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Global Value Chain Participation and Labour Productivity among Manufacturing Firms in Vietnam

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Abstract: *This study assesses the state of global value chain (GVC) participation by manufacturing firms in Vietnam and examines the impact of GVC participation on labour productivity. Utilising firm-level data from the Vietnam Technology and Competitiveness Survey and Vietnam Enterprise Survey from 2009 to 2018, we employ panel fixed-effect regression to analyse the dynamics. The findings show that Vietnam's GVC participation has been driven mainly by backward rather than forward linkages, signifying a reliance on foreign inputs for exports. The study found a positive impact of backward and forward GVC participation on labour productivity. However, the results show a stark contrast when considering the degree of GVC participation (i.e. GVC participation index). While forward GVC participation positively impacts labour productivity, backward GVC participation demonstrates a negative effect. The results partly reject the learning-to-learn hypothesis while supporting the notion that productivity improvements in Vietnam are associated with learning-by-exporting and learning-by-supplying. We suggest that the prioritisation of forward GVC participation should be accompanied by well-designed backward participation strategies to promote labour productivity. The study concludes with a few policy implications.*

Keywords: Global value chain participation; Labour productivity; Learning-by-exporting; Learning-to-learn; Vietnam
JEL Classification: F13, F14, F16

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1. Introduction

Global value chains (GVCs) have played significant roles in Vietnam's economic and social development over the past three decades. With the inception of the Doi Moi (Renovation) economic reforms in 1986, Vietnam's consistent trade liberalisation policy and foreign direct investment (FDI) promotion have facilitated its rapid integration into GVCs. Exporting and importing inputs for exporting has enabled Vietnam to achieve growth rates of domestic value added (DVA) in gross exports by 16.6% annually between 1995 and 2011 (Hollweg et al., 2017; Khoi & Chaudhary, 2022). The benefits of GVC participation have been multifold - such as structural transformation, job creation, technological development, and international trade expansion (Hollweg et al., 2017). Although the degree of Vietnam's GVC participation has shown a consistent upward trajectory, two contemporaneous phenomena persist: the slowdown in productivity growth and insufficient GVC participation among domestic firms (Ministry of Planning and Investment of Vietnam, 2019; World Bank & Ministry of Planning and Investment of Vietnam, 2016). Over time, Vietnam's labour productivity growth has declined from an average of 5.2% in 2002-2007 to 3.3% in 2008-2013 (Herr et al., 2016). This trend is observable across most industrial sectors. A factor contributing to the stagnant productivity performance is the inadequate integration of domestic firms into the GVCs (World Bank & Ministry of Planning and Investment of Vietnam, 2016). Evidence shows that Vietnam's GVC participation is focused on low value-added processes with limited forward linkages and local contribution (Herr et al., 2016; Jones, 2021). Moreover, overreliance on foreign intermediates and technologies, coupled with a lack of domestic innovation, leads to productivity deterioration and a slowdown in economic growth (Korwatanasakul, 2022; Korwatanasakul & Hue, 2022).

Recognising these challenges, the Vietnamese government has established a policy framework to support domestic industries that aim to upgrade their capabilities and technology for them to promote their relationship with FDI and facilitate their entry into the global markets (Ministry of Planning and Investment of Vietnam, 2019). Despite these efforts, productivity improvements remain below policymakers' expectations, revealing a performance gap (Herr et al., 2016). Numerous empirical studies have attempted to examine the impacts of GVC on

labour productivity in developing countries (Banga, 2016; Korwatanasakul et al., 2020; Jangam, 2020). However, the evidence is mixed, often characterised by case or industry-specific outcomes. Existing literature tends to utilise industrial average values of GVC participation rather than firm-level values, which may have overgeneralised the impact of GVC participation on firm-level labour productivity. Moreover, the proxies of GVC participation, such as firm export value, export status, and export/value chain position, do not capture the level of GVC participation nor reflect different channels of GVC participation, potentially resulting in inaccurate estimates. Thus, evidence of GVC participation's impact on labour outcomes at the individual and firm levels, particularly in developing countries, remains unclear.

Vietnam represents an interesting case study in this context due to the significant increase in the GVC network and the critical challenges the country is presently facing. Despite the impressive growth in the past, continued strong productivity growth is needed to ensure the convergence process continues. Moreover, access to foreign markets through GVC participation is essential in developing countries. Vietnamese firms could take advantage of economies of scale, enhance know-how through technology transfer, and improve worker skills. Therefore, understanding how GVC participation could affect productivity can yield substantive policy implications in Vietnam. Against this backdrop, our interest is to assess the GVC participation and identify whether the participation has been beneficial or detrimental to labour productivity among Vietnamese manufacturing firms. By utilising a panel fixed-effect regression with firm-level data from the Vietnam Technology and Competitiveness Survey (TCS) and the Vietnam Enterprise Survey (VES), 2009–2018, this study aims to unpack the roles of GVC participation and technology in enhancing labour productivity in manufacturing firms in Vietnam.

This study contributes to the existing research on the linkages between firm-level GVC participation and labour productivity. First, it provides new empirical evidence indicating the role of GVCs and technological development in firms (in Vietnam) and, in turn, outlines the associated risks and opportunities. Second, while existing firm-level analyses use industrial/sectoral GVC data or firm GVC status (as a dummy variable) due to data unavailability, this study distinguishes itself by utilising firm-level GVC panel data. Finally, the study concludes with policy recommendations

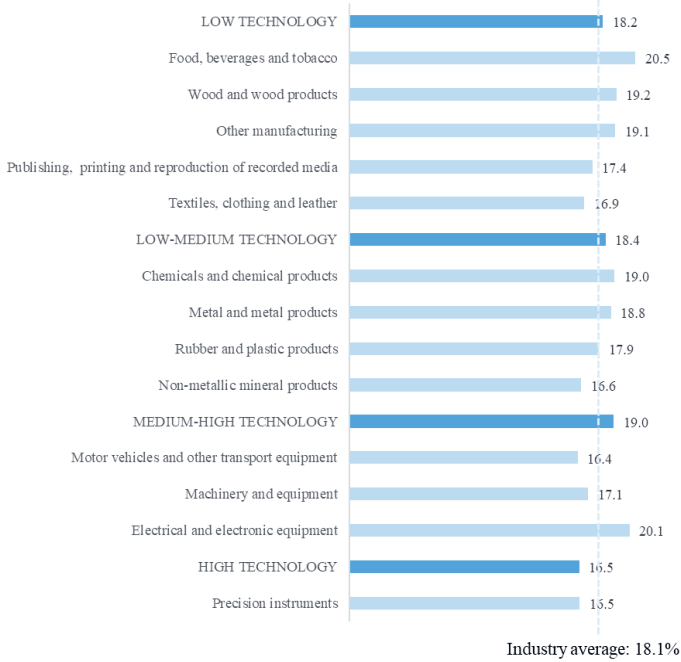
to help Vietnamese firms – and possibly firms in other developing countries – benefit from GVC integration.

This study is structured as follows. Section 2 provides a background of GVC participation in Vietnam. Section 3 reviews the related literature on GVC participation and labour productivity enhancement. Section 4 discusses the methodology and data used for the analysis. Section 5 reports the estimation results and discussion. Lastly, concluding remarks and policy implications are provided in Section 6.

2. GVCs Participation in Vietnam

Under Doi Moi's economic reforms, Vietnam promoted trade liberalisation and FDI, facilitating its integration into GVCs. This strategy has enhanced productivity, access to broader markets, and rapid economic growth by incorporating foreign inputs such as intermediate goods and technologies (Korwatanasakul, 2022). Notably, Vietnam's share of foreign value added (FVA) in gross exports has been expanding since 1990, accompanied by increases in gross exports and DVA volume in exports, with an annual growth of 16.6% annually between 1995 and 2011, just below what China achieved and significantly above than that in other countries and East and Southeast Asian countries, such as Malaysia, Singapore and Thailand (Hollweg et al., 2017; Khoi & Chaudhary, 2022). The country penetrated GVCs by specialising in low-value-added activities due to its competitiveness in cheap labour. Vietnam's intensive backward GVC participation has helped the country become a hub of electrical and electronics, textiles and clothing, and food processing industries, greatly benefiting local firms and the economy (Figure 1).

Figure 1. Vietnam's Regional Value Chain Participation by Industry, 2015 (%)



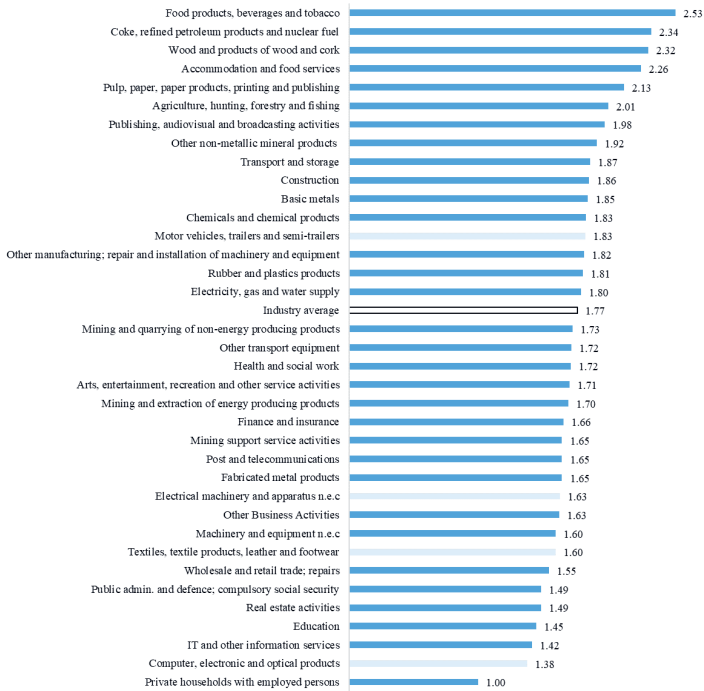
Notes: Regional value chain participation is the sum of the share of foreign value added created by other ASEAN countries in Vietnamese exports and the share of Vietnam's domestic value added incorporated in other ASEAN countries' exports.
Source: Korwatanasakul (2022), based on the ASEAN-Japan Centre data.

Nonetheless, insufficient local technology development and recent rising wages have threatened Vietnam's economic growth, primarily driven by low value-added and resource-related industries with limited technological transfer from foreign to domestic firms. Local suppliers have difficulties catching up with headquarter economies regarding technology and innovation, so they cannot move up value chains. For instance, in 2015, Samsung requested Vietnam to provide 170 supporting products and services to support its new electronics factory in Ho Chi Minh City. Nevertheless, only 12 of 1,000 local firms met its requirements and standards, with inadequate labour productivity emerging as a critical concern. Alongside the readiness of local suppliers, the lack of foreign and domestic suppliers hampers Vietnam's potential for economic agglomeration and industrial

clustering (Truong, 2008). According to Korwatanasakul and Intarakumnerd (2020), less than 250 supporting suppliers exist in Vietnam's automotive industry, whereas 2,390 foreign and local suppliers coexist in Thailand.

Heavy reliance on foreign inputs and technologies without further upgrading, particularly in strategic industries, such as the automotive industry, the electrical and electronics industry, and the textiles and clothing industry, poses challenges to the country to boost or even maintain its current growth level (Korwatanasakul & Paweenawat, 2021). The industry-level GVC data (Figure 2) indicates that the strategic industries with a relatively higher share of FVA are not among the top industries in terms of multiplier effect generation. In other words, these industries' production activities translate to a limited production level in other domestic industries and, in turn, slightly raise the economy's overall output.

Figure 2. Multiplier Effects by Industry, Vietnam, 2015



Notes: (a) The total domestic backward linkage effects are calculated from the Leontief inverse matrix of the input-output table. For the full description of each sector, refer to the OECD Input-Output table; (b) Industries highlighted in light colour are Vietnam's strategic industries.

Source: Korwatanasakul (2022), based on the Organisation for Economic Co-operation and Development (OECD) data.

3. Literature Review

3.1. Impact of GVCs Participation on Labour Productivity

Along with the emergence of the global production network in the last 30 years, the productivity spillover effects of participating in GVCs is one of the most discussed issues in the literature. Indeed, a large volume of work portrays the positive productivity spillovers of GVCs participation through exports and imports (Parteka & Wolszczak-Derlacz, 2013) and suggests that simultaneously engaging in exports and imports potentially yields greater benefits from positive interactions between both activities, such as sunk cost complementarity and joint research and development (R&D) projects. Firms' export status is positively associated with the productivity of firms and labour due to global competitive pressure that eliminates inefficiencies (Evenson & Westphal, 1995) and accumulation of external and foreign knowledge, as well as intensive R&D investment, i.e. "learning-by-exporting" and "learning-by-supplying" (Alcacer & Oxley, 2014; Silva et al., 2012).

Similarly, firms' import status also positively correlates with productivity. "Learning-to-learn" effect occurs when domestic firms learn to imitate foreign technology and, in turn, potentially improve their capacities to invent local innovation (Amiti & Konings, 2007; Coe & Helpman, 1995). In addition, foreign intermediates and capital goods can improve firm and labour productivity, owing to technological spillovers (Bas & Strauss-Kahn, 2014; Wagner, 2012) and access to foreign technology embodied within imports (Lee, 1995; Nishioka & Ripoll, 2012).

Besides, firm size, foreign ownership, R&D activities, and modern technology adoption are the main determinants affecting firm productivity. Literature has suggested that large firms may be more efficient because of their greater production differentiation, their ability to access resources, their greater market power, the cost advantages of scale economies, their brand, and their perquisites to attract more competent managers and workers (Ahuja & Majumdar, 1998). Foreign-owned firms with superior firm-specific assets are assumed to have higher productivity than domestic firms (Johansson & Lööf 2009). Castellani and Zanfei (2007) pointed out that the productivity gaps between foreign-owned and domestic firms are explained by the differences in knowledge production and the greater learning capacity of

foreign-owned firms because of their global engagement. Firms can also benefit from their own R&D and the R&D effort of their trade partners. When a domestic firm invests in R&D, new ideas, intermediate goods, methods to reduce costs, and final consumer products can be developed, allowing firms to become more efficient and profitable (Gentile et al., 2021). Furthermore, adopting and using modern technology increase opportunities for firms in developing countries to access global markets by making it easier to produce particular tasks without developing domestic supply chains (Rodrik, 2021). This will improve market performance and increase the welfare of their employees (Domset et al., 1997; Jensen, 2007).

3.2. Empirical Evidence on GVC Participation and Labour Productivity

Past empirical studies have attempted to examine the impacts of GVC on labour productivity in developing countries. However, the evidence is mixed, focusing on case or industry-specific results. Using industry-level data, Banga (2016) examined the employment impact of GVCs on the Indian labour market and found that GVC participation may enhance labour productivity. Likewise, Korwatanasakul et al. (2020) showed that GVC participation induces higher monthly wages for individuals and increases labour productivity in the labour market through backward and forward linkages. Constantinescu et al. (2019) also found a positive relationship between the industrial GVC participation level and labour productivity across countries. In contrast, Kouton and Amonle (2021) found that backward GVC participation does not affect labour productivity in the short run, while forward GVC participation does. However, backward and forward participation positively affect labour productivity in the long run.

At the firm level, Agostino et al. (2015) and Montalbano et al. (2018) employed cross-sectional data to examine the relationship between labour productivity and GVC participation. These studies proxied the GVC variables with firm export values and export statuses or positions (indicated by dummy variables) and found a positive relationship between the two variables. Banh et al. (2020) combined firm-level panel data with an industry-level GVC variable. They found that higher GVC participation at the industry level significantly raises industry and firm productivity.

Another strand of the literature used firm-level panel data with dummy variables of GVC position to disentangle the linkage between labour

productivity and GVC participation (Baldwin & Yan, 2014; Benkovskis et al., 2020). The studies concluded that productivity gains are greater for GVC firms with backward or forward participation, consistent with the learning-by-exporting and learning-to-learn hypotheses. Moreover, Benkovskis et al. (2020) posited that productivity benefits depend on specific types of exports or GVC participation that generate different levels of value-added within GVCs, such as exports of knowledge-intensive services and intermediate goods.

In the context of Vietnam, past empirical studies have presented noteworthy insights. Jangam (2020) conducted a country-level analysis and concluded that there is a positive association between GVCs with labour productivity and employment in Asia-Pacific countries, including Vietnam. Similarly, Banh et al. (2020) and Duc (2019) combined firm-level panel data with an industry-level GVC variable to examine the impact of participation in GVCs on employment. Using panel data from 1,230 small and medium-sized enterprises (SMEs), the studies found that GVC participation may increase labour productivity, wages, and employment.

The existing literature tends to rely on industrial average values for measuring GVC participation rather than firm-level values, which may have overgeneralised the impact of GVC participation on firm-level labour productivity. Moreover, the proxies of GVC participation, such as firm export value, export status (dummy variable), and export/value chain position (dummy variable), do not capture the level of GVC participation nor reflect different channels of GVC participation, potentially resulting in inaccurate estimates. Therefore, the current state of the literature highlights the need to analyse the effects of GVC participation on labour market outcomes, such as labour productivity at the firm level, to fill the gap in the literature.

4. Methodology

4.1. Data Sources

This study uses a firm-level panel data set combining 10 rounds of the TCS from 2009–2018. The survey is an additional part of the annual VES. While the VES provides general information on enterprise characteristics and financial accounts, the TCS collects detailed information on enterprises'

sourcing, production and technology utilisation, such as the structure of inputs and outputs, import and export activities, workforce, R&D and technology adoption. Matching TCS and VES provides more comprehensive data to examine the links between labour productivity, GVC participation and technology development. We match the unique identifiers, tax and permanent enterprise codes, to the TCS and VES to create a panel dataset that includes 62,824 firms with an average number of 6,282 firms per year. After data cleaning, the final sample size is 60,926 (unbalance) and the balanced panel contains 23,460 firms or 2,346 firms per year. Table 1 compares the sample used in this study (i.e. the matched TCS and VES sample) with the full VES sample in terms of firm size, ownership type and region. The full VES sample is used for comparison with the matched TCS and VES sample because the sample size of the full VES is close to the total number of manufacturing firms in Vietnam. The balanced and unbalanced panels with matched samples, as well as the full VES sample, have similar distributions. Regardless of the type of sample, most samples are small and medium enterprises (SMEs) (75%–83%), domestic private enterprises (63%–73%) and enterprises in the Southeast region (38%–42%).

Table 1: Comparison of the Matched TCS and Full VES Sample

	2009–2018					
Firm Characteristics	**TCS and VES (balanced panel)**		**TCS and VES (unbalanced panel)**		**Full VES**	
	n	**%**	**n**	**%**	**n**	**%**
Total	23,460		60,926		648,357	
Firm size						
SME	17,593	75.0	50,544	83.0	616,407	95.1
Large	5,867	25.0	10,382	17.0	31,950	4.9
Ownership						
SOE	52	0.2	628	1.0	14,295	2.2
Private	14,805	63.1	44,572	73.2	577,087	89.0
FDI	8,603	36.7	15,726	25.8	56,975	8.8
Region						
Red River Delta	5,910	25.2	17,704	29.1	197,382	30.4
North-East	1,070	4.6	3,129	5.1	25,748	4.0
North-West	350	1.5	987	1.6	7,911	1.2

Firm Characteristics	2009–2018					
	TCS and VES (balanced panel)		TCS and VES (unbalanced panel)		Full VES	
	n	%	n	%	n	%
North Central	1,130	4.8	3,172	5.2	27,598	4.3
South Central Coast	2,070	8.8	4,679	7.7	41,892	6.5
Central Highlands	360	1.5	1,104	1.8	11,159	1.7
South-East	9,860	42.0	23,244	38.2	282,886	43.6
Mekong River Delta	2,710	11.6	6,907	11.3	53,781	8.3

Notes: FDI = foreign ownership, including joint ventures; SME = small or medium-sized enterprise; TCS = Vietnam Technology and Competitiveness Survey; VES = Vietnam Enterprise Survey.
Source: Computed by the authors based on the TCS and VES.

4.2. Empirical Model Specification

This study employs a panel fixed-effect regression to examine the link between GVC participation and labour productivity at the firm level. Based on Constantinescu et al. (2019), the estimation model is as follows:

$$Y_{it} = A_{it}(\theta_1, \theta_2, \cdots, \theta_n) \times F(K_{it}, L_{it}) \quad (1)$$

Equation (1) shows a simple production function in which Y_{it} indicates the output of firm i in year t. K_{it} and L_{it} are the capital and labour of firm i in year t. A is the technology spillover, and θ refers to the channels of technology spillover, such as traditional trade and FDI.

$$lnLP_{it} = \alpha + \beta ln\left(\frac{K_{it}}{L_{it}}\right) + \sum_{j=1}^{n} \gamma_j ln(\theta_{jit-1}) + X_{it} + \delta + \mu + \varepsilon_{it} \quad (2)$$

Dividing equation (1) by L_{it}, taking the log of both sides of the equation, and adding fixed effects yield equation (2). $lnLP_{it}$ refers to the labour productivity of firm i in year t. Labour productivity, LP_{it}, is calculated by dividing the total sales of a firm i by the total number of employees. Following Constantinescu et al. (2019), proxy variables for the participation of GVCs serve as a channel for the technology spillover, θ. The variable θ takes a lag of one period since it takes time for a firm to adopt new technology or to learn new knowledge through importing foreign intermediate goods. X_{it} represents the matrix of control variables.

In addition, δ and μ are dummy variables for industry and time, serving as fixed-effects variables to control unobservable factors. Introducing fixed effects eliminates the potential for any time-invariant characteristics of firms to act as confounding factors in estimation. In other words, fixed effects prevent the estimation model from potential endogeneity issues from omitted time-invariant variables.

Labour productivity is the dependent variable in the estimation, measured by total revenue divided by the number of employees. The independent variables of interest are the backward and forward GVC participation dummy and index. The backward GVC participation dummy indicates whether firms import foreign intermediate goods and export final products, whereas the forward GVC participation dummy identifies whether firms export intermediate goods. Furthermore, the backward GVC participation index results from multiplying the exports to total sales ratio and the ratio of foreign input to total input (Korwatanasakul et al., 2020; Urata & Baek, 2021). Meanwhile, the forward GVC participation index is calculated by multiplying the ratio of intermediate goods exports to total sales and the ratio of domestic input to total input.

Five additional variables serve as control variables in the estimation: capital–labour ratio, SME, R&D, modern technology, and foreign ownership. Since the data do not contain information on total capital, total assets per worker (K/L) and the total value of machinery and technology per worker (K/L 2) are proxies of the capital–labour ratio. The SME dummy variable indicates whether a firm is an SME (SME = 1; otherwise, SME = 0). Foreign ownership is a dummy variable identifying firms with full or partial foreign ownership (i.e. a joint venture). The estimation model also considers the importance of technological upgrading on labour productivity and includes dummy variables of R&D (i.e. whether firms undertake R&D activities) and modern technology (i.e. whether firms utilise computer-operated machines, personal computers, or the internet). Except for the SME variable, all control variable coefficients on labour productivity are expected to be positive. Table 2 presents summary statistics and a definition of each variable.

Table 2: Summary Statistics

Variable	Description	Observation	Mean	Standard Deviation	Min	Max
Dependent variable						
Labour productivity	Logarithm of sales per worker	62,603	5.666	1.319	–5.966	12.635
Independent variables						
GVC participation						
Backward GVC participation dummy	Backward GVC participation dummy indicates whether firms import foreign intermediate goods and export final products. (Backward GVC participation = 1; otherwise = 0)	52,834	0.385	0.487	0	1
Backward GVC participation index	Backward GVC participation index results from multiplying the ratio of exports to total sales and ratio of foreign input to total input.	45,937	0.148	0.299	0	1
Forward GVC participation dummy	Forward GVC participation dummy indicates whether firms export intermediate goods. (Forward GVC participation = 1; otherwise = 0)	48,213	0.184	0.387	0	1
Forward GVC participation index	Forward GVC participation index results from multiplying the ratio of intermediate goods exports to total sales and ratio of domestic input to total input.	45,930	0.032	0.137	0	1
Control variable						
K/L	Capital per worker proxied by the logarithm of total assets per worker	62,781	5.713	1.234	–1.794	12.999
K/L 2	Capital per worker proxied by the logarithm of the total value of machinery and technology per worker	62,672	3.033	2.096	–7.462	12.398
SME	Small or medium-sized enterprise (SME = 1; otherwise SME = 0)	62,813	0.752	0.432	0	1
R&D	Undertaking R&D activities (R&D = 1; otherwise R&D = 0)	62,771	0.081	0.272	0	1
Modern technology	Adaption of computer-operated machines, personal computers, or the internet (Modern technology = 1; otherwise = 0)	62,824	0.601	0.490	0	1
Foreign ownership	Foreign-owned firms (including joint venture) (Foreign ownership = 1; otherwise = 0)	62,824	0.227	0.419	0	1

Notes: GVC = global value chain, R&D = research and development, SME = small or medium-sized enterprise.

Source: Computed by the authors based on the TCS and VES.

5. Findings

5.1. GVC Participation by Vietnamese Firms

Table 3 demonstrates the pattern of engagement in foreign trade by the sample firms from the perspective of backward GVC participation. Notable, 44% of the firms do not engage in foreign trade (Panel C, Column 1), while 24% participate in foreign trade either through imports of input or exports of final products (Panel C, Columns 2-5). Approximately one-third of the sample (32%) imports foreign intermediate goods to produce final products to export (Panel C, Column 10), characterising backward GVC firms. Within backward GVC firms (Panel B, Column 10), the distribution of firms according to size skews slightly towards relatively larger firms (55%). When considering the distribution of firms by trade pattern within each firm size category, the data reveal that only 4%–22% of small firms (with 1–200 employees) participate in GVCs, whereas 50%–68% of large firms (201 employees and above) engage in GVCs (Panel C, Column 10). This suggests that small firms might encounter higher barriers to backward GVC participation. The distribution is consistent with the study of Urata and Baek (2021), which used combined enterprise survey data of 38,966 firms from 111 countries from 2009–2018.

This study utilises firms exporting intermediate goods as a proxy for firms engaging in forward GVC linkages (i.e. forward GVC firms) since the data contain insufficient information to trace the flow of exported intermediate goods. However, it is essential to note that using the data of intermediate goods exports may lead to overestimating forward GVC participation. Examining the engagement pattern in foreign trade through exporting intermediate goods is crucial, given that GVC firms are part of intermediate goods-exporting firms.

The number of forward GVC firms constituted 16% of the sample is lower than that of non-forward GVC firms (Table 4, Panel C, Column 5) and nearly two times less than firms engaged in GVC with backward linkages. In contrast to the backward GVC participation pattern, forward GVC firm distribution by size skews towards small firms (57%) (Panel B, Column 5). Additionally, less than one-third of the sample participates in value chains regardless of firm size. Approximately 3%–13% of small firms and 25%–27% of large firms engage in forward GVC participation (Panel C, Column

Table 3: Pattern of Engagement in Foreign Trade by Sample Firms

			1	2	3	4	5	6	7	8	9	10	11	12
Sale	Domestic		O	O	O	X	O	X	X	O	O	**Backward GVC firm (6-9)**	**Non-backward GVC firm (1-5)**	**Total**
	Foreign (export)		X	X	X	O	O	O	O	O	O			
Input	Domestic		O	X	O	O	O	X	O	X	O			
	Foreign (import)		X	O	O	X	X	O	O	O	O			
Panel A	Firm size (number of employees)	1–10	2,833	47	117	99	148	41	26	14	63	144	3,244	3,388
		11–200	15,848	459	2,190	1,203	3,285	717	882	760	4,145	6,504	22,985	29,489
		200–300	670	55	300	236	526	165	308	217	1,083	1,773	1,787	3,560
		301 and over	849	62	454	586	1,128	1,060	1,687	542	3,118	6,407	3,079	9,486
	Total		**20,200**	**623**	**3,061**	**2,124**	**5,087**	**1,983**	**2,903**	**1,533**	**8,409**	**14,828**	**31,095**	**45,923**
Panel B	Firm size (number of employees)	1–10	14.0	7.5	3.8	4.7	2.9	2.1	0.9	0.9	0.7	1.0	10.4	7.4
		11–200	78.5	73.7	71.5	56.6	64.6	36.2	30.4	49.6	49.3	43.9	73.9	64.2
		200–300	3.3	8.8	9.8	11.1	10.3	8.3	10.6	14.2	12.9	12.0	5.7	7.8
		301 and over	4.2	10.0	14.8	27.6	22.2	53.5	58.1	35.4	37.1	43.2	9.9	20.7
	Total		**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Panel C	Firm size (number of employees)	1–10	83.6	1.4	3.5	2.9	4.4	1.2	0.8	0.4	1.9	4.3	95.7	100
		11–200	53.7	1.6	7.4	4.1	11.1	2.4	3.0	2.6	14.1	22.1	77.9	100
		200–300	18.8	1.5	8.4	6.6	14.8	4.6	8.7	6.1	30.4	49.8	50.2	100
		301 and over	9.0	0.7	4.8	6.2	11.9	11.2	17.8	5.7	32.9	67.5	32.5	100
	Total		44.0	1.4	6.7	4.6	11.1	4.3	6.3	3.3	18.3	32.3	67.7	100

Note: GVC = Global Value Chain

Source: Authors.

5). This distribution implies that firms in Vietnam, especially micro firms, have difficulties engaging in forward GVC participation. Furthermore, as the data possibly overestimate the situation of forward GVC firms, fewer firms are likely involved in forward GVC participation.

Table 4: Pattern of Engagement in Foreign Trade by Sample Firms

			1	**2**	**3**	**4**	**5**	**6**	**7**
Sale of intermediate goods	Domestic Foreign (export)		X X	O X	X O	O O	**Forward GVC Firm (3–4)**	**Non-Forward GVC Firm (1–2)**	**Total**
Panel A	Firm size (number of employees)	1–10	3,721	983	0	139	139	4,704	**4,843**
		11–200	26,446	6,666	0	4,939	4,939	33,112	**38,051**
		200–300	2,669	383	0	988	988	3,052	**4,040**
		301 and over	7,002	405	0	2,780	2,780	7,407	**10,187**
	Total		**39,838**	**8,437**	**0**	**8,846**	**8,846**	**48,275**	**57,121**
Panel B	Firm size (number of employees)	1–10	9.3	11.7	0	1.6	1.6	9.7	**8.5**
		11–200	66.4	79.0	0	55.8	55.8	68.6	**66.6**
		200–300	6.7	4.5	0	11.2	11.2	6.3	**7.1**
		301 and over	17.6	4.8	0	31.4	31.4	15.3	**17.8**
	Total		**100**	**100**	**0**	**100**	**100**	**100**	**100**
Panel C	Firm size (number of employees)	1–10	**76.8**	**20.3**	**0**	**2.9**	**2.9**	**97.1**	**100**
		11–200	**69.5**	**17.5**	**0**	**13.0**	**13.0**	**87.0**	**100**
		200–300	**66.1**	**9.5**	**0**	**24.5**	**24.5**	**75.5**	**100**
		301 and over	**68.7**	**4.0**	**0**	**27.3**	**27.3**	**72.7**	**100**
	Total		**69.7**	**14.8**	**0**	**15.5**	**15.5**	**84.5**	**100**

Notes: GVC = global value chain. This study utilises firms exporting intermediate goods as a proxy for firms engaging in forward GVC linkage (i.e. forward GVC firms).
Source: Authors.

Table 5 illustrates the sample characteristics of GVC and non-GVC firms, reporting the mean values of each dependent and independent variable and differences in mean and t-test. Overall, backward and forward GVC firms display higher mean values than non-GVC firms for all variables except the SME variable. In other words, GVC firms illustrate greater labour productivity, capital per worker, firm size, R&D activities, and adoption of modern technology. Moreover, GVC firms tend to engage with foreign

investors through full or partial foreign ownership (i.e. a joint venture).

Table 5: Sample Firm Characteristics: Global Value Chain versus Non-Global Value Chain Firms

	Backward GVC Participation				
Mean	**GVC Firm**	**Non-GVC Firm**	**Difference**	**t-statistics**	
Labour productivity	6.046	5.530	0.517	45.043	***
K/L	5.948	5.664	0.284	25.915	***
K/L 2	2.987	3.228	–0.241	–12.617	***
SME	0.507	0.858	–0.351	–94.917	***
R&D	0.107	0.061	0.046	19.321	***
Modern technology	0.649	0.528	0.121	27.622	***
Foreign-owned firm	0.534	0.091	0.443	130.000	***
	Forward GVC Participation				
Mean	**GVC Firm**	**Non-GVC Firm**	**Difference**	**t-statistics**	
Labour productivity	6.161	5.674	0.487	27.404	***
K/L	6.063	5.714	0.349	20.388	***
K/L 2	3.461	2.977	0.483	15.997	***
SME	0.581	0.721	–0.140	–22.127	***
R&D	0.089	0.080	0.009	2.483	***
Modern technology	0.622	0.591	0.031	4.487	***
Foreign-owned firm	0.559	0.241	0.318	52.389	***

Notes: GVC = global value chain, K/L = capital per worker proxied by the logarithm of total assets per worker, K/L 2 = capital per worker proxied by the logarithm of the total value of machinery/technology per worker, R&D = research and development, SME = small or medium-sized enterprise, *** = statistical significance at 99% level.

Source: Authors.

5.2. Impact of GVCs Participation on Labour Productivity

Table 6 shows the estimation results of the effect of GVCs participation on labour productivity. The results are robust across different specifications and indicate that GVCs participation, both backward and forward, has a statistically significant positive relationship with labour productivity. To participate in GVCs, firms improve their efficiency by adjusting to international standards and acquiring new knowledge and technology through foreign R&D investment. These processes, in turn, enhance firm

labour productivity and domestic innovation. Thus, the results support the hypotheses of learning-by-exporting, learning-by-supplying, and learning-to-learn.

The coefficients of all control variables express the expected signs and are statistically significant and robust across different specifications. Proxies of capital–labour ratio, the R&D dummy, and the modern technology dummy positively affect labour productivity, as capital investment and technological upgrading enhance labour productivity. Moreover, the foreign ownership dummy coefficients are positively related to labour productivity. Foreign-owned and joint venture firms have greater financial resources and technological capacity that contribute to higher capital investment, technological development, and, in turn, labour productivity improvement. On the contrary, being an SME negatively impacts labour productivity since SMEs face constraints regarding economies of scale, access to finance and information, and technological capacity (Korwatanasakul & Intarakumnerd 2020; Korwatanasakul 2019). These constraints hinder SMEs from boosting labour productivity.

Table 6: Effect of Global Value Chain Participation on Labour Productivity

	Dependent Variable: Labour Productivity					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Backward GVC participation (dummy)	0.159*** (0.013)		0.147*** (0.014)	0.397*** (0.017)		0.367*** (0.018)
Forward GVC participation (dummy)		0.088*** (0.013)	0.075*** (0.014)		0.175*** (0.019)	0.142*** (0.019)
K/L	0.700*** (0.007)	0.702*** (0.007)	0.694*** (0.007)			
K/L 2				0.137*** (0.004)	0.141*** (0.004)	0.133*** (0.004)
Small or medium-sized enterprise	–0.345*** (0.011)	–0.363*** (0.011)	–0.337*** (0.011)	–0.406*** (0.017)	–0.458*** (0.016)	–0.380*** (0.017)
Research and development	0.036** (0.017)	0.033* (0.017)	0.031* (0.017)	0.064*** (0.023)	0.093*** (0.024)	0.072*** (0.024)
Modern technology	0.037*** (0.011)	0.041*** (0.011)	0.035*** (0.011)	0.087*** (0.015)	0.091*** (0.015)	0.081*** (0.015)

	Dependent Variable: Labour Productivity					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Foreign ownership	–0.007 (0.012)	0.029** (0.012)	–0.015 (0.012)	0.031* (0.016)	0.139*** (0.016)	0.007 (0.017)
Constant	1.811*** (0.042)	1.859*** (0.044)	1.839*** (0.043)	5.336*** (0.029)	5.475*** (0.028)	5.325*** (0.029)
Observations	21,332	19,815	19,182	21,291	19,776	19,143
R-squared	0.596	0.601	0.605	0.307	0.303	0.317

Notes: K/L = capital per worker proxied by the logarithm of total assets per worker, K/L 2 = capital per worker proxied by the logarithm of the total value of machinery/technology per worker. Robust standard errors are in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1. All models control for industry and year-fixed effects.
Source: Authors.

Table 7 shows the estimation results of the GVC participation index on labour productivity. The results reveal that the estimated coefficients of backward GVC participation are negative and statistically significant in all regressions, contrasting with the results in Table 6. Yet the estimation results of the forward GVC participation index are similar to those estimated from the GVC participation dummy. The coefficients of forward GVC participation are positive, statistically significant, and robust across different specifications, supporting the hypotheses of learning-by-exporting and learning-by-supplying. Likewise, all control variables are statistically significant and robust.

Table 7: Effect of Global Value Chain Participation on Labour Productivity

	Dependent Variable: Labour Productivity					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
K/L = capital per worker proxied by the logarithm of total assets per worker						
Backward linkage (lag)	–0.052*** (0.019)				–0.044** (0.019)	
Backward linkage		–0.099*** (0.019)				–0.091*** (0.02)
Forward linkage (lag)			0.195*** (0.038)		0.188*** (0.038)	
Forward linkage				0.188*** (0.038)		0.173*** (0.038)
K/L	0.704*** (0.007)	0.705*** (0.007)	0.704*** (0.007)	0.705*** (0.007)	0.703*** (0.007)	0.704*** (0.007)

	Dependent Variable: Labour Productivity					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
K/L = capital per worker proxied by the logarithm of total assets per worker						
Small or medium-sized enterprise	–0.365*** (0.011)	–0.378*** (0.011)	–0.361*** (0.011)	–0.370*** (0.011)	–0.364*** (0.011)	–0.377*** (0.011)
Research and development	0.031* (0.017)	0.039** (0.017)	0.029* (0.017)	0.040** (0.017)	0.029* (0.017)	0.039** (0.017)
Modern technology	0.041*** (0.012)	0.041*** (0.012)	0.041*** (0.011)	0.039*** (0.011)	0.042*** (0.011)	0.04*** (0.011)
Foreign ownership	0.055*** (0.013)	0.069*** (0.013)	0.041*** (0.012)	0.0441*** (0.011)	0.049*** (0.013)	0.063*** (0.012)
Constant	1.843*** (0.045)	1.865*** (0.044)	1.837*** (0.045)	1.848*** (0.044)	1.843*** (0.045)	1.865*** (0.044)
Observations	18,771	19,184	18,769	19,182	18,769	19,182
R-squared	0.604	0.602	0.604	0.602	0.604	0.603
K/L 2 = capital per worker proxied by the logarithm of the total value of machinery/ technology per worker						
	(7)	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
Backward linkage (lag)	–0.097*** (0.027)				-0.085*** (0.026)	
Backward linkage		–0.113*** (0.028)				–0.102*** (0.027)
Forward linkage (lag)			0.290*** (0.053)		0.278*** (0.053)	
Forward linkage				0.252*** (0.052)		0.236*** (0.052)
K/L 2	0.144*** (0.004)	0.142*** (0.004)	0.144*** (0.004)	0.143*** (0.004)	0.144*** (0.004)	0.142*** (0.004)
Small and medium-sized enterprise	–0.468*** (0.017)	–0.478*** (0.016)	–0.462*** (0.017)	–0.469*** (0.016)	–0.467*** (0.017)	–0.476*** (0.017)
Research and development	0.083*** (0.025)	0.098*** (0.025)	0.082*** (0.023)	0.098*** (0.025)	0.081*** (0.025)	0.097*** (0.025)
Modern technology	0.093*** (0.016)	0.093*** (0.015)	0.093*** (0.015)	0.092*** (0.016)	0.094*** (0.015)	0.093*** (0.016)
Foreign ownership	0.186*** (0.017)	0.185*** (0.017)	0.161*** (0.016)	0.156*** (0.016)	0.178*** (0.017)	0.178*** (0.017)
Constant	5.490*** (0.031)	5.502*** (0.029)	5.476*** (0.031)	5.482*** (0.029)	5.484*** (0.031)	5.498*** (0.029)
Observations	18,736	19,145	18,734	19,143	18,734	19,143
R-squared	0.301	0.301	0.301	0.301	0.302	0.301

Notes: Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All models control for industry and year-fixed effects. Lag = a lag of one period.

Source: Authors.

The estimated results of the backward GVC participation indicate that, on average, firms engaging with backward linkages have higher labour productivity than non-GVC firms (Table 6). Nevertheless, when considering the level of GVC participation, the backward GVC participation index reveals the importance and risk of the degree to which firms rely on foreign inputs and technologies (Table 7). The results suggest that a higher level of backward GVC participation deteriorates labour productivity. Corredoira and Mcdermott (2014) argued that firms in host countries possibly fall into the trap of a subordinate role or a supporting supplier regardless of technological capabilities, reflecting the international division of labour. Although the division benefits Vietnam regarding static efficiency, the issue will likely worsen as technology transfer and domestic technology development do not occur automatically (Korwatanasakul & Intarakumnerd, 2020; Pietrobelli & Rabellotti, 2011). Ultimately, the subordinate role trap adversely affects firm labour productivity (i.e. a negative dynamic effect).

The adverse effect of backward GVC participation reveals the risk of heavy reliance on backward linkages, particularly regarding labour productivity. The problem does not only appear at the firm level but also the macro level, as discussed in Section 2. Heavy reliance on foreign inputs and technologies (i.e. intensive backward GVC participation) without further upgrading can lead to structural stagnation, erosion of national competitiveness, and growth slowdown. These results partly reject the learning-to-learn hypothesis predicting that firm import status positively correlates to labour productivity and highlights the risk of heavy reliance on foreign inputs and technology without domestic technology upgrading (i.e. intensive backward GVC participation). In contrast, the results confirm the positive effect of forward GVC participation and, therefore, the hypotheses of learning-by-exporting and learning-by-supplying. In addition, the significance of R&D, digital technology, and foreign investment emerges from the results.

In summary, the findings underscore the positive effects of GVC participation when considering the firm's GVC participation status (whether through backward or forward linkages). However, the results show a stark contrast when accounting for the GVC participation degree (represented by the GVC participation index). In particular, it reveals the negative effect of backward GVC participation on labour productivity. Consequently, these results partly reject the learning-to-learn hypothesis and confirm the views

of learning-by-exporting and learning-by-supplying. The findings also emphasise the role of R&D, digital technology, and FDI in enhancing labour productivity.

6. Conclusions and Policy Implications

This study describes the status of GVCs in Vietnam and examines the roles of GVC participation and technology in enhancing labour productivity in manufacturing firms. Employing a panel fixed-effect regression approach by matching firm-level data from the TCS and VES from 2009 to 2018, the findings show a negative impact of backward GVC participation on labour productivity, mainly when accounting for the degree of GVC participation. This observation contributes to the partial rejection of the learning-to-learn hypothesis. The rejection indicates the risk of intensive backward GVC participation, consistent with the macro-level analysis showing the adverse effects of heavy reliance on foreign inputs and technologies without further upgrading. On the other hand, the results support the hypotheses of learning-by-exporting and learning-by-supplying due to the positive effect of forward GVC participation on labour productivity. The analysis also shows the significance of R&D, digital technology, and foreign investment in promoting labour productivity.

Thus, based on these findings, policies to promote backward GVC participation should be well-designed and accompanied by strategies to facilitate technology transfer and domestic technology development. For instance, strengthening the domestic linkage and industrial agglomeration and, in turn, improving domestic R&D and digital technologies help avoid the risk of being trapped in a subordinate role within GVCs. Furthermore, policymakers should prioritise promoting forward GVC participation, as it improves firm labour productivity and creates production efficiency due to global competitive pressure. Policies promoting R&D, digital technologies, and foreign investment complement both backward and forward GVC participation promotion policies, helping reduce the risk of backward GVC participation and facilitating domestic firms to upgrade their production, technologies, and value chains. Lastly, policies that can practically address the challenges SMEs face – such as a lack of the ability to meet international standards, lack of managerial and human resources, limited access to credit and loans, and limited access to information and innovation – will help them

enhance their labour productivity.

One possible caveat in the analysis may be that the estimation model does not explicitly control industry- and country-level factors, such as input tariff liberalisation. However, the estimation model controls for year and industry-fixed effects, potentially mitigating this concern. Future research may consider employing a natural experiment to control for exogenous shocks to GVC participation. Moreover, due to data constraints, the analysis cannot account for the actual pattern of forward GVC participation and may overestimate the effect of forward GVC participation on labour productivity. The problem is common among GVC studies at the firm level and, therefore, urges rigorous GVC data collection. More comprehensive GVC data could benefit future research examining the role of forward GVC participation on labour productivity and other aspects.

Lastly, this study demonstrates the different estimated results between GVC participation indicators, status versus level or degree. This may be the result of the changes in sample firms. The sample with GVC participation dummies includes firms that switched between GVC and non-GVC status. In contrast, the sample with the GVC participation index involves firms that changed their degree of participation. A more detailed analysis considering the changes in firm GVC participation status, firm position in value chains, and the product level (i.e. what firms import and export) may help better understand the mechanism of GVC participation and labour productivity.

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