

Thailand and the Middle-Income Trap: An Analysis from the Global Value Chain Perspective

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Abstract: *The study provides a critical analysis through the lens of the global value chain (GVC) framework with empirical data on value-added trade to explain Thailand's middle-income trap (MIT) by matching GVC data at the firm, industry, and country levels with the economic development trajectory. The results show that participation in GVCs contributes to initial industrialisation and economic development. However, it does not guarantee subsequent technological upgrading, as there is a risk of falling into the middle-income technology trap (MITT). Thailand is highly dependent on passive technology and specialisation imposed by headquartered countries, trapping the country in the middle of value chains with limited knowledge and technology transfer. As a result, Thailand has fallen into the MITT, where it cannot sustain growth and catch up with the more innovative advanced economies, leading to it falling into the MIT. To escape both traps, the government can consider policies that address inadequate knowledge and technology transfer and the lack of capacity of local firms.*

Keywords: Economic development; Global value chain (GVC); GVC participation; Middle-income trap; Thailand

JEL Classification: F13, F14, O24

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1. Introduction

Historically, only 23 out of 101 economies classified as “middle-income” in 1960 managed to rise to the high-income level by 2022 (The Economist, 2023). In contrast, the rest experienced slower economic growth and fell into the middle-income trap (MIT) (Andreoni & Tregenna, 2020). Thailand is invariably one of the economies trapped in the MIT. It was considered a lower middle-income country from the 1970s to the 2000s and an upper middle-income country since 2011. Thailand joined global value chains (GVCs) predominantly at the assembly or production stage and sought to shift to higher value-added activities. Industries, such as parts and components, automobiles, and electrical appliances, have grown significantly. They are targeted as national strategic industries in the national economic and social development plans and the Industry 4.0 strategy, highlighting the importance of participation in GVC for Thailand’s economic development (Korwatanasakul, 2019). Although Thailand follows a similar strategy to the East Asian tiger economies that are rapidly industrialising, it has been a middle-income nation for several decades. Manufacturing remains specialised in labour-intensive and low value-added activities, especially assembly, suggesting that the country is caught in the middle-income technology trap (MITT) (Kumagai & Kuroiwa, 2020; Lee et al., 2020). Without local ownership and strong institutions, driven by science and technology (S&T) policies, to promote domestic value addition, the MITT eventually leads to MIT (Goto, 2011; Intarakumnerd, 2019; Lee et al., 2021). Of the limited number of studies on MIT and GVCs in Thailand, the existing literature tends to focus on S&T policy analyses (Intarakumnerd, 2019; Lee et al., 2020) and case studies, for example on agriculture (Choi & Andriessse, 2014), the automotive industry (Lee et al., 2021) and textiles (Goto, 2011), rather than empirically exploring the issues from a GVC perspective. It is, therefore, worthwhile to examine the link between MITT and MIT through the lens of the GVC framework.

Against this background, the paper aims to explore the link between MITT, GVCs and MIT and various stages. United Nations Conference on Trade and Development (UNCTAD’s) Eora database was used to empirically analyse Thailand’s GVC participation patterns and structure at the country and industry levels between 1990 and 2019, while cross-sectional data from the World Bank’s Enterprise Survey was used to examine GVC participation

patterns at the firm level, covering 727 Thai firms in 2016. Similarly, the study examines the role of firm characteristics in participation in GVCs. Matching firm, industry, and country-level GVC trends with the economic development trajectory helps to identify the relationship between firm-level GVC participation patterns and the different levels of GVC integration at the industry and country levels.

This study contributes to the long-standing policy debates on MIT, particularly in Thailand, in the following ways. First, it provides a critical analysis through the lens of the GVC framework with empirical data on value-added trade, which has not been much studied in the literature. Second, this study assesses Thailand's competitiveness in its strategic value chains, i.e., the electrical and electronics (E&E) and automotive industries, to identify challenges and solutions for upgrading GVCs. Finally, the study helps formulate policies integrating the GVC-led development model into the country's new policy agenda, such as policies that strengthen domestic capabilities and promote strategic GVC engagement.

2. MIT, GVC and MITT

Gill and Kharas (2008) first discussed the concept of MIT in 2008. The concept has been widely used in the development literature, although it still needs to be theorised (Bresser-Pereira et al., 2020; Felipe et al., 2017). More generally, MIT refers to a long-term stagnant economy that fails to maintain sustainable economic growth and reach the high-income level (Andreoni & Tregenna, 2020). The extensive literature on MIT discusses definitions (Garrett, 2004; Ohno, 2009), causes and underlying mechanisms, including global structural dynamics such as labour productivity growth and technology (Wade, 2016), global competitive dynamics (Lee, 2013; Lee & Ramanayake, 2018), premature deindustrialisation (Andreoni & Tregenna, 2020), and institutions and S&T policies (Klingler-Vidra & Wade, 2020)¹. The literature also attempts to associate MIT with the concept of GVCs to provide a more holistic view of MIT.

On the one hand, developing countries benefit from participating in GVCs because GVCs allow them to denationalise comparative advantage (Engel & Taglioni, 2017). In other words, GVCs allow firms to join international production networks instead of developing their value chains (Baldwin & Lopez, 2015). Through backward linkages and spillover

effects (Hausmann, 2014), developing countries can maintain their high growth rates and are well prepared to enter higher value-added production (upgrading). Participation in GVCs helps to escape the trap (Kummritz et al., 2017). On the other hand, the literature discusses the risks of joining GVCs, especially MITT (Andreoni & Tregenna, 2020). Lee et al. (2018) argues that joining GVCs does not guarantee upgrading, especially for products or value chains that differ substantially from a country's established specialisation (Fortunato & Razo, 2014). Typically, local enterprises in developing countries are passively integrated into value chains tied to low value-added and labour-intensive manufacturing activities (Eichengreen et al., 2014; Wade, 2016). This specific international division of labour limits knowledge and technology transfer between domestic firms and multinational enterprises (MNEs), as labour-intensive production activities, such as assembly or manufacturing technologically simple components, require simple technologies and limited collaboration (Knez, 2022). Domestic firms also rely too much on foreign investment and technologies from MNEs, leading to a lack of internalisation of innovation capacity (Goto, 2011; Raj-Reichert, 2020), premature deindustrialisation and weak productivity growth (Eichengreen et al., 2014). Without technological catch-up, their comparative advantage of cheap labour erodes over time due to rising labour costs. Domestic factors, such as low domestic enterprise capacity, insufficient human capital development (Lee et al., 2018) and weak institutions and S&T policies (Klingler-Vidra & Wade, 2020; Ravenhill, 2014), also contribute significantly to this problem. Ultimately, developing countries are structurally trapped in the MITT or imitation trap (Grodzicki & Skrzypek, 2020; Hartmann et al., 2021; Pleticha, 2021) and thus also in the MIT (Lee, 2013).

Previous studies examined the link between GVCs and the MIT through comparative country studies and industry-level case studies with S&T policy analyses (Klingler-Vidra & Wade, 2020), while a few examined the issue with empirical GVC data (Korwatanasakul, 2023; Korwatanasakul & Hue, 2022; Kumagai & Kuroiwa, 2020; Lee et al., 2018). Lee and Narjoko (2015) point out that micro-data studies are lacking due to data limitations, especially in Southeast Asian countries. Comparative country studies tend to compare: (1) economies that have successfully escaped from MIT (Korea and Taiwan) with those that have fallen into the trap (China, Malaysia and Vietnam) (Kumagai & Kuroiwa, 2020; Lee et al., 2021); (2) different MIT

countries within the same region (Lee et al., 2021), and (3) MIT countries from different regions, especially South America and Asia (Andreoni & Tregenna, 2020). Industry-level case studies typically examine the issue through value chains in agriculture, food, automotive, apparel, electronics, and information technology (IT) (Andreoni & Tregenna, 2020; Raj-Reichert, 2020). In general, the studies support discussions on the benefits and risks of GVCs and how GVCs relate to MIT. Lee et al. (2018) and Andreoni and Tregenna (2020) hypothesise that participation in GVCs proceeds in three stages to progress to the high-income level successfully, the so-called “in-out-in-again” hypothesis: (1) joining GVCs to initially benefit from foreign knowledge and production capabilities (breaking into); (2) internalising and upgrading innovations to develop its value chains independently of foreign-dominated GVCs (linking up); and (3) reintegrating back into GVCs and retaining the capabilities to run value chains (linking back and keeping pace).

3. Methodology

3.1. Data and Level of Analysis

This study utilises the UNCTAD-Eora database on GVCs. It uses value-added trade data derived from Eora’s global multi-regional input-output table to empirically examine the patterns and structure of Thailand’s GVCs at the country and industry levels. The data include information on the share of foreign value added in exports (FVA), the share of domestic value added in exports (DVA), value added integrated with other countries’ exports (DVX) and Thailand’s gross exports for the period 1990–2019.² The country and industry-level analyses empirically examine Thailand’s GVC participation patterns and structure using the UNCTAD Eora database, which covers 27 industries between 1990 and 2019.

In examining engagement patterns in value chains at the firm level, we used cross-sectional data from the World Bank’s Enterprise Survey 2016, which covers 727 manufacturing firms in Thailand. We constructed two GVC participation indicators, a GVC participation dummy and a GVC participation index, based on Urata and Baek (2021) and Korwatanasakul and Paweenawat (2021). The GVC participation dummy indicates whether firms participate in GVCs (GVC firms) regardless of the types and level of participation. Similarly, firms can join GVCs through backward or forward

linkages. Firms participate in backward linkages by importing foreign inputs to produce their intermediate or final goods and services to be exported. In contrast, they join forward linkages by exporting domestically produced intermediate goods or services to another firm in another economy, which then re-exports them through the value chain to a third firm in a third economy as a component of other goods or services for further processing.³ In contrast, the GVC participation index measures the degree of GVC participation. The index is calculated by multiplying the ratio of exports to total sales and the ratio of foreign inputs to total inputs of the firms.

The industry-level analysis focuses on manufacturing and strategic industries, i.e. automotive and E&E, as they are the most important for Thailand's GVC participation. At the industry level, the empirical analysis is complemented by other evidence. Based on the data of domestic and international sales and input procurement, firms are divided into six categories, including 1) firms without foreign trade engagement, both sales and input procurement, 2) firms procuring foreign input but selling their products domestically only, 3) firms engaging with international sales but sourcing their inputs domestically only, 4) firms engaging with domestic and international sales but only sourcing their inputs domestically, 5) firms sourcing their inputs domestically and internationally but only engaging with international sales, and 6) firms with foreign trade engagement, both sales and input procurement, for domestic and international markets. Firms in the fifth and sixth categories are GVC firms, as they engage with international sales and input procurement. The study also explores how firm-level characteristics (variables) possibly correlated with GVC participation (GVC participation dummy) and the level of GVC participation (GVC participation index) using the Probit and Tobit regression as shown in equations (1) and (2), respectively.

$$\begin{aligned} \Pr(GVC_{it} = 1|Z_{it}) &= \Phi(\alpha + \beta_1 Labour\ Productivity_{it} + \beta_2 SME_{it} + \beta_3 Firm\ Age_{it} \\ &+ \beta_4 Foreign\ Ownership_{it} + \beta_5 Quality\ Certification_{it} \\ &+ \beta_6 Financial\ Access_{it} + \delta_k + \mu_t + \varepsilon_{it}) \end{aligned} \quad (1)$$

$$\begin{aligned} GVCindex_{it} &= \alpha + \beta_1 Labour\ Productivity_{it} + \beta_2 SME_{it} + \beta_3 Firm\ Age_{it} \\ &+ \beta_4 Foreign\ Ownership_{it} + \beta_5 Quality\ Certification_{it} \\ &+ \beta_6 Financial\ Access_{it} + \delta_k + \mu_t + \varepsilon_{it} \end{aligned} \quad (2)$$

where GVC_{it} is GVC participation dummy (1 = participating in GVCs, otherwise 0) of firm i in year t , while $GVCindex_{it}$ measures the degree of GVC participation of firm i in year t . Firm-characteristic variables include labour productivity ($Labour\ Productivity_{it}$), small and medium enterprise (SME_{it}), firm age ($Firm\ Age_{it}$), the share of foreign ownership ($Foreign\ Ownership_{it}$), ownership of internationally recognised quality certification ($Quality\ Certification_{it}$), and proportion of external funds to purchase fixed assets ($Financial\ Access_{it}$). Table 1 provides summary statistics and a description of the variables and measurements. Based on previous studies such as Harvie et al. (2010), Lu et al. (2018), and Wignaraja (2013), we expect all firm characteristics except firm age to have positive effects on participation in GVCs.⁴ Our analysis only examines firm characteristics, aiming to understand the differences between firm characteristics rather than to establish full causal relationships. This is also due to the limited availability of data.

Table 1: Summary Statistics and Variable Description

Variable	Description	Observation	Mean	Standard deviation	Min	Max
GVC participation	Global value chain (GVC) participation dummy - whether a firm joins GVCs	717	0.0697	0.2549	0	1
GVC participation index	A GVC index is computed as (exports/total sales)×(procurements from foreign countries/ total procurements). It indicates the level of GVC participation	717	0.0119	0.0704	0	1
Labour productivity	Logarithm of labour productivity based on value-added calculated by dividing annual sales by the number of employees	559	13.5552	1.7848	7.71	19.17
Firm size	Logarithm of total employees	584	3.2778	1.2995	0.69	8.01
Firm age	Number of years in operation	712	18.4691	9.4160	0	67
Foreign ownership	The share of equity owned by foreign firm (%)	703	0.0503	0.1816	0	1

Variable	Description	Observation	Mean	Standard deviation	Min	Max
Quality certification	Ownership of internationally recognised quality certification	688	0.3299	0.4705	0	1
Financial access	Proportion of external funds to purchase fixed assets	727	0.2640	0.3675	0	1

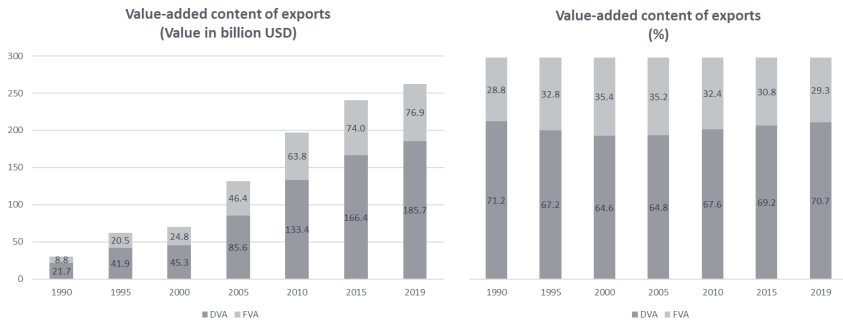
Source: Author, based on the World Bank's Enterprise Surveys data (2016) and World Bank Open Data (World Bank, 2023).

4. Findings

4.1 *Global Value Chains and MIT (Country-Level Analysis)*

Thailand's rapid economic development is primarily explained by its successful participation in GVCs by promoting trade liberalisation and attracting more foreign direct investment (FDI). The reliance on foreign inputs such as intermediate goods and technologies enables the country to achieve higher productivity and access a larger market (Intarakumnerd & Korwatanasakul, 2020; Korwatanasakul & Paweenawat, 2021; Korwatanasakul & Baek, 2021). As shown in Figure 1, the share of DVA, the part of a country's exports produced within the country, in gross exports has declined from 71.2% in 1990 to 70.7% in 2019. However, the decline in the DVA share of gross exports was accompanied by an increase in the volume of DVA (from US\$21.7 billion to US\$185.7 billion) and an increase in gross exports (from US\$30.5 billion to US\$262.5 billion), which grew by 8% annually. Thailand increased its economic activity in terms of total exports and production while using more FVA, the part of a country's gross exports that consists of inputs produced in other countries, to produce its exports, with an annual growth rate of 8%.

Figure 1: Trade in Value-Added of Thailand



Notes: DVA = domestic value-added content of exports; DVX = domestic value-added content of exports used in other countries’ exports; FVA = foreign value-added content of exports; GVC = global value chain; GVC participation = FVA + DVX; Total exports = DVA + FVA; USD = United States dollar

Source: Author, based on UNCTAD-Eora (2023).

Regarding sources of FVA, inputs for Thailand’s exports from Japan and Western economies, including the European Union (EU) and the United States (US), have been replaced in recent decades by inputs from China and other neighbouring countries. Japan was once the largest supplier of inputs to Thailand’s exports, but its share declined from 27.4% in 1990 to 11.2% in 2019 (Table 2). Similarly, the US and the EU have become less important in recent years. For instance, the US was the second largest FVA contributor to Thailand’s exports. The share of FVA from the US was 10.8% in 1990 but declined to 7% in 2019. Thailand has moved to take more inputs for the production of its exports from China (24.7%), South Korea (4.4%), India (3.3%) and Association of Southeast Asian Nations (ASEAN) countries (e.g. Malaysia (5.5%) and Indonesia (3.3%)). The shares of FVA from China and the ASEAN countries have increased significantly and are the largest and second largest, respectively, in 2019.

Table 2: Foreign Value-Added Content by Source and Domestic Value-Added Content by Export Destination

% of FVA				% of DVX			
Country	1990	2019	Annual Growth (%)	Country	1990	2019	Annual Growth (%)
China	3.1	24.7	15.8	China	0.8	9.8	18.9
Japan	27.4	11.2	4.5	Germany	8.8	9.6	9.5
USA	10.8	7.0	6.2	Singapore	7.6	8.7	9.7
Malaysia	2.6	5.5	10.5	Netherlands	7.1	7.7	9.5
Germany	6.4	5.3	7.1	Malaysia	4.3	7.3	11.1
South Korea	2.4	4.4	10.1	Japan	10.3	6.4	7.4
Indonesia	1.8	3.3	10.1	South Korea	2.8	3.7	39.4
India	1.3	2.5	10.3	Belgium	4.9	3.5	8.0
Australia	3.5	2.3	6.2	Canada	2.0	3.3	11.0
France	3.1	2.1	6.4	UK	3.9	3.1	8.3
Other	37.8	31.7		Other	47.3	37.0	

Notes: DVX = Domestic Value-Added content of exports used in other countries' exports; FVA = Foreign value-added content of exports

Source: Author, based on UNCTAD-Eora (2023).

The declining FVA shares of Japan and Western economies resulted from relocating their production bases to Thailand in response to the local content requirement in the 1970s, trade liberalisation and attractive FDI policies in the 1990s. Foreign firms, especially Japanese and American, brought capital and technology to set up their production facilities in Thailand, reducing the import share of intermediate and final products from both countries. However, the volume of imports remained constant, while sales of Japanese and American subsidiaries in Thailand increased (Korwatanasakul, 2019). Thailand benefited from backward linkages through an initial transfer of knowledge and technology, achieved a higher position in GVCs, and produced more sophisticated products. It shifted from light to heavy industry and became more dependent on raw materials and intermediate products from China and neighbouring countries. In addition, Thailand became more important as a producer for neighbouring economies, including ASEAN, China, and South Korea. As Thailand moved up the value chain, it could export more inputs used in other countries' exports. Forward

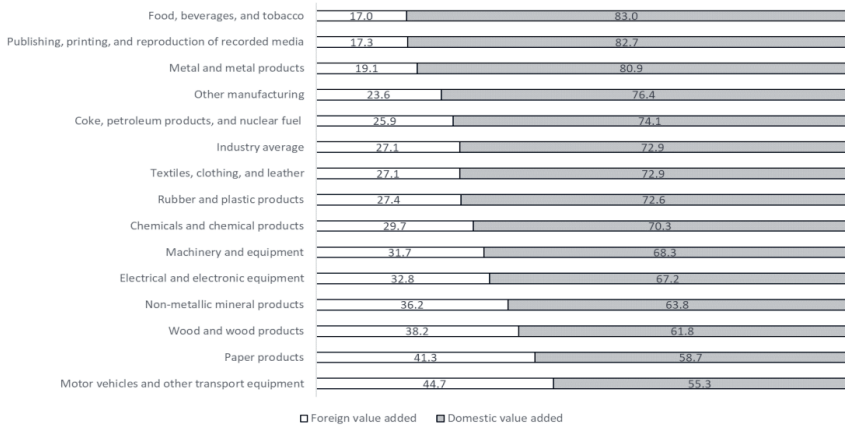
linkages show increasing trade volumes between 1990 and 2019 (Table 2). Over the same period, DVX volumes to ASEAN, China and South Korea grew at annual rates of 10%, 19% and 40%, respectively.

The country-level analysis shows that participation in GVCs has promoted industrialisation and Thailand's economic growth. The country benefited from the initial transfer of knowledge and technology from developed countries, particularly Japan and the US, consistent with previous literature (Hausmann, 2014). Consequently, with the help of foreign technology and infrastructure development, Thailand was able to improve its value chains and play an essential role in regional production networks within Southeast Asia by exporting more inputs that fed into other countries' exports. However, despite all the benefits of joining value chains, Thailand's economic growth is not sustainable, and the country is not able to become a high-income country. Moreover, the share of DVA and FVA in total exports remains reasonably constant between 1990 and 2019, even though export volumes have increased significantly and the share of FVA in total exports has decreased slightly. Therefore, further industry and firm-level investigation is worthwhile to solve the remaining puzzle.

4.2. Middle-income Technology Trap to Middle-income Trap (Industry-Level Analysis)

Although gradual upgrading in the manufacturing sector, especially in the E&E and automotive industries, has been observed, the upgrading is yet to reach a satisfactory level. Thailand has relied heavily on foreign intermediate goods and technology to produce its exports. Its strategic industries, i.e. E&E and automotive, are among the top five industries with the highest FVA share of exports by industry, at 44.7% and 32.8%, respectively (Figure 2). The shares of both industries are 5.7% - 17.6% higher than the industry average.

Figure 2: Share of Foreign Value Added in Exports by Industry, 2017



Source: Author, based on UNCTAD-Eora (2023).

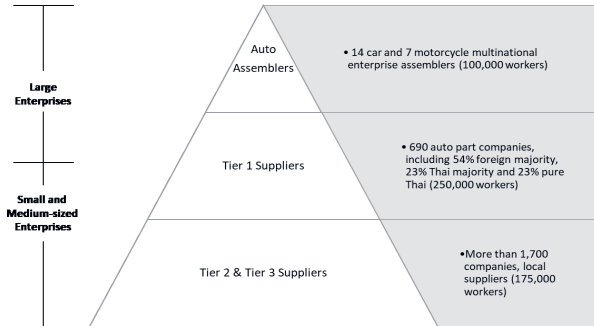
4.2.1 Automotive industry

Thailand's policy to promote the automobile industry began in the 1960s and focused on attracting automobile assembly and local parts production. The government issued a minimum local content requirement (LCR) for assembly to encourage local investment and increase the DVA share. In the late 1970s, Thailand introduced localisation policies to reduce trade deficits and increase industry growth. Likewise, import bans, tariffs and higher LCRs were introduced to improve DVA. Due to the yen's appreciation, Japanese manufacturers relocated to Thailand in the late 1980s, encouraging FDI inflows and multinational participation. The economic crisis 1997 led to a relaxation of foreign ownership rules, which previously required a Thai citizen to own a majority stake.

Although local Thai suppliers are forced to improve their operations and technologies to meet global standards and remain in the value chain, they focus on lower-tier and less technologically oriented production activities. In 2018, the auto industry hosted more than 2,400 firms, of which about 1,700 were local Tier 2 and 3 suppliers, and 690 were Tier 1 auto parts companies owned by foreign and local firms (Figure 3). In contrast, all auto assemblers belonged to multinational enterprises, including 14 car and seven motorcycle assemblers. Thus, the DVA share of automotive exports is mainly generated

by the accumulation of labour, and labour cost advantages in assembly rather than domestic technological know-how, which highlights the importance of the quality of DVA sources (labour cost advantages over technological advantages) for industrial and economic development.

Figure 3: Structure of Thai Automotive Industry, 2018



Source: Korwatanasakul and Intarakumnerd (2020).

The industry relies heavily on imported inputs and technologies from the production network, especially from headquarter economies, with the FVA accounting for 44.7% of automotive exports (Figure 2). Local firms' low technological and innovative capabilities are the biggest challenge for the Thai automotive industry. Modularisation or specialisation on a particular part prevents local suppliers from entering higher value chains. Each local supplier specialises in producing a particular component without knowing the entire modular system controlled by foreign global mega-suppliers in Tier-1. This contributes to minimal interactions with firms in other modules and stages of the value chain. Therefore, modularisation limits upstream knowledge and technology transfer from assemblers and top-tier suppliers to lower tiers (local suppliers). As a result, it is difficult for local firms to catch up with multinationals from the countries where they are headquartered regarding more sophisticated tasks, e.g. R&D and product design.

4.2.2 Electrical and electronics industry

Similar to the automobile industry, Thailand entered the value chains of the E&E industry in the 1970s by specialising in low-skilled, labour-intensive activities through labour cost advantage. Through technical acquisitions and upgrades since the 1980s, the country became one of the manufacturing hubs for E&E and a global production centre for hard disc drives. In the early 1990s, Thailand's National Centre for Electronics and Computer Technology began to support local microelectronics by promoting advanced integrated circuit design and wafer fabrication. In 1998, the Electrical and Electronics Institute was established under the Ministry of Industry to improve Thailand's global competitiveness in this sector. Its objectives include promoting local materials, improving product quality, and becoming a hub for research and information related to the E&E industry. The E&E industry makes a significant contribution to the Thai economy. In 2019, the E&E sector contributed about 13% of GDP and \$34 billion of exports. Approximately 3,939 E&E firms operate in Thailand, of which 84% are domestic SMEs (Electrical and Electronics Institute, 2019). Nevertheless, domestic firms account for only 7% of total exports, leaving 93% for MNEs that are more capital and technology intensive.

Thailand's E&E industry is relatively in the middle of the value chain. It focuses on skill-intensive production activities, i.e., the assembly and testing of complex and sophisticated components, subsystems and E&E consumer and industrial products, and operates within the low to medium value-added segments (Korwatanasakul, 2023). As a result, the industry relies excessively on its cheap labour and imported production factors, including components and subsystems from neighbouring ASEAN countries and higher technology from headquarter economies such as Japan. In 2017, DVA accounted for 67.2% of total exports, while FVA accounted for 32.8% (Figure 2). The relatively high share of FVA compared to other industries reflects the nature of the E&E industry, where most knowledge, parts and components, and innovations come from abroad. In other words, Thai E&E value chains are characterised by backward linkages (high FVA share in exports) due to heavy reliance on imports of raw materials, components, subsystems, and foreign technology.

Similar to the automotive industry, the E&E industry has also fallen into the MITT. Although local E&E firms have made technical acquisitions and upgrades, headquarter economies monopolise R&D activities for new products and innovations, usually outside Thailand (Hobday & Rush, 2007). Regardless of firm size, local firms acquire the knowledge and technology needed to perform their specific tasks rather than invest in their research and innovation activities (Intarakumnerd et al., 2016). Over time, Thailand lost its competitiveness in labour-intensive manufacturing due to rising wages, while the limited technological capabilities of local firms prevented the country from occupying a higher position in the value chain. As a result, Thailand's heavy dependence on foreign inputs has trapped it in low to medium value-added segments.

The industry-level analysis is consistent with the general literature on the benefits and risks of participating in GVCs. It partially confirms the in-out-in-again hypothesis proposed by Lee et al. (2018) and Andreoni and Tregenna (2020). It shows that upgrading occurs only in the early stages and only to the extent that local firms can efficiently perform their specific tasks with relatively low value added. The tasks are usually labour-intensive and dependent on innovation by the MNEs. Limited foreign knowledge and technology transfer can be observed, which explains the constant share of DVA and FVA in total exports since 1990 (Figure 1). As a result, industries are caught in the middle of value chains and MITT, where industries tend to join value chains through backward GVC participation (relatively high FVA share in exports) rather than producing innovative intermediates and technology for export (forward linkage participation). Furthermore, the analysis suggests that GVC data may not comprehensively analyse a particular industry without a contextual analysis, e.g., at the industry level. Thus, the causes of a higher DVA share in exports may be either labour cost advantages or domestic innovation. Therefore, a high DVA share in exports does not guarantee the benefits of GVC participation, as the share may not lead to upgrading, which underlines the importance of the quality of a DVA source.

4.3. Local Firms' Characteristics and Global Value Chain Participation (Firm-Level Analysis)

4.3.1 Patterns and structure of GVC participation

Thai firms' engagement in foreign trade contrasts sharply with the global GVC participation pattern. Regardless of firm size,⁵ the largest share of Thai firms, 65.6%, are not involved in foreign trade, sales and procurement of inputs (Table 3, column 1), which is 20.1% higher than the global GVC participation pattern (45.5%) (Urata & Baek, 2021).⁶ The second largest category is that of firms that sell both domestically and internationally but source their inputs only domestically (Table 3, column 4), which is 19.7% and 12.2% above the global GVC participation pattern (7.5%) (Urata & Baek, 2021). The analysis also reveals that firm shares without foreign trade participation become smaller as firm size increases, i.e., small firms: 81%, medium firms: 51%, and large firms: 42%. This result is consistent with the industry-level analysis, which shows that domestic enterprises are in the relatively lower tiers that rely on local inputs and a domestic market. In other words, they do not have the opportunity to engage in backward and forward GVC participation.

Table 3: Patterns of Engagement in Foreign Trade for the Sample Firms, 2016

Patterns		1	2	3	4	5	6	Missing	GVC firms (5+6)	Total
Sales	Domestic	O	O	X	O	X	O	.	X/O	.
	Exports	X	X	O	O	O	O	.	O	.
Inputs	Domestic	O	O	O	O	O	O	.	O	.
	Imports	X	O	X	X	O	O	.	O	.
Number of firms										
Firm size	Small (1-50)	336	12	8	45	3	5	6	8	415
	Medium (51-200)	68	5	3	47	1	8	1	9	133
	Large (> 200)	15	0	1	14	4	0	2	4	36
	Missing	58	13	5	37	2	27	1	29	143
	Total	477	30	17	143	10	40	10	50	727

Patterns		1	2	3	4	5	6	Missing	GVC firms (5+6)	Total
% of firms by foreign trade engagement pattern within each size firm										
Firm size	Small (1-50)	81.0	2.9	1.9	10.8	0.7	1.2	1.4	1.9	100
	Medium (51-200)	51.1	3.8	2.3	35.3	0.8	6.0	0.8	6.8	100
	Large (> 200)	41.7	0.0	2.8	38.9	11.1	0.0	5.6	11.1	100
	Missing	40.6	9.1	3.5	25.9	1.4	18.9	0.7	20.3	100
	Total	65.6	4.1	2.3	19.7	1.4	5.5	1.4	6.9	100

Notes: GVC = global value chain; O = Having exports of products/imports of foreign inputs; X = Not exports of products/imports of foreign inputs; . = not applicable (missing).

Source: Author, based on the World Bank’s Enterprise Surveys data (2016).

In Thailand, the share of GVC participating firms is 6.9% (columns 5 and 6), about three times lower than the global pattern, where 20.7% are GVC firms (Urata & Baek, 2021). Urata and Baek (2021) note that Thailand’s relatively low share of GVC firms is puzzling, as the economy is primarily driven by trade and FDI. However, the concentration of local firms in the relatively lower stages of production, as shown in the industry analysis of the automotive and E&E industries, and policies that mandate local content may explain the relatively low share of GVC firms. For example, about 1,700 local firms, representing 70% of firms in the automotive industry, are in tiers 2 and 3. They use local inputs to produce intermediate products that they supply domestically to higher-tier suppliers. In addition, Thai industries are concentrated in the assembly segments. Therefore, the larger share of Thai exports consists of final products (60%) rather than parts and components (40%), especially in the machinery trade (JETRO’s Global Trade Atlas, 2023). The share is lower than that of Malaysia, the Philippines, Singapore and Viet Nam but comparable to Indonesia’s.

Among GVC participating firms, GVC participation increases with size (Table 3, columns 6). The proportions of GVC firms in the small, medium, and large categories are 1.9%, 6.8% and 11.1%, respectively. The statistics may indicate higher barriers to participation in GVCs for SMEs. Economies of scale, access to finance and information, technological capacity and international standards may hinder SME participation in GVCs (Korwatanasakul, 2019; Korwatanasakul & Intarakumnerd, 2020 & 2021; Korwatanasakul & Paweenawat, 2021).

4.3.2 *GVC-firm characteristics*

Table 4 shows the regression results of probit (columns 1 and 3) and tobit (columns 2 and 4) for GVC participation for both GVC measures. Among firm characteristics, foreign ownership, quality certification and financial access are positive and statistically significant in explaining the likelihood of GVC participation (Harvie et al., 2010; Lu et al., 2018; Urata & Baek, 2021; Wignaraja, 2013). However, only foreign ownership matters when the GVC index is used as the dependent variable, while other firm characteristics are insignificant. To check robustness, we estimate the regression excluding labour productivity, as labour productivity may be correlated with other firm characteristics. The results reported in columns 3 and 4 remain consistent with the earlier results. Foreign ownership, quality certification and financial access are the determinants of GVC participation. Notably, foreign ownership is statistically significant and robust across different model specifications, i.e. GVC participation probability and GVC participation level, indicating the importance of MNEs in engaging local firms in value chains. In other words, local firms can be more integrated into GVCs through their interactions with MNEs (Qiang et al., 2021). Local firms with higher levels of foreign ownership tend to engage in value chains and have higher GVC involvement.

Table 4: Regression Results: Firm Characteristics and GVC Participation

Independent variables	Dependent variables			
	GVC participation (probit)	GVC participation index (tobit)	GVC participation (probit)	GVC participation index (tobit)
	1	2	3	4
Labour productivity	-0.054 (0.093)	-0.004 (0.003)		
Firm size	-0.003 (0.087)	3.92e-07 (0.002)		
Firm age	0.001 (0.006)	-5.25e-05 (0.001)	-0.001 (0.007)	-0.001 (0.001)
Foreign	2.226***	0.225***	2.312***	0.227***

Independent variables	Dependent variables			
	GVC participation (probit)	GVC participation index (tobit)	GVC participation (probit)	GVC participation index (tobit)
	1	2	3	4
ownership	(0.312)	(0.085)	(0.263)	(0.069)
Quality	0.718**	0.012	0.859***	0.009
Certificate	(0.329)	(0.014)	(0.218)	(0.007)
Financial	0.572*	-0.006	0.634***	-0.007
Access	(0.315)	(0.012)	(0.203)	(0.011)
Constant	-1.792 (1.433)	0.049 (0.042)	-2.448*** (0.199)	0.004 (0.005)
Observations	518	518	642	642

Notes: GVC = global value chain; Standard errors are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. All models are controlled for industry-fixed effects.

Source: Author, based on the World Bank's Enterprise Surveys data (2016) and World Bank Open Data (World Bank, 2023).

The results are consistent with country and sector-level analyses showing that GVC-induced industrialisation and upgrading occur among local firms. Local firms passively participated in GVCs through innovation, specialisation and division of labour imposed by MNEs. Purely local firms (100% domestic ownership) are concentrated in the lower production stages, while firms with higher foreign ownership are placed in the higher production stages, as shown in Figure 3. The estimated results for quality certification and access to finance show that firms with quality certification and access to finance have a higher chance of participating in GVCs. However, both firm characteristics do not contribute to firms increasing their degree of GVC participation. In other words, quality certification and access to finance could help firms meet minimum requirements, such as international standards, to participate in value chains initially. However, improving and intensifying participation in GVCs requires more technology, management skills and financial resources than quality certification and financial access (Korwatanasakul & Paweenawat, 2021). The results support the country and sector-level analyses and show the MITT among local firms.

Years in operation (firm age) and firm size are unrelated to the probability and extent of GVC participation. The results are partly consistent with those of Harvie et al. (2010), who find no relationship between firm

age and GVC participation. Korwatanasakul (2023) suggests that a negative relationship between firm age and GVC participation, e.g. younger firms with agility in management and technology use (Lu et al., 2018; Urata & Baek, 2021; Wignaraja, 2013), may offset a positive relationship, e.g. older firms with accumulated experience, market intelligence and networks. Moreover, the firm size estimates are inconsistent with the existing literature (Harvie et al., 2010; Lu et al., 2018; Urata & Baek, 2021) and the firm-level descriptive analysis in Section 5.1, which shows a positive relationship between firm size and GVC participation. The inconsistency between the estimated results and the descriptive trends may be due to a few observations of GVC firms, leading to insufficient data variation between GVC firms of different sizes. The overall descriptive analysis of firm characteristics shows that only 7% of Thai firms are GVC firms. However, the proportion of GVC firms increases with size, as small, medium and large GVC firms account for 1.9%, 6.8% and 11.1% of firms within the same size category, respectively. (Table 3, column 6).

5. Conclusion

Overall, the estimated results in Thailand's context with country-level GVC data are consistent with the literature that participation in GVCs promotes initial industrialisation and economic development. Thailand joined GVCs predominantly by focusing on low value-added activities. However, industries such as E&E and automobiles experienced strong growth and contributed significantly to the rapid development of the economy. Over time, Thailand has relied on foreign inputs and technology without sufficiently developing domestic industries and innovations and, as a result, has fallen into the MITT. A constant share of DVA and FVA in total exports since 1990 indicates limited upgrading across industries, possibly due to modest technology transfer and lack of capacity of domestic firms, which is later confirmed by the industry-level analysis. The lack of capacity to upgrade and eroding competitiveness in labour-intensive manufacturing made it more difficult for Thailand to sustain growth and catch up with the more innovative advanced economies, and it fell into the MIT.

The industry-level analysis shows that Thailand has been successful in upgrading, relying mainly on foreign inputs and technology. Nevertheless, there is room for improvement in product, functional and supply chain

upgrading, as this has only occurred to the extent that local firms can efficiently perform their specific tasks with relatively little added value. Industries are characterised by backward GVC participation and trapped in the middle of value chains and MITT as passive technology. Specialisation in a particular part within value chains prevents knowledge and technology transfer. The analysis also highlights the need for contextual analysis of each industry to understand the value chain components, especially the share of DVA in total exports and the importance of the quality of DVA sources, including labour cost advantage and domestic innovation.

Finally, the firm-level analysis supports the country- and industry-level results, which show that most local firms are tied to the lower market segments and use local intermediate inputs to produce intermediate goods to supply the higher market segment suppliers at home. Moreover, the estimation models reveal a positive relationship between foreign ownership share and participation in GVCs, indicating the importance of MNEs in engaging local firms in value chains and the challenge for fully locally owned firms and local firms with relatively limited foreign ownership in upgrading or moving up value chains. In addition, upgrading may require other (more sophisticated) factors to facilitate upgrading for firms beyond simple quality certification and financial access.

In summary, participation in GVCs is no guarantee of subsequent technological improvement, as there is a risk of falling into the MITT and, thus, into the MIT. MITT is primarily the result of inadequate knowledge and technology transfer and a lack of capacity on the part of local enterprises. To avoid both traps, policymakers should not set participation in GVCs as a policy goal but see it as a means to innovate, upgrade and diversify through better agreements and arrangements with MNEs. In addition, policymakers should also promote the capacity of local firms and skilled labour, as well as innovation.

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Notes

- ¹ For a more comprehensive literature review on the MIT, see Andreoni and Tregenna (2020), Gill and Khara (2015), and Lee and Narjoko (2015).
- ² According to Korwatanasakul, Baek, & Majoe (2020), individual economies/firms can participate in global value chains (GVCs) through backward or forward participation. Backward GVC participation (backward linkage) refers to the situation where an individual economy/firm imports foreign inputs to produce its intermediate or final goods and services to be exported. In contrast, forward GVC participation (forward linkage) occurs when exporting domestically produced intermediate goods or services to another economy/firm in another economy that then reexports them through the value chain to third economies/a firm in third economies as embodied in other goods or services for further processing.
- ³ Due to the data limitation on forward linkages, GVC firms in this study only refer to firms that join GVCs through backward linkages. Moreover, the problem of missing values may complicate the analysis of firm size.
- ⁴ For a theoretical discussion of the relationship between the dummy and the index of GVC participation and the individual variables for firm characteristics, see Urata and Baek (2021) and Korwatanasakul and Paweenawat (2021). Some variables were omitted or adjusted due to unavailability of data.
- ⁵ The study follows the firm size criteria of the Ministerial Regulation on the Number of Employees in SMEs and the Value of Total Fixed Assets BE2545 (2002), Ministry of Industry (Thailand) (2002). The regulation was valid until 2018, one year before the new Ministerial Regulation on SME Classification BE2562 (2019), the Ministry of Industry (Thailand) came into effect.
- ⁶ Urata and Baek (2021) also examined the pattern of engagement in foreign trade at the firm level using the World Bank Enterprise Surveys in 111 countries, including Thailand.

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