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Integrating the Engine: An Input-Output Analysis of Vietnam's Manufacturing Linkages

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Abstract:

This study clarifies the pivotal role of the manufacturing sector within the Vietnamese economy by conducting an inter-sectoral analysis using official 2012 and 2019 Input-Output tables. Utilizing an expanded inter-sectoral framework based on the Miyazawa methodology, the research mathematically disaggregates the manufacturing sector into granular sub-sectors to isolate internal multipliers from external cross-sectoral spillovers. The empirical results reveal three significant research findings. First, for Vietnam's highly trade-open economy, the greatest economic weakness lies in value-added leakage abroad. Second, the contraction in domestic value-added generation and operational efficiency is rooted in a structural deficiency: escalating import intensity for intermediate inputs alongside the progressive erosion of intra-industry linkages. This is particularly severe in the information technology equipment manufacturing sub-sector. Finally, policy interventions must prioritize cultivating core supporting industries to bolster both vertical and horizontal intra-industry linkages. Concurrently, foreign direct investment (FDI)

strategies should shift toward a selective paradigm mandating technology transfer and elevated local content requirements, while strategically transitioning labor-intensive industrial sectors toward higher value-added segments.

Keyword: *Manufacturing sector, Input-Output analysis, Spillover effects, Intra-sectoral effects.*

JEL codes: C67; O14; D57

1. Introduction

In developing economies, the manufacturing sector is widely recognized as the cornerstone of industrialization and structural transformation, driven by its substantial contributions to GDP, mass employment generation, and pivotal role in export expansion (Naudé & Szirmai, 2012). Furthermore, manufacturing functions as the linchpin of economic restructuring by enabling the structural reallocation of labor and capital from low- to high-productivity sectors (Herman, 2016). Concurrently, it acts as a catalyst for technological innovation while cultivating robust inter-sectoral production linkages. Corroborating this, Adam Szirmai's (2012) comprehensive analysis of 63 developing and 16 advanced economies spanning 1950 to 2005 underscores that manufacturing assumes an exceptionally critical role in the developing world, operating as the primary engine for systemic technological advancement and aggregate productivity growth.

However, contributions to GDP and aggregate output do not adequately reflect a sector's impact on the quality of economic growth or its true structural efficiency. As Leontief

(1966) articulated, the economy is fundamentally an interdependent system wherein the output of one industry is simultaneously the input of another industry. Consequently, evaluating the genuine systemic role of a sector requires analyzing it within the complex matrix of inter-industry relationships forged throughout the production process (Miller & Blair, 2009). The manufacturing sector is characterized by its strong spillover effects across the entire economy through input–output linkages. It not only generates robust backward linkages driving demand for raw materials, energy, transportation, finance, and supporting services but also serves as a critical upstream supplier of intermediate goods for numerous other sectors. Nevertheless, despite accounting for a large share of the economic structure, if the sector continues to rely heavily on imported intermediate inputs, it will face difficulties in generating a commensurate level of domestic value added and may simultaneously contribute to a widening trade deficit (Trinh & Phong, 2022).

The input–output (I.O) analysis method, developed by Wassily Leontief and first introduced in his seminal work "The Structure of the American Economy, 1919–1929" in 1941, has been widely recognized by researchers as an appropriate tool for in-depth analysis of sectoral impacts within an economy due to its matrix-based approach and its capacity to measure spillover effects throughout the entire production system. Consequently, this methodology has been extensively deployed in contemporary empirical research. For instance, Bui et al. (2025) utilized the I.O model to evaluate the inter-sectoral impacts of the information technology block encompassing both IT manufacturing and services on the broader economy. Similarly, Simon et al. (2025) applied I.O analysis to

assess structural transformations within the manufacturing sector in Central Sulawesi, Indonesia, while Dam et al. (2025) employed the framework to elucidate the forestry sector's dual contributions to economic expansion and environmental sustainability. Collectively, these studies underscore the versatility and analytical rigor of the I.O model in mapping economic architectures and inter-industry linkages. Therefore, the application of this model not only facilitates the assessment of the operational efficiency of the manufacturing sector but also enables the measurement of its spillover effects on the broader economy, thereby clarifying the sector's role in promoting economic growth (Franke & Kalmbach, 2005).

Furthermore, research on economic structure should be conducted based on an analysis of the diverse roles that each sector may play within the economic system. In addition to examining inter-industry impacts, it is particularly important to take into account the production relationships embedded in intra-industry linkages (Bui et al., 2012). The manufacturing sector is characterized not only by its large scale but also by its high degree of industrial and product diversity, ranging from labor-intensive industries to high-technology industries. Therefore, it is necessary to examine spillover effects within the sector itself in order to more accurately assess its role and substantive contribution to economic growth.

In this study, the I.O methodology is expanded in the direction of inter-regional analytical framework originally pioneered by Miyazawa (1966), subsequently advanced by Hewings (1985) and Hewings and Jensen (1987), and most recently refined by Trinh and Phong

(2026) for the structural evaluation of economic multipliers. By transposing the mathematical logic of spatial interregional models onto inter-industry relationships, this research mathematically disaggregates the manufacturing sector into highly granular sub-sectors. This approach facilitates the precise isolation of intra-industry spillover effects (internal multipliers) from the extensive cross-sectoral spillovers connecting the manufacturing block to the broader economy (external multipliers). Crucially, this addresses a significant lacuna in the existing literature; to date, no empirical study has explicitly employed the Miyazawa framework to decompose the internal and external multiplier matrices for disaggregated manufacturing sub-sectors within the Vietnamese context.

The empirical application using Vietnam’s 2019 Input–Output table not only helps fill the research gap related to intra-industry structures, but also provides an important quantitative foundation for identifying manufacturing sub-sectors with strong endogenous capacities as well as critical “bottlenecks” that need to be addressed. Accordingly, the study contributes to orienting industrial development toward greater depth and supports the pursuit of a more sustainable economic development model.

2. Input-output framework description and implementation

2.1. Data collection

The Input–Output (I.O) tables used in this study were obtained from the official I.O database published by the National Statistical Office (NSO) of Vietnam for the years 2012 and 2019. To ensure international comparability and methodological consistency over time,

these tables were compiled and standardized by the NSO in accordance with the United Nations Handbook on Input-Output Table Compilation and Analysis.

Vietnam's first Input-Output (I.O) table was constructed in 1989 with a 54*54 sectoral structure. Since then, the National Statistical Office of Vietnam has continuously updated and expanded the I.O system through subsequent versions released in 1996, 2000, 2007, 2012, and most recently in 2019. With each compilation, the level of sectoral detail has increased significantly: from 97 sectors in 1996 to 112 sectors in 2000, 138 sectors in 2007, 164 sectors in 2012, and reaching 171 sectors in 2019. This expansion not only reflects the growing diversification of Vietnam's economic production structure, but also demonstrates the country's commitment to improving methodological frameworks and statistical standardization in accordance with the international recommendations of the United Nations. Consequently, the I.O table has become an important analytical tool, enabling a systematic assessment of inter-industry linkages as well as spillover effects on output, value added, and imports.

2.2. Sectoral implementation

This study establishes two levels of sectoral classification consisting of 5 sectors and 12 sectors, respectively, in order to ensure consistency and comparability over time. At the aggregated 5-sector level, the economy is classified into: (i) Manufacturing; (ii) Electricity and water production and distribution; (iii) Agriculture-forestry-fisheries; (iv) Construction; and (v) Services. This classification framework is designed to facilitate a

focused assessment of the role of the manufacturing sector within the production structure of the economy.

However, due to the high degree of heterogeneity within the manufacturing sector, which requires a more detailed analysis, this study further expands the classification into 12 sectors. Under this framework, the manufacturing sector is disaggregated into 8 specific sub-sectors, while the remaining four major sector groups are retained in order to ensure consistency with the 5-sector structure. This sectoral aggregation is based on the harmonization of the corresponding Vietnam Standard Industrial Classification (VSIC) codes between the two years. This two-level approach facilitates both a macro-level overview of sectoral structural transformation (Appendix 1) and a more in-depth analysis of inter-industry relationships and spillover effects among manufacturing sub-sectors (Appendix 2).

Although the increase in the number of sectors from 164 (in 2012) to 171 (in 2019) reflects improvements in statistical compilation, it also creates difficulties for the direct comparison of structural coefficients and multipliers. Therefore, harmonizing the data into the two classification levels (5 sectors and 12 sectors) is a necessary solution to ensure temporal consistency. This unified classification framework provides a robust foundation for calculating multiplier effects, thereby enabling a more accurate assessment of the spillover role of the manufacturing sector and the dynamics of Vietnam's economic structural transformation during the 2012–2019 period.

2.3. Data analysis with Input – Output framework

This study adopts the concept of interregional analysis, as proposed by Miyazawa (1966) and further developed by Hewings (1985), Hewings Jensen (1987) and Trinh & Phong (2026), and applies it to inter-sectoral analysis. The economy is categorized into two main groups: the manufacturing sector group (Sector 1) and all remaining sectors group (Sector 2).

In this framework, the domestic direct input coefficient matrix A^d is partitioned into four sub-matrices:

$$A^d = \begin{pmatrix} A_{11}^d & A_{12}^d \\ A_{21}^d & A_{22}^d \end{pmatrix}$$

Where:

- A_{11}^d : Direct input coefficients within Sector 1.
- A_{12}^d : Input requirements from Sector 1 used by Sector 2.
- A_{21}^d : Input requirements from Sector 2 used by Sector 1.
- A_{22}^d : Direct input coefficients within Sector 2.

The corresponding Leontief Inverse Matrix $B = (I - A^d)^{-1}$ is also partitioned into four sub-matrices:

$$B = \begin{pmatrix} B_{11} & B_{12} \\ B_{21} & B_{22} \end{pmatrix}$$

- B_{11} : Intrasectoral effects generated by one unit of final demand for Sector 1 products.
- B_{12} : Spillover effects on the output of Sector 1 induced by one unit of final demand for Sector 2.
- B_{21} : Spillover effects on the output of Sector 2 induced by one unit of final demand for Sector 1.
- B_{22} : Intrasectoral effects generated by one unit of final demand for Sector 2 products.

Value Added Analysis

Let $V = (V_1, V_2)$ be the value added vector, where V_1 and V_2 represent the value added of Sector 1 and Sector 2, respectively. The value-added coefficient vector $h = (h_1, h_2)$ is defined as $h_i = V_i \cdot X^{-1}$.

Let $\hat{h}$ and $\hat{V}$ denote the diagonal matrices of the coefficient vector h and the value-added vector V , respectively.

From the fundamental Leontief relation:

$$X = B \cdot Y^d \quad (1)$$

We derive the value added relationship:

$$\hat{V} = \hat{h} \cdot B \quad (2)$$

Consequently:

$$V_1 = h_1 \cdot B_{11} + h_1 \cdot B_{12} \quad (3)$$

$$V_2 = h_2 \cdot B_{21} + h_2 \cdot B_{22} \quad (4)$$

Where:

- $h_1 \cdot B_{11}$: Intrasectoral value-added effects of Sector 1.
- $h_2 \cdot B_{21}$: Spillover value-added effects to Sector 2 induced by one unit of final demand for Sector 1.
- $h_2 \cdot B_{22}$: Intrasectoral value-added effects of Sector 2.
- $h_1 \cdot B_{12}$: Spillover value-added effects to Sector 1 induced by one unit of final demand for Sector 2.

Import Analysis for Intermediate Consumption

Similarly, let $M = (M_1, M_2)$ be the vector of imports for intermediate consumption. The import coefficient vector is $m = (m_1, m_2)$, where $m_i = M_i \cdot X^{-1}$. Let $M^\wedge$ and $m^\wedge$ be the diagonal matrix of these coefficients.

From relation (1), we have:

$$M^\wedge = m^\wedge \cdot B \quad (5)$$

Which leads to:

$$M_1 = m_1 \cdot B_{11} + m_1 \cdot B_{12} \quad (6)$$

$$M_2 = m_2 \cdot B_{21} + m_2 \cdot B_{22} \quad (7)$$

Where:

- $m_1 \cdot B_{11}$: Import intrasectoral effects, representing the internal import requirements of the manufacturing sector (Sector 1) per unit increase in its final demand.
- $m_2 \cdot B_{21}$: The import demand of Sector 2 induced by a one-unit increase in the final demand of Sector 1.
- $m_2 \cdot B_{22}$: Import intrasectoral effects within Sector 2 per unit increase in its final demand.
- $m_1 \cdot B_{12}$: The import demand of Sector 1 induced by a one-unit increase in the final demand of Sector 2.

In summary, this study utilizes an inter-sectoral model based on the Miyazawa (1966) – Hewings (1985) – Bui (2026) framework to provide a granular view of the economic linkages between the manufacturing sector and the rest of the economy. By partitioning the domestic direct input coefficients and the Leontief Inverse matrix, the methodology effectively captures not only the intra-sectoral effects within each group but also the spillover effects that propagate across sectoral boundaries.

Furthermore, by integrating value-added and import coefficients into the matrix decomposition, the model allows for a dual assessment of economic impact:

+ Value Creation: Identifying how final demand in one sector generates income and adds value across the entire domestic production chain.

+ Import Leakage: Quantifying the extent to which intermediate demand triggers foreign imports, thereby revealing the degree of self-sufficiency or external dependency of each sector.

This comprehensive analytical structure serves as the foundation for the subsequent empirical analysis, aiming to clarify the structural role of the manufacturing industry in driving national economic growth and its implications for trade balance.

3. Results and Discussions

Figure 1 reveals a clear divergence in output spillover effects across economic sectors. Despite a slight downward trend, the manufacturing sector continues to maintain its role as a “leading” sector, as its power of dispersion on output remained above unity in both 2012 (1.14) and 2019 (1.13). This implies that an increase in the sector’s final demand generates an expansion in total output that exceeds the economy-wide average. In addition, the sector’s sensitivity index remained at a very high level (1.73 in 2012 and 1.61 in 2019), reaffirming its central position as a major supplier of intermediate inputs within the production system.

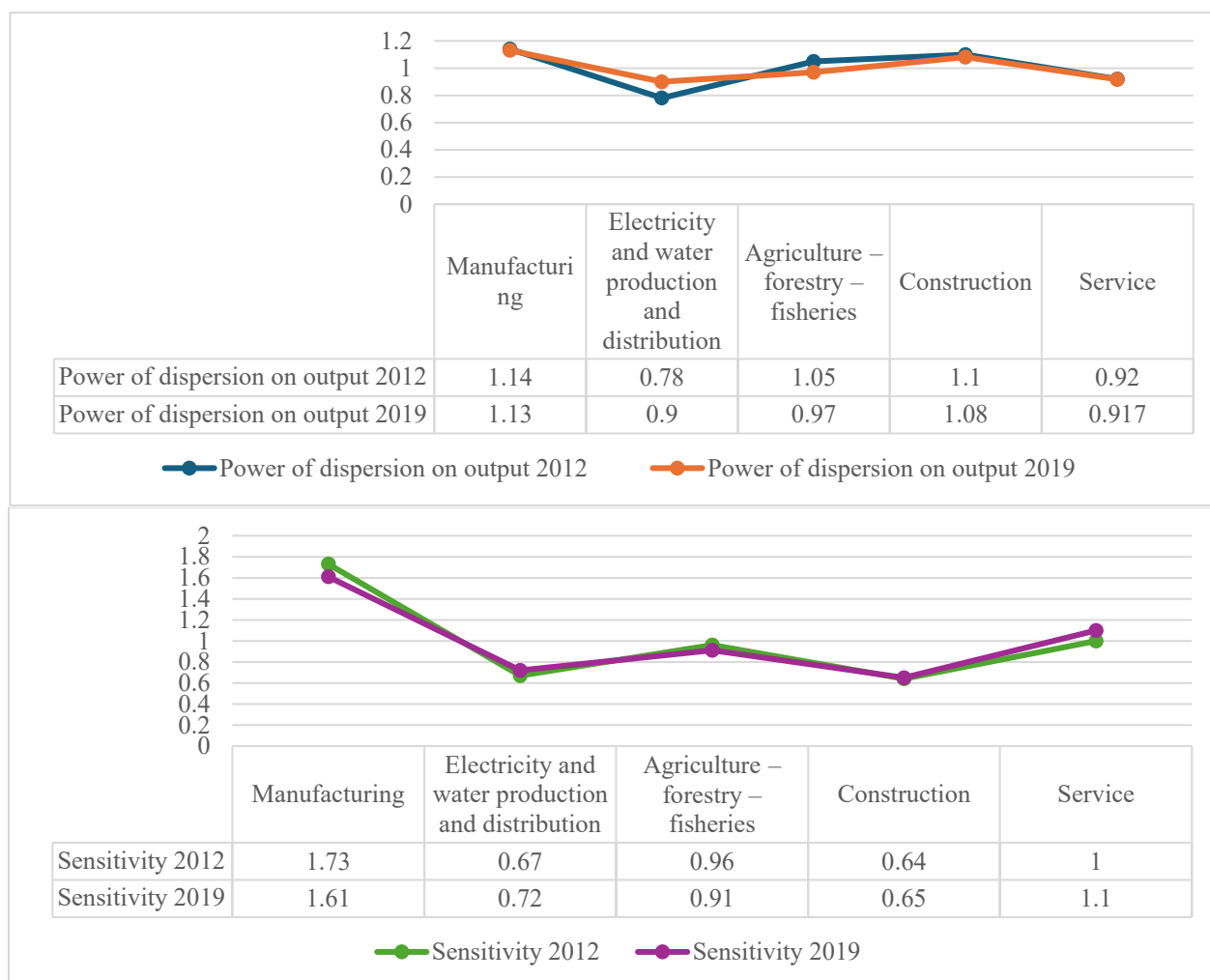


Figure 1: Power of dispersion on output and sensitivity across economic sectors

(Source: Authors' calculation based on data provided by National Statistics Office of Vietnam,

2012 - 2019)

In contrast, although the electricity and water production and distribution sector plays a foundational role in sustaining both production and household consumption activities, its spillover effects remain relatively limited, as both indices stay below the economy-wide average. This finding suggests that an increase in final demand for electricity and water services does not generate sufficiently strong backward or forward linkage effects

throughout the production system. In other words, despite being an indispensable infrastructure sector, the expansion of output in this sector induces only a relatively modest increase in production activities across other industries.

Meanwhile, the construction sector recorded a power of dispersion on output coefficient greater than unity, indicating that increases in final demand for construction activities generate output spillover effects that exceed the economy-wide average. This reflects the sector's strong backward linkage effects on a wide range of material-supplying industries and supporting service sectors, including cement, steel, construction materials, transportation, logistics, engineering, and financial services. The construction sector functions as an important transmission channel through which investment demand stimulates production expansion across multiple industries simultaneously.

However, the relatively strong output spillover effects of construction should also be interpreted cautiously. A high output multiplier does not necessarily imply a correspondingly strong capacity to generate domestic value added if the sector remains highly dependent on imported construction materials, machinery, and equipment.

For the agriculture-forestry-fisheries sector, a notable structural change is reflected in the decline of its output spillover coefficient from a relatively strong level of 1.05 (2012) to 0.97 (2019), falling below the economy-wide average. This trend indicates that the sector's capacity to induce production expansion across the broader economy has gradually weakened over time. This decline reflects an important transformation in the structure of the Vietnamese economy during the industrialization process. As economic activities

increasingly shift toward manufacturing and services, the relative centrality of agriculture within the inter-industry production network has diminished. However, the decline in the output spillover coefficient should not necessarily be interpreted solely as a deterioration in the sector's economic importance. Rather, it also reflects the broader structural transition of the Vietnamese economy toward a more industrialized and service-oriented growth model.

However, when examining Figure 2, a paradox emerges: while the agriculture-forestry-fisheries and service sectors maintained relatively stable value-added spillover capacities, the remaining three sector groups, including manufacturing, all recorded noticeable declines. Most notably, the electricity and water production and distribution sector experienced a sharp decrease in its value-added spillover coefficient, from 0.86 to 0.71, indicating a significant weakening in both the sector's efficiency in utilizing domestic resources and its capacity to stimulate domestic economic activities.

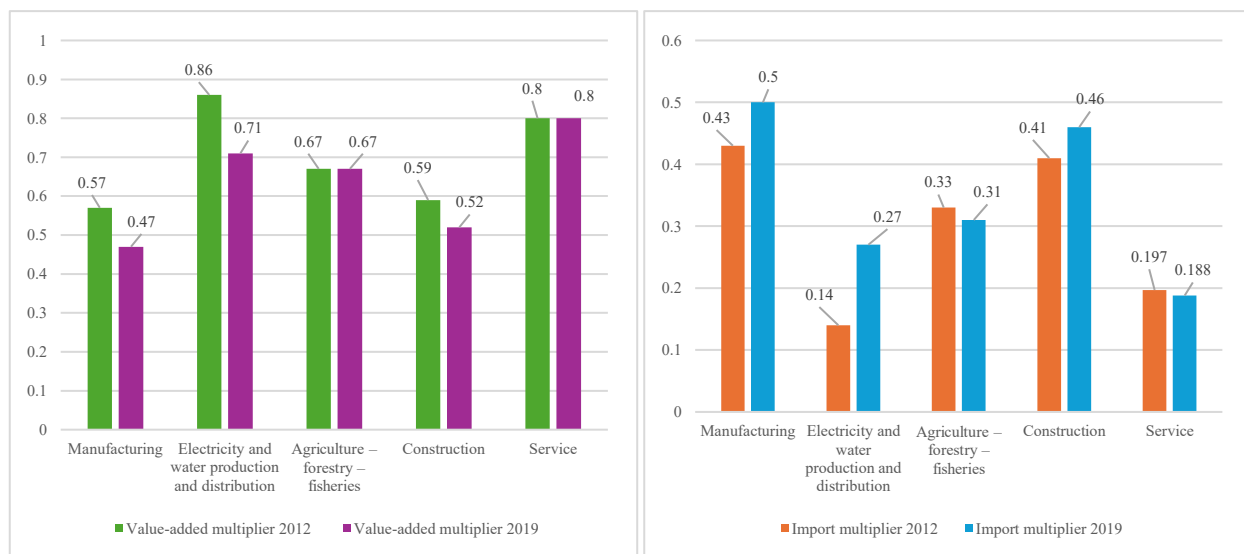


**Figure 2: Value-added multiplier, import multiplier of sector groups in the
Vietnamese economy**

*(Source: Authors' calculation based on data provided by National Statistics Office of Vietnam,
2012 - 2019)*

The research findings reveal a clear inverse relationship between the value-added multiplier and the import multiplier: the decline in the capacity to generate domestic value-added is consistently accompanied by a rising dependence on foreign inputs. Specifically, the import multiplier of the manufacturing sector increased from 0.43 to 0.5, while that of the electricity and water production and distribution sector nearly doubled, rising from 0.14 to 0.27. This trend reflects the reality that the economy is becoming increasingly integrated into low value-added processing and assembly segments within value chains. Domestic intermediate inputs in the manufacturing and construction sectors are gradually being displaced by imported goods, causing the economic structure to become more vulnerable and sensitive to external shocks.

Table 1 clearly reflects the structural changes in value-added and import spillover effects during the 2012–2019 period. The services sector and the agriculture-forestry-fisheries sector emerged as the two most notable performers. The power of dispersion on value-added in the services sector increased significantly from 1.15 to 1.26, reinforcing its role as a major driver of domestic value creation.

**Table 1: Power of dispersion On value-added; import of sector groups in the
Vietnamese economy**

	Power of dispersion On value-added		Power of dispersion On import	
	2012	2019	2012	2019
Manufacturing	0.81	0.74	1.43	1.46
Electricity and water production and distribution	1.23	1.11	0.47	0.78
Agriculture – forestry – fisheries	0.96	1.06	1.09	0.9
Construction	0.85	0.82	1.36	1.32
Service	1.15	1.26	0.65	0.54

(Source: Authors' calculation based on data provided by National Statistics Office of Vietnam, 2012 - 2019)

Similarly, the agriculture-forestry-fisheries sector improved from 0.96 to 1.06, indicating a positive structural shift from primary production toward activities with higher levels of deep processing and greater value-added content, while simultaneously reducing its import spillover coefficient from 1.09 to 0.9.

In contrast, the power of dispersion on value-added of the manufacturing sector declined from 0.81 to 0.74, while its import spillover index, already at a high level, continued to increase from 1.43 to 1.46. Similarly, the electricity-water production and distribution sector recorded a sharp rise in its power of dispersion on import index, from 0.47 to 0.78. The increasing dependence of such a fundamental infrastructure sector on imported

equipment and fuels constitutes a concerning signal, as it intensifies the risk of financial resource “leakage” from the domestic economy to foreign markets.

To clarify the underlying causes, Table 2 decomposes the spillover effects of the manufacturing sector into intra-sectoral and inter-sectoral components associated with value added and imported intermediate inputs. The results reveal a marked deterioration in the sector’s internal value-added generating capacity. Specifically, the spillover effect on the manufacturing sector’s own value-added declined substantially from 0.386 in 2012 to 0.279 in 2019, indicating that the expansion of manufacturing output increasingly failed to stimulate value-added creation within the sector itself. In contrast, the spillover effect on the sector’s own imported intermediate inputs rose significantly from 0.379 to 0.453, suggesting that the expansion of production scale has failed to generate strong demand-pull effects for domestic supporting enterprises and instead has primarily stimulated demand for imported inputs.

This divergence reflects the weakening of intra-sectoral production linkages among manufacturing sub-sectors. As a consequence, the sector’s spillover efficiency has gradually shifted away from domestic value creation toward import-intensive production patterns, reinforcing the phenomenon of value-added “leakage” from the economy.

Table 2: Intra-sectoral and inter-sectoral linkages associated with value-added spillovers and import dependence within the manufacturing sector

	2012	2019
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Spillover effects on its own value-added	0.386	0.279
Spillover effects on the value added of other industries	0.180	0.192
Spillover effects on the sector's own imported intermediate inputs	0.379	0.453
Spillover effects on other sectors' imported intermediate inputs	0.054	0.053

(Source: Authors' calculation based on data provided by National Statistics Office of Vietnam,

2012 - 2019)

Meanwhile, the spillover effect of manufacturing on the value-added of other industries increased only marginally, from 0.180 to 0.192, while the spillover effect on imported intermediate inputs of other sectors remained almost unchanged, decreasing slightly from 0.054 to 0.053. These findings imply that the sector's inter-industry linkage effects have not strengthened substantially over time. Although the manufacturing sector continues to occupy a central position in the production system, its capacity to stimulate broader domestic economic activities and induce value-added generation across other sectors remains relatively limited.

A deeper examination of individual manufacturing sub-sectors (Tables 3 and 4) reveals a pronounced structural divergence in the quality of spillover effects and the degree of import dependence within the manufacturing sector. Sub-sectors closely linked to domestic agricultural value chains, particularly seafood processing and animal feed production, exhibit increasingly favorable structural characteristics. The seafood processing industry recorded simultaneous improvements in both its value-added multiplier and its power of dispersion on value-added, increasing from 1.06 to 1.147, while its import spillover

coefficient declined markedly from 0.913 to 0.791. This indicates that the sector has gradually strengthened its domestic backward linkages and improved its capacity to retain value added within the national economy. In other words, the expansion of final demand for seafood products increasingly stimulates domestic production networks rather than generating import demand for intermediate inputs. Such a trend reflects the growing integration between seafood processing activities and domestic supporting sectors, including aquaculture, transportation, packaging, logistics, and food processing services.

A similar pattern can be observed in the animal feed production sector, where the decline in import dependence suggests that domestic input sourcing has become more effective over time. These developments imply that manufacturing sub-sectors embedded within agricultural production systems tend to generate stronger domestic multiplier effects because they are able to exploit locally available raw materials and maintain relatively dense inter-industry linkages within the domestic economy.

Table 3: Value-added multiplier and import multiplier within the manufacturing industry group

	Value-added multiplier		Import multiplier	
	2012	2019	2012	2019
Seafood Processing	0.647	0.666	0.353	0.313
Textile and Garment	0.538	0.515	0.462	0.463
Leather and Footwear	0.637	0.515	0.363	0.455

Information technology Equipment Manufacturing	0.410	0.208	0.590	0.783
Animal feed production	0.575	0.626	0.425	0.350
Fertilizers and pesticides	0.558	0.520	0.442	0.450
Steel	0.482	0.516	0.518	0.448
Other manufacturing	0.573	0.552	0.427	0.420

(Source: Authors' calculation based on data provided by National Statistics Office of Vietnam, 2012 - 2019)

The steel industry also emerged as a notable positive case. Its value-added multiplier increased from 0.482 to 0.516, while its import multiplier simultaneously declined, indicating a gradual improvement in the localization of intermediate inputs and production materials. This trend suggests that the sector has become relatively more capable of internalizing production requirements within the domestic economy instead of relying excessively on imported raw materials and semi-finished products. Although the magnitude of improvement remains limited, the simultaneous increase in value-added generation and reduction in import dependence reflects an enhancement in the sector's domestic spillover efficiency.

The export-oriented and labor-intensive industries, particularly textile-garment and leather-footwear manufacturing, have experienced increasingly significant structural pressures during the study period. The leather-footwear sub-sector, in particular, recorded a substantial decline in its value-added multiplier, from 0.637 to 0.515, while its import

multiplier simultaneously increased sharply from 0.938 to 1.152. This divergence indicates that the expansion of final demand for leather-footwear products has become progressively less effective in generating domestic value-added, while at the same time inducing a much larger demand for imported intermediate inputs throughout the production system.

These findings suggest that the domestic production structure of the leather-footwear sub-sector remains heavily dependent on imported raw materials, components, and semi-finished products, despite the sector's strong export performance and large production scale. Consequently, although production and exports continue to expand, a substantial share of the induced economic effects is transmitted abroad through import channels rather than being retained within the domestic economy.

A similar structural pattern can also be observed in the textile-garment sub-sector, where the persistence of high import dependence implies that the sector continues to operate primarily within low value-added segments of production networks. In essence, these industries remain concentrated in downstream processing and assembly activities, while higher value-added stages such as material production, design, branding, and technological development are still dominated by foreign suppliers and multinational firms.

The results therefore confirm that the growth model based predominantly on low-cost labor advantages has gradually approached the limits of its effectiveness. While this model was previously capable of rapidly expanding output and exports, it has become increasingly insufficient in enhancing domestic value-added generation and strengthening intra-industry and inter-industry linkages. As labor costs rise and global competition intensifies, the

continued reliance on imported intermediate inputs and labor-intensive assembly activities may further constrain the long-term spillover efficiency and sustainable development potential of these key export sectors.

Table 4: Power of dispersion on value-added and Power of dispersion on import within the manufacturing industry group

	Power of dispersion On value - added		Power of dispersion On import	
	2012	2019	2012	2019
Seafood Processing	1.06	1.147	0.913	0.791
Textile and Garment	0.88	0.888	1.195	1.172
Leather and Footwear	1.04	0.886	0.938	1.152
Information technology Equipment Manufacturing	0.67	0.358	1.525	1.981
Animal feed production	0.94	1.078	1.098	0.885
Fertilizers and pesticides	0.91	0.894	1.142	1.138
Steel	0.79	0.888	1.338	1.134
Other manufacturing	0.93	0.950	1.104	1.062

(Source: Authors' calculation based on data provided by National Statistics Office of Vietnam,

2012 - 2019)

The information technology equipment manufacturing sub-sector, including electronics and computer production, represents the most critical case of structural imbalance within

the manufacturing sector. During the 2012–2019 period, the sector’s value-added multiplier declined sharply from 0.41 to only 0.208, indicating a substantial weakening in its capacity to generate and retain domestic value added from each additional unit of final demand. At the same time, its power of dispersion on imports surged dramatically to 1.981, nearly twice the economy-wide average, implying that the expansion of production in this sector increasingly induces import demand rather than stimulating domestic supporting industries and intermediate input suppliers.

This divergence reflects an extremely weak degree of domestic production integration. Although the sector has expanded rapidly in terms of output scale and export value, the majority of intermediate inputs required for production continue to originate from foreign supply chains. As a result, the backward linkage effects transmitted to domestic industries remain highly limited, while a substantial proportion of the economic benefits generated by production activities “leak” abroad through imported components, machinery, and technological inputs.

These findings expose the structural reality that the large inflow of FDI into the technology sector has primarily concentrated in downstream activities such as processing, assembly, and low value-added manufacturing stages. In contrast, the core upstream segments that generate the highest levels of technological and economic value, including research and development (R&D), semiconductor design, software systems, advanced components, and intellectual property creation, continue to be dominated by foreign enterprises. Consequently, domestic firms remain largely excluded from the strategic stages of the

value chain and participate mainly in labor-intensive assembly operations with relatively low technological content.

The exceptionally high import spillover coefficient further indicates that the sector's rapid growth has not translated into a corresponding strengthening of domestic industrial linkages or technological self-reliance. Instead, the production structure has become increasingly dependent on imported intermediate goods and foreign technological ecosystems. This not only constrains the sector's capacity to create domestic value added, but also heightens the vulnerability of the economy to external supply chain disruptions, technological dependency, and fluctuations in global production networks. In essence, despite its impressive export performance and strategic importance within the digital economy, the information technology equipment manufacturing sector has yet to function as an effective engine for broad-based domestic industrial development and sustainable value-added accumulation.

4. Conclusions

The findings for the 2012–2019 period confirm that the manufacturing industry remains a central link in generating output for the Vietnamese economy. However, from the perspective of the input–output framework, the sector is increasingly revealing a classic structural weakness: although its output spillover capacity remains very high, its ability to retain domestic value added has progressively deteriorated. As a result, the economy is falling into the paradox of “output growth without commensurate value-added creation”,

driven by the leakage of economic value abroad through a heavy dependence on imported intermediate input networks.

A deeper decomposition analysis reveals a profound structural divergence within the economy. While the agricultural and service sectors are gradually transitioning toward a growth model characterized by stronger domestic linkages, key manufacturing industries such as textiles and footwear, as well as high-technology industries like information technology equipment manufacturing, are increasingly becoming disconnected from domestic production networks. In particular, the rapid expansion of the IT equipment manufacturing sector in terms of export scale essentially reflects a “temporary anchoring” in downstream labor-intensive assembly activities, generating exceptionally large import spillover effects (1.981) while retaining only a very limited amount of domestic value added (0.208). Moreover, the sharp increase in import dependency within essential infrastructure sectors such as electricity and water production and distribution also serves as a warning signal regarding the declining degree of economic self-reliance.

To optimize the role of the manufacturing sector, policy thinking must shift from the objective of merely “expanding output scale” toward the goal of “preserving and enhancing domestic value added.” Vietnam urgently needs to: (i) develop core supporting industries in order to strengthen both vertical and horizontal intra-industry linkages; (ii) reform its FDI attraction strategy toward a more selective approach, requiring explicit commitments to technology transfer and higher localization rates; and (iii) reorient labor-intensive industries toward segments with higher knowledge and technological content in order to

reduce resource leakage, thereby fostering a more self-reliant and resilient economy in the face of global supply chain shocks.

Declarations

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

The Input-Output tables for Vietnam used in this study were sourced from the National Statistics Office (NSO) of Vietnam. The datasets are available from the NSO, restrictions may apply to the availability of these data, which were used under license for the current research.

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Authors contributions

Trung Quang Dam (International School, VNU, Hanoi) and Trinh Bui (FPT School of Business and Technology), both of whom have extensive backgrounds in applying Input-Output (I.O) analysis to Vietnamese industries. Huy Khanh Nguyen (University of Economics and Business, VNU), serving as the corresponding author, coordinated the core administration of the manuscript and oversaw the analytical alignment of the framework regarding value-added leakages and import dependency. Hung Duc Hoang (University of

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Appendix 1: Names of 5 sectors

1	Manufacturing
2	Electricity and water production and distribution
3	Agriculture – forestry – fisheries
4	Construction
5	Service

Appendix 2: Names of 12 sectors

1	Seafood Processing
2	Textile and Garment

3	Leather and Footwear
4	Information technology Equipment Manufacturing
5	Animal feed production
6	Fertilizers and pesticides
7	Steel
8	Other manufacturing
9	Electricity and water production and distribution
10	Agriculture – forestry – fisheries
11	Construction
12	Service