign technology license and R&amp;D share of sales, was found to be positively and significantly associated with SME involvement in GVC. Foreign ownership, however, was not demonstrated to be a significant predictor of global value chain participation.</td>
</tr>
<tr>
<td>Harvie et al. (2010)</td>
<td>Some firms’ characteristics determine greater ASEAN SME participation in production networks.</td>
<td>About 350 ASEAN SMEs</td>
<td>Questionnaire survey; Factor analysis and SEM</td>
<td>Firm size, Firm age; Profit; Foreign ownership significantly determine the participation of SMEs in production networks, while Labor productivity and Location are not crucial characteristics</td>
</tr>
<tr>
<td>Kotturu &amp; Mahanty (2017)</td>
<td>Determinants of SME integration into GVCs focusing on Indian automotive component manufacturing enterprises</td>
<td>62 automotive component suppliers (SMEs) of a TNC, one of the largest vehicle manufacturers in India.</td>
<td>Questionnaire survey and Factor analysis</td>
<td>SMEs producing auto components revealed that competitiveness on &quot;quality&quot; is the most important priority, followed by competitiveness on &quot;cost&quot;. The remaining priorities, in descending order of importance, are &quot;time&quot;, &quot;innovation&quot;, &quot;flexibility&quot;, &quot;reliability&quot; and &quot;service&quot;.</td>
</tr>
<tr>
<td>Lu et al. (2018)</td>
<td>The impact of financial capability on GVC participation of some Asia countries</td>
<td>200,000 firms in some Asia countries from 2000 to 2006.</td>
<td>An econometric analysis for PRC firms</td>
<td>Firm size, R&amp;D, market concentration, processing trade, SOEs, foreign firms, and H–M–T firms positively affect a firm’s GVC participation, while firm age has a negative impact.</td>
</tr>
<tr>
<td>Nguyen (2019)</td>
<td>Factors influencing the participation of Vietnamese small and medium enterprises in the global value chain</td>
<td>2,600 enterprises in Vietnam in 2015 including individual business households, private enterprises, partnership, cooperative, limited liability companies, joint stock companies</td>
<td>Factor analysis</td>
<td>Firm size, Technological innovation, and Business environment contribute to promoting the participation of enterprises in the chain. Meanwhile, Firm age and Ability of finance assessment have no significant impact on a firm's GVCs participation. In terms of business types, limited liability accompanies account for the highest participation rate in the chain, whereas the group of individual business households has the lowest involvement rate.</td>
</tr>
<tr>
<td>Torres de Oliveira et al. (2021)</td>
<td>Factors affecting the export activities of Vietnamese enterprises, thereby influencing their GVCs participation</td>
<td>Approximately 2,600 privately owned manufacturing firms from 2005 to 2015, located in 10 cities and provinces in Vietnam</td>
<td>PSM</td>
<td>All of the verified characteristics have a significant influence on Vietnamese enterprises’ export.</td>
</tr>
</tbody>
</table>

**Source:** Authors compilation

As can be seen in the table, the selection of variables for the research model of influencing factors is typically focused on four business characteristics that significantly impact an enterprise's participation in GVCs, such as Firm size, Firm age, FDI capital proportion, and Technological capabilities. Numerous research have demonstrated that the size of an enterprise contributes to an increase in the its activities in the chain (Verwaal and Donkers, 2002; Monteiro *et al.*, 2013; OECD, 2015; Krammer *et al.*, 2018; Banga, 2019). Similarly, the operation time of a firm is also a control variable of its business results. More years of operation contributes to the accumulation of experience for enterprises, which in turn boosts their export activities and involvement in the chain according to Krammer *et al.* (2018). According to many other researchers, the influence of firm age, however, is negative as young businesses are frequently more active and have a stronger propensity to participate in the chain (Cieslik *et al.*, 2014; Banga, 2019). In addition, Tran (2018) argues that the rapid expansion of globalization, internationalization, and integration has led to closer connections between nations along
the global value chain through foreign direct investment (FDI). In terms of technological capability, by applying advanced technologies, specifically digital technology, SMEs have been expanding their networks and delving deeper into GVCs, according to Banga (2019).

Regarding the research methods, the econometrics model and SEM have been used in similar papers by Harvie et al., (2010), Arudchelvan & Wignaraja (2015), Urata and Baek (2020) to analyze the influence of factors affecting the participation level of enterprises in GVCs. These methods are highly effective in testing an economic theory by building economic models. Based on the estimation results with a specific sample, the authors can evaluate the relationship between the dependent and independent variables in the model. Meanwhile, other researches used the Propensity Score Matching (PSM) method (Torres de Oliveira et al., 2021) to estimate the effect of a solution or an intervention by matching the treatment and control observations. In their study, Torres de Oliveira et al. (2021) consider the choice of engaging in a certain activity, for instance innovation, as participation in one intervention practice that has the consequence of changing the exporting probability. Therefore, PSM is only acceptable when comparing innovation and non-innovation trends to assess a company's export performance. In addition, the application of PSM facilitates the estimation of propensity scores of binary variables and exports.

In terms of research data, there are two types of data used in the model: primary and secondary data. For primary data, a number of studies have designed questionnaires for enterprises to retrieve information, such as those of Harvie et al. (2010) and Kotturu & Mahanty (2017). However, the making of questionnaires is still limited in the studies since it takes time to ask questions and receive responses from businesses, which prolongs the duration of the research. Additionally, creating a questionnaire for companies in various parts of the world that will yield accurate data while minimizing errors is exceedingly challenging. Consequently, to ensure the accuracy of the final results, studies usually prioritize the use of secondary data compiled from reliable national and global sources and organizations, as in studies done by Arudchelvan & Wignaraja (2015), Urata and Baek (2020), Torres de Oliveira et al. (2021).

In Vietnam, recent studies related to the analysis of factors influencing Vietnam's position in the global value chain have also received the attention of many scholars (Nguyen, 2019; Luu, 2020; Tran, 2021). Most of these studies use qualitative methods such as synthesis, comparison, and analysis to identify the influencing elements and propose solutions to promote participation in the global value chain in some typical industries of Vietnam. Nevertheless, there are relatively few empirical studies on the factors influencing the position of Vietnam in the global value chain from the government and macro perspective. Some of them have referred to several meaningful variables that significantly affect the role of Vietnam in the GVCs. Those factors include...
foreign ownership, especially the proportion of FDI capital, favorable financial access, firm size, firm age, and the innovation of technology.

In this study, the authors evaluate the variables influencing the position of enterprises in the global value chain in three crucial industries of Vietnam: the automobile production and assembly, electronics, and textile industries. Based on the literature review on GVCs, the authors propose a multiple linear regression model illustrating the dependent relationship between the position of Vietnamese enterprises in the GVCs and significant determinants, including the proportion of FDI capital in enterprises, business size, business age, and technological capabilities. More specifically, the authors propose a theoretical framework for studying elements influencing the participation of Vietnamese enterprises in GVCs as follows:

![Conceptual Framework](Figure 1)

**Figure 1.** Proposal of conceptual framework model for the study

**Source:** Authors’ proposal

3. **Data and methodology**

3.1 **Model specification**

In this study, to evaluate the factors influencing Vietnam’s enterprise positions in GVCs in chosen industries, the authors considered an enterprise's GVC participation as the variable depending on a group of independent variables (enterprise factors). The measurement variables are presented respectively as follows:

**Dependent variable**

The dependent variable (GVC) represents the position of Vietnamese enterprises in the global value chain. In other words, it is an index that measures the value of imported inputs in the total exports of a country. The higher this index is, the higher position of
that country gets in the global value chain. This choice is consistent with previous studies in this field such as Arudchelvan & Wignaraja (2015), Urata & Baek (2020).

Independent variable
Based on a comprehensive literature review on groups of factors influencing a GVCs (as mentioned in Section 2), this study will consider 4 independent variables in the model including Foreign direct investment (FDI); Business size (SIZE); Business age (AGE); Technological capability (PPE). To achieve underlying factors, we implemented panel data analysis as deployed in the research of Ines (2019). As a result, we come up with the multiple linear regression model to analyse the factor influencing the position of Vietnamese enterprises on the global value chains as follows:

\[ GVC = \beta_0 + \beta_1 FDI + \beta_2 \ln SIZE + \beta_3 \ln AGE + \beta_4 \ln PPE + \epsilon. \]  

(1)

The SIZE, AGE and PPE values were transformed into natural logarithm to ensure a normal distribution, while the GVC and FDI variables already in percentage form do not need to be transformed.

There are three regression methods including Pooled OLS model, Fixed effect model (FEM) and Random effects model (REM) used to determine the factor influencing the position of enterprises in the GV. The difference between FEM and REM models lies in whether the characteristics of the observations are random or fixed. If the characteristics or differences between observations are random, then the REM model will be more suitable and vice versa. However, determining whether these characteristics are random or fixed is tricky. Therefore, to choose between REM and FEM, it is necessary to conduct the Hausman test to select the better model.

3.2 Data
The study uses panel data which is a combination of cross-section data and time series. The reliable secondary data sources published by Vietstock Securities Company and public Annual financial statements of enterprises focusing on automobile production and assembly, electronics and textile industries was collected. To ensure the validity as well as the consistency of the research data, the authors only selected enterprises listed on the Vietnamese stock market. In 2020, according to statistics of Vietstock Securities Company, there are 52 listed enterprises operating in these three aforementioned sectors in total. More specifically, there are 8 automotive enterprises, 8 electronics enterprises and 36 textile enterprises. Therefore, for this study, all these 52 enterprises will be the focus of data collection. The data is collected over a 5-year period from 2016 to 2020. Therefore, the total number of observations will be 52*4 = 208 observations.

For the estimation of the participation of enterprises in GVC, we employed the value of goods produced by enterprise itself, known as "Trade in Value Added" (TiVA), which is commonly deployed in the research of Nguyen & Chaudhary (2019).
specifically, TiVA engaged in the import and export process, and the added value part in trade will be calculated as the excess between the export value of the final product and the import value of the raw materials. Therefore, for this study, the position of enterprises in the global value chain (GVC) is roughly estimated as: $GVC = \frac{\text{Export turnover of final products} - \text{Import turnover of raw materials}}{\text{Export turnover of final products}}$.

Foreign direct investment (FDI) data is measured by the percentage of FDI in the capital structure of an enterprise. Enterprise size (SIZE) is measured by the equity of the enterprise. The age of the business (AGE) is the time from the date of establishment of the business to the end of December 31st, 2020. The technological capability of the enterprise (PPE) is measured by the value of the enterprise's fixed assets.

We employed data on product export turnover, import turnover of raw materials and foreign direct investment (FDI) from Vietstock Securities Company. Meanwhile, the data including the age of the enterprise, the size of the enterprise (measured by equity) and the technological capability (shown by the primary price of fixed capital) are collected from annual reports and audited consolidated financial statements on websites of companies listed on HOSE and HNX.

**Table 2.** Description of independent variables and their expected impact

<table>
<thead>
<tr>
<th>Variable</th>
<th>Variable description</th>
<th>Source</th>
<th>Empirical studies and their impact</th>
<th>Expected impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDI</td>
<td>The FDI capital proportion</td>
<td>Data from Vietstock securities company</td>
<td>(+): Helpman (1984); Helpman &amp; Krugman (2005); Kaplinsky &amp; Readman (2001); OECD (2015); Krammer et al. (2018); Tran (2018); Banga (2019)</td>
<td>+</td>
</tr>
<tr>
<td>SIZE</td>
<td>Business size</td>
<td>Annual financial statements of enterprises</td>
<td>(+): Wiklund &amp; Shepherd (2005); Arudchelvan &amp; Wignaraja (2015); Krammer et al. (2018); Lu et al. (2018); Dang (2019)</td>
<td>+/-</td>
</tr>
<tr>
<td>AGE</td>
<td>Business age</td>
<td>Data from Vietstock securities company</td>
<td>(+): Krammer et al. (2018)</td>
<td>+/-</td>
</tr>
<tr>
<td>PPE</td>
<td>Technological capability</td>
<td>Annual financial statements of enterprises</td>
<td>(+): Gereffi (1994); Vu (2018)</td>
<td>+</td>
</tr>
</tbody>
</table>
4. Results

4.1 Descriptive statistics

To have a more specific view of the observed variables, the method of descriptive statistics is essential. This method uses basic measurement criteria including: mean value; standard deviation; minimum value and maximum value to clarify the characteristics of the observed variables in the research sample.

The results of descriptive statistics about the observed variables in this study are presented in the table below:

Table 3. Descriptive statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observation</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Max</th>
<th>Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDI</td>
<td>208</td>
<td>4.85e+08</td>
<td>1.15e+09</td>
<td>30000</td>
<td>6.10e+09</td>
</tr>
<tr>
<td>SIZE</td>
<td>208</td>
<td>270.300</td>
<td>30.539</td>
<td>600.539</td>
<td>70.390</td>
</tr>
<tr>
<td>AGE</td>
<td>208</td>
<td>8.621</td>
<td>2.57</td>
<td>30.100</td>
<td>5.013</td>
</tr>
<tr>
<td>PPE</td>
<td>208</td>
<td>105.13</td>
<td>36.0143</td>
<td>11.75404</td>
<td>180.1483</td>
</tr>
</tbody>
</table>

Source: Authors’ calculation

4.2 Model correlation analysis

To determine the correlation between variables, the authors employed the Pearson test. The result of the correlation analysis shows that all the independent variables are related to the dependent variable. Simultaneously, there are no independent variables correlated with each other (significance level sig. > 0.05). Therefore, all the variables are kept for further study. It can also be seen that there is almost no multicollinearity. As a result, when testing the defects of the model, we can ignore the multicollinearity test (VIF).

Table 4. Description of model correlation

<table>
<thead>
<tr>
<th></th>
<th>GVC</th>
<th>FDI</th>
<th>lnSIZE</th>
<th>lnAGE</th>
<th>lnPPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>GVC</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FDI</td>
<td>0.030</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lnSIZE</td>
<td>0.026</td>
<td>0.012</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>lnAGE</td>
<td>-0.051</td>
<td>-0.040</td>
<td>0.155</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>lnPPE</td>
<td>0.225</td>
<td>0.102</td>
<td>0.063</td>
<td>0.092</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Source: Authors’ calculation

Results according to FEM and REM models

The FEM model has a confidence level of 53.59%, which means that the independent variables can explain 53.59% of the alteration of the dependent variable, the rest is explained by several other factors. At the 5% level of significance, there are 2 variables, FDI and lnSIZE, which are not significant (value P>|t| > 0.05). In other words,
the FEM model results in FDI and business size having no impact on the position of enterprises in the global value chain.

The REM model has a confidence level of 62.57%, which means that the independent variation in the model can explain 62.57% of the alteration of the dependent variable. The rest is explained by several other factors. Through the coefficient P>|z| of the REM model, it can be seen that the REM model gives statistically significant FDI and lnSIZE variables while the lnAGE variable is not statistically significant in case the coefficient P>|z| = 0.607 > 0.05. In other words, the age of the business does not explain the position of the enterprise in the global value chain.

According to the Hausman test, we get the coefficient Prob>chi2 = 0.0673 > 0.05. Therefore, the chosen model is the REM model. Besides, the defect tests of the model show that the REM model does not have defects. The final result on factors influencing Vietnam's position in the global value chain of the automotive, electronics and textile industries is the result of the REM model.

**Table 5. Final model result**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Correlation coefficient with dependent variable</th>
<th>Level of significance</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDI</td>
<td>0.153</td>
<td>0.038</td>
<td>++</td>
</tr>
<tr>
<td>lnSIZE</td>
<td>0.030</td>
<td>0.002</td>
<td>+</td>
</tr>
<tr>
<td>lnAGE</td>
<td>-0.037</td>
<td>0.607</td>
<td>0</td>
</tr>
<tr>
<td>lnPPE</td>
<td>0.294</td>
<td>0.000</td>
<td>+++</td>
</tr>
<tr>
<td>Cons</td>
<td>-8.563</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source: Authors’ calculation*

From the results of Table 5, we can rewrite the original regression equation as follows:

\[ GVC = 0.153FDI + 0.03SIZE + 0.294PPE \]

**5. Discussion and policy implications**

**5.1 Discussion**

Firstly, the variable of technological capacity of enterprises (PPE) has a positive regression coefficient and is the second largest among the model variables. This suggests that technology has an outstandingly positive impact on the position of a business in the global value chain. Accordingly, advanced technology allows enterprises to master the stages of creating high added value in the global value chain, such as design and production of input materials, instead of only low added value stages, such as processing and assembling. As a result, technology innovation will enable businesses to improve their position in the global value chain. This is also entirely compatible with the development context of Vietnam's key manufacturing industries, where enterprises are
making great effort to improve their position in the GVCs by developing new products based on their strengths, adhering to the strict market criteria, and producing in a sustainable, green, and clean environment. Hence, businesses must constantly incorporate technology into each product to achieve this goal (Song & Wang, 2016).

The result of this study complements the argument of Vu (2018) that owning modern machinery technology makes the business less likely to be replaced by others. Therefore, it can allow enterprises to participate in higher stages of the global value chain. In fact, these three industries (the automobile production and assembly, electronics, and textile) are all manufacturing industries. As a result, the technological aspect, which reflects in the machinery and equipment, is an inseparable factor in production. This partly explains the profound influence of the enterprise's Technological capability (PPE) on the position of businesses in the global value chain. Hence, improving technological capacity is essential in the automobile production and assembly, electronics, and textile industries to enhance the position of enterprises in the global value chain.

Secondly, the foreign direct investment variable (FDI) has a positive regression coefficient and is the second-largest among the model's variables. This implies that FDI can help businesses improve their position in the global value chain. This result is consistent with the studies of Krammer et al. (2018) and Banga (2019). In addition to providing domestic businesses with capital, FDI helps them develop their human resources and technological capabilities, enhance competitiveness, and link production through channels of spillover effects (Krammer et al., 2018). Currently, there are insufficient domestic raw materials, spare parts, and components for production in Vietnam’s chief industries, such as electronics, textiles, automobile manufacturing, and assembly. As a result, the aforementioned manufacturing sectors rely heavily on imported raw materials, which results in low productivity production and high costs. For this reason, attracting FDI into supporting industries for the aforementioned sectors would lay a significant foundation for lowering production costs, and enhancing product quality, thereby strengthening Vietnam’s position in GVCs.

Besides, the electronics, automobile, and textile industries primarily consist of small and medium enterprises with a shortage of capital. Hence, FDI enables them to approach more capital for research and development (R&D) activities and thus gain entry to high-value-added stages. According to statistics from the Vietnam Electronic Industries Association (VEIA, 2021), up to 70% of technological innovation in the electronics sector comes from foreign-invested enterprises. Simultaneously, these companies create spillover effects through all four channels, namely: technology, human resources, competition, and production linked to Vietnam’s electronics industry, which translates to a positive contribution to the development of this industry (Tran, 2018).
Finally, the business size variable (SIZE) has a positive regression coefficient, suggesting that business size favorably influences the firm's position in the global value chain. The firm size variable also appeared in the study of Dang (2019). Despite not directly studying enterprises' position in the global value chain, the research result shows that business size positively impacts business performance. Thus, this paper complements the findings of Dang (2019), Arudchelvan & Wignaraja (2015), and Lu et al. (2018). The result has been practically verified in Vietnam and other countries. Enterprises that own global value chains are large-scale corporations. These businesses possess a large amount of capital, which they invest in research and development. As a result, they can grasp processes that require profound knowledge, such as brand positioning, marketing and distribution. Meanwhile, small enterprises such as Vietnamese ones are frequently only able to perform at low-value stages, such as component assembly or sewing, based on imported raw materials.

Small and medium enterprises make up the majority of businesses in the automobile production and assembly, electronics, and textile industries. Hence, the expansion in enterprise size from year to year is not noteworthy. This explains why the SIZE variable has a positive but insignificant influence. Nevertheless, the situation in developed countries shows that large-scale enterprises such as Samsung in the electronics industry or American and European enterprises such as General Motors, Mercedes in the automotive industry are those controlling the highest value-added stages in the global value chain. They are primarily involved in brand positioning, product design, distribution, marketing, and sales. Meanwhile, small businesses in developing countries, such as Vietnam and India, almost only engage in the stages with low added value.

Additionally, there is a negative correlation between firm age and GVC participation, which can be explained by the fact that fledgling businesses will generally be defter than old ones in approaching and applying new production systems such as GVCs to develop and keep up with market trends. This finding follows the result of Wignaraja (2012) and Lu et al. (2018), that discovered a fundamentally negative association, while Harvie et al. (2010) supposed that there was no statistically significant relationship. These conclusions refute the thesis that old firms are more likely to participate in GVC as they can overcome obstacles with accumulated business expertise. That is because this experience may not be so pivotal for raising the level of GVC engagement. Hence, moderately young firms might occasionally find that they are more prosperous in expanding their business after participating in GVCs.

In conclusion, Vietnam’s position in the global value chain can be assessed through factors of enterprises, including Foreign Direct Investment (FDI), Business size, and Technology Capability.

5.2 Policy implications
To improve the country's position in the global value chain, not only the government should promulgate measures and policies to support enterprises but the enterprises also should set up plans and strategies to promote the mentioned factors. Firstly, to address technological capacity issues, it is necessary for government to set up subsidies for digital transformation for businesses, especially SMEs. With such strong support from the government, the Vietnamese enterprises would have more chance to focus more on R&D activities thereby engaging more deeply with high-value-added stages in GVCs. Secondly, strategies to attract FDI should be emphasized toward prioritizing sectors with a high technological content and high added value, thereby contribute partly in solving the technology issues in Vietnam. Beside attracting FDI companies to Vietnam, retaining these foreign investors is also an urgent task for the government. Since 2020, the Covid-19 pandemic has forced many national and local governments in the world to take actions to eliminate barriers, restore production, and prevent supply chain disruption. Vietnamese government should take these issues into consideration to keep foreign investors in Vietnam for a long time. Finally, SMEs in Vietnam should strategically scale up through integration. More specifically, local SMEs should coordinate closely to achieve collective efficiency based on size (e.g. purchasing inputs), specialization (e.g. production of components and different parts of a product) and joint actions (e.g. joint marketing). This increases their “attractiveness” as suppliers by reducing transaction costs for international buyers sourcing from different companies. For example, for global suppliers in apparel, SME clusters would reduce significantly the transaction costs of collecting input materials and outputs. In more technologically complex GVCs (such as automotive and electronics parts), clustering enables the sharing of investments required by contractors in processing and upgrading products, such as purchasing and adapting new equipment, which are usually beyond the technical or financial capabilities of SMEs as individuals. Thus, joining clusters allows SMEs in the automobile production and assembly, electronics and textile industries to scale up by combining the advantages of small size (flexibility) with the benefits of scale (economies of scale and scope). Clustering increases the efficient size of the market and reduces the cost of market access for SMEs that are collaborating with each other. Furthermore, the existence of supplier clusters in specific industries may also provide competitive advantage in terms of location to attract GVC-related FDI.

6. Conclusions

Based on the panel data analysis using Stata 14, the study has pointed out many factors possibly influencing the position of enterprises in the automobile production and assembly, electronics and textile industries in Vietnam in the global value chain. Among these, technological capability has been recognized as the most influential factor with a positive impact on the position of enterprises in the global value chain, followed by
technological capacity of enterprises, FDI and business size. The findings have helped the authors develop some policy recommendations to improve the country’s position in the global value chain focusing on the automobile production and assembly, electronics and textile industries. These include some typical policies such as reforming local administrative procedures transparently and effectively by accelerating digital transformation; clear commitments on technology transfer plan from FDI investors when discussing tax support policies; scaling up the SMEs through amalgamation. Although some research objectives have been achieved, the study still has some drawbacks. More specifically, the sample size in this study was constrained due to limited time and financial resources. Furthermore, due to limited data, the study has not yet considered the difference in the level of impact of factors on the level of participation of enterprises in GVC of three sectors. Although this sample size is adequate to meet the requirement of the model, more data should be collected and other factors (e.g., human resource) influencing the position of Vietnamese enterprises in the global value chain should be considered accordingly to extend this work. Despite the fact that three selected industry sectors appeared to be an ideal empirical study for the analysis of factors influencing on Vietnam’ GVC participation, further research geared towards other sectors in the context of Vietnam would be useful for generalizing and enriching empirical understanding of these factors. Finally, further research about coordination level of different stakeholders possibly impacting the position of three industry sectors in GVC is also needed, which is expected to provide more in-depth knowledge on drivers that further integrate Vietnam into GVCs.

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