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Research Paper

Intra-Industry Trade in Manufactured Goods Between India and Select Southeast Asian Nations: An Empirical Examination using the G-L Index

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ABSTRACT

Post the wave of industrialisation, a new order of world trade emerged, which could not be explained by the classical and neoclassical models of trade. Such a trade pattern came to be denoted as 'Intra-Industry-Trade'(IIT), implying exchange of similar or identical goods and services within an industry or sector between countries. The ASEAN is India's fourth largest trading partner, and their economic partnership has been growing exponentially. A high degree of IIT exists in India-ASEAN trade. The present study undertakes a comprehensive examination of IIT in manufactures between India and top five trade partners among ASEAN, i.e., Indonesia, Malaysia, Singapore, Thailand, and Vietnam during the period 1992-2020. As manufactures comprise of the most traded category between India-ASEAN, Intra-Industry trade is examined at technology level, wherein manufactures are classified into resource based, low, medium, and high technology manufactures, and at commodity category level, wherein IIT is examined based on major manufactured categories. The analysis reveals exponential increase in India's IIT among manufactured goods with the select ASEAN countries from 1992 to 2020. Albeit the degree of IIT varies by country, which has been examined in detail. The study suggests the promotion of IIT between the partner countries such that the several benefits of IIT can be harnessed, such as, efficiency gains, improved competitiveness, increased productivity, and greater economic growth, which would be mutually advantageous to India and ASEAN countries.

HIGHLIGHTS

- The trade relationship between India and ASEAN is characterized by a noteworthy level of intra-industry trade, and the level of intra-industry trade has been increasing over time.
- A moderate to high level of intra industry trade in manufactures is noted in the context of India's trade partnership with ASEAN nations such as Indonesia, Malaysia, Singapore, Thailand, and Vietnam.
- In terms of policy implications, the analysis brings out the areas in manufactures goods wherein high intra industry trade is taking place in manufactures, and the areas wherein intra industry trade can take place.

Keywords: Intra-Industry Trade, Grubel-Lloyd Index, Product Differentiation, Manufactures, Technology, India, ASEAN

International trade and bilateral trade flows have traditionally been explained by Smithian Absolute Advantage and Ricardian Comparative Advantage models, which theorised that differences in factor endowment, factor pricing or technology were the underlying causes that explained what a country exported or imported. In the traditional scenario, countries exported commodities they had absolute/comparative advantage in, while importing

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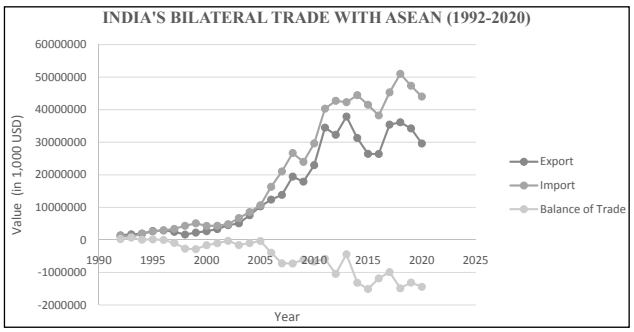
commodities they had an absolute/comparative disadvantage in. However, as the world became more industrialised, it became evident that countries were increasingly importing commodities similar to what they already produced, which was contrary to traditional Classical and Neo-Classical trade theories. Such trade pattern was denoted as '*Intra-Industry Trade*' (Balassa, 1965), implying trade in similar differentiated products belonging to the same industry. Later, empirical studies by Lancaster (1980), Krugman (1980), and Caves (1980) sought to provide theoretical bases for explaining such intra-industry trade flows and came up with factors such as economies of scale and product diversity in monopolistic competition as pertinent determinants of intra-industry trade.

In the context of India and ASEAN countries, it is imperative to study intra-industry trade, specifically in manufactured goods. In terms of the increase in volume of trade between India and ASEAN, India's bilateral trade with ASEAN has increased manifold since 1992, as noted in Fig. 1.



Source: *UN Comtrade database extracted through WITS software*

Fig. 1: Graphical Presentation of India's Bilateral Trade with ASEAN

In 1992, India's exports to ASEAN were at 1.39 billion US$, which increased to 36.13 billion in 2018. In 1992, India's imports from ASEAN were at 1.15 billion US$, which increased to 51 billion in 2018. However, 2019 marked the beginning of the Covid-19 pandemic and a visible decline in exports as well as imports. However, as per estimates by the United Nations Conference on Trade and Development (UNCTAD), merchandise trade has surged back exceeding pre-pandemic levels by year ending of 2021[1]. In terms of growth rate, for exports and imports, calculated for almost three decades period shows double digit growth for both exports and imports. The growth rates have depicted a steady and promising rise in bilateral trade integration between the partners.

Manufactured goods trade holds the most significance in India-ASEAN trade, and accounts for 70% of India's export to ASEAN; and 88% of India's imports from ASEAN, hence forming the most significant part of India-ASEAN bilateral trade. ASEAN is India's fourth largest trading partner and holds eminence in India's trade structure.

1. Significance of Intra Industry Trade

Intra-industry trade refers to the trade of similar or identical products within the same industry or sector between two countries. It is considered important for several reasons:

1. It allows for economies of scale and specialization, leading to greater efficiency and productivity in the production of goods.
2. It enables countries to access a broader range of products and technologies, leading to increased innovation and competitiveness.
3. It fosters greater interdependence and mutually beneficial relationships between trading partners.
4. It can also be a sign of a more developed and diversified economy.
5. Intra-industry trade can also help countries to reduce their dependence on exporting raw materials and instead focus on exporting value-added goods and services.

Overall, intra-industry trade is considered a key aspect of economic growth and development and is often seen as a sign of a mature and well-functioning economy.

In this context, the study, based on a dataset ranging from 1992-2020, covering the entire post reform period is a novel attempt to contribute to literature pertaining to Intra Industry Trade between India and ASEAN. India's Intra-Industry Trade has been examined with its five primary partners among ASEAN, namely, Indonesia, Malaysia, Singapore, Thailand and Vietnam. In aggregate, these five ASEAN nations chosen for the analysis comprise of 91.36% of India's exports to ASEAN, and 97.07% import from ASEAN.

[1] *https://unctad.org/news/global-merchandise-trade-exceeds-pre-covid-19-level-services-recovery-falls-short*

The paper is structured as follows. After the introduction in section 1, section 2 focuses on review of literature on India-ASEAN trade and Intra-Industry Trade. In section 3, the theoretical framework of the study is described. In section 4, the objectives of the study and research methodology is elucidated. Section 5 pertains to results and discussion, followed by conclusion and policy implications in section 6, and lastly, section 7 provides the limitations and future research directions.

REVIEW OF LITERATURE

Empirical Literature on India-ASEAN Trade

India has historically been connected with Southeast Asia through traditional Indian Ocean maritime trade routes (Khalid, 2011). As per Mohanty (2007) and Asher & Palit (2008), India's Look East Policy in 1991 was launched with India's foreign policy reorientation post the disintegration of Soviet Union, Southeast Asian nations became a lucrative option for India, due to their robust growth rates and formulation of a strong economic union called Association of Southeast Asian Nations (ASEAN). This marked the beginning of the modern-day era of India and ASEAN's bourgeoning trade relations. Since then, the scope of bilateral relations between India and ASEAN countries has been rising steadily(Sen, Asher & Rajan, 2004), and has in fact expanded to newer fields of cooperation such as tourism, investments, and other types of bilateral cooperations (Zhang, 2006). Studies by Nachiappan (2021) and Banik & Kim (2020) also testified the mutually advantageous economic and trading relationship between India and ASEAN. Bhattacharya (2020) affirmed that India's relationship with ASEAN is unlike its relationship with any other trade bloc and is likely to grow stronger in the future.

Empirical Literature on Intra-Industry Trade

In the pattern of global trade, intra industry trade has been gaining significance. It's important to note that the literature on intra-industry trade is vast and diverse, and the present section summarizes some of the key findings that have emerged. According to the study of Havrylyshyn & Civan (1985), intra-industry trade highlighted the existence of product diversification in advanced and more sophisticated economies, thus with the increase in development levels of an economy, and increased product diversification, more intra industry trade was taking place. Greenaway & Milner (1983) established that intra industry trade will become an increasing part of bilateral trade as the partner countries share a larger similarity with respect to income per capita. Hellvin (1996) established that intra-industry trade is positively associated with economic growth and development of a country. Gurler *et al.* (2006) suggested that trade agreements and other forms of economic integration can facilitate intra-industry trade and Agarwal & Betai (2021) found that India's FTAs have been IIT enhancing, while Ramakrishnan & Varma (2014) found that FTA's increase intra-industry trade if partner countries are at similar development levels. There is also evidence that intra-industry trade can lead to increased productivity and technological innovation (Agarwal & Betai, 2021).

Research Gap

Based on the review of literature, it has been found that there is lack of research on intra-industry trade in manufactures between India and ASEAN. The present study aims to fill this lacuna in research by studying intra-industry trade in manufactures between India and ASEAN's top five trading partners. For a comprehensive analysis, the study further examines intra industry trade based on technology categories of manufactures and based on major manufactures traded.

Objectives of the Study and Research Methodology

Objectives formulated for the study

- To analyse the country-wise intra industry trade in manufactures between India and major ASEAN partner countries.
- To determine the nature and pattern of Intra-Industry Trade: Technology Wise and major manufactured commodities wise.

Data and Classification: The present study is based on secondary data. Data has been collected from United Nations (UN) Comtrade database, which is the most credible repository of data pertaining to

bilateral trade flows and has been extracted through World Integrated Trade System (WITS).

The study uses Standard International Trade Classification (SITC), which is a product classification of traded commodities by the United Nations. As the present study is focused upon analysis of trade in manufactured goods, the SITC classification allows for international trade comparisons of commodities and manufactures goods and technological composition. In addition, the SITC classification is stated to be better suited to analyse long term trends in merchandise trade. The present study uses SITC data at 3 digit.

As the present study is concerned with trade specifically in manufacturers, the comprehensive classification devised by Sanjaya Lall (2000) in his seminal research "*The Technological Structure and Performance of Developing Country Manufactured Exports, 1985-1998"* has been adopted. The devised classification, based on the production processes involved in manufacturing of commodities, classifies manufactured exports into four broad categories, namely, resource-based manufactures (RB), low technology manufactures (LT), medium technology manufactures (MT), and high technology manufactures (HT). Additionally, the major manufactures traded between India and ASEAN were identified. Hence IIT has been calculated for major technological categories, as well as major manufactured categories traded.

Research Methodology: Broadly defined, Intra-industry trade (IIT)is defined as the situation wherein countries import and export simultaneously the same commodities/group of commodities/class of goods (Södersten, & Reed, 1994). Ruffin (1999) in his highly influential research considered intra industry trade as more beneficial than inter-industry trade as it is proven to stimulate innovation and exploit economies of scale

In order to measure IIT, the Grubel-Lloyd index (GL-index) is used, proposed by Grubel and Lloyd (1975). The formula is defined as follows:

$$GLi = 1 - \frac{|Xi - Mi|}{Xi + Mi}$$

Where *Xi* is the total export of *i* products and *Mi* is the total import of *i* products and 0 ≤ GLi ≤ 1. If the value of *GLi* is equal to 0, it signifies the lowest value of Intra Industry Trade i.e. no intra-industry trade. This situation means that a country has only imported or only exported in a certain industry. If the value of *GLi* is equal to 1, is signifies that a country's imports and exports in a particular industry are equal i.e. perfect Intra Industry Trade. Therefore, the closer the value of the GL-index is to 0, the lower is the level of intra-industry trade and the closer the value is to 1, the higher is the level of intra-industry trade.

RESULTS AND DISCUSSION

Intra Industry trade (IIT) index has been calculated country-wise for the technological categories of manufactured exports and for major traded commodity groups. For technology categories, IIT has been calculated for all four manufactured goods categories, namely resource based, low technology, medium technology and high technology manufactured goods. For major traded manufactured commodities, IIT has been calculated for manufactures, chemicals, textiles, machinery, and transport equipment, and other manufactures.

Intra-Industry Trade Analysis with Indonesia

Intra-Industry trade (IIT) for Indonesia has been presented in Table 1. As of 2020, it is observed that in terms of technology wise intra industry trade, highest IIT of 0.80 is noted in low technological commodities. The second and third highest IIT is noted in high-technology manufactures (0.79) and medium technology manufactures (0.78), while lowest IIT of 0.43 is noted in resource-based manufactures. The trend depicts that IIT has witnessed significant changes post 1992, wherein IIT for low-technology, medium technology and high technology commodities has increased significantly, while IIT for resource-based manufactures has declined considerably.

The IIT for major manufactured categories as of 2020 is highest in textiles (0.98) and other manufactures (0.98), followed closely by chemicals (0.94). For manufactures in totality, there is a 0.80 IIT, and lowest IIT of 0.47 is noted in machinery and transport equipment. The trend shows that IIT of manufactures in total has been decreasing marginally but consistently after 1997. For chemicals, IIT has remained high for most of the time period. For textiles, IIT has been increasing since 2007. For

Table 1: Intra-Industry Trade Analysis for India and Indonesia

Description	1992	1997	2002	2007	2012	2017	2020
IIT based on Technology Categories							
Resource Based Manufactures	0.95	0.23	0.47	0.43	0.56	0.19	0.43
Low Technology manufactures	0.18	0.69	0.93	0.71	0.67	0.73	0.80
Medium Technology Manufactures	0.43	0.93	0.88	0.99	0.60	0.83	0.78
High Technology manufactures	0.05	0.87	0.64	0.80	0.75	0.92	0.79
IIT based on Major Manufactured Categories							
Manufactures	0.63	0.97	0.99	0.86	0.66	0.89	0.80
Chemicals	0.97	0.58	0.93	0.77	0.62	0.96	0.94
Textiles	0.23	0.87	0.69	0.53	0.59	0.72	0.98
Machinery and Transport Equipment	0.03	0.51	0.91	0.88	0.67	0.71	0.47
Other Manufactures (SITC 6+8-68)	0.47	0.80	0.97	0.86	0.71	0.99	0.98

Source: *Author's calculation based on UN Comtrade database.*

Table 2: Intra-Industry Trade Analysis for India and Malaysia

Description	1992	1997	2002	2007	2012	2017	2020
IIT based on Technology Categories							
Resource Based Manufactures	0.13	0.09	0.32	0.50	0.41	0.83	0.85
Low Technology manufactures	0.04	0.18	0.67	0.76	0.93	0.74	0.86
Medium Technology Manufactures	0.37	0.70	0.86	0.79	0.70	0.91	0.75
High Technology manufactures	0.71	0.60	0.29	0.13	0.26	0.26	0.38
IIT based on Major Manufactured Categories							
Manufactures	0.34	0.95	0.77	0.52	0.65	0.74	0.75
Chemicals	0.66	0.97	0.75	0.55	0.72	0.80	0.87
Textiles	0.01	0.09	0.60	0.42	0.51	0.77	0.90
Machinery and Transport Equipment	0.35	0.78	0.39	0.25	0.42	0.55	0.63
Other Manufactures (SITC 6+8-68)	0.23	0.34	0.64	0.94	0.92	0.93	0.79

Source: *Author's calculation based on UN Comtrade database.*

machinery and transport equipment, a certain trend in IIT is not witnessed since 1992.

Intra-Industry Trade Analysis with Malaysia

Intra-Industry trade (IIT) analysis for Malaysia has been presented in Table 2. The analysis shows that as of 2020, in terms of IIT in technological categories, highest IIT of 0.86 is observed in low technological commodities, which is followed closely by resource-based manufactures (0.85). In medium technology manufactures, an IIT value of 0.75 is noted, while the lowest IIT of 0.38 is found in high technology manufacturers. The trend observed from 1992 onwards depicts an increase in intra-industry trade for all technological categories, except for high technology manufactures.

The IIT for major manufactured categories as of 2020 is highest in textiles (0.90), followed by chemicals (0.87). Overall, for almost all major traded commodity categories, including manufactures, chemicals, textiles and other manufactures, a consistent rise in IIT since 1992 has been noted. Lowest IIT of 0.63 is noted in machinery and transport equipment, and there has been a consistent increase in IIT for this commodity category since 2007.

Intra-Industry Trade Analysis with Singapore

Intra-Industry trade (IIT) analysis with Singapore has been presented in Table 3. As per the latest technology wise intra industry trade estimates of 2020, it is evident that highest IIT with Singapore lies in low technology manufactures with IIT values remaining high since 1997. For medium technology manufactures, IIT value is 0.68, and for

Table 3: Intra-Industry Trade Analysis for India and Singapore

Description	1992	1997	2002	2007	2012	2017	2020
IIT based on Technology Categories							
Resource Based Manufactures	0.76	0.71	0.45	0.77	0.47	0.42	0.64
Low Technology manufactures	0.47	0.69	0.89	0.92	0.84	0.73	0.95
Medium Technology Manufactures	0.94	0.76	0.74	0.57	0.88	0.83	0.68
High Technology manufactures	0.51	0.33	0.24	0.30	0.47	0.42	0.24
IIT based on Major Manufactured Categories							
Manufactures	0.89	0.79	0.78	0.57	0.91	0.80	0.53
Chemicals	0.96	0.73	0.63	0.53	0.73	0.41	0.28
Textiles	0.38	0.22	0.15	0.23	0.35	0.46	0.85
Machinery and Transport Equipment	0.62	0.42	0.32	0.43	0.91	0.95	0.55
Other Manufactures (SITC 6+8-68)	0.46	0.64	0.68	0.92	0.85	0.98	0.61

Source: *Author's calculation based on UN Comtrade database.*

Table 4: Intra-Industry Trade Analysis for India and Thailand

Description	1992	1997	2002	2007	2012	2017	2020
IIT based on Technology Categories							
Resource Based Manufactures	0.37	0.65	0.24	0.63	0.92	0.99	0.99
Low Technology manufactures	0.12	0.84	0.96	0.40	0.90	0.87	0.95
Medium Technology Manufactures	0.50	0.73	0.79	0.61	0.51	0.50	0.71
High Technology manufactures	0.89	0.87	0.76	0.35	0.45	0.40	0.66
IIT based on Major Manufactured Categories							
Manufactures	0.37	0.82	0.74	0.73	0.71	0.65	0.83
Chemicals	0.56	0.93	0.72	0.85	0.56	0.51	0.69
Textiles	0.22	0.76	0.68	0.97	0.81	0.85	0.96
Machinery and Transport Equipment	0.58	0.74	0.50	0.34	0.50	0.41	0.71
Other Manufactures (SITC 6+8-68)	0.25	0.54	0.43	0.99	0.92	0.85	0.87

Source: *Author's calculation based on UN Comtrade database.*

resource-based manufactures, it is 0.64. The lowest IIT with Singapore of 0.24 lies in high technology manufactures category. A consistent increase in IIT trend can only be seen for low technology manufactures. For resource based, medium technology and high technology manufactures, there has been a fluctuating or declining trend observed.

The IIT for major manufactured categories as of 2020 depicts medium to low IIT as of 2020 for most commodity categories. High IIT of 0.85 is noted in textiles, wherein IIT has been on an increasing trend since 2002. The lowest IIT with Singapore is noted in chemicals, wherein IIT value is 0.28. For manufactures, machinery and transport equipment and other manufactures, it is 0.53, 0.55 and 0.61 respectively. A declining trend in IIT values is noted in these three commodity categories.

Intra-Industry Trade Analysis with Thailand

Intra-Industry trade (IIT) analysis with Thailand has been presented in Table 4. As per the technology wise intra industry trade estimates 2020, near to perfect IIT value is noted in resource-based manufactures of 0.99. The IIT for resource-based manufactures has remained high since 2012. The second highest IIT of 0.95 is that of low technology manufactures. Medium technology manufactures and high technology manufactures have an IIT of 0.71 and 0.66 respectively. The overall trends depict an increase in IIT for resource based, low technology and medium technology manufactures, while a decrease in IIT is noted for high technology manufactures.

The IIT for major manufactured categories as of 2020 depicts higher IIT values for all the studied

Table 5: Intra-Industry Trade Analysis for India and Vietnam

Description	1992	1997	2002	2007	2012	2017	2020
IIT based on Technology Categories							
Resource Based Manufactures	0.89	0.02	0.07	0.48	0.79	0.85	0.85
Low Technology manufactures	0.00	0.03	0.07	0.38	0.80	0.61	0.55
Medium Technology Manufactures	0.61	0.01	0.03	0.11	0.69	0.93	0.78
High Technology manufactures	0	0.006	0.15	0.21	0.42	0.42	0.27
IIT based on Major Manufactured Categories							
Manufactures	0.15	0.01	0.08	0.24	0.82	0.93	0.79
Chemicals	0.10	0.01	0.04	0.13	0.53	0.75	0.68
Textiles	0.55	0.06	0.06	0.16	0.40	0.63	0.71
Machinery and Transport Equipment	0.30	0.00	0.36	0.35	0.30	0.53	0.30
Other Manufactures (SITC 6+8-68)	0.10	0.03	0.05	0.35	0.87	0.79	0.61

Source: *Author's calculation based on UN Comtrade database.*

commodity categories compared to 1992, namely, manufactures, chemicals, textiles, machinery and transport equipment and other manufactures. Highest IIT value of 0.96 is noted in textiles, followed by other manufactures (0.87) and manufactures (0.83). The lowest IIT value of 0.69 is noted in chemicals.

Intra-Industry Trade Analysis with Vietnam

Intra-Industry trade (IIT) analysis with Vietnam has been presented in Table 5. Technology wise intra industry trade as of 2020 suggests that resource-based manufactures have the highest IIT of 0.85, followed by medium technology manufactures which have an IIT value of 0.78. Low technology manufactures have an IIT value of 0.55 and high technology manufactures have the lowest IIT value of 0.27. When compared with the initial year of study 1992, it is noted that IIT value for low technology, medium technology and high technology manufactures has increased, while the IIT for resource-based manufactures has remained constant. Another noteworthy analysis is that there is a notable change in the IIT values across all categories after 2007.

The IIT for major manufactured categories as of 2020 represents highest IIT value of 0.79 in manufactures, followed by textiles (0.71), and chemicals (0.68). Other manufactures have IIT value of 0.61 and the lowest IIT value is noted in machinery and transport equipment. In machinery and transport equipment, the IIT values have not shown to be high in the period of analysis. For textiles, a contact increasing trend is noted after 2007. For commodity categories of manufactures, chemicals and other manufactures, an increasing trend in IIT is noted from 2007 up to 2017, while a decline is witnessed in 2020.

CONCLUSION

In conclusion, intra-industry trade is a significant phenomenon in India-ASEAN trade. Empirical studies have shown that intra-industry trade is positively associated with economic growth, productivity, and technological innovation. Additionally, the increasing globalization and integration of production processes has led to an increase in intra-industry trade in recent decades. Further research is needed to understand the implications of intra-industry trade for different countries and industries, as well as the potential effects of trade policy on intra-industry trade.

In context to the India-ASEAN trade, it is noted that overall, India has medium to high intra-industry trade with Indonesia, Malaysia, Singapore, Thailand, and Vietnam. Intra-industry trade has also increased significantly over time. Albeit the nature of intra-industry trade is noted to differ across countries. With Indonesia, a medium-high IIT is observed in low, medium, and high technology manufactures. Among the major manufactured categories, a very high IIT is observed in textiles, other manufactures, and chemicals. With Malaysia, a high intra industry trade is noted in resource based and low technology manufactures among the technology category of manufactures, and in textile and chemicals among the major manufactured

categories. With Singapore, high intra industry trade is observed in low technology manufactures and textiles. With Thailand, a near perfect intra industry trade is noted in resource-based manufactures, and is high in low technology manufactures, textiles, other manufactures, and manufactures. With Vietnam, a high IIT is observed in resource-based manufactures.

The paper, through the comprehensive analysis provides pertinent insights on the nature and pattern of India's IIT with select ASEAN countries and is a vital contribution to the existing literature. In terms of policy implications, the analysis brings out the areas in manufactures goods wherein high intra industry trade is taking place, and the areas wherein intra industry trade can take place. Given that fact that intra-industry trade can lead to increased competition, foster technological innovation,contribute to the development of new industries, and lead to greater efficiency in production, Indian policy makers must identify the areas country wise wherein there lies a significant scope for increasing intra industry trade. This will be highly beneficial to not just India, but also the ASEAN partner countries. As India is increasingly forging its trade and economic ties with ASEAN countries, increasing the IIT is bound to mutually benefit the macroenvironment of the partner countries.

Limitations and Future Studies

The present study has certain limitations, which lead to its future scope for research:

- The study is based on SITC 3-digit codes, and the scope of the study can be increased by extending it to more disaggregate level SITC 4- or 5-digit codes.
- As the present study is limited to India's top five trading partners with ASEAN, the study can be extended to include all the ten ASEAN countries.

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