

# MAPPING THE INTRA-INDUSTRY TRADE IN SOUTH ASIAN COUNTRIES THROUGH GRUBEL-LLOYD APPROACH: A SPECIAL FOCUS ON THE VEGETABLE TRADE

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## Abstract

Global nations are striving for sustainable growth and enhancing the welfare of the society. In the course of development, it is observed that the international trade plays a protuberant role in achieving the above mentioned goals. The intra-industry trade is the stylized fact of the modern trade, which constitutes a considerable portion in the total volume of trade. Against this theoretical background, the present study investigates the level of intra-industry trade with respect to vegetable trade in South Asian countries such as Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. In order to execute the task, secondary data on total volume of export and import of vegetables have been collected from the Direction of Trade Statistics, published by International Monetary Fund and Commodity Trade Data, published by WITS. The study covers the period from 1988 to 2018, which is the recent data available in the above mentioned sources. The analysis of the study involves two folds: at first the specialization of trade has been computed using Helpman and Krugman's (1985) general equilibrium model and the intra-industry trade has been estimated using Grubel-Lloyd Index (1975). The result of the study revealed that both Maldives and Sri Lanka are the net importers of the vegetables as the trade specialization index is negative. At the same time, the average intra-industry trade has been decreasing over the study period in South Asian countries.

**Keywords:** Intra-Industry Trade, Grubel-Lloyd Approach, Vegetables Trade, Helpman and Krugman's general equilibrium model.

**JEL Classifications:** F10, F12, F14, C62.

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## INTRODUCTION

The scholarly question emerged during the Adam Smith's (1776) epoch that 'why do nations trade?' has its relevance even in the knowledge driven age. A good number of scholars such as Adam Smith, David Ricardo, Haberler, Mill, Heckscher, Ohlin and many others attempted to postulate the basis of international trade. The quintessence of the above mentioned theories disclose that trade is a powerful instrument to enhance the social welfare. It helps in attaining the proposed developmental agenda of a nation within a stipulated period. International trade is the driver of the socio-economic development of a nation. While, trade played a noteworthy role in the overall development of developed nations during the course of development, which is not only a main vehicle in the catch-up process of developing countries, but also major subsistence. Further, to the developing countries, international trade provides advanced machines, technology, managerial skill and capital for exploring the existing resources at optimal level. On the other hand, to the developed countries, international trade is an opportunity to import scarce raw materials, labor and unprocessed commodities at a cheaper rate for economic benefits through value addition.

The common benefits of international trade are quite often cited in the world famous publications including the Nobel Laureate Paul Krugman that: trade activates the unused resources, facilitates a nation to produce outside the production possibility curve, and accumulates foreign exchange. Furthermore, it offers the strength to manage capital crisis, accomplish with BoPs problem, generates employment opportunity, guides to receive external support particularly from industrialized nations, achieve technological spillover and infrastructural development. In addition to these, reduction in cost, cutting-edge research, increase in per capita income and resulting in higher standard of living are the other benefits of trade. The intra-industry trade is a stylized fact in the arena of international trade, which accounts for a substantial share in the overall trade volume of the world.

## Intra-Industry Trade

The renowned social scientist Balassa has introduced the concept of intra-industry trade (IIT) in the 1960s, but the same attracted the attentions of researchers and policy makers around the world after the formal work published by him in 1966 (Balassa, 1966). In the seminal studies, scholars such as Krugman (1979), Lancaster (1980) Krugman and Obstfeld (1991), and Sawyer, Sprinkle, & Tochkov, (2010) attempted to explain the term IIT on their own style. The foot-print of the above mentioned scholars' definition is that the IIT is the two-way exchange of goods and services which are similar kinds in nature. On the other hand, it can be described as the simultaneous trade (both export and import) of the same commodity between the players of international trade. The IIT is also known as trade in homogeneous product (Balassa, 1966 and Anishchenko 2013). It was found at the beginning that the IIT had been taking place between industrialized nations. But, the trade pattern of the recent decades demonstrated that the IIT is taking place between two continents, two countries and two industries, which are very different with respect to the degree of development culture and so on. The IIT became very prominent as the commodities involved in this trade are differentiated by design, quality, style, appearance, packing and so on (Falvey, 1981, Falvey & Kierzkowski, 1987, Flam and Helpman, 1987, Sawyer, Sprinkle, & Tochkov, 2010). The theoretical framework propounded by Krugman (1979) Lancaster (1980) and many other scholars that both horizontal and vertical expansions of IIT in the recent decade attract the attention of researchers and policy makers. Hence, the present study is an attempt to estimate the status of IIT in South Asian countries in vegetable trade. By computing Helpman and Krugman's (1985) general equilibrium model and Grubel-Lloyd index, the study contributes to the existing body of literature from South Asian countries' perspective as this is one of the unexplored areas of research in social science.

### Previous Studies: A Snapshot

Social scientists around the world have been assessing the dimensions of intra-industry trade in different contexts. In a historical study, Sazanami and Hamaguchi (1978) inspected the trend of IIT particularly in the manufacturing sector between European Economic Community and Japan for the period 1962-1972. The study yielded the result that the size of Japan's IIT with its trading partners was very low, but progressing gently. The conclusion of Sazanami and Hamaguchi (1978) more or less coincided with the research findings of Fertó (2007), Wang (2009), and Varma (2011) for China, India and European Union respectively. In an influential research, Qasmi and Fausti (2001) attempted to examine the impact of NAFTA on IIT and INT. More specifically the study considered the impact of NAFTA on agricultural and food products in two trading groups such as Mexico, Canada and United States and their trade with other nations for the period 1990-1995. The study found that the IIT with respect to the food products and INT in terms of bulk commodities have increased over the study period. By applying Grubel-Lloyd (G-L) index, Luka and Levkovych (2004) computed the IIT in Ukrainian. They considered only agro-food sector for their assessment. The conclusion of the study disclosed that though the level of IIT vary significantly across the trading partners, the aggregate size of IIT is very minimal.

Researchers applied different types of techniques to quantify the IIT in wide variety of commodity trade around the world. Among them, Using Grubel & Lloyd and Fontagn & Freudenberg indices, Rasekhi (2008) measured the IIT in agricultural products during 1997-2003. The author reported that though the size of intra-industry trade is very small, it is in increasing trend in the case of Iran, implying the comparative advantage with respect to trade in agricultural products. By applying panel data model, Jing et al. (2010) attempted to check the existence of IIT in agricultural products of China during 1997-2006. In this study, the authors considered the absolute difference in GDP, culture and physical capital as major determinants. The conclusion of the study revealed that the share of agricultural product in the total IIT is very low. Łapinska's (2014) experiment on IIT between Poland and EU members between 2002 and 2011 illustrated that both agriculture and food products played significant roles in the international trade of Poland during the study period. At the same time, the level of IIT had increased considerably as a result of its membership in EU. Varma and Ramakrishnan (2014) have examined the IIT of India with the members of SAFTA with respect to agro-food products. The result obtained from Tobit and random-effect models revealed that the level of IIT of India is very high in processed food items. Among the trading partners, the higher level of IIT was found with Sri Lanka, Bangladesh, Nepal and Bhutan during the study period between 2003 and 2011.

A good number of studies attempted to identify the determinants of IIT among the available documents, a comprehensive attempt was made by Zhang et al. (2005), in which panel data for 50 countries for the period from 1992 to 2001 had used. The bilateral IIT technique revealed that trade openness, foreign direct investment, composition of trade, economic size and geographical distance have played noteworthy roles in influencing the IIT. In an analytical study, Caetano and Galego (2006) scrutinized the size and pattern of IIT in European Union and Central, and East European countries during 1993-2001. The conclusion of the study revealed that the IIT was influenced by human capital, foreign direct investment and economic size. In two prominent studies, Leitão and Faustino (2008), and Rasekhi & Shojaee (2012) observed that both differences in per capita GDP and the degree of economic development had positive effect on IIT in Iran over the study period. Similar type of study was conducted by Kabir, et al. (2010) for the period between 1995-2008, and concluded that geographical distance produced a

negative impact on IIT, while the size of the economy, degree of trade liberalization and the flow of foreign direct investment have created positive impacts on IIT. The result of Kabir, et al. (2010), more or less consistent with the findings of Zhang et al. (2005), Caetano and Galego (2006), Leitão and Faustino (2008), Sawyer, et al. (2010), Sawyer, Sprinkle, & Tochkov, (2010), Jing et al. (2010) Turkcan (2011) Varma and Ramakrishnan (2014) and Łapinska (2014) who focused on different parts of the world in different periods. The research findings of Egger, (2002) is slightly divergent from the above mentioned studies that in the case of OECD, Egger, (2002) found that distance and market size had negative and positive impact on IIT respectively during 1985-1996.

Though several studies attempted to estimate the IIT in wide range of commodities, research on the agricultural commodities is very limited. Further, to the best of the researcher's knowledge, there is no scientific study on the IIT on vegetables from South Asian countries premises. Hence, in order to fill the gap in the literature, the present study is an attempt to address the above mentioned issue using annual time series data for South Asian countries for the recent decade.

### Data and Estimation

In the existing literature, Sexton (2012) and Jambor (2015) says that trade in agro-based products are taking place in the framework of imperfect competition and the IIT has been playing a noteworthy role in agricultural trade not only in developing countries but also in developed countries. Against this real-world significance, the present study attempts to empirically investigate the IIT in vegetables in South Asian countries such as Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. The study deliberately selected the South Asian region as the study area to compute the IIT in vegetables as these nations are agro-based and majority of the people are directly or indirectly depending upon primary sector. In order to execute the research, secondary data have been sourced from direction of trade statistics, published by International Monetary Fund and commodity trade data, which is collectively offered by UNCTAD, the World Bank, UNSD, WTO and International trade Centre. The study period spans from 1988 to 2018, which is the latest data available in the above mentioned sources. Though quarterly data on trade available in the second source, we have considered only annual data in order to follow the uniformity. The values of both export and import of the South Asian countries are presented in terms of thousand US dollar. After the pioneering work of Balassa (1966) a good number of studies have estimated the IIT in different part of the world for wide-ranging commodities. This work used the Helpman and Krugman's (1985) model of general equilibrium to understand the trade specialization index. The mathematical form of the above mentioned index as follows:

$$TSI_{ij} = \frac{(X_{ij} - M_{ij})}{(X_{ij} + M_{ij})}$$

Where  $X_{ij}$  and  $M_{ij}$  are exports and imports of commodity  $i$  by country  $j$  respectively. The rule of the trade specialization index revealed that the calculated value lies between -1 and +1. While, if the computed value is 1 with positive sign, it denotes that this particular country  $j$  specialized in production of commodity  $i$  and it holds the position of net exporter. In the terminology of international trade, country  $j$  has the comparative advantage in that commodity. By contrast, the country  $j$  has comparative disadvantage and net importer of the commodity  $i$  if the value is -1 (Pourmoghim, 2001). Further, the present study applied the Grubel-Lloyd index for computing the IIT in South Asia's vegetable trade. The equational form of the Grubel-Lloyd index as follows:

$$GLI_{it} = 100 \times \left[ \frac{(X_j + M_j) - |X_j - M_j|}{(X_j - M_j)} \right]$$

Where  $X_j$  and  $M_j$  denote the values of export and import of vegetables respectively in year  $t$  in each of the South Asian countries. The calculated value of the IIT is ranging from 0 to 100. If the computed value is 0 it means that there is a complete inter-industry trade. By contrast if the value is 100, it indicates that there is a complete IIT (Wei, 2004). The index of Grubel-Lloyd can also be empirically expressed as follows:

$$GLI_{it} = \left[ 1 - \frac{|X_{it} - M_{it}|}{(X_{it} + M_{it})} \right]$$

The computed values of trade specialization index and intra-industry trade in vegetable in the South Asian countries are presented and discussed in the analysis part.

### RESULT AND DISCUSSION

The development experience of the world portrays that the trade started with agro-based commodities on the planet. The export of primary products and unprocessed natural resources was determined by the respective prices of those commodities in the world market and climatic contingencies. IIT is the major basket in the overall international trade in the recent decades. The theory of IIT and its sharpness has been streaming from the pioneering work of Balassa (1966) and Grubel (1967). The scholarly attempts of academicians have classified the IIT into

three folds such as (i) trade in homogeneous goods; (ii) trade in horizontally differentiated goods; and (iii) trade in vertically differentiated goods (Hoang, 2019). The recent literatures evidently revealed that the importance of IIT has been increasing since 1960s as a result of augmenting the IIT in the industrialized nations in manufacturing commodities (Krugman et al., 2012). Against this theoretical underpinning, the present study attempted to document the IIT in vegetables in South Asian countries.

Governments in general and health departments in particular insist the society that it is necessary to eat good amount of vegetables and fruits every day, to maintain both physical and mental health. As a result, the consumption and trade of vegetables have been flourishing across the world. The South Asian region being the agro-based economy contributes a sizable portion in the overall vegetable trade. According to 2018 statistics, in the total vegetable export from South Asian countries, India contributes 51 per cent, and Pakistan holds second place with 19 per cent. The remaining nations Bangladesh, Afghanistan, Sri Lanka and Nepal contribute 17.8%, 4.9%, 4.1% and 2.8% respectively. At the same time, both Maldives and Bhutan are in the bottom position with 0.5% and 0.07% respectively in the total export of vegetables from the South Asian countries.

Where as, in the total import of vegetables in South Asian countries, India holds first place with 69 per cent of the total volume of import of vegetables followed by Pakistan (16%) and Sri Lankan (8%). The remaining nations such as Afghanistan, Bangladesh, Bhutan, Maldives, and Nepal import less than 5 per cent.

**Table: Trade Specialization index for South Asian Counters- Helpman and Krugman Index**

Countries/Year	1988	1995	2000	2005	2010	2015	2018
Afghanistan	-0.134	0.548	0.405	0.591	0.591	0.377	0.248
Bangladesh	0.942	0.936	0.914	0.934	0.919	0.915	0.935
Bhutan	0.665	-0.674	-0.669	0.146	0.481	-0.502	0.644
India	-0.486	-0.435	-0.207	-0.179	0.023	0.012	0.011
Maldives	-0.779	-0.718	-0.612	-0.442	-0.414	-0.293	-0.117
Nepal	0.158	0.377	-0.375	0.047	0.464	0.669	0.766
Pakistan	-0.103	0.544	0.182	0.208	0.173	0.220	0.246
Sri Lanka	-0.535	-0.129	-0.428	-0.271	-0.186	-0.167	-0.183

Source: Computed from secondary data collected from IMF and WITS

The result of trade specialization index presented in table: 1 reveals that among the eight South Asian countries, both Maldives and Sri Lanka are the net importers of the vegetables as the trade specialization index is negative over the period under study. The probable reasons could be the nature of land and climatic conditions in these two regions are not suitable for the cultivation of vegetables and they become the net exporters in South Asia. Mention should be made here that for most of the

South Asian countries the trade specialization indices are progressing. This trend reveals that few nations are slowly increasing their volume of vegetable export in the global market. Further, the unleashed export policy is also supporting the trades to export a huge volume of vegetables from the South Asian countries. Hence, it can be mentioned that the South Asian hub may become a leading exporter of the globe in the near future, if the governments of these nations crate a constructive environment for vegetable export.

**Table: 2 Intra-Industry trade for South Asian Countries- Grubel-Lloyd Index**

Country/Year	1988	1995	2000	2005	2010	2015	2018
Afghanistan	1.134	0.452	0.595	0.409	0.409	0.623	0.752
Bangladesh	0.058	0.064	0.086	0.066	0.081	0.085	0.065
Bhutan	0.321	1.674	1.669	0.854	0.519	1.502	0.356

India	1.486	1.435	1.207	1.179	0.977	0.988	0.989
Maldives	1.779	1.718	1.612	1.442	1.414	1.293	1.117
Nepal	0.842	0.623	1.375	0.953	0.536	0.331	0.234
Pakistan	1.103	0.456	0.818	0.792	0.827	0.780	0.754
Sri Lanka	1.535	1.129	1.428	1.271	1.186	1.167	1.183
<b>Average</b>	<b>1.032</b>	<b>0.944</b>	<b>1.099</b>	<b>0.871</b>	<b>0.744</b>	<b>0.846</b>	<b>0.681</b>

Source: Computed from secondary data collected from IMF and WITS

The absolute value of trade balance in the South Asian countries with respect to vegetable export proves that among the eight nations considered in the study, in three nations such as India, Maldives and Sri Lanka, the trade balance is negative. At the same time, both Nepal and Bhutan have enhanced their positions in the trade balance. Interestingly, three nations such as Afghanistan, Bangladesh and Pakistan maintain their favorable trade position with respect to global vegetables trade. This trend further implies that there is a considerable level of ecological balance in these nations as they are concentrating on vegetable cultivation.

Further, in order to understand the IIT, the Grubel-Lloyd Index has been computed (for the total export and import of vegetables to the entire world by the South Asian countries) and the result is presented in table number 2. As per the Grubel-Lloyd rule, higher the index values denote the greater the IIT. At the same time, the index value 1 indicates the equal position between import and export. Hence, it is very visible from the result presented that the computed index is around one for most of the nations over the period under study, indicating the more or less balancing between export and import. Mention should be made here that the average of IIT for the entire South Asian countries was 1.03 in 1988, which is decreased to 0.68 in 2018. Further, it can be observed from table 2 that the composition of trade has changed from intra-industry trade to inter-industry trade. At the same time, most of the countries are becoming the importer of vegetables over the period. Increase in modernization coupled with decrease in the importance of agriculture could be the reasons for the above mentioned trend. While, advanced nations such as United States, Italy, France, United Kingdom, Germany and Belgium are the net exporter of the scientific equipment and pharmaceuticals, being the agro-based nations, the South Asian countries should be the net exporter of at least agro-based commodities. But the ground reality is different. Hence, it is suggested that using available resources, South Asian countries should produce high quality vegetables and tap the global vegetable market. Further, they may export the value added vegetables to foreign countries, the income earned through vegetable export will at least partially set-right the socio-economic issues of cultivators in South Asian countries.

#### CONCLUSION AND POLICY IMPLICATIONS

Both physical and mental health are playing a significant role in augmenting productivity and enhancing the overall socio-economic development of a nation. Consumption of the required amount of vegetables is essential to maintain the good health. With this ground reality, the present study empirically investigates the IIT in South Asian countries in vegetables. In order to execute the research, secondary data have been used for the period from 1988-2018, which are sourced from International Monetary Fund and World Integrated Trade Solutions, which is collectively offered by UNCTAD, the World Bank, UNSD, WTO and International trade Centre. The time series dataset is annual and weighted by thousand USD. For the purpose of examining the specialization and IIT, the present

study estimated the trade specialization index and Grubel-Lloyd index of IIT. The computed results of trade specialization index revealed that among the eight South Asian countries two nations such as Maldives and Sri Lanka are the net importers of the vegetables as the trade specialization index is negative over the period under study. Further, the IIT has been decreasing and most of the South Asian countries are heavily importing instead of cultivating vegetables. It should be reminded that the South Asian countries have comparative advantage in labour force, which is suitable for vegetable cultivation. Hence, it is suggested that these nations should utilize the available labour force for vegetable cultivation, process the output and export them to the global market. This route will give a new export earning to address the socio-economic issue of the South Asian countries.

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