DECEMBER 2024

DISCUSSION PAPER SERIES NO. 2024-39

The Role of Services in Global Value Chains: Assessing the Servicification of Philippine Manufacturing Industries

Neil Irwin S. Moreno

CONTACT US:

RESEARCH INFORMATION DEPARTMENT
Philippine Institute for Development Studies

18th Floor, Three Cyberpod Centris - North Tower
EDSA corner Quezon Avenue, Quezon City, Philippines

publications@pids.gov.ph
(+632) 8877-4000

https://www.pids.gov.ph

The Role of Services in Global Value Chains: Assessing the Servicification of Philippine Manufacturing Industries

Neil Irwin S. Moreno

PHILIPPINE INSTITUTE FOR DEVELOPMENT STUDIES

December 2024

Abstract

The emergence of global value chains (GVCs) in recent years has underlined the increasing reliance of manufacturing industries on services. Manufacturing firms have intensively used service inputs, performed in-house services activities, and sold services embedded in, or bundled with goods. Considered a services economy, the Philippines could leverage services to develop a competitive manufacturing sector and strengthen its GVC integration. This study assessed the servicification of the Philippine manufacturing sector, in the context of trade and GVCs. Using trade in value added data, we observed that the contribution of services in Philippine manufacturing exports has been on par with that of its regional neighbors; however, Philippine manufacturing has had weak linkages with modern services, such as ICT and business services. Based on establishment surveys/censuses, Philippine manufacturing firms extensively use service inputs, but R&D activities and sale of services have been less common. We also estimated the relationship between servicification and export participation, and found that sale of industrial services, utilization of transport services, and employing R&D personnel were associated with higher probability of exporting. Drawing from the empirical findings, we posit the need to develop the country's modern services sectors, and strengthen their linkages with manufacturing industries. Promoting R&D and innovation among firms could also develop their capabilities, making them competitive to enter export markets. Moreover, firms looking to export could benefit from potential reductions in transport and logistics costs, brought about by the streamlining of transport regulations and procedures.

Keywords: servicification, trade in value added, manufacturing, GVCs

Table of Contents

List of Figures

List of Tables

List of Appendices

The Role of Services in Global Value Chains: Assessing the Servicification of Philippine Manufacturing Industries

Neil Irwin S. Moreno

1. Introduction

Services have been dominating the global economy since the late 1990s. The sector has accounted for around 62 to 65 percent of world gross domestic product (GDP), while its share in world employment increased from 35 percent in 1991 to 50% in 2021. Moreover, the emergence of services was evident in global trade and production—in terms of trade in value added, services covered around half of total exports, and 30 percent of manufacturing exports. This increasing reliance of industries on service inputs, called servicification, has paved the way for the emergence of regional and global value chains (GVCs). Advancements in transportation, communications, and technology have led to the fragmentation of production processes across geographical locations and sectors. Firms have also leveraged service inputs to increase the value of their products, improve their production processes, and gain access to new technologies.

Servicification presents a valuable opportunity for the Philippines to move up the value chains. Services have been the main driver of the Philippine economy, accounting for at least half of the country's GDP since the 1990s. Moreover, the sector has exhibited an increasing significance as a source of trade in value added to the country. However, Hansl and Cattaneo (2017) noted that, while the Philippines is a services economy and a lead exporter of services, it lacks efficient linkages between services and other industries. With servicification, rooted in the development of high services content in goods, becoming a major path to competitiveness in light of the emergence of new technologies, it would be important to assess whether servicification could indeed be a strategy for enhancing GVC participation and upgrading, especially in important sectors such as electronics.

The government recognizes the increasing reliance of manufacturing on service-related labor. As stated in the Philippine Development Plan (PDP) 2023-2028, one of its strategies in revitalizing local industries is to leverage the county's competitive advantage in services to foster intersectoral linkages. This would subsequently create synergies for more value-adding opportunities, expansion of products and markets, and a more efficient delivery network (NEDA 2023). Value chain interventions will not only focus on improving access to physical inputs. The government would also aim to strengthen the inter-industry demand between industry and services sectors to facilitate servicification. Through the Strategic Investments Priorities Plan, the government could give targeted and time-bound fiscal incentives to activities that will enhance in-house servicification, such as R&D and engineering services that will enhance manufacturing processes and raise productivity (NEDA 2023). Leveraging services for industrial development could also be relevant to other government efforts, most notably the Tatak Pinoy strategy. The said strategy aims to encourage local industries to produce more sophisticated products, which could subsequently improve the country's GVC position (De Leon 2024). Domestic industries could leverage service inputs to improve their competitiveness, and gain access to new technologies. This would enable them to create substantial value in the products.

With the increasing reliance of manufacturing industries on services, the role of services in international trade and GVCs has been assessed by various studies in recent years. Studies have

mainly used trade in value added data to examine trends in the contribution of service inputs in manufacturing exports. Meanwhile, the development of various firm-level data enabled researchers to assess the impact of servicification on firm exports. This study aims to contribute to this emerging empirical literature, by looking at the servicification of manufacturing industries in the Philippines. We extended the analysis of Serafica (2016) on services value added-content in manufacturing exports, using the 2023 edition of the OECD-WTO Trade in Value Added (TiVA) data. This study is also one of the first to explore the different services-related activities employed by Philippine manufacturing firms, and whether these activities encourage export participation. Unlike most existing empirical studies that only utilized service inputs, this study was able to access information on service outputs and in-house activities of Philippine manufacturing firms.

We observed that, overall, the contribution of services value added in Philippine manufacturing exports has been on par with its regional neighbors and important trading partners. Domestic and foreign services have almost equal contributions in the servicification of Philippine manufacturing exports. However, Philippine manufacturing exports have had relatively lower percentages of modern service inputs, such as ICT, finance, and business services. Services-related activities among Philippine manufacturing firms have been mainly concentrated in incorporating service inputs, with only a small percentage of firms conduct R&D activities and sell services. However, firm-level estimations reveal that the sale of services, R&D employment, and transport expenses were positively associated with a firm's tendency to export. Estimations using interaction terms with firm size, ownership, and industry reveal heterogeneous relationships between services and export participation.

The rest of the paper is organized as follows: Section 2 provides a literature review of the servicification of manufacturing industries; Section 3 presents stylized facts on the Philippine GVC participation, and the contribution of services to participation of Philippine manufacturing industries; Section 4 investigates the servicification of Philippine manufacturing firms, and their role in facilitating firm exports; and Section 5 provides the conclusion and recommendations.

2. The role of services in manufacturing GVCs

Increasing globalization during the last few decades has resulted in the emergence of global value chains (GVCs). Significant developments in transportation and communication technologies have contributed to reducing trade barriers, encouraging firms to not only participate in foreign markets, but also divide their productions into separate tasks, to be carried out in different locations to take advantage of their respective competencies. Thus, many firms and industries across the world have become integrated into different value chains. A value chain refers to the set of economic activities related to producing a specific good or offering a particular service. This includes the whole process of production—from acquisition of raw materials to assembly of the final product—as well as other relevant activities, such as research and development (R&D), design, marketing, distribution, and consumer support (Kaplinsky, 2004; Gereffi & Fernandez-Stark, 2016).

Value chains have become instrumental in facilitating production efficiency and productivity among firms. Various growth theories acknowledge that productivity growth can be explained by the division of labor (Miroudot and Cadestin 2017). Comparative advantage significantly influences the location decision of firms, as they intend to position each segment in the location

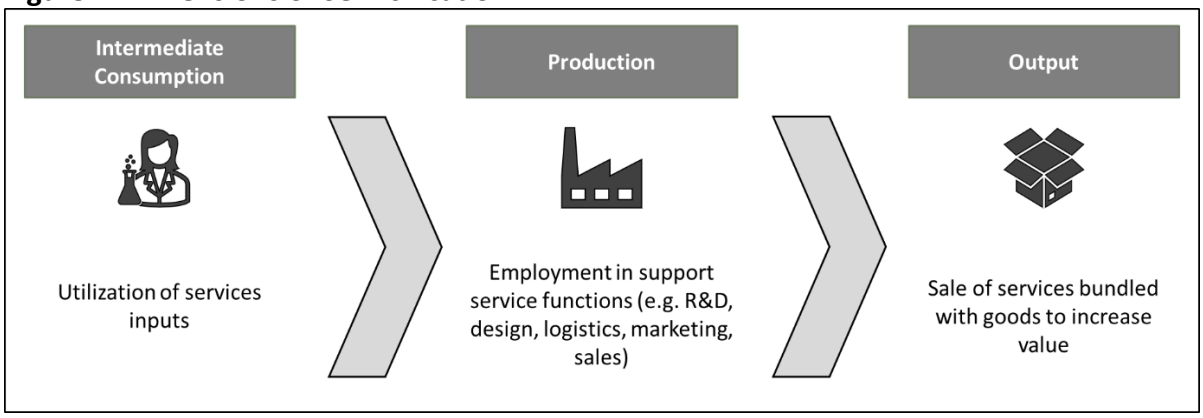
that would generate the highest production efficiency (i.e. lowest cost). Thus, those involved in the GVC would be able to leverage their respective competences and contribute to output maximization (Grossman and Rossi-Hansberg 2008, Inomata 2017). Jones and Kierzkowski (1990) showed that production fragmentation improves the cost efficiency of firms. While dividing tasks entails additional fixed costs in coordination and transportation, the improved efficiency would also lower the marginal cost.

2.1 The servicification of manufacturing industries

Services have played a crucial role in linking production segments across countries. Baldwin (2011) asserted that services facilitated the first two unbundlings of globalization. The first unbundling facilitated cross-border trade in goods, as lower transportation costs allowed factories to be spatially separated from consumers. In the second unbundling, the development of information and communications technology (ICT) reduced international communication and coordination costs, allowing movement of ideas and the geographical dispersion of production stages previously performed in proximity (Baldwin 2011). Services remain to be necessary components in managing GVCs, as firms continue to utilize transport and logistics, ICT, finance, and other types of services to maintain the smooth flow of production processes across countries.

Indeed, servicification has made manufacturing entwined with services, as they become increasingly reliant on services. However, services do not only serve as the "glue" in GVCs, as firms have utilized services beyond linking activities across countries (Low 2013). The use of services as intermediate inputs in production has intensified, and manufacturing jobs are slowly becoming more service oriented, evidenced by the increase in the share of workers performing service-related activities. Moreover, firms increasingly sell services embedded in, or bundled with, goods to create more value (Mercer-Blackman and Ablaza 2018).

Figure 1. Dimensions of Servicification



Source: Author's illustration based on Miroudot and Cadestin (2017).

Different types of services are utilized as inputs in manufacturing processes. Some of these services are considered horizontal, since they are common to all manufacturing sectors. For instance, services such as R&D and design, business consulting, legal services, accounting and finance, and marketing are necessary activities for businesses, regardless of their industry. On the other hand, there are services that are classified as vertical, in the sense that they are specific to an industry; for example, clinical tests are primarily conducted in the pharmaceutical sector, while industrial engineering services are mostly required by industries such as electronics, automotive, and machinery (Gereffi and Fernandez-Stark 2010).

Servicification also takes place within manufacturing firms themselves, as they allocate more resources in services activities performed in-house.[1] Workers involved in non-production operations usually perform functions related to R&D, design, logistics, marketing and sales. Meanwhile, the third component of servicification entails firms bundling services with the goods they sell. In many cases, these services are necessary for customers to fully utilize the product. Some of these services include installation, maintenance, and repair services, usually offered as product warranties or insurances. Cusumano et al. (2015) presented a taxonomy of services offered by firms, wherein services are classified as smoothing, adapting, or substituting (see Table 1).

Baldwin et al. (2015) noted that servicification could arise from various causes, including reclassification, task-composition shifts in connecting services and changes in final goods, and task-relative price shifts. Reclassification takes place when firms begin to outsource services that were traditionally sourced in-house. This results in the splintering of goods and services (Bhagwati 1984). Task-composition shifts in connecting services stems from the importance of services links in GVCs—outsourcing and offshoring contribute to the share of services in the value added of goods (Heuser and Mattoo 2017). On the other hand, shifts in terms of changes in final goods occur when the embodiment of services changes the nature of the final manufactured goods. For instance, automotive manufacturers have increasingly incorporated software in cars. Meanwhile, task-relative price shifts signify the increase in prices of services tasks relative to those of core manufacturing (Taguchi and Lar 2024). Offshoring intermediate goods have been perceived to be easier than intermediate services. Since it is primarily rooted in cost-reduction motives, offshoring would tend to reduce the relative price of the offshored tasks. Thus, this could also lead to increases in services value added embodied in manufactured goods (Baldwin et al. 2015).

Table 1. Taxonomy of Services Offered by Product Firms

	Definition	Examples
Complementary with products	**Smoothing** – enhance the sale or usage of the product without significantly altering its functionality	Financing, warranty/insurance, maintenance/repair, technical support, training in basic uses
	Adapting – expand the functionality of a product, help the customer develop new uses, or adapt the product to novel conditions	Customizations, trainings/consultations that introduce new uses, integration of the core product with other products/services
Replacement	**Substituting** – replace the purchase of a product	Software as a service instead of software product, data processing services offered in lieu of mainframes

Source: Cusumano et al. (2015).

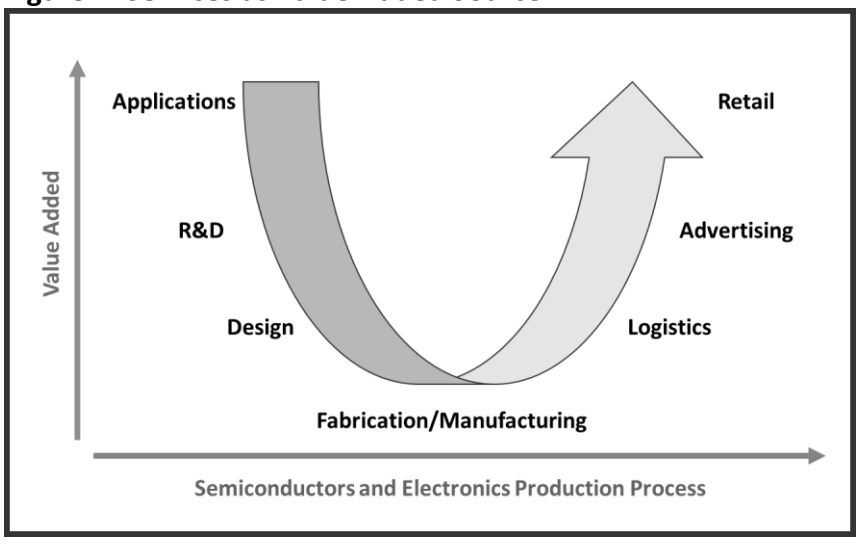
[1] This particular process is termed servitization by Vandermerwe and Rada (1988).

2.2 The role of services in facilitating trade and GVC integration

Engaging in services activities presents value-creating opportunities for manufacturing firms. Services are present in both upstream and downstream segments of manufacturing GVCs, and firms have leveraged services to facilitate technology and knowledge acquisition, GVC integration, and value creation, among others. The value-added contribution of services is well-illustrated by the smile curve (see Figure 2). The model is commonly used to explain the distribution of value across the different value chain segments, wherein the services-related segments around core manufacturing generate higher value. For instance, upgrading in the electronics GVC could manifest through shifts to service-related activities, such as R&D and design. Firms might completely shift to these functions on behalf of the entire value chain, or they might merely incorporate these functions into the value-adding activities they perform (Frederick and Gereffi 2016).

Miroudot and Cadestin (2017) posited that, regardless of the dimension, manufacturing firms could leverage servicification to create value. Service inputs could generate additional value and enhance firm productivity either through cost savings (e.g., reduced materials or energy use, outsourcing service is cheaper) or product quality improvements that raise output value (USITC 2013). Outsourcing services could allow manufacturing firms to benefit from scale economies and the specialization of the external provider, and potential knowledge spillovers. For some firms, developing services-related competencies in-house might be the better strategy for value creation.

Figure 2. Services as Value Added Source



Source: Mercer-Blackman and Ablaza (2018).

Engaging in various services, such as software design, market research, education and organizational development, and R&D contribute to a firm's knowledge capital (Lodefalk 2014). Firms could leverage these service inputs to enhance their absorptive capacity in comprehending and utilizing advanced technologies (Cohen and Levinthal 1990). Intensifying R&D and design activities could also enhance the firm's ability to offer differentiated products, through customization, development of new varieties, and innovation. Research activities would enable firms to determine customer needs and preferences, and accordingly create new products (Sousa and da Silveira 2020, Serafica 2016). Meanwhile, engineering services, supply chain management, and other management services can assist the firm in utilizing labor more efficiently and reducing input requirements (Nordås 2010).

Offering complementary service activities is also a source of value creation, both for the firm and the customer. The sale of complementary services, such as repair and maintenance, could be an additional source of income for the manufacturing firm. They could also benefit from the economies of scope brought by the bundling of goods and services (Grover and Mattoo 2021). For the customer, it could be more cost-effective to purchase goods with bundled services, since they do not need to look for another firm that provides the same service, possibly at a higher cost (Miroudot and Cadestin 2017). Thus, some services have been perceived as "indispensable"; for instance, a customer might not purchase the product if the firm does not provide installation or repair services (Kommerskollegium 2014).

The ability of services to generate additional value is crucial in facilitating the participation of firms in foreign markets and GVCs. According to Lodefalk (2014), export participation entails dealing with trade costs and intense competition, requiring firms to consistently possess sufficient productivity levels. Exporting entails sunk costs, mainly from developing knowledge of trade regulations and procedures, conducting research on foreign markets, modifying products and marketing strategies, and developing distribution networks. Exporters also must deal with variable costs from customs, insurance, and transportation activities, engaging with foreign entities, monitoring foreign markets, and adjusting to changes in demand and in rules and regulations (Clerides et al. 1998, Bernard and Jensen 1999, Melitz 2003, Lodefalk 2014).

Manufacturing firms can exploit the value-creating characteristics of services to facilitate their entry into export markets. Lopez (2004) noted that, in developing countries, firms with sufficient productivity levels consciously self-select into exporting and, in preparation, adopt advanced technologies to produce a competitive good for the foreign market. As previously mentioned, increasing utilization of service inputs could improve production efficiency and product quality. While offering services could increase production costs and result in higher prices, firms would be able to differentiate their products from their competitors, and the modified offer could attract additional customers and increase foreign demand (Chamberlin 1933, Lodefalk 2014).

With the increasing reliance of manufacturing industries on services, studies have investigated the impact of servicification on manufacturing export performance and GVC participation. Kordalska and Olczyk (2021), using inter-country input-output data, found that linkages between services and manufacturing help the development of GVCs among Central and Eastern European (CEE) economies. The study also observed differences in terms of the service type primarily utilized by CEE economies. For instance, the manufacturing sectors in Baltic countries[2], as well as the Czech Republic, primarily utilize financial services to strengthen their GVC participation and position. On the other hand, Poland, Hungary, and Slovakia have strong linkages between manufacturing and transportation services. Meanwhile, Taguchi and Lar (2024) assessed the dynamics between manufacturing and services GVCs in emerging Asian economies. The results indicate notable linkages between manufacturing and business services—foreign business service inputs were particularly associated with higher manufacturing exports. Foreign manufacturing inputs were also found to facilitate the utilization of foreign business services.

Recent developments in firm-level data have allowed studies to analyze the role of services in trade and GVC participation of firms. Mukherjee (2015) examined the impact of service inputs

[2] Estonia, Latvia, Lithuania

in the export intensity of Indian manufacturing firms.[3] The study found that higher service input intensity positively and significantly influences export participation and export intensity. However, regression results by industry revealed that the impact of service inputs was non-significant for some industries, such as jewelry, petrochemicals, lubricants and chemicals. The positive impact of services on Indian firm exports was also established in the study of Goldar et al. (2018), as the use of service inputs had a positive association with export intensity, as well as propensity to export. Matsuura (2023) assessed the impact of in-house service production and bought-in service inputs on the GVC participation of Japanese manufacturing firms. The study found that bought-in service inputs, particularly outsourced services, are significantly associated with GVC participation and higher export intensity. The effects were found to be greater among high-tech industries. Lodefalk (2014) utilized a rich panel of Swedish firms to investigate the role of services in manufacturing firm exports. The results suggest that, controlling for covariates and firm heterogeneity, a greater proportion of services in in-house production translates to higher export intensity. Buying-in more services was also associated with higher export intensity in selected industries.

Manghnani et al. (2021) investigated the role of service inputs in the GVC integration of Indian firms. The study covered various services activities in the analysis, including R&D, distribution, renting, communications, and repair and maintenance. The findings suggest that both the intensity of service usage and the composition or type of service are important determinants of GVC participation. Complex services, such as ICT and R&D activities, were particularly important in the participation of Indian firms. Reddy et al. (2023) also found that servicification positively influences an Indian manufacturing firm's decision to participate in GVCs. The positive effect holds even among small and medium enterprises (SMEs).

3. Servicification and the GVC participation of Philippine manufacturing industries

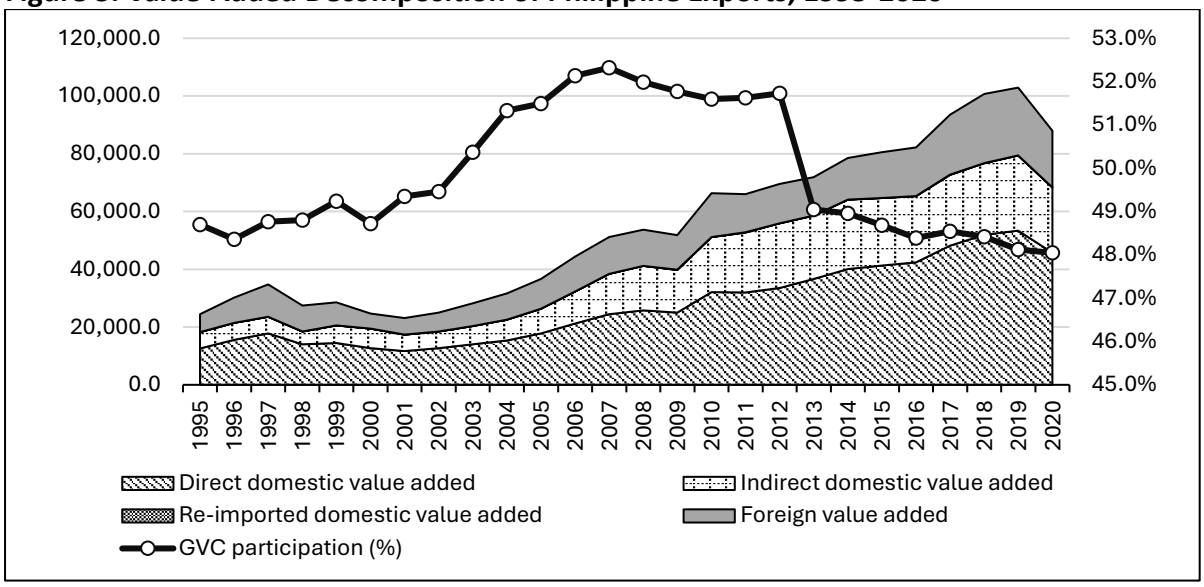
This section presents trends and patterns in the Philippine GVC participation and the servicification of Philippine manufacturing industries in GVCs. To this end, we utilized the Trade in Value Added (TiVA) data, developed by the World Trade Organization (WTO) and Organisation for Economic Co-operation and Development (OECD). The TiVA statistical approach estimates the origin (by country and industry) of the value added incorporated in goods and services exports. It is especially important in analyzing trade taking place in GVCs, since it addresses the double counting implicit in traditional trade statistics, since intermediate goods and services cross borders many times (OECD 2013).

3.1 The Philippine GVC participation: Some stylized facts

Figure 3 shows that, since the late 1990s, trade associated with GVCs has already accounted for approximately half of the country's exports. Until the 2000s, GVC-related trade exhibited constant increases in percentage share, which peaked at 52.3 percent in 2007. Despite having a steep decline in 2013 and a decreasing trend in the following years, the share of GVC-related trade was still relatively high by 2020, at 48 percent.

[3] Service inputs included business services, repair and maintenance, professional services, R&D, and other services.

Figure 3. Value-Added Decomposition of Philippine Exports, 1995-2020



Source: WTO calculations based on the OECD TiVA database.

In terms of the decomposition of GVC-related trade, we observe fluctuations between the share of indirect domestic value added (i.e. domestic value in exports that is further exported to other countries) and foreign value added (i.e. value-added incorporated from foreign inputs). For most of the 1990s and 2000s, foreign value added dominated the country's GVC-related trade. By the late 2000s, much of the country's participation in GVCs was primarily driven by its forward linkages, evidenced by the greater share of indirect domestic value added.

The Philippines has been lagging behind most of its regional neighbors in terms of GVC participation. Table 2 shows that the average GVC-related trade of the Philippines stood at USD 44.2 billion during the 2015-2020 period. In contrast, China registered an average of USD 1.54 trillion; within the Southeast Asian region, Singapore, Thailand, Viet Nam, Malaysia, and Indonesia had greater GVC activities than the Philippines. Despite exhibiting a 5.2-percent compound annual growth rate (CAGR), the country was outpaced by other countries in the region. Viet Nam exhibited a remarkable growth performance in GVC trade during the past two decades. While having lower GVC-related trade than the Philippines during the 1995-1999 period, Viet Nam gradually intensified its GVC activities in the succeeding years. By the late 2000s, Viet Nam has already surpassed the Philippine in total GVC trade, and exhibited one of the highest CAGRs during the 1995-2020 period (17.1%).

The inability to sustain its increasing GVC participation rate during the 2010s has prevented the Philippines from gaining a favorable GVC position in the Asia-Pacific region. The average rate of the Philippines during the 2015-2020 period was its lowest since the late 1990s. While exhibiting similar trends, important trading partners such as China, South Korea, and Singapore have already had high GVC participation rates (around 60%). Meanwhile, Viet Nam's notable integration in GVCs is further reflected in the consistent growth of its participation rate. From 49.6 percent during the late 1990s, its average GVC participation rate steadily improved in the succeeding periods, peaking at 64.9 percent in the late 2010s.

The seeming stagnation of the Philippine integration in GVCs has become a topic of discussion during the previous decade. Looking at its GVC performance, it can be argued that the Philippines, particularly its manufacturing sector, might have failed to capture the wave of increasing globalization, through GVC integration, that has brought significant benefits to

some of its ASEAN neighbors (ASEAN-Japan Centre, 2017). Thus, improving the competitiveness of local industries remains to be an important policy area for the Philippines in pursuing greater GVC integration.

Table 2. Average GVC-related Trade, Selected Economies, 1995-2020 (billion USD)

Economy	1995-1999	2000-2004	2005-2009	2010-2014	2015-2020	1995-2020 CAGR (%)
Australia	37.2	45.5	90.1	149.7	139.6	6.2%
Cambodia	0.4	0.9	2.3	3.5	6.1	12.1%
China	110.7	241.0	723.7	1293.0	1539.0	12.7%
Chinese Taipei	74.3	100.1	172.4	232.5	204.7	4.3%
Hong Kong, China	31.7	36.6	59.9	70.0	65.9	2.5%
India	26.2	45.2	128.4	239.7	244.8	10.1%
Indonesia	23.6	31.2	52.6	85.6	88.8	5.7%
Japan	197.1	222.4	338.5	405.3	379.9	2.1%
Korea	89.8	123.8	247.6	414.1	377.9	5.9%
Lao PDR	0.1	0.2	0.4	1.2	1.6	11.3%
Malaysia	50.4	60.3	99.9	127.3	120.1	3.7%
Myanmar	0.5	1.1	2.2	4.3	8.5	12.4%
New Zealand	9.6	11.4	18.7	26.2	27.0	4.1%
Pakistan	4.3	5.5	9.2	13.0	11.7	4.0%
Philippines	14.2	13.3	24.7	35.6	44.2	5.2%
Singapore	48.0	59.5	120.1	212.3	224.8	6.4%
Thailand	37.2	50.4	101.9	159.5	165.1	5.6%
Viet Nam	5.4	11.5	32.0	70.3	139.6	17.1%

Source: Author's calculations based on the OECD TiVA database.

Table 3. Average GVC Participation Rates, Selected Economies, 1995-2020 (Percentage)

Economy	1995-1999	2000-2004	2005-2009	2010-2014	2015-2020
Australia	50.6	51.8	51.0	51.3	49.3
Cambodia	37.7	39.2	44.5	44.8	44.6
China	66.6	67.3	70.5	68.8	67.8
Chinese Taipei	55.4	57.9	63.8	63.3	56.1
Hong Kong	52.7	52.5	54.7	50.6	45.5
India	61.3	59.4	58.0	57.0	51.3
Indonesia	40.7	44.0	41.1	40.2	45.7
Japan	45.0	45.4	46.9	48.1	47.0
South Korea	60.2	60.3	62.4	64.9	61.1
Lao PDR	30.1	32.3	34.4	32.7	31.5
Malaysia	65.7	63.9	62.6	60.5	62.7
Myanmar	44.0	41.5	38.4	44.3	47.0
New Zealand	55.7	56.5	57.0	57.3	55.3
Pakistan	42.5	42.7	45.6	45.5	41.1
Philippines	48.8	49.8	51.9	50.6	48.4
Singapore	62.1	62.4	62.4	63.4	60.1
Thailand	53.8	58.0	61.6	62.6	59.1
Viet Nam	49.6	54.0	59.1	60.7	64.9

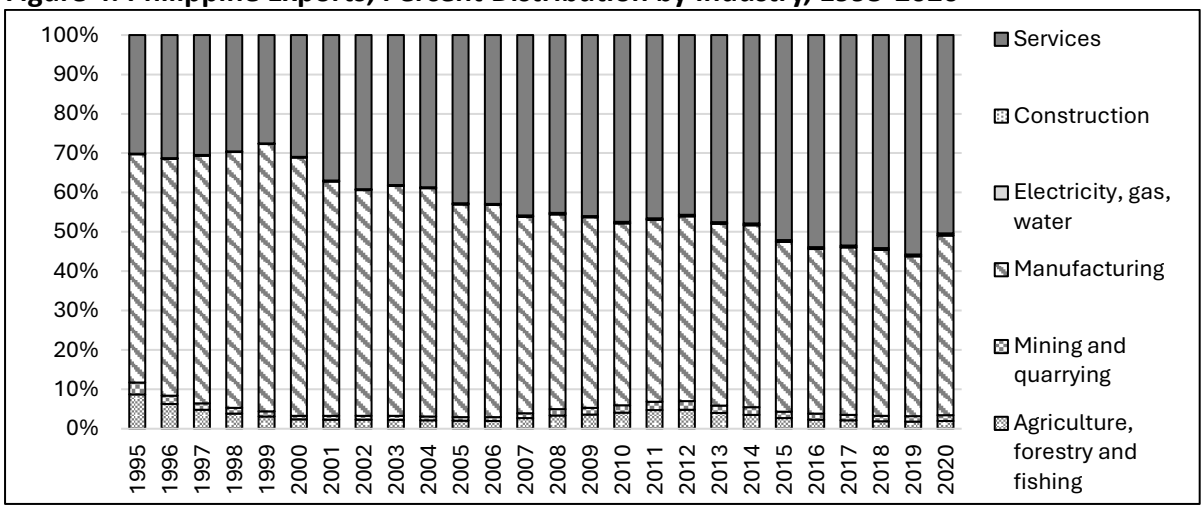
Source: Author's calculations based on the OECD TiVA database.

Philippine exports mainly consist of exports from the manufacturing and services sectors. The combined share of the two sectors have accounted for at least 90 percent of total Philippine exports. However, we can observe that there has been a shift in the structure of exports in recent decades, as services continued to emerge as the key driver of the Philippine economy. During the late 1990s, around 60 percent of total exports were covered by manufacturing, while

services exports constituted around 30 percent of export values. By the late 2010s, services were already comprised around half of the country's exports; on the other hand, the share of manufacturing ranged from 40 to 45 percent.

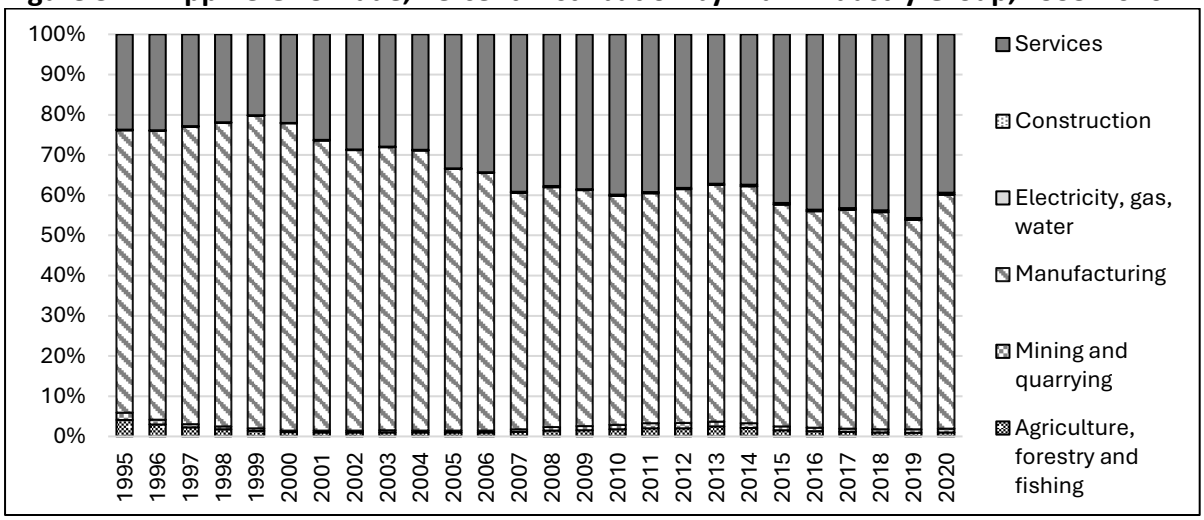
The industry decomposition of GVC trade also reveals similar trends, as services slowly emerged as a key driver of the Philippines' GVC participation. A key difference, however, is the greater significance of manufacturing in GVC-related trade. During the 1995-1999 period, manufacturing accounted for at least 70 percent of total GVC trade. Despite exhibiting contractions in the succeeding periods, manufacturing continues to be the primary component of the country's GVC participation, as it still covered around 53 to 58 percent of GVC-related trade.

Figure 4. Philippine Exports, Percent Distribution by Industry, 1995-2020



Source: WTO calculations based on the OECD TiVA database.

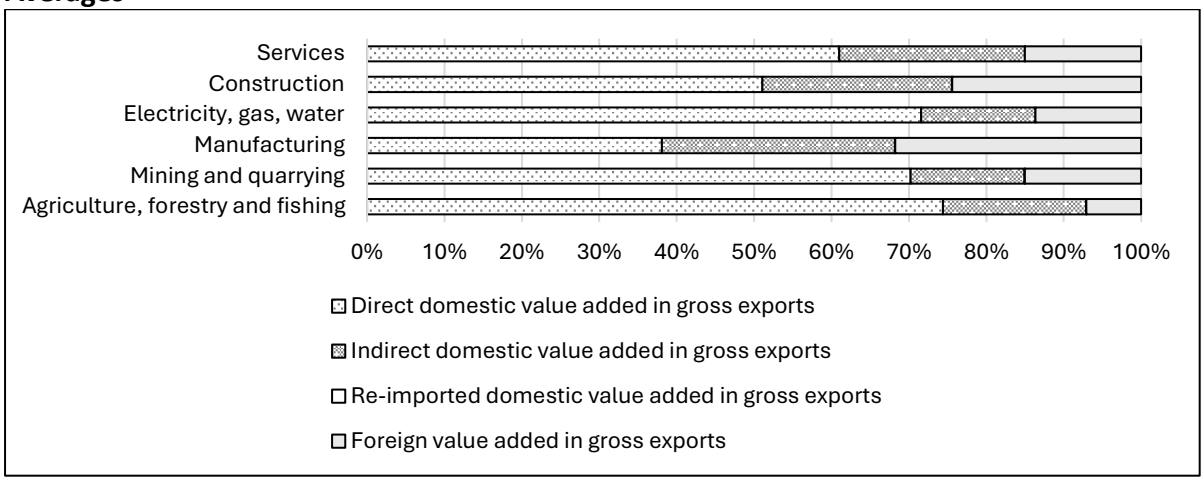
Figure 5. Philippine GVC Trade, Percent Distribution by Main Industry Group, 1995-2020



Source: WTO calculations based on the OECD TiVA database.

The greater GVC integration of manufacturing further manifests in its decomposition of exports. Looking at Figure 6, direct domestic value added accounted for more than half of the exports of all industries, except manufacturing. The share of domestic value added in manufacturing only stood around 38 percent, with the remaining percentage being divided between the sectors forward and backward GVC linkages.

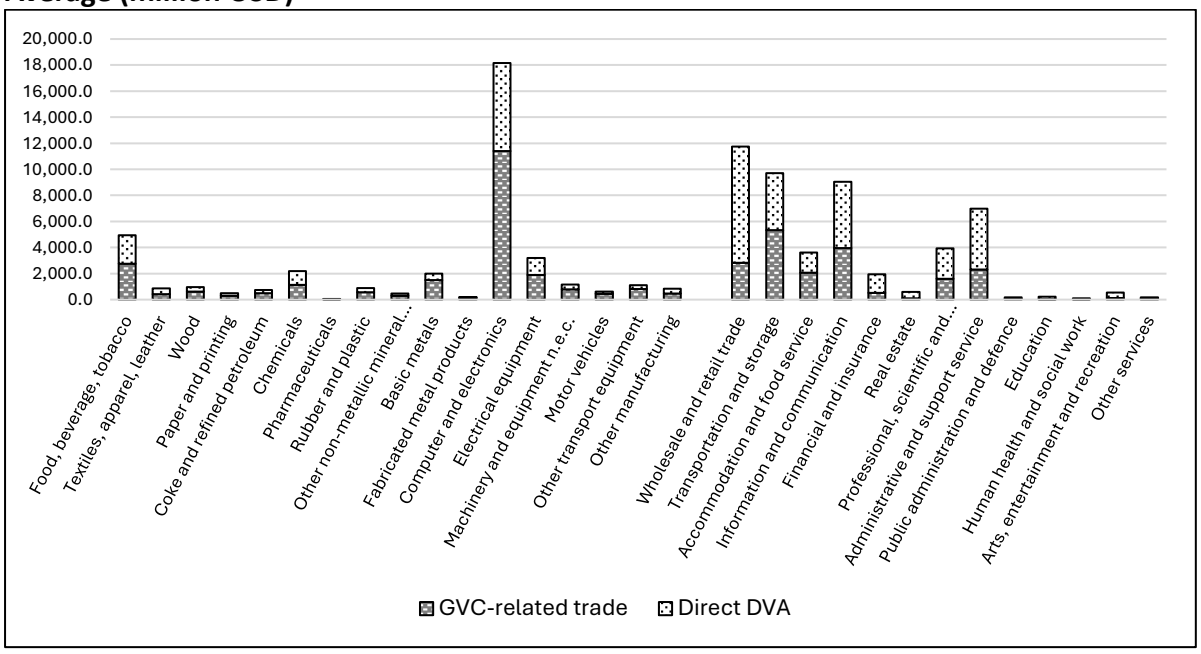
Figure 6. Decomposition of Philippine Exports, by Main Industry Group, 2015-2020 Averages



Source: WTO calculations based on the OECD TiVA database.

Figure 7 shows the export decomposition of manufacturing and services subsectors. Computer and electronics have been the key driver of the country's exports, having an average export value of USD 1.8 billion during the late 2010s. It has also led all industries in terms of GVC-related trade, which stood at USD 1.1 billion and accounted for more than 60 percent of total electronics exports. It is interesting to note, however, that the other major exporting sectors have been services. Wholesale and retail trade registered an average export value of USD 11.8 billion, while average exports of transportation and storage, and information and communications sectors exceeded USD 9 billion during the 2015-2020 period. However, these sectors exhibited lower GVC participation rates than electronics. Given the significance of manufacturing and services in the country's participation in international trade and GVCs, it is thus notably important to assess the linkages between the two sectors.

Figure 7. GVC Trade in Gross Exports, Manufacturing and Services Industries, 2015-2020 Average (million USD)



Source: WTO calculations based on the OECD TiVA database.

3.2 Servicification of Philippine manufacturing industries

The servicification of manufacturing GVCs can be reflected by the contribution of services in manufacturing export values. Table 4 shows the sectoral contribution in exports of Philippine industries. The figures show that much of the country's export value is generated by its domestic industries, although manufacturing exhibited the highest share of foreign value added (31.6%), followed by construction (24.2%). Sectoral shares also reveal that the industries themselves are the main sources of their export values; for instance, 76.7 percent of Philippine agriculture exports are generated by the agriculture inputs. However, only 45.9 percent of total manufacturing exports originated from manufacturing inputs. More importantly, manufacturing seems to have relied on service inputs in terms of exporting, since services constituted around 27 percent of manufacturing exports during the 2015-2020 period. Meanwhile, more than 80 percent of the services export value was generated by service inputs, while manufacturing inputs accounted for the second highest contribution (10.8%). This posits that the linkages between the manufacturing and services sectors have been more established than the rest of the industries.

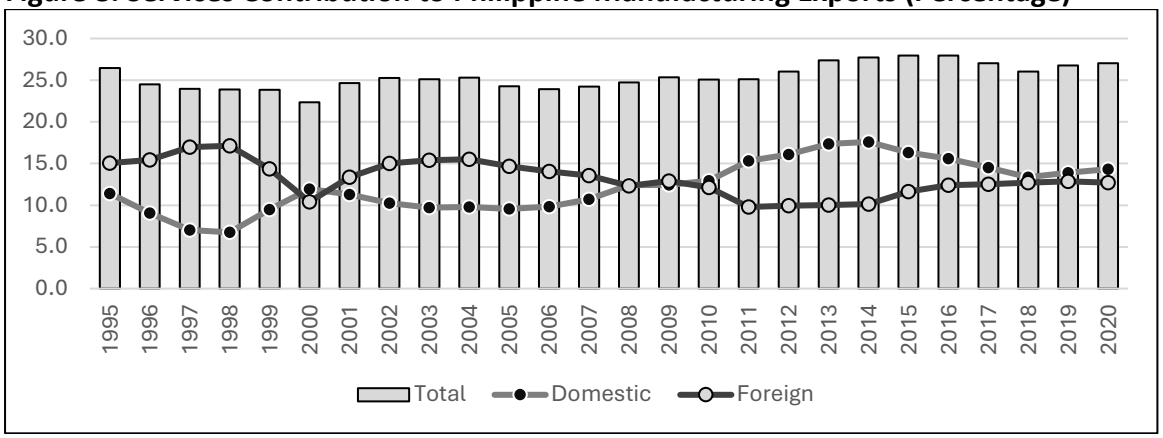
Table 4. Sectoral Contribution in Philippine Exports, 2015-2020 Average (Percentage)

Value Added Origin		Exporting Sector						
		Total	AFF	MAQ	MFG	EGW	CNS	SRV
Domestic	Total DVA	78.1	92.9	85.0	68.4	86.4	75.8	85.0
	AFF	4.3	75.5	0.8	4.4	0.5	1.3	1.4
	MAQ	1.8	0.1	71.1	1.3	0.9	1.9	0.3
	MFG	22.7	5.2	3.7	45.9	3.9	8.7	5.6
	EGW	1.9	0.9	1.3	1.9	72.9	1.6	1.7
	CNS	0.5	0.1	0.5	0.2	0.2	51.1	0.4
	SRV	47.0	11.1	7.7	14.7	8.1	11.3	75.5
Foreign	Total FVA	21.9	7.1	15.0	31.6	13.6	24.2	15.0
	AFF	0.5	1.2	0.2	0.7	0.2	0.4	0.3
	MAQ	3.1	0.8	4.3	4.4	5.0	4.8	2.2
	MFG	8.5	1.9	4.1	13.1	3.6	9.1	5.2
	EGW	0.5	0.1	0.3	0.7	0.3	0.8	0.3
	CNS	0.1	0.0	0.1	0.1	0.1	0.1	0.1
	SRV	9.2	3.0	5.9	12.5	4.5	8.9	6.9

Note: DVA = domestic value added; FVA = foreign value added; AFF = agriculture, forestry and fishing; MAQ = mining and quarrying; MFG = manufacturing; EGW = electricity, gas, water; CNS = construction; SRV = services.
Source: Author's calculations based on the OECD TiVA database.

Services contribution to manufacturing exports has been relatively consistent since the late 1990s, hovering around 22-28%. An increasing trend can be observed from the late 2000s up to the first half of the 2010s. However, overall servicification fluctuated in the succeeding years; services contribution in 2020 stood at 27 percent, only 5 percentage points higher than the percentage in 1995. As in the overall GVC participation rates, the shares of domestic and foreign services value added exhibited similar trends—from 1995 to 2009, foreign services have mostly driven the servicification of Philippine manufacturing exports. By the early 2010s, Philippine manufacturing became more reliant on domestic service inputs, and the gap was increasing. However, the difference between domestic and foreign shares dwindled in the succeeding years.

Figure 8. Services Contribution to Philippine Manufacturing Exports (Percentage)



Source: Author's calculations based on the OECD TiVA database.

Table 5 shows the shares of important sources of foreign service inputs for Philippine manufacturing. From the late 1990s up to the first half of the 2010s, services sectors from Japan and the US accounted for the highest shares of foreign services value added. Despite being the primary sources of foreign service inputs, the two countries have been showing decreasing shares since 1995. Meanwhile, China has slowly emerged as an important source of service inputs. Its average share increased from 1.8 percent during the 1995-1999 period to 17.8 percent during the late 2010s—during this period, China already accounted for the highest share in foreign services value added.

Table 5. Foreign Services Value Added in Philippine Manufacturing Exports, by Economy of Origin

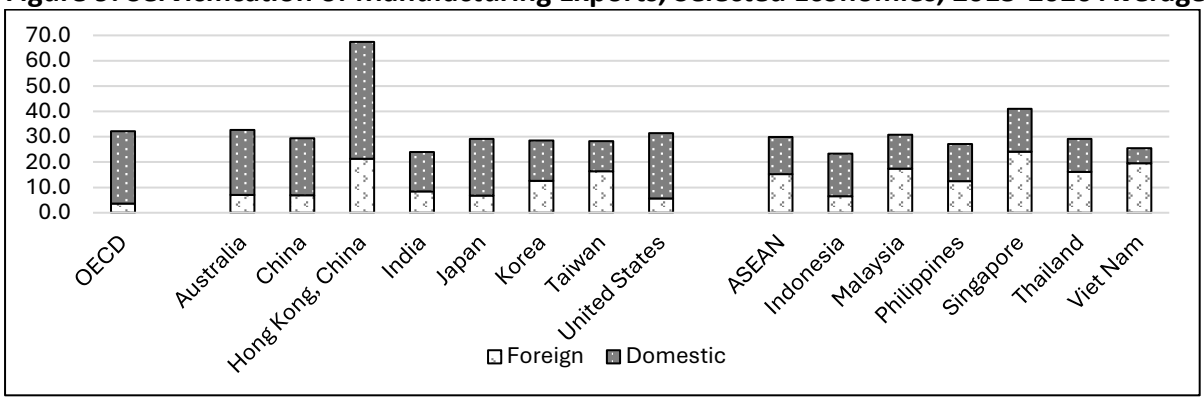
Economy	1995-1999	2000-2004	2005-2009	2010-2014	2015-2020
Australia	1.6	1.6	1.6	2.8	1.8
China	1.8	2.8	5.7	9.6	17.8
Chinese Taipei	5.0	5.4	6.0	4.8	4.3
France	2.4	1.9	2.0	2.3	1.6
Germany	3.8	3.1	3.3	3.9	3.1
Hong Kong, China	2.8	3.8	2.8	2.1	2.3
India	0.4	0.7	1.2	1.7	2.0
Indonesia	1.6	2.1	1.7	2.9	3.1
Japan	23.5	22.1	16.1	13.6	11.8
Korea	5.9	4.9	4.5	4.7	5.8
Malaysia	1.2	1.7	1.9	2.3	2.2
Singapore	3.9	4.6	6.9	7.7	7.8
Thailand	2.0	2.3	2.5	3.1	3.1
United Kingdom	2.8	2.7	2.4	1.7	1.7
USA	22.1	23.4	24.5	18.0	14.7

Source: Author's calculations based on the OECD TiVA database.

The role of services in manufacturing exports of other countries could also help in assessing the servicification of Philippine manufacturing. Figure 9 shows that the Philippines has one of the lowest servicification rates in manufacturing. It has lagged behind many of its ASEAN+6 partners, as well as many high-income countries (evidenced by the higher average rate of OECD countries). Meanwhile, Hong Kong, China and Singapore exhibited exceptionally high

rates of servicification. It is also important to note that the servicification of many countries in the figure were largely driven by their own services sectors.

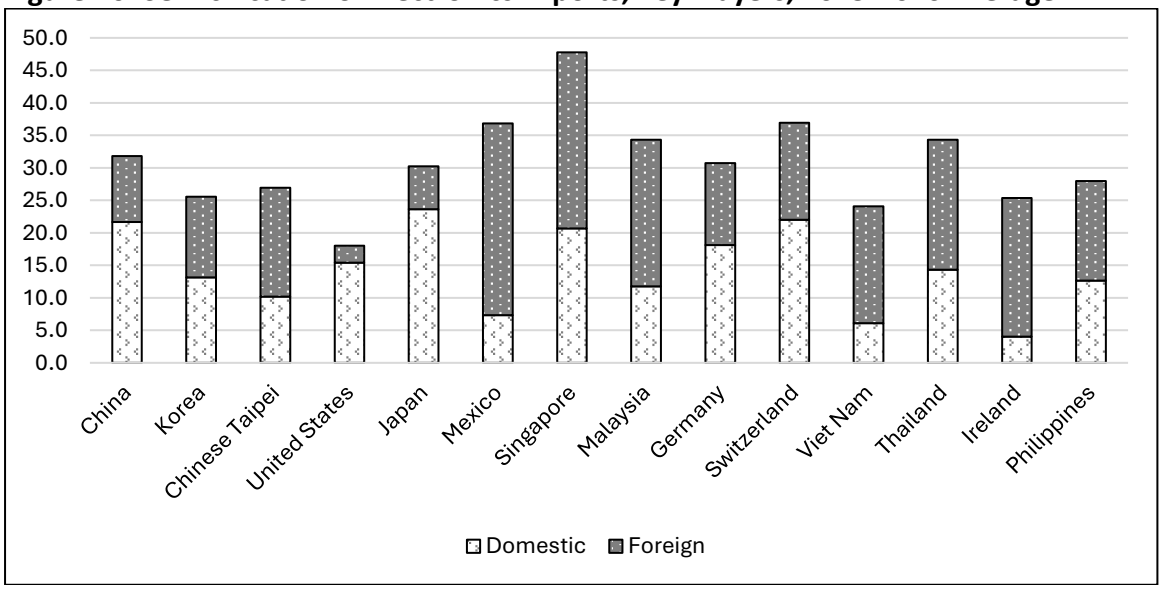
Figure 9. Servicification of Manufacturing Exports, Selected Economies, 2015-2020 Average



Source: Author's calculations based on the OECD TiVA database.

A closer look at the servicification across manufacturing subsectors reveals that most of these industries have gradually shifted their incorporation of services from foreign to domestic inputs. During the late 1990s, most of the industries possessed higher shares of foreign services value added. By the next decade, most have primarily relied on domestic services for their exports. However, the electronics industry, which is the country's main exporting sector, has consistently outsourced foreign services. Since its participation in foreign markets and value chains has been significantly greater than the rest of manufacturing, it is crucial to assess whether it is imperative to strengthen its linkages with domestic services. Figure 10 shows the decomposition of electronics exports among the major economies in the industry. We can observe that the servicification rate of the Philippines has been on par with many of the key industry players. More importantly, most of these countries have had intensive utilization of foreign services; notable exceptions include the United States, Japan, China, Germany, and Switzerland.

Figure 10. Servicification of Electronics Exports, Key Players, 2015-2020 Average



Source: Author's calculations based on the OECD TiVA database.

Table 6. Average Share of Services in Gross Exports, by Manufacturing Subsector

Industry	Domestic					Foreign					Total				
	1995-1999	2000-2004	2005-2009	2010-2014	2015-2020	1995-1999	2000-2004	2005-2009	2010-2014	2015-2020	1995-1999	2000-2004	2005-2009	2010-2014	2015-2020
Food, beverage, tobacco	13.2	13.7	15.0	18.8	19.1	6.9	4.9	4.2	4.4	4.9	20.1	18.6	19.2	23.3	24.0
Textiles, apparel, leather	11.8	13.7	15.8	18.8	22.3	12.9	10.8	8.7	6.6	6.7	24.6	24.5	24.5	25.4	29.0
Wood	10.8	13.1	15.1	17.5	20.1	11.9	9.1	8.0	7.0	7.1	22.7	22.1	23.1	24.5	27.2
Paper and printing	12.7	15.1	17.9	18.8	20.6	14.3	13.9	12.0	10.1	10.0	26.9	29.0	29.8	28.9	30.7
Coke and refined petroleum	8.6	8.4	7.0	8.0	15.6	12.6	7.9	6.7	6.6	8.6	21.2	16.3	13.7	14.6	24.2
Chemicals	14.2	12.7	13.2	18.1	13.2	10.6	10.2	10.2	8.5	11.8	24.9	22.8	23.4	26.7	25.1
Pharmaceuticals	18.2	15.7	15.9	21.6	15.0	12.0	8.2	7.7	6.5	10.6	30.3	23.9	23.6	28.1	25.7
Rubber and plastic	10.4	11.8	13.9	17.4	15.2	11.6	10.3	9.4	9.3	12.4	22.0	22.1	23.3	26.7	27.6
Other non-metallic mineral products	10.9	12.2	16.8	27.3	18.5	9.2	8.8	8.3	6.2	6.8	20.1	20.9	25.1	33.4	25.4
Basic metals	7.8	9.1	10.3	11.5	13.9	14.1	11.2	10.6	10.1	11.3	21.8	20.3	20.9	21.6	25.2
Fabricated metal products	7.5	9.9	12.1	16.0	19.5	14.8	12.7	12.6	10.2	10.6	22.3	22.6	24.7	26.2	30.1
Computer and electronics	5.5	8.7	8.1	14.7	12.7	20.2	18.5	19.8	13.1	15.3	25.7	27.2	27.9	27.8	28.0
Electrical equipment	7.5	10.2	12.2	15.8	12.5	15.2	12.2	10.3	10.3	13.5	22.7	22.5	22.5	26.1	26.1
Machinery and equipment n.e.c.	9.2	8.9	9.9	17.2	17.0	15.0	13.7	11.5	8.8	12.5	24.2	22.6	21.4	26.0	29.5
Motor vehicles	11.7	15.5	17.0	21.3	19.1	15.6	11.6	10.3	8.6	13.9	27.3	27.1	27.3	29.9	33.0
Other transport equipment	10.3	16.4	16.6	16.1	14.5	16.2	14.2	14.5	14.8	16.9	26.5	30.6	31.1	31.0	31.5
Other manufacturing	11.5	14.3	14.7	16.4	17.4	11.8	10.1	8.3	7.6	9.1	23.3	24.5	23.0	24.1	26.5

Source: Author's calculations based on the OECD TiVA database.

The contribution of different services sectors could provide insights not only on the kinds of services manufacturing industries have been utilizing, but also on their level of development. Services can be classified into two groups: traditional and modern services (Baumol 1985). These service groups are differentiated by their transportability, tradability, and technology utilization. Traditional services, such as wholesale and retail trade, transportation, and personal and publicly provided services, usually require face-to-face interaction and sparingly utilize advanced technologies (World Bank 2009). On the other hand, modern services, such as finance, insurance, ICT, and business services, can be delivered at arm's length and extensively use ICT technologies (World Bank 2009, Haven and van der Marel 2018). Eichengreen and Gupta (2011) put forward that modern services are associated with higher levels of income.

Table 7 indicates that, for most countries, traditional services have primarily driven the servicification of their manufacturing industries. Distribution services (i.e. wholesale and retail trade) alone comprised the highest percentage of services value added. Except for Singapore, distribution services accounted for around half of the services embodied in the manufacturing exports of ASEAN countries during the 2015-2020 period; in contrast, the total share of modern services ranged from 31 to 36 percent.

Table 7. Distribution of Services Value Added in Manufacturing Exports, by Subsector, 2015-2020 Average

Economy	Trade	Transport	Accom, Food	ICT	Finance	Real estate	Prof, technical	Admin, support	Other service
OECD	*32.8*	*13.6*	*1.6*	*7.1*	*9.0*	*5.9*	*15.4*	*10.2*	*4.3*
AUS	24.1	16.5	2.0	7.2	14.9	5.6	14.0	10.6	5.0
CHN	36.3	16.6	2.8	3.9	18.5	4.8	6.9	7.2	3.0
HKG	54.3	8.1	0.6	4.8	11.0	5.7	7.7	4.5	3.4
IND	46.9	17.8	1.0	2.9	13.8	2.2	4.1	9.6	1.7
JPN	44.2	14.9	2.3	7.1	5.9	4.6	11.1	7.9	2.0
KOR	32.6	14.8	2.7	6.4	10.6	4.4	15.8	9.1	3.6
TWN	43.2	10.9	1.8	5.1	12.3	4.5	8.5	9.5	4.2
USA	31.8	10.4	1.2	7.1	8.9	7.2	20.8	8.8	3.8
ASEAN	*44.0*	*12.8*	*1.4*	*5.3*	*12.4*	*3.8*	*8.9*	*9.2*	*2.2*
IDN	51.1	13.6	1.5	7.4	12.4	3.8	3.1	5.0	2.1
MYS	49.3	11.4	1.3	4.7	13.1	3.3	8.6	6.1	2.1
PHL	48.5	11.8	0.9	4.1	12.1	6.4	6.2	5.8	4.3
SGP	29.3	12.9	1.1	6.8	9.4	4.1	14.8	19.4	2.2
THA	49.7	10.8	1.5	4.9	16.0	2.8	7.2	5.6	1.6
VNM	45.9	16.6	1.9	3.9	12.3	4.1	7.6	5.2	2.5

Note: AUS = Australia; CHN = China; HKG = Hong Kong, China; IND = India; JPN = Japan; KOR = Korea; TWN = Chinese Taipei; USA = United States; IDN = Indonesia; MYS = Malaysia; PHL = Philippines; SGP = Singapore; THA = Thailand

Source: Author's calculations based on the OECD TiVA database.

For the Philippines, 65.5 percent of services value added were covered by traditional services, with distribution services being the highest contributor (48.5%). Meanwhile, the share of modern services only stood at 34.6 percent, which is lower than most of its regional neighbors. Financial services were the most utilized type of modern service by Philippine manufacturing, as it accounted for 12.1 percent of services value added embodied in manufacturing exports.

The relatively high utilization of modern services among higher-income countries implies that there could actually be an association between modern services and economic development. For Australia, Singapore, and the US, modern services already constituted more than half of services value added, while the average share of modern services among OECD countries stood at 47.6 percent. As one of the world's fastest-growing economies in recent decades, China has also exhibited considerable shares of modern services, which had an average of 41.3 percent in the late 2010s. Strong linkages with professional and technical services are also particularly evident in these countries—the average share of the sector in Australia, Singapore, South Korea, and OECD group hovered around 14 to 15 percent. Meanwhile, 20.8 percent of service value added in US manufacturing exports originated from professional and technical services.

The services embodied in the exports of Philippines manufacturing industries are also generally dominated by traditional services. Distribution services were still the highest contributor across industries. These services accounted for almost 60 percent of services value added in food, beverage, and tobacco; and textiles, apparel, and leather industries. On the other hand, around 30 to 34 percent of service inputs in metals exports consists of wholesale and retail trade.

Table 8. Distribution of Services Value Added in Exports of Philippine Manufacturing Industries, by Subsector, 2015-2020 Average

Industry	Trade	Trans-port	Accom, Food	ICT	Finance	Real estate	Prof, technical	Admin, support	Other service
Manufacturing	48.5	11.8	0.7	4.0	12.1	6.3	6.3	5.9	4.4
Food, beverage, tobacco	58.1	8.3	1.2	3.7	12.4	4.6	3.7	4.1	3.7
Textiles, apparel, leather	57.1	7.6	0.3	3.1	11.8	9.7	3.1	3.8	3.5
Wood	42.8	13.4	0.7	4.2	14.8	9.9	4.2	5.7	4.2
Paper and printing	41.6	10.5	0.7	5.2	17.7	8.2	4.9	6.2	4.9
Coke and refined petroleum	37.9	11.9	0.8	3.7	15.6	16.5	4.5	4.9	4.1
Chemicals	49.0	10.8	0.8	4.0	11.6	4.8	7.6	5.6	6.0
Pharmaceuticals	48.2	10.1	0.8	3.9	12.8	5.4	6.6	5.4	6.6
Rubber and plastic	46.0	11.2	0.7	3.6	12.0	11.2	5.8	5.1	4.3
Other non-metallic mineral products	36.8	10.7	0.4	4.0	24.9	8.3	4.3	5.9	4.7
Basic metals	34.1	22.2	0.8	4.4	15.5	6.3	5.6	6.7	4.4
Fabricated metal products	29.6	19.9	0.7	4.3	17.6	11.6	5.0	6.6	4.7
Computer and electronics	49.8	10.8	1.1	4.3	11.1	5.4	7.2	6.1	4.3
Electrical equipment	46.3	15.4	0.8	3.9	11.2	6.6	6.2	6.2	3.5
Machinery and equipment n.e.c.	44.3	14.9	0.7	3.7	13.2	8.4	5.1	5.7	4.1
Motor vehicles	43.2	12.8	0.9	4.6	15.2	7.9	5.5	6.1	4.0
Other transport equipment	47.1	10.8	1.0	4.1	11.8	6.7	7.6	6.1	4.8
Other manufacturing	46.6	13.3	0.8	3.8	11.7	9.1	4.5	5.3	4.9

Source: Author's calculations based on the OECD TiVA database.

In terms of modern services share, non-metallic mineral products, coke and refined petroleum, fabricated metal products, and paper and printing all registered percentages greater than 40 percent. Meanwhile, the computer and electronics industry has exhibited relatively weak linkages with modern services, as their share was only 34.1 percent. With its close association with digitalization and technology adoption, the lower shares of modern services could pose issues in facilitating the country's integration and upgrading in electronics GVCs.

To confirm the importance of modern services in GVCs, it is worthwhile to look at the contribution of modern services to electronics exports of key industry players. Table 9 reveals that the Philippines has one of the lowest percentages of modern services. Most of the major exporting countries exhibited high percentage shares of modern services, mainly driven by financial services, professional and business services, and administrative and support services. Strengthening linkages with business services could be particularly crucial in electronics GVCs, since these include services conducted in the higher segments of the value chain, such as R&D and design.

Table 9. Share of Services in Electronics Exports, by Subsector, 2015-2020

Economy	Trade	Transport	Accom, Food	ICT	Finance	Real estate	Prof, technical	Admin, support	Other service
CHN	37.4	14.0	2.6	5.7	17.5	4.8	7.8	7.2	2.9
KOR	36.6	13.2	2.5	6.7	10.6	4.5	13.7	8.7	3.4
TWN	40.3	9.9	1.9	5.6	13.0	4.5	9.1	11.6	4.1
USA	19.9	6.1	1.1	7.0	7.4	9.6	37.4	8.6	2.8
JPN	36.9	13.0	2.6	9.9	5.5	5.0	14.5	10.2	2.4
MEX	48.8	10.4	1.5	5.0	9.9	5.1	8.9	8.3	2.2
SGP	27.7	10.7	0.9	7.5	9.0	3.8	16.6	21.8	1.9
MYS	47.7	11.4	1.2	5.0	12.2	3.7	9.2	7.5	2.2
DEU	25.1	13.7	1.2	11.7	7.2	7.8	15.4	12.5	5.5
CHE	42.4	11.0	1.5	6.5	9.9	3.6	13.0	6.6	5.4
VNM	46.3	15.5	2.0	4.6	10.7	3.9	8.6	5.8	2.5
THA	58.1	9.9	1.2	4.3	10.5	2.8	6.3	5.4	1.6
IRL	27.1	12.6	1.2	8.4	14.9	3.6	11.5	16.4	4.2
PHL	49.7	10.9	0.9	4.3	11.1	5.4	7.2	6.2	4.3

Source: Author's calculations based on the OECD TiVA database.

4. Service utilization and exports of Philippine manufacturing firms: An empirical analysis

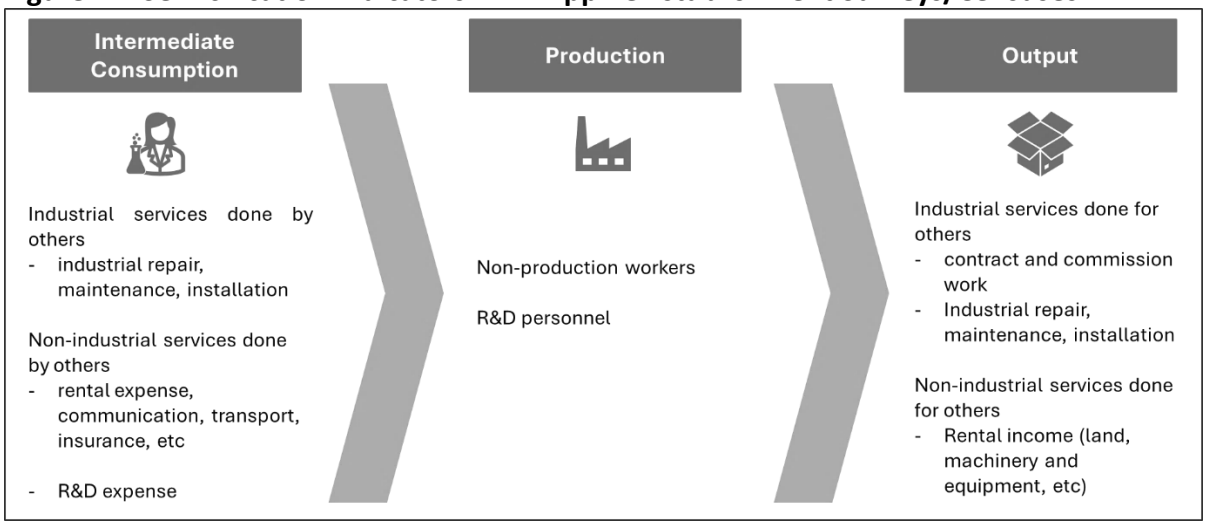
While the TiVA data has provided important insights on the contribution of services in the GVC participation of Philippine manufacturing industries, it mostly covers the contribution of services through inputs that are imported or bought from domestic suppliers (Miroudot and Cadestin 2017). Other servicification dimensions, such as in-house services activities, are not captured by aggregated data (Mercer-Blackman and Ablaza 2018). Taglioni and Winkler (2016) contended that various factors, such as firm heterogeneity and production models, are important in GVC analysis, which could be investigated through firm-level assessments. Firm-level data provide relevant information on the various aspects of firm operations (Inomata, 2017; Hallak and Levinsohn, 2004). This could be crucial in understanding the reliance of manufacturing firms on services

4.1 Data Sources

This study investigated the services-related activities of Philippine manufacturing firms by looking at the Annual Establishment Survey of Philippine Business and Industry (ASPBI) and Census of Philippine Business and Industry (CPBI). Conducted by the Philippine Statistics Authority (PSA), the ASPBI and CPBI contain the most comprehensive compilation of statistical information on the operations of establishments in the formal sector of the Philippines. They contain information on firm characteristics (e.g. ownership, employment), as well as various aspects of firm operations (e.g. revenues, costs, capital expenditure). We utilized an unbalanced panel of Philippine manufacturing firms for the years 2012-2021.

The ASPBI and CPBI data contain information on various dimensions of servicification. Service inputs are mainly represented by expenses incurred in acquiring the industrial and non-industrial services of other entities. Industrial services are industrial repair, maintenance, and installation, as well as contract and commission work. Non-industrial services, on the other hand, are accounted for by expenses for renting land, buildings, office equipment, and other facilities and equipment. Other non-industrial services include communication, insurance, transport, and unclassified business services. The ASPBI and CPBI also contain information on R&D expenses, which is important since R&D activities have been typically positioned among the higher-value segments of GVCs. The establishment surveys and censuses define R&D as systematic, scientific and creative work undertaken to increase the stock of knowledge, to be used for creating new or improved products, processes, services, and other applications.

Figure 11. Servicification Indicators in Philippine Establishment Surveys/Censuses



Source: Author's illustration based on information from ASPBI/CPBI.

In-house services activities are mostly indicated by the number of employees in non-production functions. Total number of non-production workers were proxied by the difference between total employment and the total number of production workers. In the ASPBI and CPBI, production workers exclude occupations such as managers, executives, administrative and technical personnel, and accounting and personnel staff. Thus, it can be assumed that the difference would cover these occupations. An important limitation of these measure, however, is the lack of information on the distribution of non-production workers—one firm might substantially employ professional workers, while the non-production workers of another firm might be predominantly low-skilled. The surveys/censuses also include information on R&D

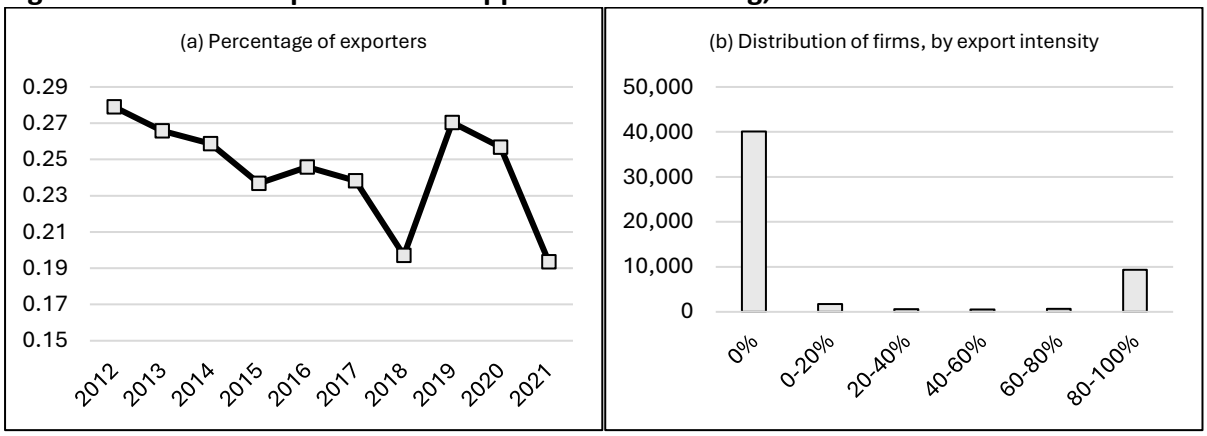
employment. Personnel involved in R&D work include researchers, technicians, and other workers associated with the conduct of R&D (e.g. clerical and administrative personnel).

Services-related output is captured by the income generated from the industrial and non-industrial services performed by the firm for other entities. Similar to the expense side, industrial services income covers contract and commission work, as well as industrial repair, maintenance, and installation. On the other hand, income from non-industrial services only consists of rental income.

4.2 Empirical Strategy

This study investigated the potential role of servicification in the GVC participation of manufacturing firms, by empirically assessing the significance of various servicification dimensions in firms' decision to export. While most of the existing empirical studies used export intensity as the outcome variable (see, for example, Lodefalk 2014, Mukherjee 2015, Matsuura 2023), our analysis used export status, since non-exporters constituted around three-fourths of the surveyed firms. Thus, it would be worthwhile to investigate first whether services-related activities positively influence the propensity of firms to export.

Figure 12. Share of Exporters in Philippine Manufacturing, 2012-2021



Source: Author's calculations based on data from ASPBI/CPBI.

For this purpose, we employed a fixed-effects panel logistic regression to control individual unobserved fixed effects. We modeled the log-odds of exporter status as a linear function of servicification indicators, firm characteristics, and various fixed effects. The empirical model is denoted by the following equation:

$$\mathbf{logit}(\mathbf{E}[\,\boldsymbol{EXP}_{is,t}\,|\boldsymbol{SRV}_{is,t}, \boldsymbol{X}_{is,t}, \boldsymbol{\mu}_s, \boldsymbol{\delta}_t, \boldsymbol{\varphi}_i]) = \mathbf{log}\left(\tfrac{p}{1-p}\right) = \boldsymbol{\beta_0} + \boldsymbol{\beta}_{SRV}\boldsymbol{SRV}_{is,t} + \boldsymbol{\beta}_x\boldsymbol{X}_{is,t} + \boldsymbol{\mu}_s + \boldsymbol{\delta}_t + \boldsymbol{\varphi}_i \quad (1)$$

where $\boldsymbol{EXP}_{is,t}$ is a binary variable indicating the exporter status of firm *i*, belonging to manufacturing sector *s*, in year *t*. A firm is considered an exporter if it has revenues coming from direct exports, regardless of amount. The variables of interest are captured by the $\boldsymbol{SRV}_{is,t}$ vector, which covers indicators on service inputs, in-house services activities, and sale of services. Service inputs were proxied by the percentage share of services-related expenses in total expenses. Percentages of non-production workers and R&D employees in total employment were the indicators for in-house services activities, while service outputs were represented by the share of services-related revenues in total firm income.

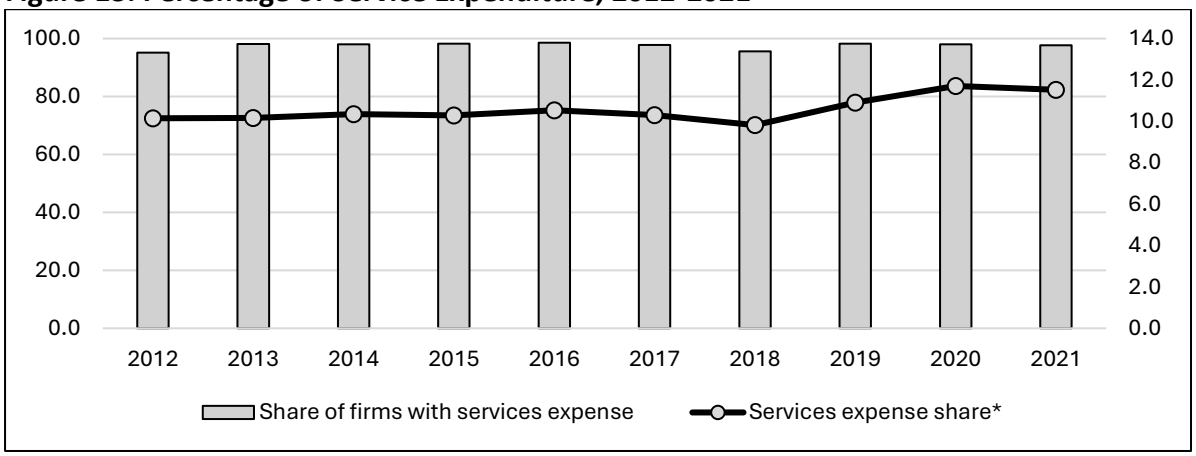
The vector $\boldsymbol{X_{is,t}}$ encompasses various firm characteristics, including firm age, foreign ownership, firm size, labor productivity, and capital intensity. These variables are considered potential determinants of firm export participation. As established by literature, more productive firms tend to self-select into export markets, since they have the necessary capabilities to cover the additional sunk and variable costs. The other covariates are also associated with firm capabilities, experience, and foreign linkages. The model also includes sector, time, and firm fixed effects. Average elasticities were derived from the regressions to assess whether an increase in the intensity of service inputs/outputs is associated with a higher probability of exporting. Table A1 shows the variable definitions and summary statistics.

4.3 Services activities among Philippine manufacturing firms

4.3.1 Service inputs

Overall, almost all manufacturing firms have been outsourcing services. Figure 13 reveals that the share of manufacturing firms that incur services-related expenses has consistently exceeded 95 percent throughout the 2012-2021 period. However, service inputs did not account for substantial shares of firm expenses. Among firms that spend on service inputs, the average share of service inputs in total firm expenses hovered around 9.8 to 11.7 percent during the covered period. Changes in percentage shares across years could be considered marginal, although we can observe an increasing trend in the latter part of the period; by the 2020s, the average share of services-related expenses was already greater than 11 percent.

Figure 13. Percentage of Service Expenditure, 2012-2021



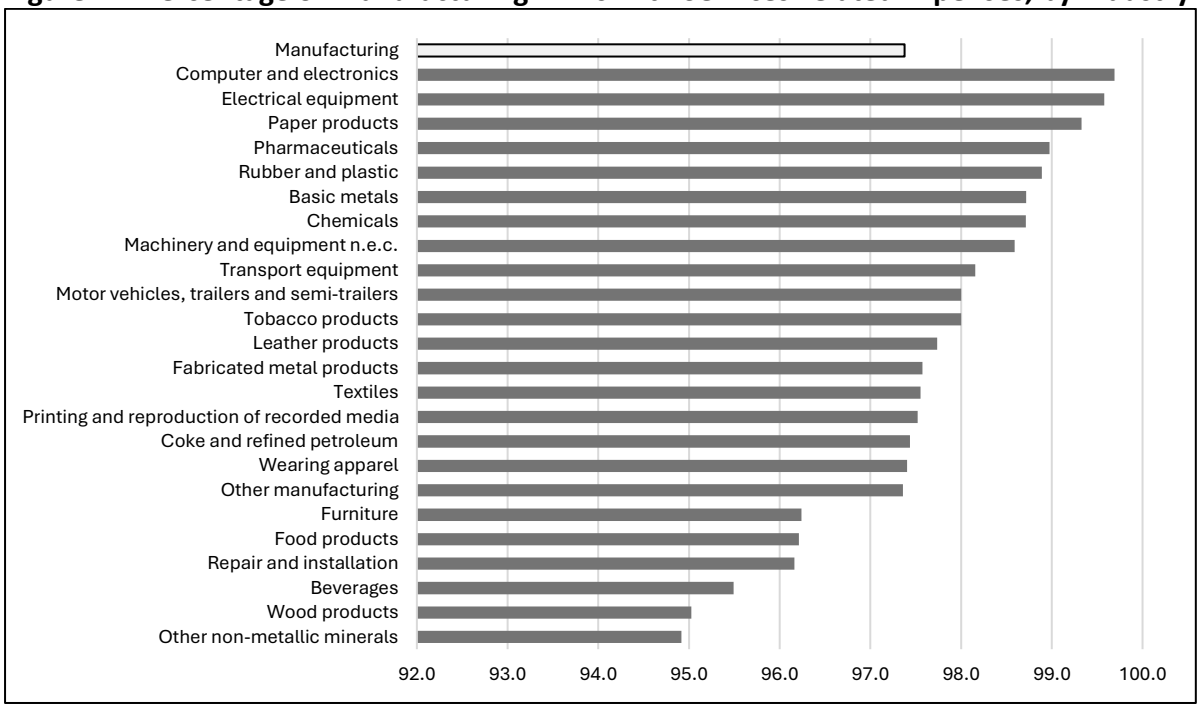
Note: * – only firms with services-related expenses are included.
Source: Author's calculations based on ASPBI/CPBI data.

While service inputs have been utilized by almost all sampled manufacturing firms, some industries exhibited relatively higher percentages than others. Based on Figure 14, electronics and electrical industries had the highest shares of firms with service inputs, at 99.7 and 99.6 percent, respectively. On the other hand, other non-metallic minerals and wood products registered the lowest shares of services-outsourcing firms, at 94.9 and 95 percent, respectively.

In terms of distribution by type of service, service-related expenses have been dominated by non-industrial service activities. Much of the services availed by manufacturing firms were miscellaneous non-industrial services, which accounted for as much as one-third of service expenses. Around 20 to 28 percent of service expenses came from rentals of various facilities and equipment, such as land, buildings, and office machinery. Meanwhile, the share of

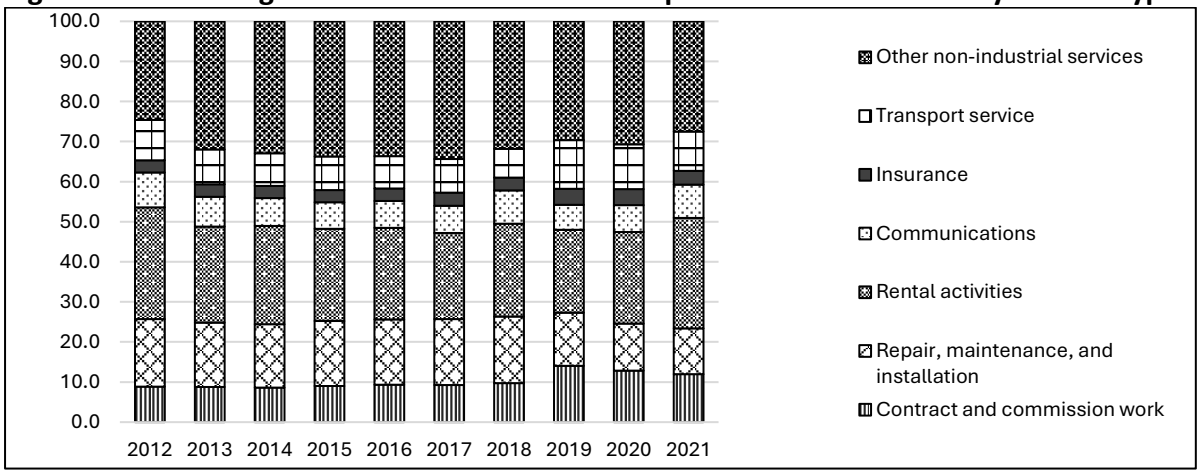
industrial services activities, consisting of contract and commission work and repair, maintenance, and installation, only ranged between 24 and 27 percent.

Figure 14. Percentage of Manufacturing Firms with Services-related Expenses, by Industry



Source: Author's calculations based on ASPBI/CPBI data.

Figure 15. Percentage Share of Services-related Expense and Distribution by Service Type

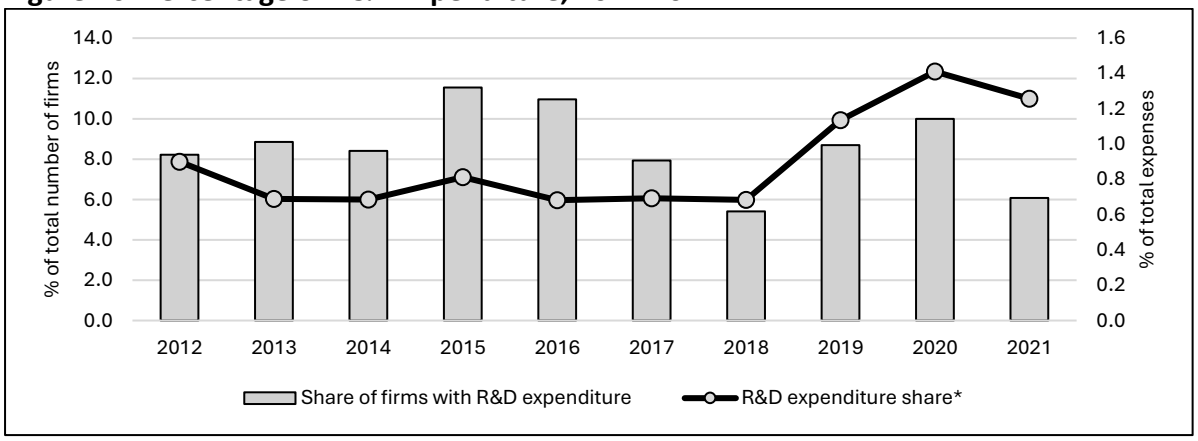


Note: Only firms with services-related expenses are included.
Source: Author's calculations based on ASPBI/CPBI data.

As noted in the previous sections, engaging in high-value activities such as R&D could prove crucial for the GVC participation of manufacturing firms. Thus, this study particularly assessed the R&D activities of Philippine manufacturing firms. Figure 16 shows the percentage share of firms with R&D expenditure, as well as intensity (in terms of percentage of total expenses). Overall, R&D has not been a common venture among manufacturing firms in the country. The share of firms with R&D expenditure fluctuated throughout the 2012-2021 period; most of the years had percentages lower than 10 percent. Among R&D spenders, the intensity of R&D expenditure has been strikingly marginal. The average share of R&D spending did not exhibit significant changes from 2012 to 2018, only ranging from 0.7 to 0.8 percent. In the succeeding

years, however, the average percentage notably increased, surpassing 1 percent.

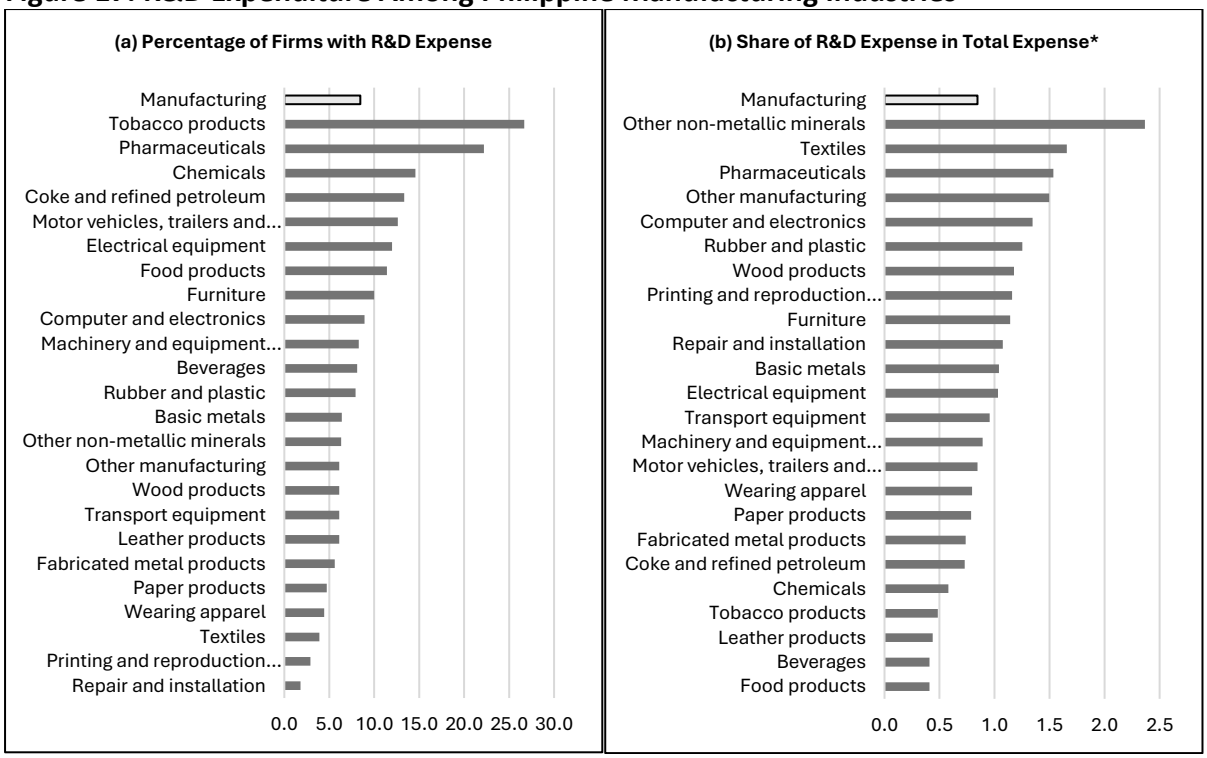
Figure 16. Percentage of R&D Expenditure, 2012-2021



Note: * – only firms with R&D expenses are included.
Source: Author's calculations based on ASPBI/CPBI data.

It is interesting to observe that manufacturers of tobacco products exhibited the highest average share of R&D spenders (26.7%) in the 2012-2021 period (see Figure 17). Other industries with notable percentages were mostly associated with chemicals manufacturing. The pharmaceuticals sector registered a 22.2-percent share of R&D spenders, while chemicals and coke and refined petroleum had average shares of 14.6 and 13.3 percent, respectively. In terms of the average share of R&D expenditure, non-metallic minerals exhibited the highest percentage, at 2.4 percent. It was followed by textiles (1.7%), pharmaceuticals (1.5%) and other manufacturing (1.5%). These figures suggest that R&D activities, in terms of spending, evidently vary among Philippine manufacturing sectors, both the low- and high-tech industries.

Figure 17. R&D Expenditure Among Philippine Manufacturing Industries



Note: * - only firms with R&D expenses are included.
Source: Author's calculations based on ASPBI/CPBI data.

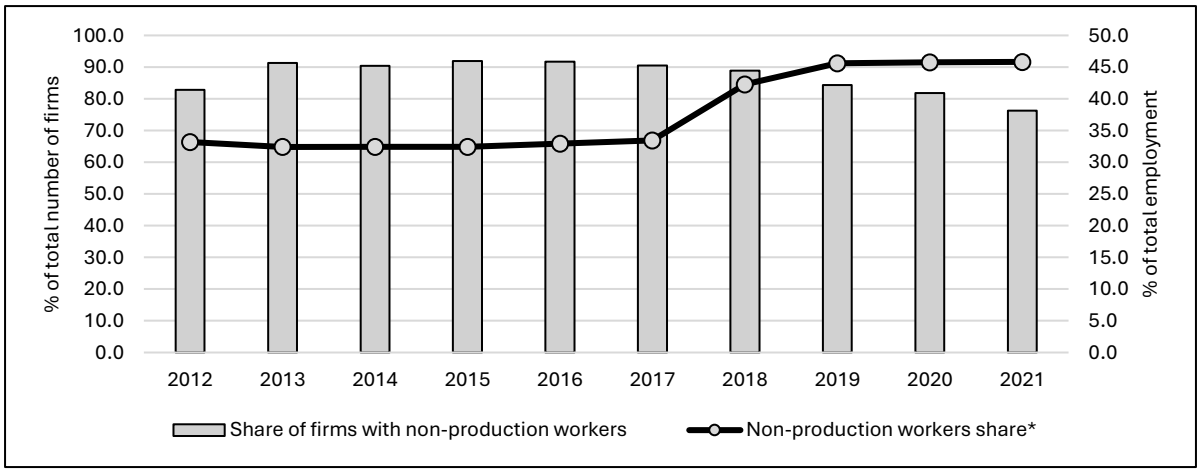
4.3.2 Services employment

Employment figures show that most manufacturing firms have incorporated activities other than the core production segments. Figure 18 shows that, for most of the 2012-2021 period, at least 80 percent of the sampled firms employ workers for non-production functions. However, the percentage share of these firms has gradually decreased since 2015—from 91.9 percent down 76.2 percent in 2021.

The figure also implies that manufacturing firms in the Philippines still focus on production activities. Among firms with non-production workers, these types of employees accounted for around one-third of total employment for the years 2012-2017. Evident increases can be observed in 2018 and 2019, as the average share of non-production employees exceeded 45 percent. The trends present contrasting findings on the reliance of manufacturing firms on services-related employment—while the share of firms that employ non-production workers has gradually decreased, services-related activities have become increasingly important for firms that actually employ service workers.

Among manufacturing subsectors, the electronics industry exhibited the highest percentage of firms with non-production workers, at 94.4 percent. Other sectors with notably higher percentages include motor vehicles (93.2%), coke and refined petroleum (92.8%), chemicals (92.7%), and pharmaceuticals (92.5%). In terms of average employment share, almost half of the employees in coke and refined petroleum perform non-production functions. Pharmaceuticals, chemicals, and beverages sectors had average shares exceeding 40 percent. Meanwhile, less than one-fourth of total employment in wearing apparel and leather industries perform non-production functions.

Figure 18. Employment of Non-production Workers in Philippine Manufacturing Firms, 2012-2021

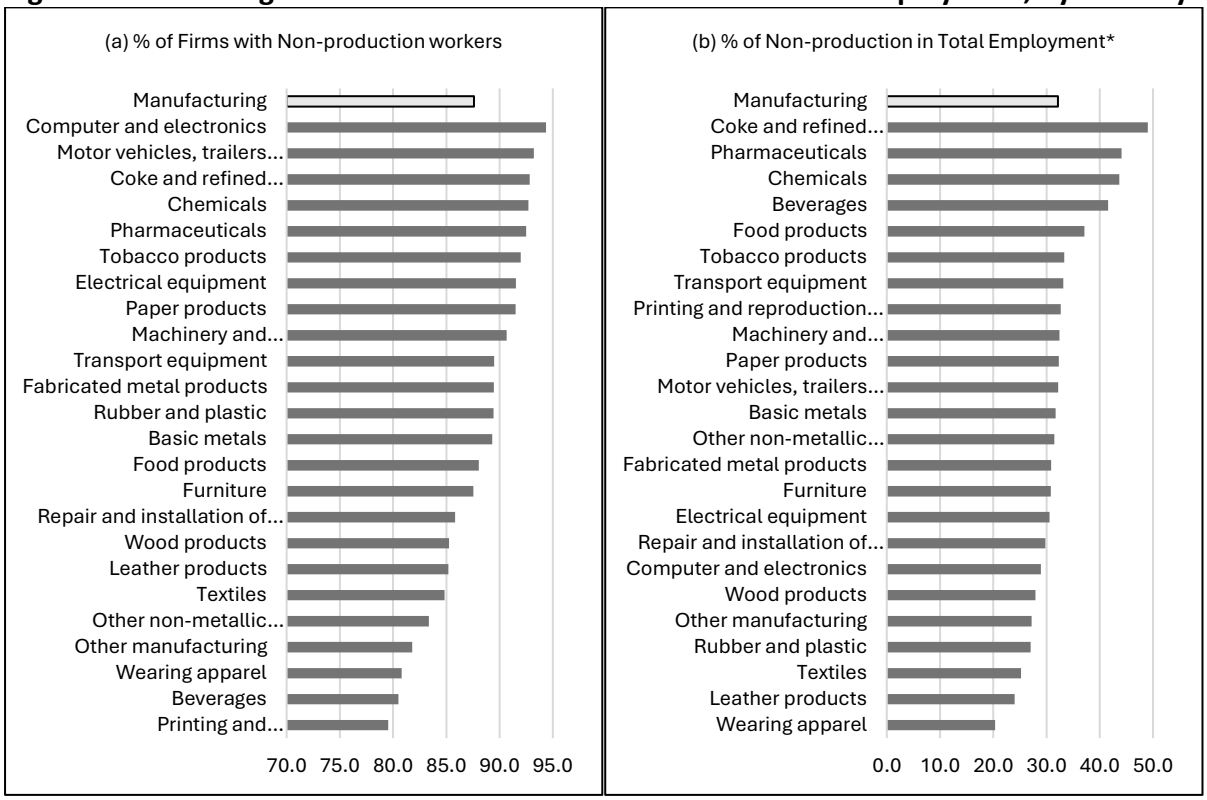


Note: * - only firms with non-production workers are included.
Source: Author's calculations based on ASPBI/CPBI data.

The limited R&D activities among Philippine manufacturing firms have also been evident in the employment of R&D personnel. The share of firms with R&D personnel fluctuated throughout the 2012-2021 period. However, the highest percentage can be seen in 2012, at 14.3 percent. This further supports the notion that R&D activities have not been sustained in the Philippine manufacturing sector. On the average, workers assigned to R&D functions have been evidently few among Philippine manufacturing firms. Average share of R&D personnel

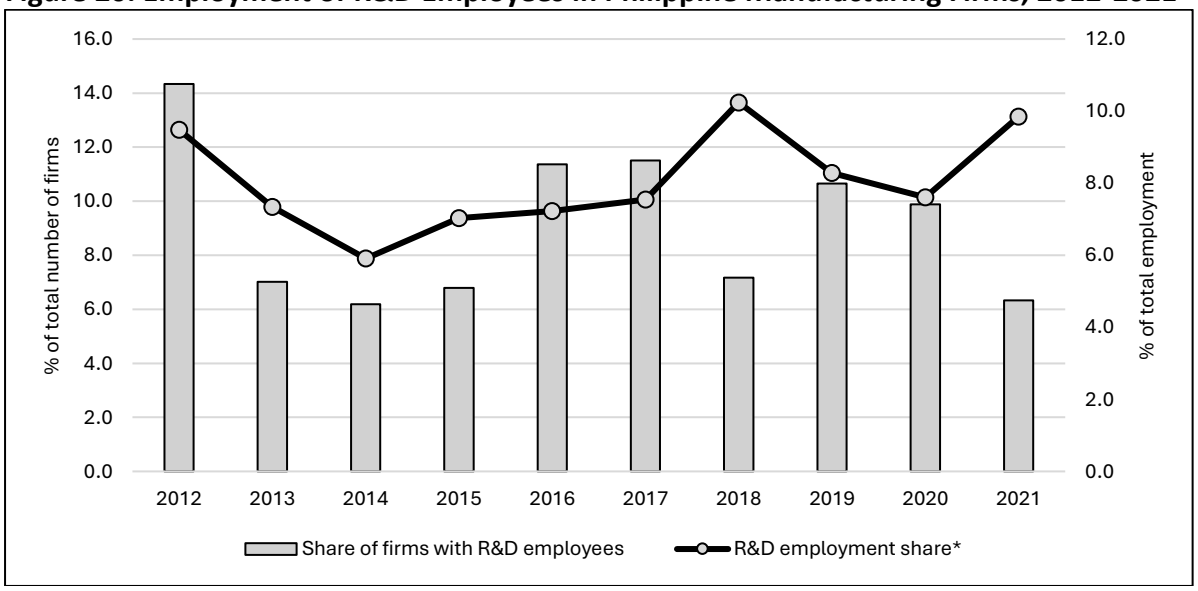
in total employment nosedived from 9.5 percent in 2012 to 5.9 percent in 2014. A generally increasing trend can be seen for the rest of the period, with 2018 and 2021 recording shares of 10.2 and 9.8 percent, respectively.

Figure 19. Percentage Share of Non-Production Workers in Total Employment, by Industry



Note: * - only firms with non-production workers are included.
Source: Author's calculations based on ASPBI/CPBI data.

Figure 20. Employment of R&D Employees in Philippine Manufacturing Firms, 2012-2021

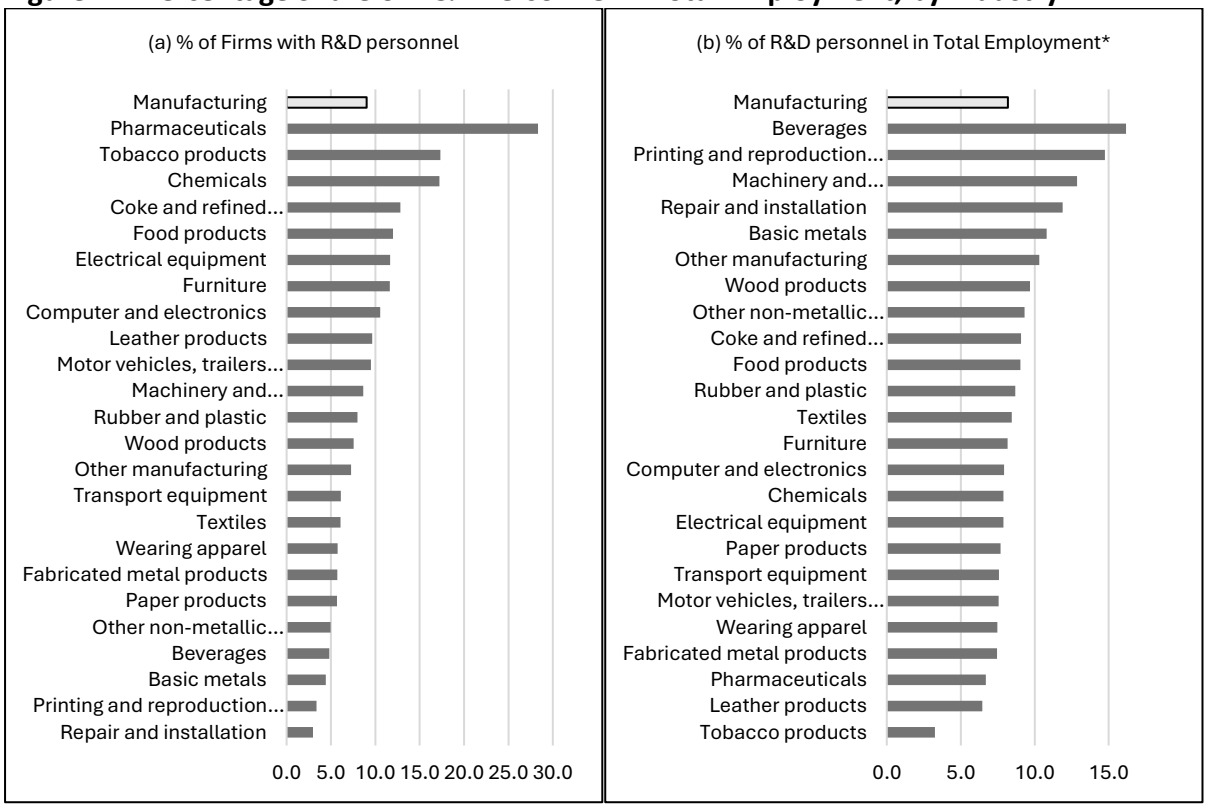


Note: * - only firms with R&D workers are included.
Source: Author's calculations based on ASPBI/CPBI data.

Chemicals industries registered the highest percentages of firms with R&D personnel. Based on Figure 21, 28.3 percent of pharmaceuticals firms have workers for R&D functions. Chemicals, and coke and refined petroleum sectors had average firm shares of 17.2 and 12.8 percent, respectively. Interestingly, tobacco also recorded a relatively high percentage of firms with R&D workers (17.2%). Repair and installation, and printing sectors exhibited the lowest shares, at 3.0 and 3.4 percent, respectively.

In terms of average share of R&D workers in total employment, the percentage in beverages industry stood at 16.2 percent—the highest among manufacturing industries. It is also interesting to note that, despite having the lowest percentages of firms employing R&D personnel, the repair and printing sectors recorded high employment shares, at 14.8 and 11.9 percent, respectively. This suggests that, while R&D employment is less common in these sectors, R&D personnel are relatively more integral for the firms that actually employ these kinds of workers.

Figure 21. Percentage Share of R&D Personnel in Total Employment, by Industry

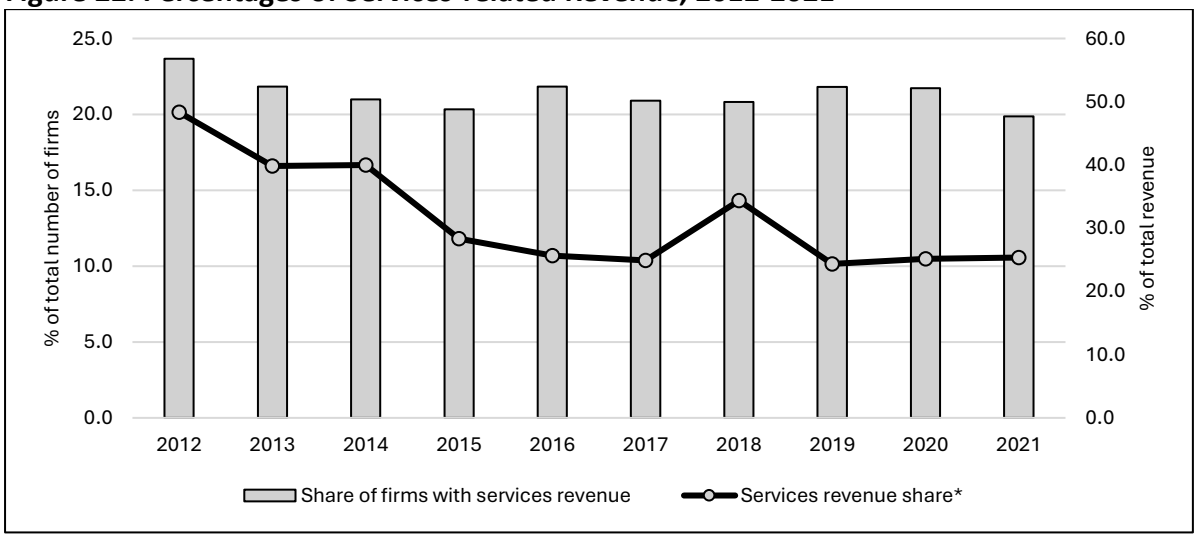


Note: * - only firms with R&D personnel are included.
Source: Author's calculations based on ASPBI/CPBI data.

4.3.3 Sale of services

While majority of manufacturing firms in the country outsource various service inputs, such as transport and repairs, only a smaller fraction of these firms have been capable of providing services. Figure 22 shows that the percentage of firms selling services have generally decreased over time, from 23.7 percent in 2012 to 19.9% in 2021. Among these service-providing manufacturing firms, the average percentage of service revenues have also declined during the period. In 2012, almost half of firm revenues came from the sale of services (48.3%). By the end of the decade, only around one-fourth of their total revenues were generated from performing services activities for other entities.

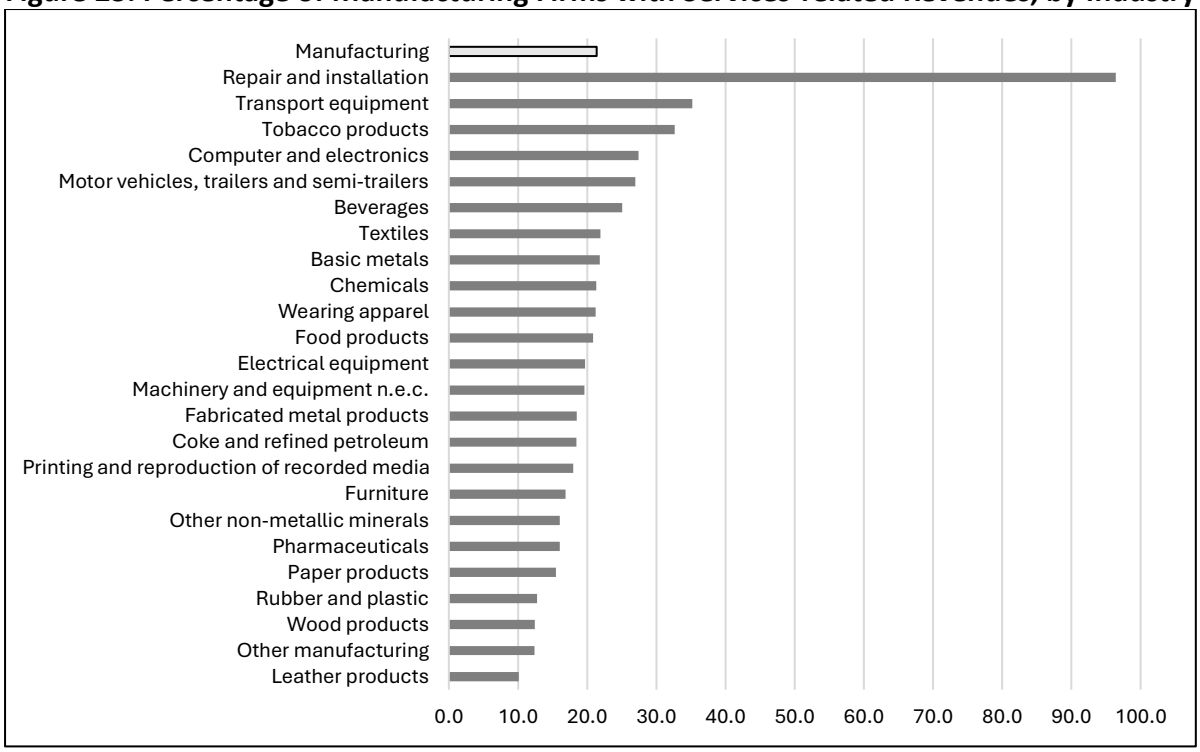
Figure 22. Percentages of Services-related Revenue, 2012-2021



Note: * – only firms with services-related expenses are included.
Source: Author's calculations based on ASPBI/CPBI data.

Given the nature of its activities, the repair and installation industry recorded the highest percentage of firms involved in the sale of services (96.4%). Transport equipment and tobacco industries both exhibited shares greater than 30 percent. Many medium- and high-tech industries registered relatively high percentages of firms generating services-related income. These include electronics, motor vehicles, basic metals, and chemicals. Interestingly, beverages and textiles exhibited above-average percentages.

Figure 23. Percentage of Manufacturing Firms with Services-related Revenues, by Industry

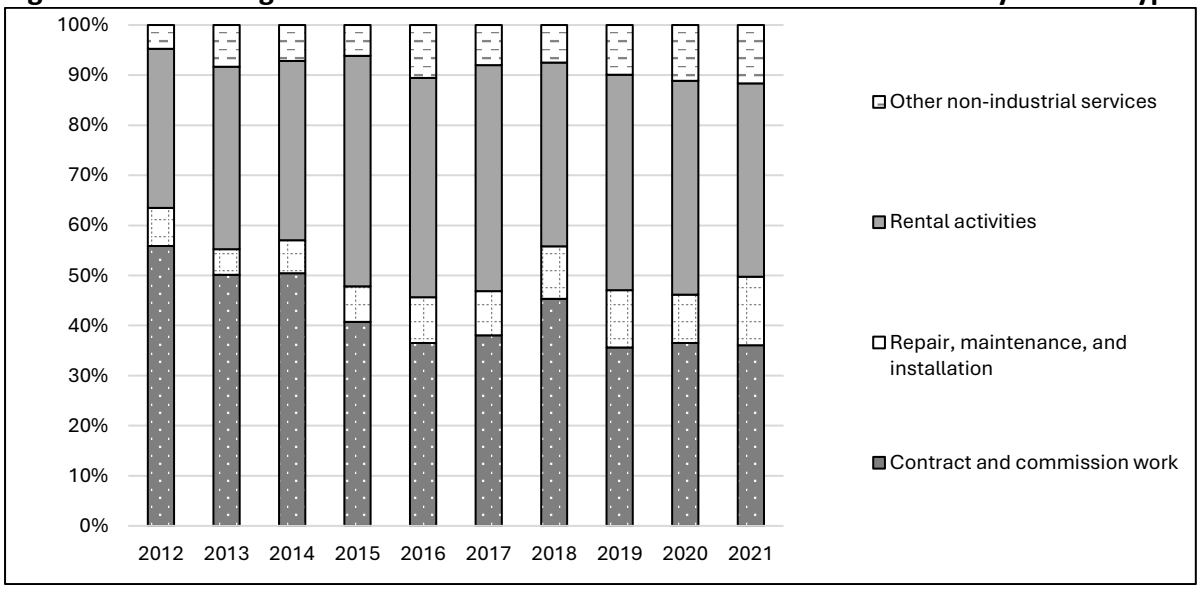


Source: Author's calculations based on ASPBI/CPBI data.

The decomposition of service revenues was markedly different from that of service inputs. While services-related expenses were mainly comprised of non-industrial services, service

output had a higher percentage of industrial services. More than half of the services-related revenue consisted of industrial services during the years 2012-2014. However, there has been a gradual shift in the decomposition of service output. In the following years (except 2018), non-industrial services became the dominant source of services-related income. Income from these services mainly came from rental activities. In 2021, service revenues were nearly equally divided between industrial and non-industrial services.

Figure 24. Percentage Share of Services-related Revenue and Distribution by Service Type



Note: Only firms with services-related revenues are included.
Source: Author's calculations based on ASPBI/CPBI data.

4.4 Empirical Results

The estimation of the relationship between the main servicification dimensions and firm decision to export are reported in Table 10. The estimated coefficients of the firm controls have been generally consistent across all specifications. Labor productivity was associated with a higher propensity to export, supporting the notion of more productive firms self-selecting into export markets; the estimates, however, were statistically non-significant. Firm age and capital intensity also had non-significant coefficients. Meanwhile, foreign ownership was associated with higher probability of export participation, and the coefficients were all significant at the 1-percent level. Foreign ownership has been strongly associated with trade and GVCs, as firms with foreign capital tend to serve as international exporting platforms (Dovis and Zaki 2018).

Servicification indicators had a generally positive association with firms' propensity to export. When accounting for a single servicification variable, as seen in Columns (1) to (5), we can observe that higher intensities in service input and output, as well as R&D expenditure and employment, significantly translated to higher probability of exporting. These indicate that greater reliance on service inputs, as well as selling services (potentially bundled with goods) influence export entry among Philippine manufacturing firms.

The specification in Column (6) accounted for both service expenses and service revenues. The coefficient of service expenses becomes negative, albeit non-significant. In contrast, the service revenues variable maintained its positive association with export propensity, even in magnitude. When both services-related employment variables were included, R&D employment intensity maintained its positive association with firm decision to export,

significant at the 5-percent level. Column (8) included all main servicification components, only the service inputs intensity had a negative (but non-significant) coefficient. Service revenue intensity still had a positive and significant coefficient, indicating that a 1-percentage point increase in service revenue intensity was associated with a 3.6-percentage point increase in export probability. On the average, a 1-percentage point increase in R&D employment intensity translated to an increase in a firm's probability to export by 1.2 percentage points, significant at the 5-percent level.

Table 10. Fixed-effects Logit Regression Results: Servicification and Firm Export Status

Dependent variable: *Exporter*	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
SrvExp	0.569***					-0.300		-0.307
	(0.207)					(0.245)		(0.246)
SrvRev		3.583***				3.594***		3.596***
		(0.172)				(0.173)		(0.173)
NonProdEmp			0.082				0.078	0.073
			(0.086)				(0.086)	(0.098)
R&DEmp				1.194**			1.187**	1.237**
				(0.470)			(0.470)	(0.541)
R&DExp					3.495			2.535
					(2.656)			(2.542)
Age	0.0035	0.003	0.0035	0.0036	0.0036	0.003	0.0036	0.0031
	(0.0029)	(0.003)	(0.0029)	(0.0028)	(0.0029)	(0.003)	(0.0028)	(0.0030)
ForeignOwn	0.489***	0.550***	0.489***	0.488***	0.490***	0.551***	0.487***	0.548***
	(0.084)	(0.086)	(0.084)	(0.084)	(0.084)	(0.086)	(0.084)	(0.086)
MSME	-0.131	-0.193**	-0.123	-0.124	-0.118	-0.186**	-0.127	-0.194**
	(0.084)	(0.089)	(0.084)	(0.084)	(0.084)	(0.089)	(0.084)	(0.089)
lnLabProd	0.025	0.041	0.024	0.023	0.024	0.040	0.022	0.039
	(0.025)	(0.029)	(0.025)	(0.025)	(0.025)	(0.029)	(0.025)	(0.029)
lnCapitalInt	-0.0051	0.010	-0.0038	-0.0042	-0.0037	0.011	-0.0045	0.0094
	(0.013)	(0.015)	(0.013)	(0.013)	(0.013)	(0.015)	(0.013)	(0.015)
Sector fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	12,882	12,882	12,882	12,882	12,882	12,882	12,882	12,882
No. of firms	2,201	2,201	2,201	2,201	2,201	2,201	2,201	2,201

Note: Reported coefficients are average elasticities. Standard errors are in parentheses. ***, **, and * indicate statistical significance at the 1 percent, 5 percent, and 10 percent level, respectively.

The significance of servicification in manufacturing exports tends to vary across heterogeneous firms (Lodefalk 2014). We then attempted to assess the services-export relationship in terms of firm size, ownership, and industry, by including various interaction terms. In Table 11, Column (1) shows the results when interaction terms with MSME status were included. Both the main and interaction terms of service revenue had positive and statistically significant coefficients, indicating that sale of services has greater importance export entry of MSMEs.

The results of the estimation with services-ownership interactions are shown in Column (2). The main effect of service expense was negative and significant at the 5-percent level. However, the interaction term with foreign ownership status was positive and significant at the 10-percent level, suggesting that service inputs might be more essential in the export activities of firms with foreign capital. However, the interaction between service revenue and foreign ownership had a negative and significant coefficient, suggesting that the importance of selling services was dampened among foreign owned firms.

Meanwhile, we looked at the differing effects among industries by including interactions with an industry dummy variable. The said variable classifies industries whether they have medium-

to-high technology intensity or not. Column (3) shows that the interaction with service expense was positive, while the one with service revenue was negative. The results suggest that, for foreign and high-tech firms, both inputs and outputs of services are crucial in facilitating their participation in export markets.

Table 11. Regression Results With Firm Size, Ownership, and Industry Interaction Terms

Dependent variable: *Exporter*	**(1)**	**(2)**	**(3)**
SrvExp	-0.196	-0.846**	-0.757**
	(0.436)	(0.371)	(0.309)
SrvRev	2.584***	4.640***	4.168***
	(0.282)	(0.276)	(0.251)
NonProdEmp	0.075	0.064	0.050
	(0.171)	(0.132)	(0.116)
R&DEmp	0.880	2.112***	1.808***
	(1.158)	(0.726)	(0.652)
R&DExp	-0.172	4.547	4.004
	(3.645)	(3.945)	(3.812)
SrvExp×MSME	-0.196		
	(0.504)		
SrvRev×MSME	1.469***		
	(0.329)		
NonProdEmp×MSME	-0.0053		
	(0.203)		
R&DEmp×MSME	0.500		
	(1.270)		
R&DExp×MSME	4.956		
	(4.899)		
SrvExp×ForeignOwn		0.854*	
		(0.466)	
SrvRev×ForeignOwn		-2.422***	
		(0.349)	
NonProdEmp×ForeignOwn		0.055	
		(0.195)	
R&DEmp×ForeignOwn		-1.597	
		(1.010)	
R&DExp×ForeignOwn		-2.704	
		(4.986)	
SrvExp×HiTech			1.173**
			(0.508)
SrvRev× HiTech			-1.459***
			(0.337)
NonProdEmp× HiTech			0.112
			(0.222)
R&DEmp× HiTech			-1.406
			(1.062)
R&DExp× HiTech			-3.358
			(4.963)
Firm controls	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
No. of observations	12,882	12,882	12,882
No. of firms	2,201	2,201	2,201

Note: Reported coefficients are average elasticities. Standard errors are in parentheses. ***, **, and * indicate statistical significance at the 1 percent, 5 percent, and 10 percent level, respectively.

4.4.1 Specific Channels of Servicification

To further provide information on the key drivers of the relationship between servicification and export participation, we utilized the different components of service expenses and revenues found in the Philippine establishment surveys and censuses. Table 12 shows the estimations results for different service inputs. Controlling for other servicification dimensions and firm characteristics, only transport expense was significantly associated with higher probability of exporting. This shows the significance of transportation in facilitating smooth flow of transactions, which is crucial in promoting export activities among Philippine manufacturing firms. Meanwhile, the coefficient of miscellaneous non-industrial services was negative and significant.

Table 12. Fixed-effects Logit Regression Results: Service Inputs

Dependent variable: *Exporter*	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
ContractExp	0.060						
	(0.394)						
RepairExp		-0.534					
		(0.830)					
RentExp			-0.895				
			(0.610)				
CommExp				2.040			
				(3.418)			
InsureExp					1.259		
					(4.907)		
TransExp						5.098***	
						(1.234)	
OthNonIndExp							-1.114***
							(0.417)
SrvRev	3.583***	3.587***	3.591***	3.583***	3.584***	3.585***	3.597***
	(0.172)	(0.173)	(0.173)	(0.172)	(0.172)	(0.172)	(0.173)
Servicification controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	12,882	12,882	12,882	12,882	12,882	12,882	12,882
No. of firms	2,201	2,201	2,201	2,201	2,201	2,201	2,201

Note: Reported coefficients are average elasticities. Standard errors are in parentheses. ***, **, and * indicate statistical significance at the 1 percent, 5 percent, and 10 percent level, respectively.

Estimations on the role of service revenue components are presented in Table 13. Overall, the sale of industrial services was strongly associated with higher probability of exporting. Contract and commission work exhibited a greater magnitude than repair, maintenance, and installation. It is interesting to note, however, that the coefficients of service expense were positive and significant when contract and commission work was not included in the model. It could be possible that those providing industrial services tend to perform in-house services activities, utilizing lesser service inputs.

Table 13. Fixed-effects Logit Regression Results: Service Revenues

Dependent variable: *Exporter*	(1)	(2)	(3)	(4)
ContractRev	3.617***			
	(0.176)			
RepairRev		1.177***		
		(0.321)		
RentRev			-0.480	
			(0.555)	
OthNonIndRev				0.451
				(0.734)
ServiceExp	-0.280	0.578***	0.568***	0.564***
	(0.245)	(0.208)	(0.207)	(0.207)
Servicification controls	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
No. of observations	12,882	12,882	12,882	12,882
No. of firms	2,201	2,201	2,201	2,201

Note: Reported coefficients are average elasticities. Standard errors are in parentheses. ***, **, and * indicate statistical significance at the 1 percent, 5 percent, and 10 percent level, respectively.

4.4.2 Robustness Checks

We assessed the robustness of our regression results, by using two alternative definitions of exporter status. We used higher thresholds of export intensity for the alternative indicators, at 10 and 20 percent.[4] Table 14 presents the estimation results using the alternative dependent variables. Service revenue intensity remained positively associated with higher probability of export participation, significant at the 1 percent level. The magnitudes of the coefficients were slightly greater than the one in the baseline estimation. Higher R&D employment intensity was associated with greater export propensity, significant at the 10 percent level. We can also observe that, when using the 20-percent export propensity threshold, the coefficient of R&D expenditure intensity became significant at the 10 percent level. Overall, the results presented in Table 13 support the findings from the baseline estimations.

Table 14. Fixed-effects Logit Regression Results: Higher Export Intensity Thresholds

	10 percent (1)	20 percent (2)
SrvExp	-0.204	-0.358
	(0.273)	(0.276)
SrvRev	3.951***	3.988***
	(0.186)	(0.183)
NonProdEmp	0.026	-0.061
	(0.114)	(0.119)
R&DEmp	1.137*	1.049*
	(0.616)	(0.628)
R&DExp	3.881	5.851*
	(2.772)	(3.421)
Firm Controls	Yes	Yes
Sector fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
No. of observations	12,882	12,882
No. of firms	2,201	2,201

Note: Reported coefficients are average elasticities. Standard errors are in parentheses. ***, **, and * indicate statistical significance at the 1 percent, 5 percent, and 10 percent level, respectively.

[4] Export intensity is the percentage share of direct exports in total sales of products/by-products.

5. Conclusion and Policy Implications

The emergence of GVCs in recent decades has highlighted the importance of services in facilitating manufacturing processes across different locations. Manufacturing firms have also increasingly utilized services to create additional value and improve their competitiveness. Through ICT advances, some services have become increasingly tradable; as a result, these services are now capable of generating benefits of scale, greater competition, and technology diffusion associated with international trade—characteristics that were once unique to manufacturing (Nayyar and Cruz 2018).

The Philippines has not experienced the manufacturing-led industrial growth attained by some of its regional neighbors in recent decades. Rather than undergoing a structural transformation from agriculture to manufacturing, the Philippine economy has exhibited a premature ageing throughout the last few decades, characterized by a rising share of services and decreasing share of industry and manufacturing (Fabella and Fabella 2012, Aldaba 2014). Thus, leveraging the dominant services sector has been one of the prospective strategies to bolster the competitiveness of manufacturing industries and establish their participation in GVCs.

This study assessed the role of services in the Philippines' participation in manufacturing GVCs. It utilized both country-sector and firm-level data to explore the different dimensions of servicification. Using TiVA data, we observed that the contribution of services value added in Philippine manufacturing exports has been on par with its regional neighbors and important trading partners. Domestic and foreign services have almost equal contributions in the servicification of Philippine manufacturing exports. However, Philippine manufacturing exports have had relatively lower percentages of modern service inputs, especially in comparison to higher-income countries. A closer look at the decomposition of electronics exports also revealed that linkages with modern services are crucial, since most of the key exporting countries in electronics substantially utilize modern services, such as ICT, finance, and business services.

The role of various services-related activities in the export participation of Philippine manufacturing firms was also assessed in this study. We found that most of the sampled firms had recorded expenses in service inputs. Most firms also had employed workers for non-production tasks and functions. In contrast, a smaller percentage of firms have engaged in the sale of services, suggesting that offering services as a complement to goods might require certain capabilities from firms. Activities related to R&D have been evidently limited among manufacturing firms in the country; only a small number of observations had R&D expenditures and R&D personnel. Moreover, these R&D activities only constitute a marginal fraction of firm operations. The results of firm-level estimations reveal heterogeneous effects of servicification on export propensity. Overall, the sale of services, R&D employment, and transport expenses positively influenced a firm's inclination to export. Estimations using interaction terms with firm size, ownership, and industry reveal heterogeneous relationships between services and export participation. Selling services are more important among MSMEs, while foreign-owned exporters and exporters from medium-to-high technology industries substantially utilize service inputs and generate revenues from selling services.

The findings of this study put forward the importance of services in the country's industrial and trade policies. Goods and services trade policies have become increasingly intertwined; hence, they can no longer be formulated in isolation (Pasadilla and Wirjo 2016). Countries could leverage trade agreements to liberalize services trade. Although most of the Philippines'

trade agreements contain provisions on trade in services, it could be worthwhile for the Philippines and its trading partners to explore other areas of cooperation that are relevant to services trade, such as R&D and innovation, data policies, and labor market regulations.

Strengthening linkages with modern services should be prioritized in formulating interventions. These types of services tend to be closely associated with technology; hence, linking manufacturing with these services present valuable opportunities for digitalization and innovation, as well as value creation. Thus, modern services could be instrumental to technological learning and capability building that would enable firms to compete through productivity gains, rather than participating in a "race to the bottom" competition of lowering prices and wages (Pietrobelli and Rabellotti 2006).

Manufacturing industries could benefit from policies focusing on the development of domestic services. While we did not observe notable patterns in terms of domestic service inputs embodied in manufacturing exports, it would be worthwhile to sustain the growth of the country's services sector. Services have already dominated the Philippine economy, and the percentage share of modern services in gross domestic product has gradually increased in recent years. Amendments to landmark legislations, such as the Public Service Act, Retail Trade Liberalization Act, and Foreign Investment Act, have been passed to further attract foreign investments in the country. The government could then intensify its efforts in promoting the Philippines as an ideal destination for investing in services-related activities.

Establishing a conducive environment that fosters collaboration between manufacturing and services sectors could also provide the impetus needed for the participation of manufacturing industries in high-value GVC segments. For instance, the IT and Business Process Association of the Philippines (IBPAP) and Semiconductor and Electronics Industries in the Philippines Foundation, Inc. (SEIPI) recently signed a Memorandum of Agreement to collaborate in various areas to generate additional jobs and revenue and boost the country's exports (Garcia 2023). Additionally, the government could intensify its efforts in establishing a support system, through improving ICT infrastructure and internet access in the country. Despite having one of the highest intensities of internet use, the Philippines has lagged behind its regional neighbors in terms of internet and broadband speed (Parungao 2024).

The findings of the study highlight the value-creating opportunities from selling services, potentially complementary with goods. The bundling of goods and services could be an ideal strategy for firms to differentiate their products, thereby gaining an advantage over their competitors. This is particularly important for MSMEs, since most of them face difficulties in staying competitive in foreign markets (Francisco et al. 2019). The government could assist MSMEs in identifying service activities that they could perform in complement to the goods they sell, as well as the necessary skills needed to sell these services.

The conduct of R&D and innovation activities in the country needs to be intensified. In many manufacturing GVCs, high-value segments primarily involve the conduct of research, as well as engaging in innovation. Manufacturing firms could significantly build their capabilities from adopting technologies and innovating, in order to develop new or improved products and processes. The Philippines could benefit from the upskilling of workers, as well as promoting science, technology, engineering, and mathematics (STEM) programs in higher education institutions. The results also confirm that traditional services such as transportation and logistics are still vital in trade and GVCs, since they facilitate the cross-border flow of goods. However, high shipping and logistics costs have significantly hampered the productivity gains

in services (NEDA 2023). High market concentration in the domestic shipping industry has also exacerbated the cost of freight services in the country (Francisco and Abrigo 2023). Thus, the government must work on streamlining regulations and procedures, and promote competition to reduce transport and logistics costs.

While we attempted to investigate the servicification of Philippine manufacturing in various aspects, further research could still be conducted to thoroughly assess the role of services in facilitating GVC participation. For instance, it would be interesting to explore other data sources, such as the Occupation Wages Survey (OWS), to establish a profile of services-related employees in the manufacturing sector.

6. References

Aldaba, R.M. The Philippine manufacturing industry roadmap: Agenda for new industrial policy, high productivity jobs and inclusive growth. PIDS Discussion Paper No. 2014-32. Makati City: Philippine Institute for Development Studies. https://pidswebs.pids.gov.ph/CDN/PUBLICATIONS/pidsdps1432.pdf (accessed on November 5, 2024).

ASEAN-Japan Centre. 2017. Paper 8: Global Value Chains in ASEAN: The Philippines. Tokyo: ASEAN-Japan Centre.

Baldwin, R. 2011. 21st century regionalism: Filling the gap between 21st century trade and 20th century trade rules. WTO Staff Working Paper No. ERSD-2011-08. Geneva: World Trade Organization. https://www.wto.org/english/res_e/reser_e/ersd201108_e.pdf (accessed on February 16, 2024).

Baldwin, R., R. Forslid, and T. Ito. 2015. Unveiling the evolving sources of value added in exports. Joint Research Program No. 161. Chiba: Institute of Developing Economies, Japan External Trade Organization. https://www.ide.go.jp/library/English/Publish/Reports/Jrp/pdf/161.pdf (accessed

Cusumano, M.A., S.J. Kahl, and F.F. Suarez. 2015. Services, industry evolution, and the competitive strategies of product firms. *Strategic Management Journal* 36(4): 559-575.

Dovis, M. and C. Zaki. 2020. Global value chains and local business environments: Which factors really matter in developing countries? *Review of Industrial Organization* 57: 481-513.

Fabella, R. and M.C. Fabella. 2012. Development Progeria? In BusinessWorld, *Looking back, moving forward: 25 years of BusinessWorld*. Quezon City: BusinessWorld Publishing Corp.

Fracisco, J.P., T. Canare, and J.R. Labios. 2019. Obstacles of Philippine SMEs participation in global value chains. PIDS Research Paper No. 2019-05. Quezon City: Philippine Institute for Development Studies. https://pidswebs.pids.gov.ph/CDN/PUBLICATIONS/pidsrp1905.pdf (accessed on November 10, 2024).

Francisco, K.A. and M.R.M. Abrigo. 2023. Market power in the Philippine domestic shipping industry. PIDS Research Paper No. 2023-44. Quezon City: Philippine Institute for Development Studies. https://pidswebs.pids.gov.ph/CDN/document/pidsdps2344.pdf (accessed on December 11, 2024).

Galindo-Rueda, F. and F. Verger. 2016. OECD taxonomy of economic activities based on R&D intensity. OECD Science, Technology and Industry Working Paper No. 2016/04. Paris: OECD. https://www.oecd-ilibrary.org/docserver/5jlv73sqqp8r-en.pdf?expires=1731670053&id=id&accname=guest&checksum=291B342B3D5776D78D02DAF465D5DB66 (accessed on October 14, 2024).

Garcia, M.J.C. 2023. IBPAP, SEIPI forge strategic alliance for jobs, revenue generation. *Manila Bulletin*. November 4. https://mb.com.ph/2023/11/3/ibpap-seipi-forge-strategic-alliance-to-boost-ph-exports (accessed on February 25, 2024).

Gereffi, G. and K. Fernandez-Stark. 2010. The offshore services value chain: Developing countries and the crisis. World Bank Policy Research Working Paper No. 5262.

———. 2016. Global value chain analysis: A primer (2nd ed.). Durham, North Carolina: Duke University, Center on Globalization, Governance & Competitiveness. Washington, D.C.: The World Bank. https://openknowledge.worldbank.org/server/api/core/bitstreams/5eeef38f-5cf3-5502-9aea-d4305841bc65/content (accessed on January 13, 2024).

Goldar, B., R. Banga, and K. Banga. 2018. India's linkages into global value chains: The role of imported services. *India Policy Forum* 14(1): 107-172.

Grover, A. and A. Mattoo. 2021. Why do manufacturing firms sell services? Evidence from India. World Bank Policy Research Working Paper 9701. Washington, D.C.: The World Bank. https://documents1.worldbank.org/curated/en/687351624023153525/pdf/Why-Do-Manufacturing-Firms-Sell-Services-Evidence-from-India.pdf (accessed on November 7, 2024).

Hallak, J.C., and J. Levinsohn. 2004. Fooling ourselves: Evaluating the globalization and growth debate. NBER Working Paper No. 10244. Cambridge, Massachusetts: National Bureau of Economic Research. http://www.nber.org/papers/w10244 (accessed on February 17, 2024).

Hansl, B. and O. Cattaneo. 2017. The Philippines: Resurrecting Manufacturing in a Services Economy. *World Bank Blogs*. June 23. https://blogs.worldbank.org/eastasiapacific/philippines-resurrecting-manufacturing-services-economy (accessed on February 1, 2024).

Heuser, C. and A. Mattoo. 2017. Services trade and global value chains. World Bank Policy Research Working Paper No. 8126. Washington, D.C.: The World Bank. http://documents1.worldbank.org/curated/en/627361498584454928/pdf/WPS8126.pdf (accessed on October 10, 2024).

Inomata, S. 2017. Analytical frameworks for global value chains: An overview. In World Bank Group, IDE-JETRO, OECD, UIBE, and World Trade Organization, *Global value chain development report 2017: Measuring and analyzing the impact of GVCs on economic development*. Washington DC: The World Bank. https://documents1.worldbank.org/curated/ar/440081499424129960/pdf/117290-WP-P157880-PUBLIC.pdf (accessed on February 20, 2024).

Kaplinsky, R. 2004. Spreading the gains from globalization: What can be learned from value-chain analysis? *Problems of Economic Transition* 47(2): 74-115.

Kommerskollegium. 2014. *Making green trade happen – Environmental goods and indispensable services*. Stockholm: National Board of Trade, Sweden.

Kordalska, A. and M. Olczyk. 2021. Linkages between services and manufacturing as a new channel for GVC growth: evidence from CEE countries. *Structural Change and Economic Dynamics* 58: 125-137.

Lodefalk, M. 2014. The role of services for manufacturing firm exports. *Review of World Economics* 150: 59-82.

Low, P. 2013. The role of services in global value chains. Fung Global Institute Working Paper No. FGI-2013-1. Hong Kong: Fung Global Institute. https://www.asiaglobalinstitute.hku.hk/storage/app/media/pdf/456-The-Role-of-Services-in-Global-Value-Chains.pdf (accessed on January 14, 2024).

Manghnani, R., B. Meyer, S. Saez, and E. van Der Marel. 2021. Integration in global value chains—The role of service inputs. World Bank Policy Research Working Paper 9813. Washington, DC: The World Bank. https://documents1.worldbank.org/curated/en/396541634653390686/pdf/Integration-in-Global-Value-Chains-The-Role-of-Service-Inputs-Evidence-from-India.pdf (accessed on February 1, 2024).

Matsuura, T. 2023. Servicification of Japanese manufacturing firms and its impact on corporate performance in the export market. RIETI Discussion Paper No. 23-E-043. Tokyo: Research Institute of Economy, Trade and Industry. https://www.rieti.go.jp/jp/publications/dp/23e043.pdf (accessed on October 2, 2024).

Mercer-Blackman, V. and C. Ablaza. 2018. The servicification of manufacturing in Asia: Redefining the sources of labor productivity. ADBI Working Paper No. 902. Tokyo: Asian Development Bank Institute. https://www.adb.org/publications/servicification-manufacturing-asia-redefining-sources-labor-productivity (accessed on January 31, 2024).

Miroudot, S. and C. Cadestin. 2017. Services in global value chains: From inputs to value-creating activities. OECD Trade Policy Paper No. 197. Paris: OECD Publishing. https://doi.org/10.1787/465f0d8b-en (accessed on January 13, 2024).

Mukherjee, S. 2015. The role of services in enhancing Indian manufacturing exports: A firm level analysis, 2000-01 to 2011-12. *Journal of Economics Library* 2(4): 334-349.

———. 2018. Services outsourcing and productivity growth: Evidence from Indian manufacturing firms. *South Asia Economic Journal* 19(2): 192-209.

National Economic Development Authority (NEDA). 2023. Philippine Development Plan 2023-2028. Pasig City, Philippines: NEDA. https://pdp.neda.gov.ph/philippinedevelopment-plan-2023-2028/ (accessed on February 1, 2024).

Nayyar, G. and M. Cruz. 2018. Developing countries and services in the new industrial paradigm. World Bank Policy Research Working Paper No. 8659.

Organisation for Economic Co-operation and Development (OECD). 2013. *Interconnected economies: Benefiting from global value chains.* Paris: OECD. Washington, DC: The World Bank. https://openknowledge.worldbank.org/server/api/core/bitstreams/e534b933-8a22-50b3-a6cd-cecc4471cdf3/content (accessed on November 14, 2024).

Parungao, A. 2024. PH needs faster internet to compete globally – think tank. *Philippine Daily Inquirer*. June 28. https://newsinfo.inquirer.net/1956074/ph-needs-faster-internet-to-compete-globally-think-tank (accessed on November 15, 2024).

Pasadilla, G.O. and A. Wirjo. 2016. Services-manufacturing linkage and the role of policy. *Philippine Journal of Development* 41-42(1-2): 81-110.

Pietrobelli, C. and R. Rabellotti. 2006. Clusters and value chains in Latin America: In search of an integrated approach. In C. Pietrobelli and R. Rabellotti (Eds.), *Upgrading to compete: Global value chains, clusters, and SMEs in Latin America*. Washington, D.C.: Inter-American Development Bank.

Reddy, K., S. Sasidharan, and S. Thangavelu. 2022. Does servicification of manufacturing increase the GVC activities of firms? Case of India. *The World Economy* 46(1): 153-81.

Serafica, R.B. 2016. Why manufacturing resurgence will mean more services, not less. PIDS Discussion Paper No. 2016-46. Quezon City: Philippine Institute for Development Studies. https://pidswebs.pids.gov.ph/CDN/PUBLICATIONS/pidsdps1646.pdf

Sousa, R. and G.J.C. da Silveira. 2020. Advanced services and differentiation advantage: an empirical investigation. *International Journal of Operations & Production Management* 40(9): 1561-1587.

Taguchi, H. and N. Lar. 2024. Servicification in global value chains in emerging and developing Asian economies. *Economies* 12(6): 1-15.

United States International Trade Commission (USITC). 2013. *The Economic effects of significant U.S. import restraints*. Washington, DC: USITC.

Appendix

Appendix 1. Variable Definitions and Summary Statistics

Variable	Definition	Obs	Mean	Std. dev.	Min	Max
Exporter	Exporter status dummy (1 if firm *i* has direct exports; 0 otherwise)	52,862	0.242	0.428	0	1
SrvExp	Service expense intensity (percentage share of service expense in total expense)	52,866	0.102	0.108	0	0.962
SrvRev	Service revenue intensity (percentage share of service revenue in total revenue)	52,862	0.070	0.237	0	1
NonProdEmp	Non-production employment intensity (percentage share of non-production workers in total employment)	52,866	0.321	0.273	0	1
R&DEmp	R&D employment intensity (percentage share of R&D personnel in total employment)	52,860	0.007	0.044	0	1
R&Dexp	R&D expense intensity (percentage share of R&D expense in total expense)	52,868	0.001	0.007	0	0.450
ContractExp	Contract expense intensity (expense on contract and commission work done by others, as percentage of total expense)	52,867	0.016	0.055	0	0.933
RepairExp	Repair expense intensity (expense on repair, installation, and maintenance done by others, as percentage of total expense)	52,868	0.012	0.027	0	0.672
RentExp	Rent expense intensity (expense on rental of land, building, and equipment from others, as percentage of total expense)	52,868	0.027	0.057	0	0.913
CommExp	Communications expense intensity (expense on communications services done by others, as percentage of total expense)	52,868	0.004	0.009	0	0.753
InsureExp	Insurance expense intensity (expense on insurance services done by others, as percentage of total expense)	52,868	0.002	0.006	0	0.554
TransExp	Transport expense intensity (expense on transportation services done by others, as percentage of total expense)	52,868	0.008	0.020	0	0.575
OthNonIndExp	Other non-industrial service expense intensity (expense on non-industrial services done by others, as percentage of total expense)	52,868	0.032	0.056	0	0.948
ContractRev	Contract revenue intensity (revenue from contract and commission work done for others, as percentage of total revenue)	52,862	0.061	0.228	0	1
RepairRev	Repair revenue intensity (revenue from repair, installation, and maintenance done for others, as percentage of total revenue)	52,862	0.003	0.042	0	1
RentRev	Rent revenue intensity (revenue from rental of land, building, and equipment by other entities, as percentage of total revenue)	52,869	0.004	0.039	0	1
OthNonIndRev	Other non-industrial service expense intensity (expense on non-industrial services done by others, as percentage of total expense)	52,862	0.001	0.022	0	1
Age	Firm age by the year of survey/census	52,640	18.633	14.457	0	169
ForeignOwn	Foreign ownership dummy (1 if foreign capital participation share is at least 10%; 0 otherwise)	52,869	0.240	0.427	0	1
MSME	MSME status (1 if total employment is less than 200; 0 otherwise)	52,866	0.831	0.375	0	1
lnLabProd	Natural logarithm of labor productivity (value added per employee)	51,387	12.505	1.350	2.817	19.724
lnCapitalInt	Natural logarithm of capital intensity (book value of tangible and intangible assets, divided by total employment)	50,577	11.935	2.409	-5.767	21.413

Appendix 2. Industry Classification by Technology Intensity

Technology Intensity	ISIC Rev. 4 /PSIC 2009 Code	Industry
High intensity	21	Pharmaceuticals
	26	Computer, electronic and optical products
Medium-high intensity	30	Transport equipment
	29	Motor vehicles, trailers and semi-trailers
	28	Machinery and equipment n.e.c.
	20	Chemicals and chemical products
	27	Electrical equipment
Medium intensity	22	Rubber and plastic products
	32	Other manufacturing
	23	Other non-metallic mineral products
	24	Basic metals
	33	Repair and installation of machinery and equipment
Medium-low intensity	13	Textiles
	25	Fabricated metal products, except machinery and equipment
	15	Leather and related products
	17	Paper and paper products
	10	Food products
	11	Beverages
	12	Tobacco
	14	Wearing apparel
	19	Coke and refined petroleum products
	31	Furniture
	16	Wood and products of wood and cork
	18	Printing and reproduction of recorded media

Note: Technology intensity is proxied by R&D intensity.
Source: Galindo-Rueda and Verger (2016).