Comparative Advantage of Malaysia Manufactured Exports: Evidence from 2020-2024

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Abstract. Malaysia's manufacturing sector has long been a major contributor to national economic growth. There are limited evidence exists on how Malaysia's comparative advantage in manufactured exports has evolved in recent years. This study examines changes in Malaysia's manufacturing competitiveness from 2020 to 2024 using the Revealed Comparative Advantage (RCA) index. The analysis covers 115 products from the UN Comtrade database, classified into low-, medium-, and high-technology groups based on Lall's (2000) framework. Results show a clear shift from low- to high-technology products, with electrical and electronics (E&E) exports (HT1) maintaining strong comparative advantage, while process industries (MT2) also strengthened. In contrast, engineering (MT3) and non-E&E high-technology (HT2) products remain less competitive. These findings suggest that Malaysia's manufacturing structure is becoming more technology-intensive but concentrated in a few cores E&E products. Policy measures are needed to support innovation, skills upgrading, and export diversification to sustain Malaysia's global competitiveness.

Keywords: Malaysia, Manufacturing Exports, Revealed Comparative Advantage, Trade Competitiveness.

1 Introduction

Malaysia's manufacturing sector has long been a key driver of the nation's economic growth, export performance, and employment creation. It is also a core component of national development strategies, particularly under the New Industrial Master Plan 2030 (NIMP 2030), which emphasizes innovation, research and development (R&D), human capital development, and the promotion of higher value-added industries. These strategies align with Malaysia's aspiration to become a knowledge-based economy and to move up the global value chain.

While Malaysia has made considerable progress in expanding its manufacturing exports, most academic studies on its comparative advantage have focused on periods ending in or before 2015 (e.g., Zam & Yakob, 2017; Mahani & Wai, 2008; Mawar et al., 2010). These studies found that Malaysia had strong comparative advantage in high-

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technology exports, especially electrical and electronics (E&E) products, alongside moderate strength in medium-technology process industries. However, the global trade environment has changed substantially in recent years. The COVID-19 pandemic disrupted global supply chains and reshaped trade patterns, while the accelerating adoption of digital technologies, automation, and Industry 4.0 practices has intensified global competition (WTO, 2023). In addition, rising production costs, the reconfiguration of global value chains, and trade protectionism have created new challenges for Malaysia's export competitiveness (World Bank, 2023; MIDA, 2022). These structural shifts may have affected the composition and direction of Malaysia's comparative advantage, yet empirical evidence on Malaysia's post-2015 trends remain scarce.

Therefore, this study to fill this gap by examining changes in Malaysia's comparative advantage in manufactured exports from 2020 to 2024. It evaluates 115 manufactured products using the Revealed Comparative Advantage (RCA) index based on UN Comtrade data, classified according to Lall's (2000) framework. The study aims to identify Malaysia's current areas of comparative strength across different technology groups, assess how the structure of manufacturing competitiveness has shifted in recent years, and draw policy implications to support NIMP 2030 targets through innovation promotion, export diversification, and human capital development.

1.1 Overview of Malaysian Economies

Malaysia's manufacturing sector has long been one of the main drivers of the country's economic transformation. Since the implementation of the New Economic Policy (NEP) in the 1970s, Malaysia has shifted from a resource- and agriculture-based economy towards industrialisation, with manufacturing becoming a key contributor to GDP, employment, and export earnings. The sector expanded rapidly during the 1980s and 1990s through export-oriented industrialisation policies, attracting substantial foreign direct investment (FDI), particularly in electrical and electronics (E&E), textiles, and resource-based processing industries.

During the 2000s, Malaysia further strengthened its participation in global production networks, with E&E products emerging as the backbone of its manufactured exports. This sector consistently contributed more than one-third of total exports and played a vital role in integrating Malaysia into global value chains. However, after 2010, Malaysia began facing increasing competition from regional peers such as Vietnam, Thailand, and China, which gradually eroded its competitiveness in several low- and medium-technology product segments.

Between 2020 and 2024, Malaysia's manufacturing sector has navigated multiple challenges, including the COVID-19 pandemic, global supply chain disruptions, and rising protectionist measures. Despite these shocks, manufacturing exports rebounded strongly after 2021, driven by high-technology E&E products (HT1) and medium-technology process industries (MT2). At the same time, several medium-technology engineering (MT3) and high-technology non-E&E (HT2) products showed weaker competitiveness, reflecting the structural changes occurring in global trade.

Recognising these shifts, the Malaysian government introduced the New Industrial Master Plan 2030 (NIMP 2030) to accelerate industrial upgrading, encourage innovation, and develop a highly skilled workforce. These policy efforts highlight the need to evaluate Malaysia's comparative advantage in manufactured exports to ensure the sector remains competitive and continues to contribute significantly to national economic growth.

2 Revealed Comparative Advantage

Increasing global competition pushes Malaysia to identify products in which it has a comparative advantage. This means the country can produce certain goods at a lower cost than others, so it should focus on producing those goods where it is most efficient. Some studies have been done based on the concept of Revealed Comparative Advantage introduced by Balassa (1965).

Noh et al. (2018) investigated the evolution of Malaysia's manufacturing export comparative advantage from 1990 to 2013 using the Revealed Symmetric Comparative Advantage (RSCA) index at the three-digit SITC level, covering 215 manufactured commodities. The results indicate minor overall changes in comparative advantage patterns, with low-technology products exhibiting greater dynamism than primary, resource-based, medium-technology, and high-technology products. This reflects Malaysia's stronger orientation toward low-technology exports.

Zam and Yakob (2017) analyzed Malaysia's export trade patterns from 2010 to 2015 using Revealed Comparative Advantage (RCA) indices for 144 manufactured products, classified into five technology-based categories and nine subcategories. Globally, Malaysia's comparative advantage was concentrated in high-technology goods, particularly electrical and electronic (E&E) and process industry products. In contrast, the Vietnamese market was dominated by agriculture-based and process industry goods, though Malaysia's competitiveness there shifted from low- to medium-technology products, reflecting a similar trend in the global market.

Zhao Chunming (2012) employed the Revealed Comparative Advantage (RCA) index to examine the patterns of China's manufactured exports in the global and Vietnamese markets from 2002 to 2009, based on 144 manufactured products classified by technology level. The study found an overall increase in the number of Chinese manufactured products with comparative advantage in both the global and U.S. markets. Most of these products were low-technology goods, while medium-technology products showed improvement in comparative advantage, albeit with relatively low RCA indices. The findings also indicate that China's manufactured exports possess a stronger comparative advantage in the global market than in the U.S. market.

Mawar et al. (2010) analyzed the shift in Malaysia's export specialization to Singapore and found that the country's competitiveness transitioned from the agro-based industry to semi-manufactured products, particularly iron, steel, and zinc. Similarly, Mahani and Wai (2008) reported that while the share of machinery goods in Malaysia's exports was slightly above the global average, the country did not possess a comparative advantage in most product groups within this subsector. Furthermore, Malaysia

lacked a comparative advantage in textiles, clothing, and footwear industries, with export shares falling below the global average for most product groups. The study also highlighted the absence of comparative advantage in metal manufacturing.

Saşmaz (2025) conducts a country-specific analysis employing Balassa's Revealed Comparative Advantage (RCA) index, alongside the Revealed Symmetric Comparative Advantage (RSCA) for subsectors, to examine the manufacturing sectors classified under SITC 5–8 for Türkiye in comparison with selected European economies over the period 1996 until 2021. The study identifies the highest levels of competitiveness in specific manufacturing groups, such as miscellaneous manufactures and selected SITC subsectors. Şaşmaz (2025) finds that Turkiye's manufacturing competitiveness is concentrated in certain subsectors (notably miscellaneous manufactures), and that shifts in comparative advantage are significantly shaped by export-partner income, domestic sectoral value-added, and exchange rate dynamics.

Empirical RCA/RSCA analysis in Boltho (2024) focused on machinery & equipment across emerging markets, extending data into the early 2020s. The paper documents recent shifts in comparative advantage within higher-tech manufacturing (machinery & equipment), showing country-level gains and losses across sub-categories and linking these changes to trade dynamics over 2000s until 2020s. The sector-specific RCA analysis provides actionable insights for effective industrial policy targeting.

3 Methodology

This study examines the comparative advantage of 115 Malaysian manufactured commodities in the global market, focusing on their distribution and variation across different technology levels during 2020 to 2024 using the Revealed Comparative Advantage (RCA) index. The classification follows Lall (2000) framework, which is commonly applied to assess the competitiveness of manufactured goods from developing countries. The 115 products are categorized into three technology levels: low-technology, medium-technology, and high-technology products.

This analysis employs the RCA index introduced by Balassa (1965, 1977), a widely used tool for evaluating a country's export potential. The RCA index helps determine whether a country is diversifying into products with emerging trade potential, as opposed to maintaining a static set of competitively exported goods. Moreover, it provides valuable insights into potential trade opportunities with new partners.

The index is calculated as a commodity's share of a country's total exports divided by that commodity's share of total world exports. If X represents exports, the index for country i and commodity j is expressed as:

$$RCA_{ij} = (X_{ij} / X_{it}) / (X_{wj} / X_{wt}) \quad (1)$$

Or general expression of RCA (using Malaysia as example)

$$RCA = \frac{\text{Malaysia export of commodity i / Malaysia export of all commodities}}{\text{World export of commodity i / World export of all commodities}}$$

The determination of comparative advantage is based on the figure of RCA. If RCA_{ij} greater than one means that country i has comparative advantage in group of products

j. In contrast, RCA_{ij} less than one implies that country i has a comparative disadvantage in the group of products j.

3.1 Data

The study utilizes data obtained from the United Nations Commodity Trade Statistics Database (UN Comtrade) based on the Standard International Trade Classification (SITC), Revision 4, covering the period from 2020 to 2024.

Based on Lall's (2000) classification, which is commonly used to analyse the competitiveness of manufactured goods in developing countries, this study categorizes 115 types of manufactured products according to their technology level into three main groups and seven subgroups, covering most of Malaysia's manufactured exports. The detailed classification is presented in Table 1.

Low Technology Products (LT)

This group of products is generally associated with stable and widely used technologies. Most of the technology is embedded in capital equipment, while the lower segment requires only basic skills. Many products in this category are not highly differentiated and compete mainly through price, making labor cost an important factor in competitiveness. Economies of scale and entry barriers are usually low, and the market grows slowly with income elasticity below one. However, some low-technology products occupy high-quality market segments where brand, design, skills, and technological refinement are important, even though their technology intensity remains low. In developing countries, products of main interest are usually in lower-quality segments and rely on simple technology and price competition. This category is divided into two subgroups: Textiles, Garments, and Footwear (LT1) with 20 product types, and Other Products (LT2) with 24 product types.

Medium Technology Products (MT)

This category includes most skill- and scale-intensive technologies found in capital goods and intermediate products. It represents the core of industrial activities in advanced economies. The products in this group generally involve complex technologies, moderate to high levels of research and development (R&D), advanced skills, and long learning periods. There are three subgroups within this category: (1) Automotive Products (MT1), which are of particular export interest to newly industrializing countries, especially in East Asia and Latin America; (2) Process Industries (MT2), mainly chemicals and basic metals that differ technologically from (3) Engineering Products (MT3). Process industries typically produce standardized goods on a large scale and require continuous technological improvements in equipment and production processes. MT1 consists of 5 product types, MT2 includes 20, and MT3 comprises 29 product types.

High Technology Products (HT)

High-technology (HT) products involve advanced and rapidly changing technologies, supported by substantial investment in research and development (R&D) and strong focus on product design. These technologies require well-developed infrastructure, specialized technical skills, and close collaboration among firms, universities, and research institutions. Some products, such as electronics, still rely on labor-intensive final assembly, and their high value-to-weight ratios make it cost-effective to locate this stage in low-wage countries. This has led to globally integrated production systems, where multinational corporations (MNCs) separate and locate production processes based on cost differences. This category is divided into two subgroups: Electronic and Electrical (E&E) products (HT1), which include 11 product types, and Other High-Technology products (HT2), which consist of 7 product types.

Table 1. Technological classification of exports

Classification	Types
Low Technology Manufactures (LT)	**43**
LT1: Textile, Garment and Footwear	19
LT2: Other low technology	24
Medium Technology Manufactures (MT)	**54**
MT1: Automotive	5
MT2: Process	20
MT3: Engineering	29
High Technology Manufactures (HT)	**18**
HT1: Electronic and electrical products	11
HT2: Other high technology	7

4 Analysis of the RCA of Malaysia's Manufactured Exports in the World Market

Table 2. Summary of RCA based on product category

	RCA				
	2020	2021	2022	2023	2024
LT					
LT1	1.46	1.80	0.74	0.63	0.72
LT2	1.41	1.24	1.22	1.19	1.30

MT					
MT1	0.14	0.13	0.14	0.11	0.10
MT2	1.52	1.68	1.66	1.59	1.76
MT3	0.88	0.86	0.82	0.93	0.87
HT					
HT1	4.69	4.44	5.24	5.79	6.11
HT2	1.30	2.06	1.04	1.01	0.93

Table 2 presents Malaysia's RCA for manufactured products by technology category from 2020 to 2024. HT1 and MT2 consistently record RCA values above 1, indicating strong comparative advantage. LT1 and LT2 remain moderately above 1, reflecting a modest but sustained comparative advantage. In contrast, MT1, MT3, and HT2 mostly record values below 1, indicating comparative disadvantage in these categories.

Table 3 shows RCA for HT1 products. Malaysia's HT1 E&E products maintained a strong comparative advantage (RCA > 1) throughout 2020–2024, with the aggregate index increasing from 4.69 to 6.11. Growth was primarily driven by transistors, valves, etc. (SITC 776), which rose from 10.00 to 14.24, reinforcing their position as the dominant export within the category. Office machines (SITC 751) and automatic data processing equipment (SITC 752) also recorded upward trends, the latter rebounding from 1.50 to 2.86. In contrast, office machine parts and accessories (SITC 759), television receivers (SITC 761), and electrical machinery (SITC 778) exhibited declining or stagnant performance, while several items, such as rotating electric plant (SITC 716) and other power-generating machinery (SITC 718), remained below unity, indicating low competitiveness. These findings suggest that Malaysia's HT1 advantage remains concentrated in a few core products, highlighting the importance of diversification strategies to strengthen its broader high-technology export portfolio.

Table 3. RCA for HT1 products

		RCA				
SITC Code	Commodity	2020	2021	2022	2023	2024
HT1		4.69	4.44	5.24	5.79	6.11
776	Transistors, Valves, etc	10.00	8.93	10.46	12.58	14.24
751	Office Machines	4.62	5.36	4.10	4.17	5.19
759	Office, Machines, Parts, Accessories	2.43	1.78	1.81	1.99	1.88
761	Television Receivers	1.94	1.89	1.86	1.69	1.39
778	Electrical Machinery	1.79	1.72	1.85	1.60	1.48
752	Automatic Data Processing Equipment	1.50	1.60	1.82	1.84	2.86
764	Telecom Equipment, Parts, Accessories	1.30	1.36	1.58	1.60	1.60
716	Rotating Electric Plant	0.20	0.19	0.20	0.18	0.20
718	Other Power Generating Machinery	0.17	0.16	0.12	0.15	0.21
771	Electric Power Machinery	1.06	1.05	1.02	1.11	1.06
774	Electrodiagnostic, Medical, Xray Equipment	1.01	1.14	1.12	1.17	1.86

Table 4 show the RCAfor process industries, mainly chemicals and basic metals. Malaysia's medium-technology 2 (MT2) products maintained a comparative advantage (RCA > 1) throughout 2020–2024, with the overall index increasing from 1.52 to 1.76. The category's growth was mainly driven by alcohols, phenols, etc. (SITC 512), which rose from 6.53 to 8.78, and iron and steel primary forms (SITC 672), which surged from 2.58 to 9.47. Explosives and pyrotechnic production (SITC 572) also showed improvement, rising from 4.46 to 5.69. Other products, such as synthetic fibres to spin (SITC 266), carboxylic acids (SITC 513), and pig iron (SITC 671), sustained RCA values above 3.00, reflecting stable competitiveness. In contrast, soap and cleansing preparations (SITC 554), iron and steel tubes and pipes (SITC 678), and miscellaneous chemical products (SITC 598) remained above unity but with limited growth. Several products, including pigments and paints (SITC 533), pesticides (SITC 591), and woven man-made fibre fabric (SITC 653), stayed below unity, indicating low competitiveness.

Table 4. RCA for MT2 products

Code	Commodity	2020	2021	2022	2023
	MT2	1.52	1.68	1.66	1.59
512	Alcohols, Phenols etc	6.53	7.71	7.10	7.61
572	Explosives, Pyrotech Production	4.46	4.19	4.20	5.01
266	Synthetic Fibres to Spin	3.11	4.00	3.42	2.71
513	Carboxylic Acids etc	3.08	3.88	3.24	3.20
671	Pig Iron etc	2.94	2.35	2.89	2.30
672	Iron, Steel Primary Forms	2.58	2.21	2.08	3.76
554	Soap, Cleansing etc Preparations	1.78	1.79	1.64	1.60
678	Iron, Steel Tubes, Pipes, tec	1.36	1.17	1.20	1.62
598	Miscellaneous Chemical Products nes	1.23	1.27	1.24	1.33
562	Fertilizers, Manufactured	1.26	1.33	1.55	1.49
582	Explosives, Pyrotech Production	1.16	1.15	1.06	1.06
882	Photo, cinema Supplies	1.09	1.13	1.11	1.16
533	Pigments, paints, etc	0.91	1.03	1.12	1.11
591	Pesticides, Disinfectants	0.77	0.74	0.73	0.73
653	Woven Man-Made Fib Fabric	0.74	0.57	0.50	0.46
583	Polymerization etc Prods	0.29	0.19	0.20	0.15
553	Perfumery, Cosmetics etc	0.28	0.23	0.23	0.23
786	Trailers, Nonmotor Vehicles, nes	0.19	0.12	0.25	0.24
267	Other Man-Made Fibres	0.14	0.32	0.94	0.77
791	Railway Vehicles	0.04	0.06	0.05	0.07

5 Conclusion

In summary, the RCA analysis reveals that Malaysia consistently maintains a strong comparative advantage in electronic and electrical (E&E) products, particularly in high-technology segments such as semiconductors, office machines, and automated data processing equipment. However, several product groups within E&E, including monitors, electrical machinery, and parts and accessories for machines, have experienced declining or stagnant competitiveness. This trend suggests that while Malaysia's overall position in the global E&E market remains strong, its export performance is increasingly concentrated in a few core products, with other segments showing signs of erosion over time.

Understanding Malaysia's comparative advantage in manufactured products is vital for directing industrial policy, export promotion, and investment. Focusing on competitive sectors while upgrading weaker ones will strengthen manufacturing competitiveness, enhance value-added production, and sustain the sector's role as a key driver of economic growth.

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