Social Science and Human Research Bulletin

ISSN(e): 3050-5542
ISSN(p): 3050-5534

Vol. 03(06): 628-641, June 2026

Home Page: http://sshrbjournal.org/

Evaluation of the Export Competitiveness of Vietnam's Industries[1]

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Article DOI: 10.55677/SSHRB/2026-3050-0601 **DOI URL: https://doi.org/10.55677/SSHRB/2026-3050-0601**

KEYWORDS: Export competitiveness; composite competitiveness index; entropy weight method; value-chain upgrading; Vietnam

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Published: June 01, 2026

ABSTRACT: This study examines the structural transformation of Vietnam's export competitiveness across 97 Harmonized System (HS) 2-digit industries over 2005–2024. To overcome the limitations of single-indicator measures, it constructs a multidimensional Composite Competitiveness Index (CCI) by integrating Revealed Comparative Advantage (RCA), Market Share (MS), Trade Competitiveness (TC), and Relative Trade Advantage (RTA) using the Entropy Weight Method and Coefficient of Variation approach. The results show that Vietnam's export structure has shifted from raw-material dependence and basic assembly toward deeper processing, supply-chain localisation, and technology-intensive manufacturing. Competitiveness has weakened in several primary sectors, but risen strongly in processed agriculture, upstream textile inputs, and heavy and high-technology industries. The study contributes by offering a comprehensive sector-wide assessment of Vietnam's export competitiveness, a more robust objective weighting framework for composite trade measurement, and new empirical evidence on value-chain upgrading in an emerging economy. The CCI also provides a practical monitoring tool for identifying competitive strengths, structural weaknesses, and policy priorities for industrial upgrading and domestic value creation.

INTRODUCTION

Export competitiveness has become a decisive test of whether an emerging economy is merely expanding trade volumes or genuinely upgrading its position in the global value chain. For Viet Nam, this issue is especially important. The country has been a clear development success story, moving from one of the world's poorest economies into a dynamic middle-income economy, while also maintaining a very high trade-to-GDP ratio and a deep exposure to global value chains. At the same time, the World Bank notes that Viet Nam's export growth has remained driven more by quantity than quality, with persistent reliance on low-value-added and labour-intensive activities even as the export basket has become more sophisticated. The country's 2045 high-income aspiration therefore depends not only on exporting more, but on exporting better—through higher domestic value added, stronger industrial linkages, and deeper technological capabilities.

This challenge has attracted sustained scholarly attention, yet the export competitiveness literature remains fragmented in both theory and method. A systematic review of three decades of research shows that the field has developed around multiple determinants—productivity, costs, exchange rates, institutions, logistics, and firm capabilities—while also displaying a wide variety of empirical approaches and measurement choices. More recent work further confirms that export advantage is not a purely static outcome: dynamic export capabilities such as innovativeness, adaptability, and task flexibility are directly associated with competitive advantage in foreign markets. In parallel, the broader trade literature increasingly recognises that competitiveness is shaped by the interaction of firm resources, market conditions, and institutional support rather than by factor endowments alone.

[1] Funding The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by the Vietnam National University, Hanoi (VNU) under project number QG.25.96 **(QG.25.96).**

For Viet Nam, however, the existing evidence remains incomplete in a crucial respect: much of the literature is still sector-specific, indicator-specific, or focused on particular determinants such as logistics, trade agreements, or firm capabilities. This creates a gap between explanation and measurement. Studies may show that a given policy, capability, or market condition matters for export performance, but they rarely provide a unified, economy-wide assessment of how competitiveness evolves across sectors over time. That limitation is important because a country can exhibit strong export growth in a few industries while still remaining dependent on low-value activities elsewhere. A more comprehensive framework is therefore needed to distinguish genuine upgrading from simple expansion in trade volumes.

This study responds to that gap by constructing a multidimensional Composite Competitiveness Index (CCI) for all 97 industries classified at the Harmonized System 2-digit level over the 2005–2024 period. The data are drawn from ITC Trade Map, a database designed to provide international trade indicators on export performance, market access, and competitive positioning across 220 countries and 5,300 products. The long panel allows the analysis to capture major structural shifts in Viet Nam's trade regime, including WTO accession, the expansion of new-generation free trade agreements, and the more recent phase of global supply-chain reconfiguration. By covering the full HS-2 industrial panel, the study moves beyond sectoral case studies and provides a macro-level map of changing competitiveness across agriculture, consumer manufacturing, and heavy and high-technology industries.

Methodologically, the paper addresses a second gap in the competitiveness literature: the limitations of single-indicator analysis. RCA remains the most widely used measure of revealed comparative advantage, but it is asymmetric and sensitive to extreme values; more recent work on composite indicators shows that weights should ideally be derived from the information structure of the data rather than assigned arbitrarily. Shannon-entropy-based weighting is particularly useful in this regard because it generates common weights endogenously from the relative variability of indicators, making it well suited to multidimensional benchmarking and policy analysis. Building on this logic, the present study integrates RCA, Market Share (MS), Trade Competitiveness (TC), and Relative Trade Advantage (RTA) through a hybrid Entropy Weight Method–Coefficient of Variation framework. This approach produces a statistically grounded CCI that captures export specialisation, market presence, trade balance, and import-adjusted advantage in a single measure.

The study makes three contributions. First, it offers a comprehensive, sector-wide assessment of Viet Nam's export competitiveness rather than a fragmented discussion of selected industries. Second, it develops a more robust measurement framework by combining multiple trade indicators into a single composite index with objective weighting. Third, it generates an empirically grounded view of structural transformation that is directly relevant to industrial policy. The results later in the paper show that Viet Nam's competitiveness is increasingly concentrated in processed agriculture, upstream textile materials, and more technologically complex manufacturing, suggesting that the country is moving from static factor-based advantage toward more dynamic and capability-driven competitiveness. This has clear implications for policies aimed at domestic value creation, industrial linkage development, and quality upgrading.

The remainder of the paper is structured as follows. Section 2 reviews the literature on export competitiveness and the associated measurement approaches. Section 3 sets out the theoretical framework. Section 4 describes the data and methodology, including the construction of the Composite Competitiveness Index. Section 5 presents the empirical results and discussion. Section 6 concludes with policy implications, limitations, and directions for future research.

LITERATURE REVIEW

Competitiveness is a multidimensional and inherently dynamic construct that cannot be adequately captured at a single analytical level. Rather, it must be examined across the macro, meso, and micro levels, where national endowments, industry structure, and firm-specific capabilities jointly shape trade performance. At the organisational level, Ambastha and Momaya (2004) argue that competitiveness derives from three interrelated foundations: assets, management processes, and business performance. Consistent with this view, empirical evidence from China (Yu & Hao, 2011) and Latvia (Biukšāne, 2016) shows that export competitiveness depends not only on macro-environmental support, but also on technological flexibility, organisational architecture, and adaptive business strategy. In the Vietnamese setting, studies of major export sectors similarly identify R&D capability, human resources, production technology, financial strength, and brand reputation as core determinants of industrial competitiveness (Ai, 2014; Huong, 2017; Tri & Thanh, 2022). Taken together, this literature suggests that competitiveness is best understood not as a static endowment, but as a capability-based process through which comparative advantages are converted into sustained competitive strength in international markets.

This conceptualisation is closely consistent with the theoretical architecture of the present study. The classical foundations of comparative advantage, especially Ricardo's cost-based logic and the Heckscher–Ohlin framework, explain why labour-abundant and resource-rich economies typically begin with exports concentrated in primary commodities and low-skill manufactures. Yet these theories are insufficient to explain how countries upgrade from factor-driven exports to technology-intensive and value-added activities. For that purpose, the Resource-Based View (RBV) and Dynamic Capabilities Theory are more informative, as they emphasise the accumulation, recombination, and reconfiguration of firm- and industry-level resources in response to

changing market conditions. This theoretical progression is particularly relevant for Vietnam, whose export structure has moved from raw materials and basic assembly toward more sophisticated processing, but whose upgrading remains uneven across sectors. Accordingly, the literature supports the need for an analytical framework capable of capturing not only revealed trade patterns, but also structural transition, supply-chain deepening, and the emergence of dynamic competitive capabilities.

A second major stream of research concerns how export competitiveness should be measured. The RCA index proposed by Balassa (1965) remains the most widely used indicator because it infers comparative advantage from actual trade flows. However, RCA is limited by asymmetry, sensitivity to extreme values, and an exclusive focus on exports, which can overstate competitiveness in sectors with high import dependence or substantial intra-industry trade. To address these weaknesses, subsequent studies have developed improved measures, including the Revealed Symmetric Comparative Advantage (RSCA) index, which constrains values to a bounded range and facilitates cross-sector comparison (Ismail et al., 2024; Maqbool et al., 2021). Leromain and Orefice (2013) further advanced the literature by proposing a Structural Ricardian RCA measure grounded in the gravity equation, thereby separating intrinsic productivity from trade frictions such as distance and policy barriers. Complementing these approaches, Vollrath's (1991) RTA index incorporates import-side information and therefore better captures net competitive position. The measurement literature thus converges on a central point: a credible assessment of competitiveness must integrate multiple indicators rather than rely on a single export ratio.

The same logic applies to empirical strategy. Econometric studies, particularly panel data models, are widely used to identify the effects of exchange rates, FDI, logistics costs, trade agreements, and domestic value-added content on export performance. Time-series tools such as ARIMA and VAR are often employed to forecast export trajectories and trade balances (Phung et al., 2024; Trinh et al., 2024). At the same time, qualitative strategic frameworks such as SWOT, PESTEL, value chain analysis, and Porter's Diamond Model remain important for interpreting structural conditions and institutional constraints. Yet these approaches also have limitations when used separately. Econometric models tend to isolate marginal effects, while qualitative frameworks describe strategic positioning without producing a unified sectoral measure. This creates a methodological gap between explanation and evaluation. The present study addresses that gap by constructing a multidimensional Composite Competitiveness Index (CCI) that integrates RCA, MS, TC, and RTA using the Entropy Weight Method and the Coefficient of Variation approach. In doing so, it follows the logic of MCDM-based competitiveness assessment while reducing the arbitrariness of equal weighting or purely expert-driven scoring.

Empirical evidence from developing economies confirms that export competitiveness is deeply shaped by structural upgrading rather than by factor abundance alone. In the ASEAN-5 region, Maqbool et al. (2021) show that competitiveness in electrical machinery is highly uneven: Malaysia, Singapore, and Thailand exhibit strong comparative advantages, whereas Indonesia remains disadvantaged. In Pakistan, Mahmood (2004) finds persistent dependence on low-skill, labour-intensive textile exports, indicating limited success in moving toward high-technology production. These findings are important because they demonstrate that export growth can coexist with weak industrial upgrading. In other words, the possession of a positive RCA does not necessarily imply a transition to higher-value production or stronger domestic value capture. This insight is central to the present study, which treats competitiveness as a structured and evolving attribute of the export system rather than as a binary export-success indicator.

The Vietnamese literature provides especially important background for the present analysis. Le (2010) argues that Vietnam has advanced from raw-material exports to labour-intensive manufactures, yet value-added content remains low, exposing the economy to a low-value assembly trap. Nguyen Khanh Doanh (2011), using Markov transition matrix analysis, identifies a convergence in comparative advantage but also shows that unskilled labour-intensive products continue to dominate the export structure. Nguyen Ngoc Quyen (2023) documents a severe asymmetry in the textile and garment industry, where Vietnam performs strongly in garment assembly but remains heavily dependent on imported fabric and raw materials, with the CMT model severely limiting profit margins and domestic upgrading. These studies establish a consistent diagnosis: Vietnam's export expansion has been real, but industrial deepening remains incomplete. The present paper extends this literature by showing, through the CCI framework, that upgrading is not uniform across the economy. Some sectors continue to lose ground in raw, low-value exports, while others move decisively into deeper processing, upstream localisation, and technology-intensive manufacturing.

Recent work further broadens the determinants of competitiveness beyond conventional trade theory. Doan and Vu (2024), using PPML estimation, find that logistics performance significantly enhances Vietnam's bilateral exports, confirming infrastructure as a first-order competitiveness determinant. Quynh (2025) shows that the depth of trade agreements matters more than tariff reduction alone in explaining coffee-export expansion, highlighting the importance of institutional alignment and standards harmonisation. Toai (2025) demonstrates strong autoregressive patterns in Vietnam's trade balance, suggesting that export competitiveness is path dependent and shaped by historical accumulation. At the firm level, Vien et al. (2025) find that digital transformation, human capital, and logistics upgrading are strong predictors of export performance among Vietnamese manufacturing SMEs, with absorptive capacity as a key mechanism. Tran (2026) further shows that social accounting practices, moderated by foreign ownership structure, can improve competitiveness by strengthening corporate legitimacy in international

markets. Collectively, these studies point to a transition from static comparative advantage toward dynamic, capability-based competitiveness.

Against this backdrop, the contribution of the present study is both conceptual and empirical. Conceptually, it integrates comparative advantage theory with RBV and Dynamic Capabilities Theory to explain how competitiveness evolves from natural endowments toward technologically embedded, institutionally supported, and supply-chain–based advantage. Methodologically, it overcomes the limitations of single-indicator approaches by developing a composite measure that captures export strength, market presence, trade balance, and import-adjusted advantage simultaneously. Empirically, it provides a full-sector view of Vietnam's export structure over a 20-year horizon, allowing the identification of differentiated upgrading paths across agriculture, consumer manufacturing, and high-technology industries. The results show that Vietnam is not merely exporting more; it is reorganising its competitive structure. Declining reliance on raw cereals and fresh aquatic products, strong gains in processed agricultural goods, rapid deepening of textile upstream linkages, and substantial advances in technical metals, electrical machinery, and precision instruments together indicate a broad shift from static to dynamic competitiveness. This study therefore fills a significant gap in the literature by offering a comprehensive, weighted, and theoretically grounded assessment of export competitiveness across the entire 97-industry HS 2-digit panel.

THEORETICAL FRAMEWORK

Research on export competitiveness is grounded in a theoretical tradition that has evolved from classical trade theory to contemporary strategic management. The foundational insight comes from Ricardo's theory of comparative advantage, which holds that international trade is shaped by cross-country differences in technology and labour productivity, leading nations to specialise in products for which they face lower opportunity costs. The Heckscher–Ohlin model extends this logic by arguing that countries export goods intensive in their relatively abundant factors of production and import goods intensive in scarce factors. This framework is highly relevant to Vietnam's early export pattern, which was concentrated in labour-intensive and agricultural products. However, the empirical results of this study show that Vietnam's competitiveness has moved well beyond this initial factor-endowment stage: the observed decline in raw cereals and fresh aquatic products, alongside strong gains in processed agriculture, textiles, technical metals, and high-technology manufactures, indicates a clear transition from static factor-based advantage toward more dynamic, capability-driven competitiveness.

At the micro level, the Resource-Based View (RBV) explains competitive advantage as a function of firm-specific resources that are valuable, rare, inimitable, and non-substitutable (VRIN). Yet in volatile international markets, resource endowments alone are insufficient. Dynamic Capabilities Theory therefore adds a crucial layer of explanation by emphasising the capacity to continuously sense opportunities, seize them, and reconfigure organisational resources in response to external shocks, technological change, and shifting market standards. This perspective is especially useful for interpreting the findings of the present study. The strong upgrading observed in upstream textile inputs, deep-processed agricultural products, and precision-oriented manufacturing sectors suggests that Vietnam's export competitiveness is increasingly shaped by adaptive learning, supplier upgrading, industrial linkage formation, and institutional compliance rather than by labour cost advantages alone. In this sense, the empirical evidence is consistent with a move from passive specialisation to active capability accumulation across industries.

Because relative production costs and resource allocations are difficult to observe directly, empirical competitiveness research typically relies on revealed trade-based indicators. Balassa's (1965) RCA index remains the most widely used measure, premised on the idea that comparative advantage is "revealed" through actual export flows. RCA compares the export share of a given product in one country's total exports with that product's share in world exports; values above unity indicate comparative advantage. Yet RCA is inherently asymmetric, ranging from zero to infinity, and can be overly sensitive to scale effects and extreme observations. To address these limitations, later studies have proposed the RSCA index, which transforms RCA into a bounded scale between -1 and +1 and thereby improves comparability and econometric usefulness. Vollrath's (1991) RTA index further strengthens the framework by incorporating import-side information, reducing double-counting and offering a more balanced view of net trade position. More recently, Leromain and Orefice (2013) introduced a Structural Ricardian approach based on the gravity equation with fixed effects, providing a more purified estimate of intrinsic productivity by filtering out trade-cost distortions such as geography and policy barriers.

A key methodological challenge in competitiveness research is how to synthesise multiple partial indicators into one coherent measure. In response, multi-criteria decision-making frameworks such as TOPSIS, AHP, and entropy-based methods have been widely adopted in economics and management studies to capture the multidimensional nature of competitiveness (Vu et al., 2019). Among these, the Entropy Weight Method (EWM) is particularly appropriate for trade competitiveness analysis because it determines weights objectively from the dispersion structure of the data, rather than imposing subjective importance ex ante. The Coefficient of Variation (CoV) method complements this by capturing the relative variability of each indicator around its mean. When combined, EWM and CoV generate a hybrid weighting scheme that balances information richness with relative dispersion. This is not merely a technical refinement: it is analytically important because, as the results of this study show, RCA and MS carry

the largest weights, while RTA contributes relatively little at the HS 2-digit level. That pattern suggests that at this level of aggregation, export share and market presence contain substantially more informational content than import-adjusted advantage, thereby justifying the composite weighting strategy adopted here. More broadly, this dual-weight approach addresses a persistent weakness in earlier studies on Vietnam, which often relied on equal weighting or expert-assigned weights that may not have reflected the true informational structure of the underlying data.

RESEARCH METHODS

This study employs secondary data extracted from the Trade Map database of the International Trade Centre (ITC). The analytical scope covers all 97 industries classified by the Harmonized System (HS) at the 2-digit level (HS-2). The dataset includes detailed export and import turnovers for Vietnam, as well as total global export and import volumes for each industry code, to facilitate calculation of the component indices. The observation period spans 20 years from 2005 to 2024 comprehensively covering major structural economic shifts including WTO accession (2007), the 2008 global financial crisis, the implementation of new-generation FTAs, and the recent period of global supply chain volatility.

Revealed Comparative Advantage (RCA)

The RCA index (Balassa, 1965) measures comparative advantage based on the export share of a commodity in a country's total exports relative to its global export share:

$$RCA_{ab} = \frac{X_{ab}/X_a}{X_{wb}/X_w}$$

where X_{ab} is export turnover of industry b in country a; X_a is total exports of country a; X_{wb} is total global exports of industry b; and X_w is total global exports of all commodities. If RCA > 1, the industry possesses competitive capacity; if RCA < 1, it does not.

Market Share (MS)

The MS index is the most direct measure of an industry's dominance in the global market:

$$MS = \frac{X_{ab}}{X_{wb}}$$

A higher MS value indicates a more solid position on the international market.

Trade Competitiveness (TC)

The TC index reflects whether an industry acts as a net exporter or importer:

$$TC_{ab} = \frac{X_{ab} - M_{ab}}{X_{ab} + M_{ab}}$$

TC ranges from −1 to +1; values approaching +1 indicate strong export competitiveness, values near −1 indicate weak competitiveness relying predominantly on imports, and values near 0 reflect a balanced trade position.

Relative Trade Advantage (RTA)

The RTA index (Vollrath, 1991) addresses distortions from intra-industry trade by simultaneously considering comparative advantages from both export and import perspectives:

$$RTA_{ab} = \frac{X_{ab}/X_a}{X_{wb}/X_w} - \frac{M_{ab}/M_a}{M_{wb}/M_w}$$

If RTA > 0, the industry has a comparative advantage; if RTA < 0, it lacks one.

Construction of the composite competitiveness index

Although each traditional indicator plays a vital role in quantifying trade positions, applying them individually introduces systematic biases. The RCA index focuses entirely on export flows, ignoring import dynamics; the MS index is prone to bias toward large economies; the TC index is distorted by differences in sectoral economic scale; and RTA, while correcting several of these issues, does not fully capture market-scale dimensions. Accordingly, this study employs a multi-indicator integrated approach that simultaneously combines RCA, MS, TC, and RTA through a mathematical model using the Entropy Weight Method (EWM) and the Coefficient of Variation (CoV) method. This combination minimises deviations caused by anomalous values while ensuring balance and accuracy across the full panel.

Entropy weight method (EWM)

The Entropy Weight Method is built on Shannon's information theory. In economic evaluation, it is used to determine the weight of indicators based on the amount of information each indicator provides; the greater the data dispersion of an indicator, the smaller the Entropy value, indicating a higher amount of information provided, and thus it will be assigned a higher weight.

Step 1: Set up the decision matrix. Assuming the study has n evaluation objects (industries/years) and m evaluation criteria (RCA, MS, TC, RTA). The initial decision matrix X is established as follows:

$$X = \begin{pmatrix} x_{11} & x_{12} \cdots & x_{1n} \\ x_{21} & x_{22} \cdots & x_{2n} \\ \vdots & \ddots & \vdots \\ x_{m1} & x_{m2} \cdots & x_{mn} \end{pmatrix}$$

Where x_{ij} represents the i-th criterion of the j-th object.

Step 2: Data normalization. To ensure comparability, data must be normalized to the same value range (0, 1)

For indicators with a positive impact: $r_{ij} = \frac{x_{ij} - min(x_{ij})}{max(x_{ij}) - min(x_{ij})}$

For indicators with a negative impact: $r_{ij} = \frac{max(x_{ij}) - x_{ij}}{max(x_{ij}) - min(x_{ij})}$

Determine the proportion and calculate Entropy. First, calculate the proportion of the i-th indicator's value in the j-th object (f_{ij})

$$f_{ij} = \frac{r_{ij}}{\sum_{j=1}^{n} r_{ij}}$$

The Entropy value of the i-th indicator (H_i) is determined by

$$H_i = -\frac{1}{ln\, n} \sum_{j=1}^{n} f_{ij} ln f_{ij}$$

Step 4: Calculate the Entropy weight. The weight is determined based on the information deviation:

$$w_i = \frac{1 - H_i}{m - \sum_{i=1}^{m} H_i}$$

Where $0 \le w_i \le 1 \; and \; \sum_{i=1}^{m} w_i = 1$

Coefficient of variation (CoV) method

The Coefficient of Variation method is an objective weighting approach based on the degree of fluctuation of observed values relative to their mean. This method is particularly effective in eliminating the negative impact of outliers and truthfully reflecting the contribution level of each factor to the overall variation in competitiveness.

Step 1: Calculate the mean value $\overline{r_i}$ and standard deviation σ_i

$$\overline{r_i} = \frac{\sum_{j=1}^{n} r_{ij}}{n}$$

$$\sigma_i = \sqrt{\frac{1}{n-1} \sum_{j=1}^{n} (r_{ij} -)^2}$$

Step 2: Calculate the coefficient of variation.

$$E_i = \frac{\sigma_i}{\overline{r_i}}$$

Step 3: Determine the variation weight.

$$\delta_i = \frac{E_i}{\sum_{i=1}^{m} E_i}$$

Where $0 \le \delta_i \le 1 \; and \; \sum_{i=1}^{m} \delta_i = 1$

Combined Weight and Composite Index

The combined weight integrating EWM and CoV is computed as:

$$\omega_i = \gamma w_i + (1 - \gamma)\delta_i$$

where γ is a priority coefficient set to 0.5 to assign equal importance to both methods. The Composite Competitiveness Index for each industry is then calculated as:

$$V_i = \sum_{i=1}^{m} \omega_i X_{ij}$$

A larger Vi indicates stronger competitive capacity; a smaller value indicates an industry primarily dependent on net imports or with very low global competitiveness.

RESULTS AND DISCUSSION

Determination of component index weights

Prior to computing the composite index, the study established weights for the four component indicators by integrating EWM and CoV with a priority coefficient γ = 0.5. The finalised weights are presented in Table 1.

Table 1. Weights of component indices for competitiveness evaluation

Indicator	EWM Weight (wi)	CoV Weight (δi)	Combined Weight (ωi)
RCA	0.4137	0.4134	0.4135
RTA	0.0030	0.0225	0.0127
MS	0.3985	0.3733	0.3859
TC	0.1849	0.1908	0.1878

Source: Authors' calculations

Table 1 presents the weighting structure of the four component indicators used to construct the Composite Competitiveness Index (CCI), derived from the integrated Entropy Weight Method (EWM) and Coefficient of Variation (CoV) framework. The results reveal substantial heterogeneity in the informational contribution of each indicator, suggesting that different dimensions of competitiveness do not contribute equally to explaining variation across Vietnam's industrial sectors.

Among all indicators, the Revealed Comparative Advantage (RCA) index receives the highest combined weight (ωi=0.4135\omega_i = 0.4135ωi=0.4135), closely followed by Market Share (MS) (ωi=0.3859\omega_i = 0.3859ωi=0.3859). Together, these two indicators account for approximately 79.94% of the total weighting structure, indicating that export competitiveness across Vietnam's industries is primarily driven by revealed export specialisation and international market presence. The strong weighting assigned to RCA suggests that differences in comparative export strength contain the highest informational content in distinguishing competitive industries, while the substantial contribution of MS indicates that the scale of participation in global markets remains a critical dimension of competitive performance.

By contrast, Trade Competitiveness (TC) receives a moderate combined weight (ωi=0.1878\omega_i = 0.1878ωi=0.1878). Although TC contributes meaningfully to the evaluation framework by reflecting the balance between export and import activities, its lower relative weight implies that net trade position alone provides less discriminatory power than export specialisation or market penetration. This outcome is theoretically plausible because industries may exhibit strong export growth while simultaneously relying heavily on imported intermediate inputs, particularly in economies integrated into global value chains.

The most notable result concerns Relative Trade Advantage (RTA), which receives an exceptionally small combined weight (ωi=0.0127\omega_i = 0.0127ωi=0.0127). The low contribution of RTA suggests that import-adjusted comparative advantage provides relatively limited additional information beyond that already captured by RCA and MS within the HS 2-digit panel. One possible explanation is that aggregation at the HS-2 level smooths sectoral heterogeneity and reduces variation in import-adjusted trade structures across industries. Consequently, although RTA remains conceptually important in accounting for import-side dynamics, its empirical contribution to explaining competitiveness variation appears relatively weak in this specific context.

Methodologically, the close correspondence between the EWM and CoV estimates across all indicators confirms the robustness and stability of the hybrid weighting framework. The consistency between the two objective weighting approaches indicates that the resulting weights are driven by the intrinsic statistical properties of the data rather than by methodological artefacts or subjective assumptions. This finding supports the validity of the integrated weighting strategy adopted in the present study.

More importantly, the weighting structure provides early evidence consistent with the broader empirical findings of the paper. The dominance of RCA and MS suggests that Vietnam's competitiveness over the 2005–2024 period has been shaped primarily by increasing export specialisation and expanding global market participation. This pattern aligns closely with the later results showing the transition from traditional factor-driven sectors toward stronger positions in processed agricultural products, upstream textile materials, and technology-intensive manufacturing industries.

Agriculture, forestry, and fishery sector

Table 2 presents the composite competitiveness indices for key agricultural, forestry, and fishery products from 2005 to 2024. The data reveal profound structural divergence, illustrating a systematic transition from natural resource exploitation toward value-added processing.

Table 2. Composite competitiveness index of key agriculture, forestry, and fishery products

HS Code	Description	CCI 2005	CCI 2024	Change (%)
HS 09	Coffee, tea, spices	0.5514	0.4075	−26.09
HS 08	Edible fruits and nuts	0.1708	0.3252	+90.40
HS 03	Fish and aquatic products	0.4083	0.2443	−40.16
HS 10	Cereals	0.4188	0.2304	−44.98
HS 11	Milling industry products	0.1306	0.2094	+60.35
HS 16	Preparations of meat/fish	0.1764	0.2392	+35.62
HS 40	Rubber	0.2470	0.2913	+17.94
HS 44	Wood and articles of wood	0.1410	0.3154	+123.65

Source: Authors' calculations based on Trade Map data

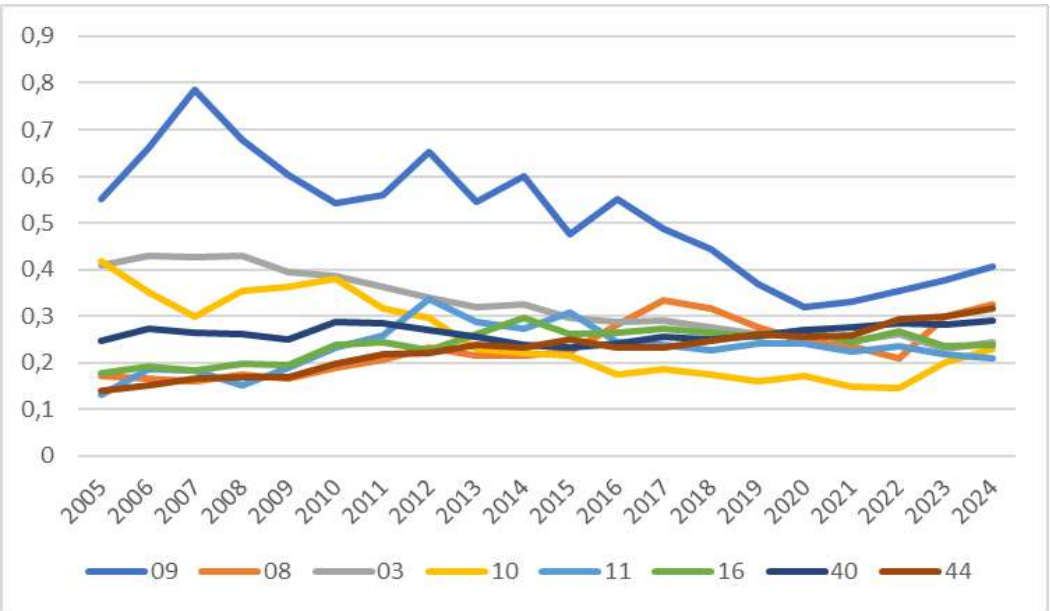

Figure 1: Composite competitiveness index of key agriculture, forestry, and fishery products

Table 2 reports the Composite Competitiveness Index (CCI) of major agricultural, forestry, and fishery industries over the period 2005–2024. The results reveal substantial heterogeneity in sectoral trajectories and point to a broader process of structural transformation within Vietnam's primary sector. Rather than exhibiting uniform changes in competitiveness, the industries display a clear divergence between traditional resource-based exports and sectors characterised by greater processing intensity and stronger value-chain integration. Overall, the evidence suggests a gradual transition from static advantages rooted in natural endowments toward more dynamic forms of competitiveness based on processing capability, supply-chain upgrading, and market diversification.

The most pronounced decline is observed in cereals (HS 10), whose CCI decreased by 44.98%, from 0.4188 in 2005 to 0.2304 in 2024. A similarly substantial reduction is recorded in fish and aquatic products (HS 03), which declined by 40.16%, while coffee, tea, and spices (HS 09) experienced a smaller but still notable contraction of 26.09%. Importantly, these reductions should not necessarily be interpreted as evidence of deteriorating export performance. Rather, they appear to reflect structural repositioning within the economy. Traditional export sectors that previously relied on abundant land resources and low production costs increasingly face diminishing returns arising from intensifying international competition, commodity price volatility, and the tightening of regulatory standards in export markets. In the case of fisheries, stricter non-tariff measures, including sustainability and traceability requirements, have likely intensified these pressures. Consequently, the decline of several primary-product industries may represent a relative weakening of raw-material dependence rather than an absolute loss of export capability.

In contrast, sectors associated with deeper processing and stronger industrial linkages demonstrate substantial improvements in competitiveness. The most remarkable expansion is observed in wood and wood products (HS 44), whose CCI increased by 123.65%, rising from 0.1410 to 0.3154. This increase suggests a successful movement away from reliance on raw timber exports toward higher value-added activities, particularly furniture production and processed wood manufacturing. Such upgrading reflects not only increased production capability but also improvements in design capacity, supply-chain coordination, and compliance with international sustainability requirements. Likewise, edible fruits and nuts (HS 08) experienced a substantial increase of 90.40%, while milling products (HS 11) and preparations of meat and fish (HS 16) recorded gains of 60.35% and 35.62%, respectively. These patterns indicate that competitiveness increasingly originates from processing activities that transform primary commodities into higher-value products rather than from simple extraction or cultivation.

Particularly noteworthy is the opposite movement between fish and aquatic products (HS 03) and processed meat and fish preparations (HS 16). While the former experienced a substantial decline, the latter expanded considerably over the same period. This divergence provides important evidence of a structural upgrading process within Vietnam's seafood industry. Rather than relying predominantly on exports of fresh or minimally processed products, firms appear increasingly able to capture value through downstream processing and product differentiation. Such a pattern is highly consistent with Dynamic Capabilities Theory and value-chain upgrading perspectives, which argue that long-term competitiveness increasingly depends on the capacity to reconfigure production systems and move toward higher-value market segments.

More broadly, the results suggest that competitiveness within Vietnam's agricultural, forestry, and fishery sectors is undergoing a transition from resource-based specialisation toward capability-driven upgrading. Industries that rely primarily on natural endowments exhibit weaker long-term competitiveness dynamics, whereas sectors characterised by stronger processing intensity, technological adaptation, and supply-chain integration demonstrate more sustained improvements. This pattern also aligns with

the broader findings of the study, which indicate that Vietnam's competitive trajectory is progressively shifting from static comparative advantages toward dynamic competitive capabilities.

From a policy perspective, these findings imply that future competitiveness strategies should focus less on expanding export volumes of raw commodities and more on strengthening domestic value creation. For agricultural and fishery industries, priority should be given to investment in processing technologies, cold-chain logistics, traceability systems, and internationally recognised certification mechanisms. For forestry products, maintaining competitiveness increasingly requires adherence to sustainability standards and participation in responsible supply-chain networks. More generally, the evidence suggests that industrial policy should increasingly support upgrading within value chains rather than relying solely on traditional factor-based advantages.

Consumer Goods and Processing Industry Sector

Table 3 presents the composite competitiveness indices for consumer goods and processing industries. The data uniformly depict strong and consistent growth across the sector, illustrating Vietnam's transition from primary processing toward integrated manufacturing and specialised supporting industries.

Table 3. Composite competitiveness index of consumer goods and processing industries

HS Code	Description	CCI 2005	CCI 2024	Change (%)
HS 64	Footwear	0.5714	0.7184	+25.74
HS 62	Non-knitted apparel	0.3544	0.4481	+26.42
HS 61	Knitted apparel	0.3063	0.4213	+37.56
HS 60	Knitted fabrics	0.0320	0.2757	+762.92
HS 52	Cotton	0.0497	0.3808	+665.52
HS 54	Man-made filaments	0.0582	0.2361	+305.84
HS 50	Silk	0.1818	0.3566	+96.15
HS 59	Technical fabrics	0.0967	0.2582	+167.11
HS 42	Articles of leather	0.2176	0.2811	+29.19
HS 94	Furniture	0.2919	0.3811	+30.58
HS 95	Toys/sports equipment	0.1948	0.2926	+50.15
HS 48	Paper and paperboard	0.1109	0.1839	+65.77
HS 39	Plastics	0.1878	0.2225	+18.48

Source: Authors' calculations based on Trade Map data

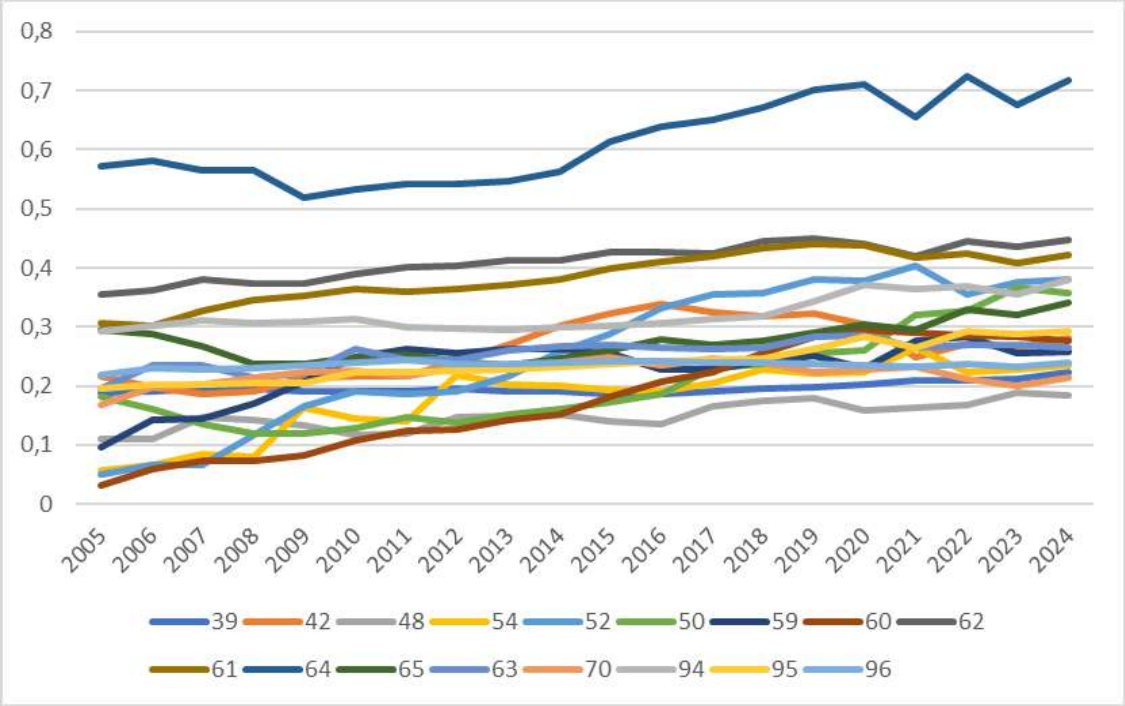

Figure 2: Composite competitiveness index of consumer goods and processing industries

Table 3 reports the Composite Competitiveness Index (CCI) for Vietnam's consumer goods and processing industries over the period 2005–2024. The results reveal a broad-based strengthening of competitiveness across both final consumer goods and upstream intermediate inputs, indicating that the sector has moved beyond simple assembly toward more integrated manufacturing, deeper supply-chain localisation, and greater industrial sophistication. Rather than reflecting isolated product-level gains, the pattern in Table 3 points to a systemic upgrading process in which final goods, supporting materials, and semi-finished inputs have advanced in a mutually reinforcing manner.

Footwear (HS 64) remains one of Vietnam's most competitive export categories, with its CCI increasing from 0.5714 to 0.7184, or 25.74 percent over the study period. The persistence of this strong position suggests that the sector has developed not merely scale advantages but a more durable competitive foundation based on supplier coordination, material availability, production efficiency, and compliance capabilities. Apparel exhibits a similar though somewhat more moderate trajectory: non-knitted apparel (HS 62) rose by 26.42 percent and knitted apparel (HS 61) by 37.56 percent. This simultaneous strengthening of both footwear and apparel confirms that Vietnam's traditional labour-intensive export sectors have not stagnated; rather, they have been progressively upgraded through quality improvement, process standardisation, and deeper integration into global value chains. The performance of these industries is also consistent with the disciplining effects of preferential market access under CPTPP and EVFTA, which have encouraged firms to meet stricter rules of origin, improve product standards, and expand compliance capacity.

The most significant transformation, however, is observed not in final consumer goods but in upstream textile inputs and semi-finished materials. Knitted fabrics (HS 60) recorded an exceptional increase of 762.92 percent, cotton (HS 52) rose by 665.52 percent, and man-made filaments (HS 54) expanded by 305.84 percent. These are not incremental changes; they indicate a structural break in the organisation of Vietnam's textile industry. The evidence strongly suggests that the sector is no longer dominated by pure assembly logic, but is instead moving toward closed-loop industrial clustering and upstream localisation of inputs. In other words, competitiveness is increasingly being generated within the domestic production network itself, rather than being confined to final-stage export assembly. The concurrent rise of technical fabrics (HS 59) and silk (HS 50) further reinforces this interpretation, as it points to greater product diversification, higher technical complexity, and stronger endogenous capabilities within the textile and materials ecosystem.

Beyond textiles, other consumer goods industries also show meaningful upgrading. Furniture (HS 94) expanded by 30.58 percent, while toys and sports equipment (HS 95) increased by 50.15 percent. These gains suggest a shift from labour-cost-based competition toward design-intensive, standards-driven manufacturing. The expansion of furniture competitiveness is particularly significant because it reflects Vietnam's capacity to capture opportunities created by global supply-chain reconfiguration, especially as production shifted away from China. Likewise, the rise in toys and sports equipment signals that Vietnamese firms are increasingly participating in manufacturing segments that require quality consistency, flexibility, and integration into multinational sourcing networks. Supporting industries also advanced in parallel: paper and paperboard (HS 48) increased by 65.77 percent, and plastics (HS 39) by 18.48 percent. Their relatively steady growth is important because it indicates the emergence of an interdependent industrial ecosystem in which upstream materials and intermediate inputs provide the logistical and technological basis for sustained competitiveness in downstream consumer goods production.

Taken together, the results in Table 3 provide strong evidence of a qualitative shift in Vietnam's consumer goods and processing industries. The sector's competitive advantage is no longer derived solely from low labour costs or final-stage assembly, but increasingly from a more complex configuration of supplier networks, material localisation, compliance capacity, and production upgrading. This pattern is highly consistent with Dynamic Capabilities Theory, which emphasises the ability of firms and industries to reconfigure resources in response to global market pressures. It also supports the broader argument of this study that Vietnam's export competitiveness is evolving from static comparative advantage toward a more dynamic and structurally embedded form of industrial capability.

Heavy Industry and High-Technology Sector

Table 4 presents the composite competitiveness indices for heavy and high-technology industries. The results provide compelling evidence that Vietnam is gradually escaping the middle-income trap by ascending to higher value-added stages in the global value chain.

Table 4. Composite competitiveness index of heavy and high-technology industries

HS Code	Description	CCI 2005	CCI 2024	Change (%)
HS 76	Aluminium	0.0854	0.2158	+152.62
HS 74	Copper	0.0895	0.2097	+134.36
HS 72	Iron and steel	0.1672	0.2721	+62.69
HS 83	Misc. base metal art.	0.1201	0.2248	+87.17
HS 85	Electrical machinery	0.2076	0.3493	+68.25
HS 84	Mechanical appliances	0.2064	0.2631	+27.47

HS 90	Optical/medical inst.	0.1395	0.2260	+61.92
HS 88	Aircraft/spacecraft	0.1023	0.1954	+91.04
HS 89	Ships and boats	0.1756	0.2256	+28.46
HS 87	Vehicles and parts	0.1974	0.2079	+5.31
HS 73	Iron/steel articles	0.2100	0.2350	+11.91
HS 91	Clocks and watches	0.1864	0.2060	+10.52
HS 68	Stone, cement, plaster	0.1935	0.1924	−0.59

Source: Authors' calculations based on Trade Map data

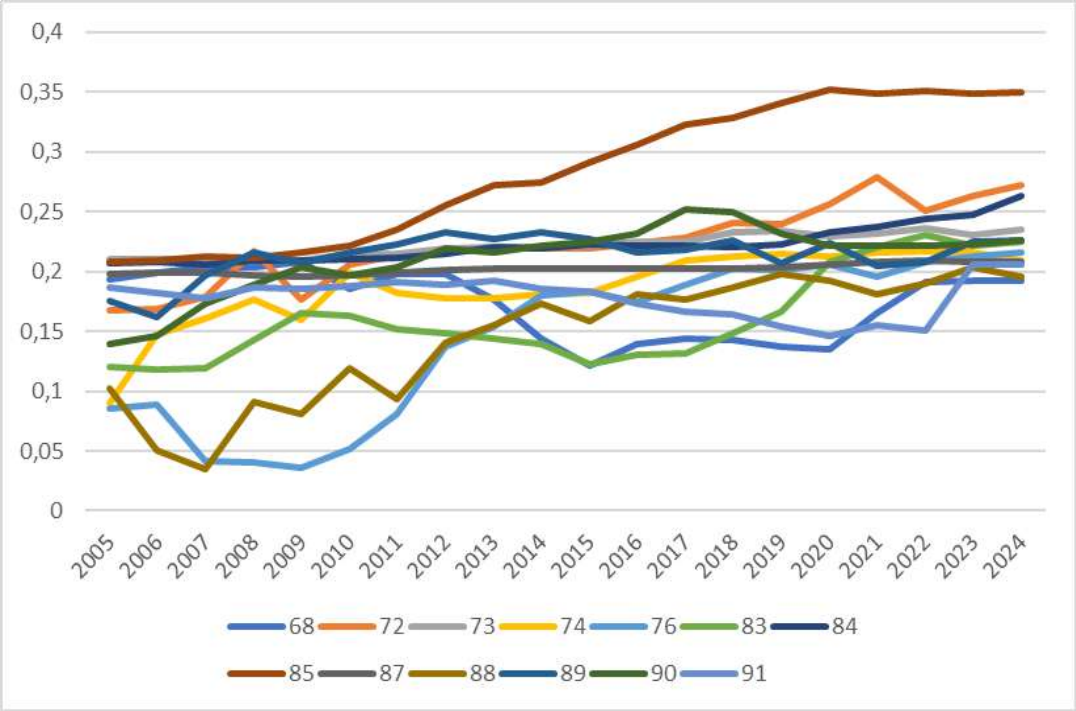

Figure 3: Composite competitiveness index of heavy and high-tech industries

Table 4 presents the Composite Competitiveness Index (CCI) for Vietnam's heavy and high-technology industries over the period 2005–2024. The results provide strong evidence that the sector has undergone substantial structural upgrading, with competitiveness increasingly concentrated in technical metals, electronics, precision machinery, and knowledge-intensive manufacturing. Rather than reflecting isolated sectoral gains, the pattern in Table 4 indicates a broader transition from resource-based industrial activity toward higher value-added production segments embedded in more sophisticated global value chains.

The most striking improvements are observed in technical metals, particularly aluminium (HS 76) and copper (HS 74), whose CCIs rose by 152.62% and 134.36%, respectively. These increases suggest a significant deepening of downstream processing capacity, moving beyond raw material extraction toward more refined industrial inputs that are essential for advanced manufacturing. The strong performance of iron and steel (HS 72), which increased by 62.69%, further confirms that Vietnam has developed a more robust metallurgical base capable of supporting a wide range of industrial applications. The modest decline in stone, cement, and plaster (HS 68) should not be interpreted as a weakening of the sector, but rather as evidence of structural reallocation away from lower-value construction materials toward more technology-intensive industries with greater export potential and stronger learning effects.

Electronics and machinery represent the clearest expression of Vietnam's technological upgrading. Electrical machinery and equipment (HS 85) recorded a 68.25% increase and reached the highest absolute CCI value in the entire sector at 0.3493. This result is particularly important because it signals not only export success, but also the consolidation of Vietnam's position within global electronics production networks. The expansion of this industry reflects the country's growing integration into high-value manufacturing systems led by multinational firms and supported by improved domestic capabilities in assembly, component supply, and quality compliance. Mechanical appliances (HS 84) also posted a solid gain of 27.47%, while miscellaneous articles of base metal (HS 83) increased by 87.17%, suggesting that a supporting ecosystem of precision components, tools, moulds, and technical accessories has emerged around the core electronics segment. Together, HS 83, HS 84, and HS 85 form a mutually reinforcing industrial cluster that increases domestic value content and reduces dependence on low-complexity assembly alone.

The transport-related industries further reinforce this upgrading trajectory. Aircraft and spacecraft (HS 88) registered the strongest growth in the sector at 91.04%, rising from 0.1023 to 0.1954. This is a highly significant result because aerospace manufacturing

is characterised by extreme entry barriers, stringent technical standards, and high capital intensity. The expansion of this category indicates that Vietnam has begun to participate in production activities requiring advanced precision engineering and stringent global certification. Shipbuilding (HS 89) also expanded steadily, while vehicles and parts (HS 87) showed more modest but still positive growth. These trends suggest that Vietnam is gradually moving into transport industries where competitiveness depends less on labour cost advantages and more on technical capability, supplier coordination, and compliance with international standards.

Perhaps the most strategically important finding is the strong performance of optical, medical, and measuring instruments (HS 90), which rose by 61.92% to 0.2260. This category is among the most knowledge-intensive in the entire classification and requires sustained investment in R&D, precision engineering, and quality control. Its growth therefore provides direct evidence that Vietnam is not only expanding in volume terms, but also moving into activities with higher technological complexity and greater value-added potential. Clocks and watches (HS 91) and vehicles and parts (HS 87) contributed to this diversification process, though at a slower pace. Their more moderate growth nonetheless indicates that Vietnam is broadening its industrial base across a range of technologically demanding sectors.

Taken as a whole, the results in Table 4 suggest that Vietnam is progressively escaping dependence on low-value industrial activities and moving toward a more advanced manufacturing structure. The sector's upgrading path is consistent with Dynamic Capabilities Theory: competitiveness is being generated through continuous capability accumulation, technological adaptation, and integration into sophisticated supply networks. It is also consistent with the broader theoretical argument of this study that export competitiveness should be understood not as a static trade outcome, but as a dynamic expression of industrial learning, structural transformation, and value-chain ascent. In this sense, the evidence from heavy and high-technology industries provides some of the clearest support for the paper's central claim that Vietnam's export base is shifting from factor-driven advantage toward capability-driven competitiveness.

Cross-sectoral synthesis, theoretical implications, and policy relevance

Taken together, the composite index results across the three sectoral groupings provide a coherent account of Vietnam's structural transformation over the period 2005–2024. The evidence indicates that export competitiveness has not evolved uniformly across industries, but has instead followed differentiated upgrading trajectories shaped by factor endowments, industrial capabilities, supply-chain integration, and institutional adaptation. This pattern is broadly consistent with classical trade theory, yet it also reveals the limits of a purely static comparative-advantage interpretation. In particular, the decline in the CCI of cereals (HS 10) and fresh fish products (HS 03) should not be interpreted as a loss of competitiveness in an absolute sense; rather, it reflects a relative reallocation of productive resources away from low-value, resource-intensive activities toward sectors with stronger processing depth, higher value added, and greater learning potential. From the perspective of the Heckscher–Ohlin framework, this transition is expected in an economy that is gradually accumulating physical capital, human capital, and industrial sophistication. Vietnam's export structure therefore appears to be moving from factor-driven specialisation toward a more complex configuration of capability-based competitiveness.

The consumer goods and processing sector offers particularly strong support for Dynamic Capabilities Theory. The simultaneous strengthening of final products such as footwear and apparel, together with the extraordinary expansion of upstream textile inputs and semi-finished materials, suggests that competitiveness is increasingly generated through the reorganisation of production networks rather than through labour-cost advantages alone. The rapid growth of knitted fabrics, cotton, man-made filaments, and technical fabrics indicates that domestic firms are not merely assembling imported inputs, but are progressively localising key segments of the supply chain. This is an important theoretical finding because it shows that industrial upgrading in Vietnam is not confined to downstream export performance; it also involves the internal deepening of production architecture, supplier development, and capability accumulation. In this sense, the results extend existing work on absorptive capacity and FDI spillovers by showing that external knowledge and market access generate durable competitiveness only when domestic firms and supporting industries are able to internalise, adapt, and redeploy these resources across the production system.

The heavy and high-technology sector provides even stronger evidence of structural upgrading. The sharp rise in technical metals, precision components, electrical machinery, aerospace parts, and medical instruments suggests that Vietnam is entering industries characterised by high technological thresholds, stricter quality requirements, and stronger linkage effects. This trajectory challenges the common assumption that FDI-led manufacturing in emerging economies remains enclave-like and contributes limited domestic value added. Instead, the evidence suggests that prolonged participation in global production networks, combined with technology transfer, supplier upgrading, and compliance with international standards, may be enabling Vietnamese firms to internalise advanced productive capabilities. This interpretation is consistent with the "Linkage, Leverage, and Learning" paradigm and implies that Vietnam may be approaching a transitional phase in which indigenous capability accumulation, rather than simple assembly for foreign buyers, becomes a more important source of export competitiveness.

The methodological results also have broader implications. The weighting structure derived from the integrated EWM-CoV approach shows that RCA and MS account for the large majority of the composite index's explanatory content, whereas RTA contributes only marginal additional information at the HS-2 level. This does not diminish the conceptual value of RTA, but it

does indicate that, at a relatively aggregated industry level, export specialisation and global market presence capture the most informative variation in competitiveness. The finding also suggests that the optimal weighting structure of composite trade indices is not universal, but depends on the level of aggregation and the extent of intra-industry trade. Future research at more detailed HS-4 or HS-6 levels may observe a larger role for import-adjusted indicators as product heterogeneity and two-way trade intensify. In this regard, the present study not only provides a substantive assessment of Vietnam's export upgrading, but also contributes a methodological lesson on how competitiveness should be measured in structurally diverse and rapidly changing economies.

From a policy perspective, the findings point to a clear strategic imperative: Vietnam should no longer focus primarily on expanding export volume, but on deepening domestic value creation and strengthening the domestic foundations of competitiveness. For agricultural and fishery sectors, policy should prioritise processing capability, traceability systems, certification infrastructure, and cold-chain logistics, with the aim of moving beyond raw commodity exports toward higher-value processed products. For consumer goods and textiles, the main priority should be upstream localisation, industrial clustering, and support for domestic suppliers of raw materials, technical fabrics, and intermediate inputs. For heavy and high-technology industries, policy should focus on supplier development, precision engineering, R&D incentives, STEM human capital, and stronger linkages between foreign-invested enterprises and local firms. Across all sectors, the evidence supports a shift from passive reliance on static comparative advantage toward an active industrial strategy built around dynamic capabilities, learning, and value-chain upgrading.

CONCLUSION

This study examined the structural transformation of Vietnam's export competitiveness across 97 HS 2-digit industries during 2005–2024. By integrating RCA, MS, TC, and RTA through the Entropy Weight Method and Coefficient of Variation approach, the study developed a multidimensional Composite Competitiveness Index (CCI) that overcomes key limitations of single-indicator assessments and provides a more comprehensive evaluation of export competitiveness at the macro level.

The findings reveal substantial upgrading in Vietnam's export structure, characterised by a gradual shift from raw materials and basic assembly toward deeper processing, supply-chain localisation, and more technology-intensive production. In agriculture, forestry, and fisheries, competitiveness increasingly concentrates in processed and higher-value products, while traditional strengths such as cereals and fresh aquatic products have weakened relative to wood products, edible fruits, and processed food industries. In consumer goods and processing sectors, footwear and apparel remain highly competitive, but the most significant advances occur in upstream textile materials, suggesting a transition from assembly-based production toward more integrated domestic supply systems. In heavy and high-technology industries, the strong performance of technical metals, electrical machinery, medical instruments, and aerospace-related products indicates increasing technological sophistication and a gradual movement toward higher-value segments of global production networks.

Overall, the evidence suggests that Vietnam's competitive trajectory is becoming increasingly dynamic and capability-driven rather than relying solely on static comparative advantages. Sustaining this transition requires stronger support for industrial linkages, technological upgrading, domestic value creation, and compliance with international sustainability and quality standards. The proposed CCI may therefore serve as a useful evidence-based tool for identifying emerging sectors and supporting targeted industrial policy.

Several limitations should be acknowledged. First, HS 2-digit aggregation may conceal substantial heterogeneity across products; future studies should extend the analysis to HS 4-digit and HS 6-digit levels. Second, incorporating additional dimensions such as domestic value-added, unit values, and carbon intensity may strengthen the explanatory power of the index. Third, future research should further decompose competitiveness dynamics into price, quantity, and quality effects to better identify the underlying mechanisms of structural change.

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