



Category-wise Export Concentration of Capital Goods in India

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Abstract

This research examines the concentration of capital goods in Indian exports to determine the degree of export diversification and volatility. The study makes use of secondary data on the main categories of capital goods and concentration and instability indicators of the export patterns across time. The results show that small segments participate in capital goods exports, which are concentrated in a few categories. Exports in the less diverse categories, which are comparatively more susceptible to volatility, have less steady external market vulnerabilities. These findings indicate that the stability of exports may be impacted by an over-reliance on particular categories, which is why policies that encourage diversification, introduction, and focus on improving other segments should be put into place.

Keywords: *Capital Goods Exports, Export Concentration, Export Instability, Diversification, India*

Introduction

Exports are crucial in determining an economy's economic trajectory through industrial expansion, foreign exchange, and global market integration. In India's case, exports have been crucial to increasing industrial capacity and competitiveness abroad. These include the engineering of items that have become an important part of the global Indian export system due to the tight relationship with the advancement of Indian technology and industry. According to Adewumi et al. (2024), capital goods encompass a broad range of items, such as transportation equipment, machinery, and metal products. The manufacturing sector's export success is seen as its structural strength. The capital goods exports have, however, failed to grow equally across all the products. There are only a limited number of categories more than 60% that would dominate the export earnings, and several sub-sectors, less than 5%, will play in the background. This imbalanced distribution indicates the issue of export concentration. In case a company relies on a small number of products or categories, it is referred to as an export concentrated when compared to an export relying on a large number of products or categories, which is referred to as a diversified export. The high category-wise concentration subjects the firm to exogenous demand shocks, price variation, and

company-specific shocks. Such reliance can result in trade instability, which is hard to maintain trade in the long term and policy planning. Examining category-based exports has attracted very little attention, despite the fact that their level has become a critical concern (Barbieri et al., 2024). This creates a research gap in determining the influence of concentration patterns on export stability. The reason we are carrying out the current research is that we examine the category-based export concentration of capital goods in India and its implications for export diversification and stability.

In addition, a category-based analysis of the capital goods export will provide a clearer picture of the structural weaknesses of the export sector. Aggregate export analysis has a propensity to mask the variations among the different product lines, and therefore, it will be difficult to distinguish the weak segments. This will assist policymakers in spotting those sectors that require support and diversification by focusing on the individual categories. Such an analysis is also important in the creation of export strategies that will reduce volatility and increase resiliency (Tuyen et al., 2024). Therefore, the concentration of exports at the category level should be studied to have a sustained growth in the capital goods exports in India and to improve the performance of the trade.

Review of Literature

According to Ebadi and Ebadi (2025), the performance signifies that export composition and structure are important in the stabilization of trade and final growth. According to some of the studies, a high concentration of a country on the export products will render a country more susceptible to the external shocks that occur, since the more a country depends on fewer commodities, the more it will be more exposed to the variation of demand and market shocks. On the other hand, export diversification is also regarded as a stabilization effect that assists in reducing volatility and enhancing resilience in foreign trade (Ebadi and

Ebadi, 2025). The manufacturing and engineering export studies reveal that the category-level analysis will be able to provide more details than aggregate export research studies. Researchers note that product engineering does not exhibit a uniform distribution of exports since some strong categories have a high proportion of the total export (Dosi et al., 2020). This propensity to concentration is normally associated with inflexibility in the structure, slowness in the diffusion of technologies, and skewed industrialisation. Studies further suggest that capital-demanding and technologically advanced types are relatively stable when it comes to export activities, but less diversified segments are relatively unstable.

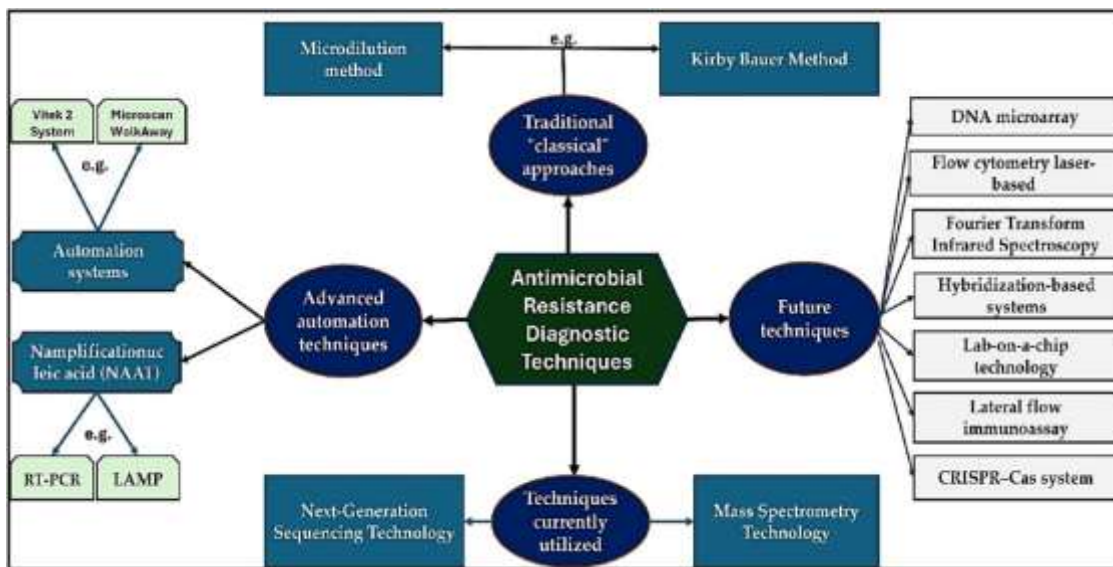


Figure 1: Detection of antimicrobial resistance via state-of-the-art technologies versus conventional methods (Ebadi and Ebadi, 2025)

The volatility isolates product concentration as a second factor that ascertains the changes in the export earnings. When the concentration is high either at the product or category level, the magnitude of the impact of the global demand shocks, alteration in policies, and inherent risks associated with a specific sector is amplified (Mengjie & Huang, 2025). Other researchers also indicate that the ability to manage concentration risks is determined by the firm's attributes, such as size and export intensity. Large firms will be known to have an upper hand to diversify product and markets compared to smaller firms that only have to adapt to new trade

environments (Gautam and Lal, 2020). The Indian export industry indicates the possibility of occupying more of the engineering products, but it laments that it is always dependent on a few types.

Even though there are studies that aim at the total export growth and diversification, not much has been done concerning category-based export concentration. This disparity makes it significant to focus on the special examination of the correlation between a concentration in the goods categories and the export stability (Imran et al., 2021). The existing study is anchored on existing literature, which satisfies this gap, and provides an improved



understanding of the role of export concentration and instability at the category level. Category-level analysis of export help in the development of more effective policies by exposing weak and non performing segments (Carlos et al., 2024). Such implications may assist policymakers in developing certain interventions that will reduce the reliance on superior categories and enable an equal export growth in the this sector.

Methodology

The study is based on the secondary data gathered through the official and valid sources in the realm of foreign trade in India and capital goods exports as well. These sources are Big Data and government trade publications, export promotion agencies, and published statistical databases. The secondary data is considered to be appropriate in the study of long-term export trends and structural adjustment in the export of capital goods (Jain, 2023). Comparable and standardized data are used to ensure the consistency and comparability of the data between the categories of exports and also through the periods. Goods exports of capital goods is divided into major categories of products so as to analyze them under these categories. The classification reflects the broadness of this industry and the heterogeneity of export performance of the segments in the capital goods industry.

The combination of exports into various groups would allow us to understand the tendencies in the concentration better and to discover the dominant and marginal export markets within the engineering goods industry. The calculation of the standard concentration indices that indicate the nature of the dispersion of exports is used to calculate the concentration of exports. These indices provide an indication as to whether the exports are in a few categories or are relatively diversified. When the concentration index is high, it is a signal of greater dependence on small categories as compared to

when the index is low, hence the export structure is more balanced (Kiss et al., 2023). The statistical measure of export instability is the indicator that depicts a change in export performance. Such measures become less variable in the category-wise exports, and they are applicable in calculating which segments are more vulnerable to external shocks. The indicators of instability are applied in complementing concentration measures due to the fact that concentration measures relate to export structure and volatility. To examine the change in the level of export concentration and instability across categories, the analysis applies descriptive statistics and trend analysis. The tests of differences between categories are performed by using inferential statistical tests, including tests of significance. Through this aggregate analysis approach, a detailed analysis of the export trends of the engineering goods in India, instability, and diversification is possible.

Results

The findings demonstrate that there has been a large level of export concentration in relatively small sets of products, especially in the areas of transport equipment, machinery, and iron and steel products, which comprise a huge portion of Indian capital exports. A few minor categories play a minor role, which means that there is not much diversification. The concentration indices reveal that the Indian exports are of moderate to high concentration and thus exposed to exogenous demand shocks. The instability analysis shows that the capital and technology-intensive ones have relatively lower volatility, and the smaller and niche segments have increased export instability (Lee and Zhang, 2021). The results, on the whole, indicate that, despite the high capital goods base in India, too much dependence on particular categories brings with it threats to the sustainability of exports in the long term.



Table 1: Category-wise Export Concentration and Instability of Capital Goods in India

Capital Goods Category	Mean Export Share (%)	Concentration Index (HHI)	Instability Index	t-value	p-value	Significance (0.05)
Transport Equipment	28.6	0.182	12.4	4.892	0.000	Yes
Machinery & Equipment	24.1	0.164	14.1	4.106	0.001	Yes
Iron & Steel Products	21.3	0.149	18.6	3.874	0.002	Yes
Electrical Equipment	15.7	0.102	20.9	2.986	0.006	Yes
Misc. Capital Goods	10.3	0.067	26.8	1.742	0.087	No

The capital goods exports of India, according to the results, have high mean export shares and t-values in terms of transport equipment, machinery, and iron and steel products. Such segments are not very unstable compared to smaller segments, which reflect greater strength to export. The miscellaneous goods, on the other hand, are not highly concentrated

and more prone to instability, and the findings are not statistically significant at the 5 percent level. The findings support moderate-to-high export concentration, which implies the vulnerability to external shocks and how fluctuations in major markets affect it. Diversification of the capital good sub-sector is also vital to the stability of exports in the long-run.

Table 2: Effect of Firm Size on Perception of Export Concentration and Instability (ANOVA)

Dependent Variable	F-value	p-value	Decision at 0.05
Perceived Export Concentration	4.218	0.018	Yes
Export Instability Awareness	3.746	0.027	Yes
Ability to Diversify Export Basket	5.392	0.007	Yes
Sensitivity to Global Demand Shocks	1.486	0.232	No

The ANOVA results have indicated that the perception of the exporters on the export concentration and instability is considerably influenced by the firm size. The risks of export concentrations are more sensitive to big companies, and their capacity to diversify their export portfolio is statistically significant, as shown by significant F-values. Less obvious is the fact that small and medium-sized companies have lower chances of

responding to the pressures of instability and diversification (Lee and Wang, 2023). The shock sensitivity in the global demand is, however, not much varied among firms of all sizes, and this shows that all exporters are equally vulnerable to external market volatility. These findings highlight how larger firms are structurally superior in terms of coordinating risks of capital goods export concentration in India.

Table 3: Effect of Export Intensity on Export Concentration and Instability (ANOVA)

Dependent Variable	F-value	p-value	Decision at 0.05
Perceived Export Concentration	3.912	0.022	Yes
Export Instability	4.586	0.013	Yes
Dependence on Key Engineering Categories	5.024	0.009	Yes
Export Market Diversification	1.168	0.318	No

The results indicate that the level of export has a significant effect on the perceptions of concentration

and instability among the exporters. The more intensive companies engaged in export are more



dependent on a few varieties of capital goods, and their instability problems are greater. The level of export does not contribute so much to the market diversification, which implies that even large exporting companies do not erase the need for the traditional markets and products. This means that the engineering exports in India are rigid, and they need to be diversified using particular strategies.

Discussion

The research findings indicate that the level of category-led capital goods export in India is high. It has some product types, which are performing well, and several segments that are performing on the periphery. This trend implies that there is no balance in the structure of the capital good export industry and assists in justifying the argument that exports have not been growing equally in the categories. This level of concentration is an indication that one can conclude that the export performance is being performed well by already existing and capital-intensive segments (Ozekicioglu et al., 2025). Its results also show that the instability of export is heterogeneous in terms of categories. The capital good areas are ones that are marked with relatively stable export performances that might be attributed to the increased production potentials, technological capabilities, and market networks. As a comparison, smaller and less differentiated categories are more liable to instability, implying that they are more susceptible to the market changes in demand and the market uncertainties. This confirms the feeling that small scale and a lack of diversification expose one to export performance.

The firm characteristics and their role in the choice of the export concentration and instability are also highlighted in the analysis. The larger companies and those companies that also have the export exposure of a higher type demonstrate the enhanced awareness of risks related to focus and how they can manage the export volatility. However, even high-export companies have a dependence on a few product groups, which can be deemed as the manifestation of stress in the structure of the export composition (PANDA and SHARMA, 2020). The findings are in line with the existing literature that also indicates the necessity to diversify to reduce the

aspect of instability in exports. The results demonstrate the need to increase the underrepresented capital goods sub-sectors to have a more well-balanced and healthy export structure.

Policy Implications

The findings of this study suggest that a need for policy interventions exists, which can be applied to reduce category-based concentration of exports in the capital goods sector in India. The measures targeted at the encouragement of exports should focus on enabling the underexploited capital goods sub-sectors to possess a more balanced export base. The competitiveness of smaller and emerging categories may be enhanced via special assistance in terms of technology upgrading, capacity development, and availability of funds. The development of innovation and product diversification in this field can help in the reduction of the dependency on a small number of categories that dominate. In addition, policies of export support will be developed, and this will enable the small firms to build on their export capacities and manage the market risks. A diversified export structure would minimize export instability, besides increasing long term sustainability and resiliency of capital goods exports in India.

Conclusion

In conclusion, the capital goods exports concentration in categories in India and their influences on export instability. The engineering exports of India have not been evenly distributed in terms of categories, with several dominating segments having a major portion of the export performance. Such concentration opens the export earnings to external shocks and lowers their stability. However, the performance of large categories of products in exports is relatively stable, but smaller and less diversified category is more vulnerable to instability. The findings indicate that the limitation of sustainability in the long-term export can be induced by a small export base. The research presents a glimpse of the industry as far as the further examination of export structure is considered at the category level. The results also highlight the fact that diversification should be adopted in the sub-sectors to boost the levels of exports. Future research



can be based on further developing the current industry study by employing market-level diversification, as well as using firm dynamics, to establish the origin of the export stability to a greater degree.

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