A review of the research done in the area that one chooses to explore is very informative as it helps in placing each work in the context of its contribution to the understanding of the subject under review. A purpose of reviewing the related studies is to develop thorough understanding and insight into the work already done and areas left untouched or unexplored. Different research workers have dealt with different issues pertaining to the topic undertaken in this study. It would, therefore, be quite useful to review the research work as has been carried out by different research scholars in the area during the past couple of decades.

A stream of literature has been emerged in the recent decades focusing on the theories of intra-industry trade which is the upcoming topic of significance in the international trade theory. Broadly speaking, the available studies pertaining to intra-industry trade can be classified into broad groups:-

(1) Intra-Industry Theories/Models

(2) Measurement of Intra-Industry Trade

(3) Determinants of Intra-Industry Trade

(4) Gains from Intra-Industry Trade

(1) Intra-Industry Theories/Models

A stream of literature has emerged in the recent decades focusing on the theories of intra-industry trade which is an
upcoming topic of significance in the international trade theory. To get insight into the nature of the IIT problems, it will be useful to discuss the various theories/models at the very outset. It will not only give a clear understanding of the problem but will also suggest an appropriate method for the measurement of IIT. Consequently, some of the important theories/models are discussed below.

**LINDER HYPOTHESIS (1961)** focuses on exports and imports of manufacturing products, both consumer goods and capital goods. It is not necessary that the product must be consumed domestically as firms produce to cater the domestic demand. As production begins, the domestic market limits the growth of successful firm so that firm looks for foreign market. Innovations are solutions to some domestic problems. So far as imports are concerned it is the internal demand, which determines the range of potential imports. This establishes the proposition that from the both export and import side internal demand determines potential trade. He also stressed that more the countries having similar demand structures more intensive will be trade between two countries. The pattern of demand is affected by level of income per head. He made three propositions; As per capita income increases, products of superior quality replaces products of inferior quality; Income elasticity of demand for aggregate manufacture production is close to unity in short run; Range of potential export and import goods is widened by uneven distribution of income.

**Krugman(1979,1980,1981)** in Neo-Chamberlinian model (based on horizontal differentiation when varieties differ in their characteristics that may be either actual or perceived) assumes
only one differentiated product industry producing large number of varieties say from 1 to n. The model assumes that each consumer has same utility function in which all varieties enter the utility function symmetrically. Thus each firm will produce same output of its chosen variety with the same average cost, and will sell at the same price. If we assume a second economy, which is identical to the first, and if two countries are allowed to trade, a firm in one country, which originally produced a variety identical to, one produced in the second country will merely change the variety it produces to one which is not produced by other firm. There will be welfare on consumption side as consumers enjoy wider variety.

The Lancaster Model (1980) Lancaster assumes two sectors – differentiated products sector and outside goods sector. In the different ‘products’ sector all different products are of same quality so that no product dominates another product. Individuals have preference over characteristics of goods rather than over goods themselves. A consumer chooses a product from the different products in the market on the basis of a) their relative prices and b) the relationships of their specifications to those of the consumer's most preferred product. In the ‘outside goods’ sector, the quantity of the different good that each consumer buys will depend on the consumer’s income and the price of the outside good. The outside good has no influence on the choice of the differentiated good but does have influence on the quantity of differentiated goods consumed. On the production side, there are initial economies of scale. The economies of scale are lost if the specification of the differentiated good is changed. To show how IIT takes place, Lancaster assumes two identical economies. Each economy has
a manufacturing sector producing differentiated products (under monopolistic competition) with economies of scale and outside goods sector producing agricultural goods (under Perfect Competition) without economies of scale. Under autarky, each country will have an identical equilibrium. The two countries trade freely without any barrier or transport cost. Under perfect monopolistic competition, no two firms will choose to produce the same differentiated product. Each variety is produced in only one country, but consumed in both. If \( n_1 \) and \( n_2 \) are number of manufacturing goods produced in countries one and two, then \( n_1 + n_2 \) need not necessarily equal \( n^* \), the large market will lower average costs and lead to large number of differentiated products being produced at equilibrium.

Since both countries have identical resources, equal agriculture outputs, consumption of identical quantities of each good in each country, the solution \( n_1 = n_2 \) is equilibrium configuration. At equilibrium, there is only IIT. Each country is self-sufficient in agriculture, but each country exports half of the output of each of its differentiated products and imports half the output of each of other country’s products.

**Falvey (1981)** in Neo-Heckscher-Ohlin model put forward a model with two features (i) IIT generation without increasing returns to scale (2) vertically differentiated products are produced. A two country, home and foreign with different endowments of capital (\( K \)) and Labour (\( L \)) has been taken. Home country is a capital abundant such that rent of capital is relatively low. A industry produces products of different qualities \( q_i \); a lowest quality \( q_1 \) and highest quality \( q_2 \). The quality depends on capital-labour ratio. The results showed that home country
would have comparative advantage in range of high quality products while foreign country will have comparative advantage in low quality products. Thus the direction of trade will be determinate. **Brander-Krugman Model** demonstrates how IIT can take place in homogeneous products under oligopolistic market structure. Assuming a two-country world where each country has only one firm producing an internationally homogeneous product. Each country's markets are segmented and each firm can produce for the domestic as well as foreign market. It is further assumed that there are transport costs if the good is exported, and zero if the good is sold in the local market. Each firm in each country is assumed to exhibit the cournot behavior that is each firm believes that its actions will have no effect on its rival decisions. The solutions show that the domestic firm captures a larger share of the domestic market in the presence of transport costs. In equilibrium both firms equate MC to MR in both markets. Because of transport costs, MC = MR is higher in the foreign country since the transport costs are absorbed by the producer. This revelation has lead Brander and Krugman (1983) to describe the resultant intra industry as reciprocal dumping, that is, firms charging lower actual prices in export markets than in home market.

**Greenaway (1987)** discusses that the fundamental reason why intra-industry trade has excited such interest on the part of trade theorists is that it is a phenomenon, which is not readily explicable by the neo-classical factor proportions theory. Intra-industry trade in some commodities can in fact be rationalized in a Heckscher—Ohlin setting, for instance, border trade. The proportion of such trade is, however, relatively small.
Intra-industry trade in the perfectly competitive scenario of the Heckscher-Ohlin model has been supplanted by a range of models, which admits an imperfectly competitive sector. In turn this means that the gains from trade and the welfare effects of trade intervention are also sensitive to model specific assumptions (Greenaway 1985 and Venables 1985). Intra-industry trade can be shown to emerge in a wide range of circumstances. As we have seen, the features of many of these imperfect competition models vary quite considerably. Two factors that appear to emerge as being of importance with striking regularity are preference diversity and decreasing costs. Moreover, at least in the large number of cases, it has proved possible to embed these factors in a general equilibrium setting by incorporating factor proportions theory.

(2) Measurement of Intra-Industry Trade

Considering the importance and significance, which IIT has witnessed in the last few decades, efforts have been made to gauge its magnitude by different methods (various methods for the measurement for IIT are discussed in chapter III). The exact measurement of IIT is dependant upon the right type of categorical aggregation. Measurement of IIT has mainly been based on the use of data at the different levels of statistical aggregation and efforts have also been made to decompose IIT into Horizontal and Vertical IIT. Some of the important studies in this direction are as under:

Loertscher-Wolter (1980) in their study of IIT trade flows among OECD countries consider five country hypotheses and three industry hypotheses and consider 14 explanatory
variables. The sample consists of 60 three-digit SITC trade flows among OECD countries. All country specific variables are highly significant except (average development stage and cultural groups dummy) and industry specific variables except production differentiation are significant. But scale economies although highly significant possess wrong sign. \( R^2 \) reveals only 7 percent variation in IIT. IIT will found to be intense: if average of their level of development is high; if differences in level of development are small; if average of their market size is large; if differences in market size are small; if barriers to trade are low; if potential for product differentiation is high; if transaction cost is low.

Greenaway and Milner (1983) examine the measurement of intra-industry trade. The interpretation of measured intra-industry trade is undoubtedly complicated by categorical aggregation. Uncritical use of conventional measures at the three-digit level of statistical aggregation is hazardous since one has no way of knowing what kind of impact the phenomenon is exerting. This paper suggests a number of approaches for evaluating aggregation error (one of which has been quite widely used). Although the approaches might be regarded as second-best solutions to regrouping, they are easily applicable and do, at least, facilitate less arbitrary measurement of intra-industry trade at the ‘industry’ level. When applied to U.K. trade data they allow one to conclude that although some variation in third-digit indices is accounted for by categorical aggregation, it is far from being a complete explanation of the pattern of intra-industry trade in the United Kingdom.
Havrylyshyn and Civan (1985) measure intra-industry trade among developing countries in two major sections. Firstly, the extent of intra-industry trade of developing countries is described and compared to the IIT of industrial countries. Secondly, intra-industry trade among developing countries in general and newly industrialized countries (NICs) in particular is analyzed at product level. The conclusions suggest that the trade of individual NICs with other NICs is well below 10 percent of their total exports, much lower than among industrial countries. More surprisingly, the level of IIT is lower among NICs than for NICs with the rest of the world. However, in categories such as capital-intensive products and investment goods, IIT is high, although the volume of trade is low.

Nilsson (1997) discusses the measurement of intra-industry trade between unequal partners. He argue that the inadequacy of the GL index to correctly reflect the level of intra-industry trade in presence of trade imbalances may partly be due to measuring intra-industry trade between countries with large differences in economic size. A new measure of intra-industry trade is proposed in which the bilateral level of intra-industry trade is divided by the total number of products traded between two countries to yield an average level of intra-industry trade per product. This measure may also be applied at industry level, and in contrast to the GL index, it is highly correlated with the actual level of intra-industry trade. One should cautiously interpret the GL index since it may give a false picture of the extent and the volume of intra-industry trade. If the standard GL index is used, it is suggested that also alternative measures of intra-industry trade are employed to complement the GL index.
in order to correctly observe the true extent of intra-industry trade.

**Markusen and Venables (2000)** discuss the theory of endowment, intra-industry and multi-national trade. A monopolistic-competition model of international trade has been developed which includes positive trade costs and endogenous multinational firms. It was demonstrated how the presence of trade costs changes the pattern of trade, creates incentives for factor mobility which may lead to agglomeration of activity in a single country, and may lead to multinational firms. The mix of national and multinational firms that operate in equilibrium depends on technology and on the division of the world endowment between countries. Multinationals are more likely to exist the more similar are countries in both relative and absolute endowments, a result consistent with empirical evidence. The presence of multinationals creates trade in headquarters' services, alters the incentives for factor mobility, and reduces the tendencies towards agglomeration.

**Gullstrand (2002)** discusses the question of the measurement of intra-industry trade. The paper discusses different methods of capturing the main aspects of the Chamberlin-Heckscher-Ohlin-Samuelson model. The significant ones are the distinction between horizontal and vertical intra-industry trade, the adjustment of aggregation biases, and the definition of inter-and intra-industry specialization at product level. The main findings are that it is important to disentangle horizontal and vertical intra-industry trade, and to consider specialization patterns within refined product groups. Moreover, there is a nonlinear relationship between intra-industry trade
and economies of scale that may explain contradictory results in the literature

**Broda and Weinstem (2004)** estimate the impact of increased variety of products in the US over the period 1972 to 2004 and observe that if consumers value variety and countries cannot produce all varieties due to fixed cost in the production of each variety, countries stand to gain from trade because it expands the set of available varieties. Using the disaggregated import data available, it is found that numbers of varieties imported by US, increased four times. About half of this increase was due to the increase in the number of categories and half due to doubling of the number of countries from which the US imported each good. They used Feenstra’s (1994) methodology to estimate elasticity and then construct an aggregate price index that is robust to common changes in quality variation, introduction of new goods and other data problems. The four digit SITC data and 433 goods categories are used.

**Moshirian, Li and Sim (2005)** discussed intra-industry trade in financial services. So far intra-industry trade (IIT) has been central to increasing the variety of products available to consumers. Unlike traditional trade theories, the recent trade theories have placed an emphasis on the role of foreign direct investment (FDI) in generating trade and increasing the volume of IIT. It is the first study of intra-industry trade in banking services in which the key elements of the new trade theories of IIT have been taken into account in measuring the determinants of IIT in banking services. The empirical results of the determinants of IIT in banking services indicate that factor endowments, average per-capita income, FDI in banking,
economies of scale in the banking sector, trade intensity between the US and its partners and market openness make a positive contribution to the volume of IIT in banking services. Furthermore, the empirical results indicate that intra-trade activities amongst the US multinational corporations reduce the level of IIT in banking services for the US.

**Zhang and Li (2006)** aim to assess the trends and pattern of intra-industry trade and structural adjustment in China’s manufacturing sector associated with its trade liberalization using data spanning from 1990 to 2000. In particular, they distinguish intra-industry trade as either horizontally or vertically differentiated, and examine how the various country-specific factors affect the intensity of China’s horizontally and vertically differentiated intra-industry trade with its major trading partners, and how trade liberalization changes the pattern of China’s IIT and integration with the East Asian region. These issues have important policy implications for product differentiation strategy and labour adjustment.

**Vogiatzoglou (2006)** analyzes patterns of INTRA-NAFTA intra-industry trade (IIT) in the USA, Canada and Mexico over the 1992-2002 periods, by decomposing IIT into Horizontal IIT (HIIT) and Vertical IIT (VIIT). The determinants of both IIT types are also examined. Results indicate that HIIT and VIIT within NAFTA exhibit opposite trends. Specifically, HIIT is increasing, whilst VIIT exhibits a significant downward trend, indicating a restructuring in favour of IIT in horizontally differentiated products. However, VIIT still represents the dominant IIT type. Contrary to theoretical expectations, findings for the determinants of each IIT type suggest that some crucial factors
influence HIIT and VIIT in the same way. Overall, findings imply that on the one hand, comparative advantage is losing importance in driving intra-NAFTA trade and specialization patterns, and that on the other hand; trade-induced adjustment costs have become less severe over time.

Clark and Rees (2006) examine changes in intra-industry specialization indicators over the 1992-2004 period to assess potential for structural adjustment problems that may arise in U.S. textile and apparel products with growth in trade. Separate analyses are conducted for U.S. bilateral trade with China, Mexico, and DR-CAFTA members. Seven of the sixteen three-digit Standard International Trade Classification (SITC) product groups are expected to experience significant structural adjustment problems. With the exception of one group, all fall within the apparel and clothing (SITC 84) category. Results suggest substantial increases in U.S. imports from China are influencing these findings.

Gurbler, Erdal and Cbicek (2006) analyze the effects of Free Trade Agreement on Intra-Industry Trade (A case study of textile sector in Turkey). The textile sector of Turkey, which has an important role on Turkey’s external trade, is studied and effects of free trade agreement on intra-industry trade are studied. The textile sector has been examined in three subgroups as classified by SITC within the 1996-2003 time internal. These subgroups are SITC-26 that is made up of textile fibers (other than wool tops) and their wastes, SITC-65 made up of textile yarn, fabrics, made up articles and SITC-84 made up of apparel and clothing accessories. As a consequence of all studies done, it can be said that agreements have a positive effect on

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Intra-Industry Trade based on textile sector. And it also can be said that this effect is more intense on SITC-65 products.

**Azhar and Elliot (2006)** analyzed that the world has witnessed a dramatic increase in trade over the last forty years. Much of this growth in trade is intra-industry in nature. A relatively recent development in the intra-industry trade (IIT) literature is the measurement of the simultaneous import and export of quality-differentiated products, commonly known as vertical and horizontal IIT. The paper compares the Greenaway, Hine and Milner (1994) and Fontagne and Freudenberg (1997) approaches to disentangling vertical and horizontal intra-industry trade and examines some of the implications of employing simple ratios to define the boundary between product quality types. A complementary approach based on the traditional Grubel and Lloyd (GL) index is presented and demonstrated its versatility and applicability at the product level with numerical examples.

**Feenstra (2006)** discusses the new evidence on gains from trade. There are three sources of gains from trade in the monopolistic competition models; the gains from reduced prices due to competition between firms; the gains from the expansion in product varieties; and the gains due to the self-selection of firms as only the most efficient firms survive. Surprisingly, the first source of gains from trade due to reduced prices has the least empirical support to date. There is little direct evidence to support the idea that firms expand their output following trade liberalization and enjoy economies of scale, leading to lower prices. But there is indirect evidence that in environments where trade barriers are really minimized, such at the EU internal
market, price become more similar across countries and that trade grows. This indirect evidence suggests that firms cannot price-discriminate in unified market, which can lead to substantial gains.

The second source of gain from trade—due to increased product variety—has received a good deal of support in current research using disaggregate data. The assumption used to analyze these data is that each country provides different product varieties than every other country. New statistical methods allow us to estimate the degree of substitution between product varieties across countries, and with that elasticity of substitution, measure the consumer gains from importing more product varieties. These gains are substantial for the United States, the country that has received the most study, but I would except them to be even larger for many other countries with a higher ratio of trade to GDP, such as in Europe. The third source of gains from trade—due to the self-selection of firms—has received overwhelming support from recent study of the Canada-United States free trade agreement, as well as firm-level data sets for the United States, France, and other countries.

**Menon and Dixon (2006)** discussed the presence of intra-industry trade in Australia. Empirical work on intra-industry trade (IIT) is almost 30 years old. Initial research sought to identify if IIT was a significant share of total trade (TT). The Grubel-Lloyd (GL) index was widely used for this purpose, since it provides a relatively reliable measure of the importance of IIT at any point in time. Interest has since shifted to the changing importance of IIT over time, particularly with the emergence of regional trading blocks. Previous researchers have used
movements in the GL index to infer the importance of IIT over time. This is not only vague, but can be misleading. In this paper, it is shown how to measure the contributions of net trade (NT) and IIT to the growth in TT. To understand changes in IIT over time, we also derive the contributions of imports and exports to the growth in TT, NT and IIT. All our formulas are illustrated with data for 205 Australian manufacturing industries defined at the 3- and 4-digit level of the SITC for the periods 1981 to 1986 and 1986 to 1991. The results show that while NT drove almost all the growth in TT between 1981 and 1986, IIT contributes almost half the sharp growth in TT between 1986 and 1991. The dominant contribution of NT between 1981 and 1986 was mainly a result of import growth, while the increase in the contribution of IIT between 1986 and 1991 was almost solely due to export growth.

Fontagne, Freudenberg, and Gaulier (2006) provide a systematic decomposition of world trade using harmonized bilateral flows at the most available detail (some 5,000 product categories), into three trade types: inter-industry, intra-industry in horizontally and in vertically differentiated products. The analysis is diachronic and considers country pairs such as France-Germany, United States-China, Malaysia-Singapore, or India-Nigeria. The study revealed that the increase in IIT at the world level is due to two-way trade of vertically differentiated products. It was found that France and Germany having the highest share of IIT in their bilateral trade among all country pairs in the world. In value terms, the most important bilateral IIT is between the United States and Canada. Recently, specialization according to the classical theories of international
trade (inter-industry trade), has recovered, due to the increasing participation of emerging economies in world trade.

Ferto (2007) analyzed horizontal and vertical intra-industry trade (IIT) in agri-food products between Hungary and the EU. Intra-industry trade is separated into horizontal and vertical components on the basis of differences in unit values. Three different approaches to measuring IIT are employed and tested using standard regression models. Results show that horizontal IIT in agri-food products is low, but vertical type trade is more prevalent, though still less important than inter-industry trade. The results also lend support to the contention that there are different determinants for horizontal and vertical IIT. More importantly, using a measure of IIT that reflects the level of trade produces better regression results than those based on the degree or share of IIT. The model relating to Hungary’s vertical IIT in agri-food products yields the most promising results in terms of a priori expectations.

Amador, Cabral and Maria (2007) focuses on the evolution of the international trade pattern of Portugal over the last forty years and confronts it with developments in the other EU15 cohesion countries (Spain, Greece and Ireland). In general, the changes observed in Portugal bear similarities with those observed in Spain and Greece. The total of 120 manufacturing products were aggregated into four broad categories with distinct technological intensities (high, medium-high, medium-low and low-technology) reveals that one striking feature of the evolution of Portuguese inter-national trade was the continuous decline in the export share of low-tech products over the last four decades. This decline was particularly sharp in Food products, beverages...
and tobacco and Textiles, textile products, leather and footwear. On the contrary, there was a marked increase of the share of medium-high-tech exports, in particular Motor vehicles, trailers and semi-trailers since the second half of the nineties. The four countries considered have become less specialized in low-tech products over the last four decades, as measured by the evolution of the Balassa (1965) index of revealed comparative advantage. This trend was especially strong in Ireland, which is the only country where a specialization in low-tech products is not evident presently. On the contrary, Portugal still has a clear specialization in this type of products in the 2000-04 periods, similar to that of Greece. In what concerns medium-low-tech products, there was an increase of its export share in Portugal, although still showing a Balassa index below 1. The same upward trend was observed in Greece, whose specialization index has always been the highest. On the contrary, Ireland and Spain showed a decreasing trend over the last 20 years, although the later country maintains a higher specialization in these products. As for medium-high-tech products, all countries increased their export share of these products, though Spain shows values substantially higher than those of the other countries and above the world average since mid-eighties.

In the case of high-tech products, Portugal, Spain and Greece show a high resemblance over the entire sample period, always with coefficients below 1. Portugal had a slightly higher specialization index than Spain and Greece until mid-eighties, but that difference disappeared in the most recent period. The specialization index in Portugal is broadly similar in the beginning and the end of the sample period, pointing to the maintenance of a strong comparative disadvantage of the
Portuguese economy in these products. The striking point in this technological category is the sharp increase of export specialization observed in Ireland, partly associated with its participation in vertical specialization activities.

- **Faustino and Leitao (2007)** examines the features and determinants of intra-industry trade (IIT), horizontal IIT (HIIT) and vertical IIT (VIIT) between Portugal and the European Union in the period 1996–2002, using a static and a dynamic panel data analysis. The findings indicate that Portuguese VIIT increased significantly during the period in accordance with the values expected for a developed country. The IIT between Portugal and the European Union (EU) is over 50 percent for the period 1996–2002. The findings indicate that Portuguese IIT attained the value of 59 percent in 2002 and that VIIT increased significantly during the period, in accordance with the values expected for a developed country. For all of the period in analysis, the VIIT is generally much higher than the HIIT, while the weight of inferior VIIT (low-quality products) is predominant relative to superior VIIT (high-quality products). These results suggest that Portugal can be defined as a non-qualified (or semi-qualified), labor-abundant developed country. The regression results confirm that changes in non-qualified labor and physical capital intensity are revealed to be significant in influencing VIIT, but not the HIIT. This was as forecast by Neo-HO theory. It was concluded that Portugal, relative to the EU, has comparative advantages in lower-quality differenced varieties (products).

- **Bernatonyte and Normantiene (2007)** discuss the importance and difficulties faced in calculating IIT. The globalization and integration processes have influence on
development of international trade. It was determined that in recent year a large part of international trade consists of intra-industry trade. Computations for the period 1999-2005 indicate that intra-industry share of Lithuanian and the EU trade has been growing rapidly. The analysis shows that increasing part of intra-industry trade in the volume of global trade is of importance to the changes of economy of countries. This leads to changing nature of international trade and its structure of goods. It was determined that intra-industry trade represents international trade within industries rather than between industries. This is more beneficial than inter-industry trade because it stimulates innovation and exploits economies of scale. Hence intra-industry trade ensures that irrespective of whether the production factors are relatively abundant or scarce, the income of the owners of all production factors increase due to the effect of economies of scale. On the other hand, inter-industry trade determines the ruin of many production branches that are unable to compete with cheaper foreign goods. Intra-industry trade is less harmful from the social point of view also. It does not create migration of large groups, engaged in sectors export of which reduced; into other sectors enjoying increasing export.

On the basis of study many methods of estimation of intra-industry trade were determined. The most appropriate method for measuring the importance of this form of trade is Grubel-Lloyd index. This index as an indicator of the degree of industrial specification helps to study ability of Lithuania and other EU countries to compete in a more open trade setting.
On the basis of Grubel-Lloyd index it was determined that growth tendency during examined period is characteristic to the EU intra-industry trade with Japan and Russia, and tendency of reduction with other partners. On the basis of SITC it was determined that huge differences in separate groups of goods prevail in intra-industry trade between the EU and its main partners. It is found trading in machines and means of transport, chemical products, and other manufactured goods dominate between the EU and USA, Switzerland. At the same time the value of index of trade in food products, drinks and tobacco between the EU and Japan and mineral fuel between the EU and Russia was almost close to 0. This shows the nature of specialization of different countries and international trade. On the basis of SITC it was determined that Lithuanian intra-industry trade is the most important and constantly increasing sector of international trade. Thus analysis shows that intra-industry trade provides more additional benefits from international trade than comparative advantage because intra-industry trade enables the countries to gain benefit from larger markets. By manufacturing a small number of kinds of goods useful for consumers the country can produce bigger volumes of each kind with lesser costs and higher productivity of labor. At the same time the consumers gain benefits from increasing range of choice. Thus, the nature of international trade is changing as well as its structure of goods due to increasing specialization within a branch and the variety of produced goods increases.

Egger, Egger and Greenaway (2007) indicate that recent developments, including the analysis of firm-level adjustment to falling trade costs, have contributed to a revival of interest in
intra-industry trade (IIT) and emphasizes that most empirical work still relies on the standard Grubel-Lloyd measure. This however refers only to international trade, disregarding income flows stimulated by repatriated profits of multinationals. Given the overwhelming importance of the latter, this is a major shortcoming. This paper provides a guide to measurement and estimation of the determinants of bilateral IIT shares from the perspective of new trade theory with multinational firms. An analytically solvable general equilibrium model has been developed to investigate the impact of investment costs, multinational activities and income flows from repatriated profits. Level of the bias of the Grubel-Lloyd index associated with repatriated profit flows of multinationals has also been discussed. Using bias-corrected versions of the Grubel-Lloyd index as the dependent variable, it has been demonstrated that the determinants motivated by the theoretical analysis offer important insights into variations in IIT shares.

(3) Determinants of Intra-Industry Trade

Besides developing methods for the measurement of IIT and formulation of theories of IIT, efforts have also been made to test the existing theories or to develop new theories of IIT. Various country-specific determinant viz. preference diversity or demand for variety, level of development and per capita income, country and market size, trade policy or trade-orientation in terms of openness of the economy, trade intensity, factor endowment, geographical proximity etc. have been considered. On the other hand, industry specific determinants viz. economies of scale, product differentiation, technology differences or innovation activity, technology spillover have also
been considered. To get a better insight of the main directions in which efforts have been made, some of the important studies are presented below.

**Barker (1977)** formulates variety hypothesis, according to which consumers love variety, and so as real incomes increase, it enables the consumer to choose out of the varieties of the product available in the market and since a greater number of these extra varieties is available from abroad rather than at home, the share of imports in demand tends to increase. It starts from the theory of demand based on characteristics of goods. The consumer actually desires the characteristics of goods available rather than the goods themselves. Characteristics are defined as those objective properties that are relevant to choice by people (Lancaster, 1971). For example consumer does not desire the commodity “automobile” as such, but desires a set of characteristics such as safety, fuel consumption and comfort etc., embodied in varying degrees in varieties of automobiles available in the market. He adds a series of assumption and demonstrates various proposition like there will be international trade in any tradable good, since foreign goods will contain combination of characteristics preferred by some buyers, volume of trade in a set of goods having similar combinations of characteristics increases as per capita real income increases, because higher spending possibilities enable consumers to buy more of available goods and thirdly up to the point of saturation, as per capita real income increases, the purchases of imported goods increases by more than purchase of analogous goods produced at home.
Manrique (1987) presents calculations of the share of intra-industry trade in the manufactured goods trade of the United States and the NICs for the years 1967, 1972, 1977, and 1982. In addition, using a cross section of manufacturing industries for regression analysis, the paper uses the determinants of intra-industry trade previously used for industrial country trade as explanatory variables for the presence of intra-industry trade between the United States and NICs. The results are then compared with the results for the US-United Kingdom (UK) trade to see if the same factors that explain intra-industry trade in developed country (DC) trade also explain intra-industry trade in DC-LDC (less developed countries) trade.

Stokey (1991) utilizes Lancaster frame work to explain why developing countries often produce lower quality goods for their own local consumption while exporting higher quality goods to developed countries. The explanation lingers on key feature of demand. The range of characteristics that a consumer can buy depends on her income. Therefore, low-income countries lend to purchase lower quality goods than high income countries even if higher quality goods are available.

Christodoulou (1992) examines the factors, which explain cross- country variations in levels of intra-industry trade in the EEC meat and meat products industry in the late 1980s. A variety of explanatory forces, describing the situation in every member state’s meat sector, were assessed. These related to either the demand side of the market, and were referred to as ‘country-specific’ characteristics, or the supply side of the market, referred to as ‘industry-specific’. A primary conclusion is the fact that both supply and demand features of market
structure are relevant in explaining intra-industry patterns of trade in the European meat market. On the demand side, the most important factor is the taste overlap captured by the similarity both in economic variables and in cultural variables, as suggested by per capita incomes and geographical proximity respectively. On the supply side, imperfect competition, an important feature of the European meat sector, where a considerable number of firms compete in similar but differentiated products in an already saturated market where a low minimum efficient size does not present a significant barrier to entry for the firms, significantly explains intra-industry trade. No deterministic conclusion could be drawn for the processing stage dummies. It is however believed that intra-industry trade is more significant for raw (carcasses and cuts) and for highly processed products, which are also the products most subject to product differentiation, presumably implying that countries trade considerably in raw material for their processing industries and re-trade the output. Given that meat represents not only the most important single item in consumers’ expenditure but also the most significant agro food sector in terms of turnover, the results suggest areas for further research on the overall picture of the European agro food economy and trade, especially with reference to market structure.

**Balassa and Bauwens (1993)** have tested various hypotheses about the determinants of intra industry specialization in manufactured goods, including country characteristics as well as industry characteristics. The study covers 38 countries exporting manufactured goods; calculations have been made for bilateral trade flows among all 38 countries among 18 developed countries, among 20 developing as well as
between 18 developed and 20 developing countries. The extent of IIT is found positively correlated with average income levels, average country size, trade orientation and existence of common traders and is negatively correlated with size, distance and income. A positive correlation was found between IIT and ECM, EFTA and LAFTA. The extent of IIT is positively correlated with product differentiation, represented by Hufbauer measure of product differentiation, marketing costs and variability of profit rates and negatively correlated with product differentiation represented by economies of scale and industry concentration. All regression coefficients have the expected sign and are significant statistically- exception being standard deviation of profit rates in case of trade among developed and developing countries. The economies of scale in case of trade among developing countries and between developed and developing countries; and the product differentiation in case of trade between developed and developing countries.

Hughes (1993) measures intra industry trade in 1980s. A panel study has analyzed the industry specific determinants of IIT for six largest OECD economics from 1980 to 1987. The trade data used was 4 digit data on ISIC (International Standard Industrial Classification) for US, Japan, Germany, France, UK and Italy. The dependent variables chosen were Heterogeneity, Product differentiation, Scale. It is suggested that structure of the labour force may be an explanatory variable in detecting intra-industry trade. The professional and technical staff, may, on the one hand, promote product differentiation and hence IIT and on the other may proxy human capital and so unpaid IIT.
Davis (1995) found that technological differences may be sufficient reason for IIT, these differences may create comparative advantages and disadvantages between countries which are reflected in the pattern of trade. Trade’s purchase from 1993-2000 for 24 sectors, and 26 countries were included in the empirical model; determinants of total, horizontal and vertical IIT were studied. The various determinants are income similarity and endowments, scale, geographical distance and trade barriers, technology innovation, technology spillovers. It is found that total IIT is positively influenced by income similarity. A percent decrease in income differences between trading partners result in 0.19 percent increases in IIT. Geographical distance has a negative effect on total IIT. Whereas relative scale has positive effect on IIT, technology output has no impact on IIT whereas Techno input (R and D) has a positive effect. Surprisingly, technology spillovers have a positive and significant impact on total IIT. In horizontal IIT, technology and spillovers have very limited impact. But in vertical IIT, they play a major role in determining VIIT. Moreover, relative factor endowments are also crucial determinant of IIT.

Pieri, Rama, Venturini (1997) discuss intra-industry trade in the European dairy industry. They have examined bilateral ultra-industry trade (IIT) in the EU dairy products industry during 1988-92, in order to assess whether both country-specific and industry-specific factors determine this component of trade flows. It is shown that IIT in dairy products between pairs of countries is negatively related to the variables indicating inequality between the two countries. Two-way flows are thus more significant, the more similar the countries are. The coefficients for the variables describing industry structure
suggest that the presence of large firms with an absolute cost advantage over smaller firms stimulates IIT-enhancing non-price competition. Concentration in the retail sector was found to have a negative effect on IIT, which conflicts with our original hypothesis.

_Amiti (1998)_ examines the relationship between the size of a country and the characteristics of the goods it produces and trades. In a general equilibrium model with two countries, which only differ in size, there are two imperfectly competitive industries, which can differ in terms of factor intensities, trade costs and demand elasticity. The 'market access' effect attracts firms to the large country to save on transport costs; and the 'production cost' effect attracts firms to the small country due to lower wages. The tension between these effects determines the pattern of specialization and trade.

_C Clark and Stanley (1999)_ identify country and industry level determinants of IIT between US and developing countries. Most empirical and theoretical research has focused on 2 way trade between industrial nations. Theoretical models are based on scale economies, imperfect competition and horizontal product different, where each industry produces a variety of goods with similar factor intensities and distinguishable product attributes. IIT index in US trade with developing countries show the share of total trade. Overall, 50 percent of trade in manufactured goods between US and 155 developing countries and territories consist of IIT. The corresponding figure for trade between US and 30 largest developing countries is 48.5 percent. Two-way trade in similar goods takes place in industries supplying consumer goods, producer goods, components, high
and low technology goods, natural resource intensive products and labour intensive assembled products.

**Sharma (1999)** discusses the pattern and determinants of intra-industry trade in Australian Manufacturing since the late 1970s and finds that a sharp rise in intra-industry trade was noted from the mid 1980s, which may be linked with an outward-oriented policy. An industry level analysis indicates that industries with low protection are having high levels of intra-industry trade. The industries include textiles, garments, rubber products and machinery and equipment. An increasing trend in intra-industry trade suggests that the short-term adjustment costs related with liberalization are likely to be lower. A logit model was used to measure the effect of determinants. The results indicates that intra-industry trade is positively related to product differentiation and scale economies, and negatively related to the levels of protection and foreign ownership in the pre-liberalization period. In the post-liberalization period, scale economies explained the variations in intra-industry trade. Research and Development intensity and close economic integration found to have no impact on intra-industry trade.

**Hu and Ma (1999)** reveal that IIT in an important component of China’s international trade in manufactured goods and that China’s IIT index varies significantly across trading partners and countries. The differences of total IIT indices among countries vary from 3.5% (with Srilanka) to 85.4% (with Hongkong). The high proportion of IIT with Hongkong is because of Hongkong being a major entrepot and having cultural and language similarity. Also China’s IIT was divided into vertical and horizontal IIT. The vertical IIT is influenced by human capital
intensity, which creates the quality differences that, determines the level of such trade. In horizontal IIT, product differentiation and economics of scale are major determining factors. The article also finds that China's IIT has some different features from that of industrialized countries. China's IIT is complementary (within the same industry, there are imports from one group of countries and simultaneous exports to another group of countries). The cross-country regression results show that share of manufactured goods in exports and Hufbauer index are most important factors to stimulate IIT. China's IIT is positively related to absolute per capita income level of partner countries. In cross industry regression, R and D ratio and minimum efficient scale are found to be significant.

Choi (2001) argues that signal of quality provides a new rationale for planned obsolescence. This paper, explores how the durability choice can be used as a signaling device in addition to introductory pricing when goods are durable. Swan (1970) demonstrates that durability choice is independent of market structure and is efficient. This is in sharp contrast to claims made by earlier authors (Klevman and Ophir, 1966, Levhari and Srinivasan, 1969) that a monopolistic supplier produces goods of less durability than an efficient level that would be chosen by competitive industry. Bulaw (1982, 1986) points out that earlier contribution implicitly assume the commitment power of the monopolist to the future production plan. Once the potential for monopolist’s export opportunism is recognized, monopolist’s optional strategy is not consistent, monopolist over produces in the second period coz the seller does not internalize the adverse effects of his second period output on the value of units sold in the previous period. Consumers with rational expectations,
correctly perceiving the seller’s export incentive to overflood the market with additional product in the future, refuse to pay high prices. Bulow (1986), presents a theory of planned obsolescence in which the monopolist produces goods of “uneconomically short useful lives”. Thus reduced durability below the efficient level allows monopolist not to reduce price tomorrow. The reason is that planned obsolescence increases future residual demand by reducing the quantity of usable goods in the hand of consumers next period.

Pombo (2001) in the paper analyses the theoretical and empirical relationship between intra-industry trade (IIT) flows in manufactures and technical change for the Colombian manufacturing industry during the 1970-95 period. A general estimating equation for the sources of change of the equilibrium number of varieties, in which TFP (Translog index of total factor productivity corrected by scale economies and markups) growth is one of its components, is derived from the basic model of trade in differentiated goods with monopolistic competition. Based on that relationship, several estimations on the determinants of IIT flows are carried out. The econometric set up follows a panel data and cross-section estimation of system of simultaneous equations. TFP and IIT indices are the endogenous variables of the system with industry characteristic, trade policy, and innovation-activity variables as the set of exogenous variables. The paper also presents a comparative analysis in the direction and trends of Colombia’s IIT flows in manufactures with the Group of Seven, NAFTA, and the Latin American Free Trade area members (LAFTA) since 1974.
Shelburne (2002) deals with the properties of the bilateral trade flows in multi-country Helpman-Krugman-Chamberlin-Heckscher-Ohlin (HKCHO) model. Helpman (1981) and Helpman and Krugman (1985) made a major advance in international trade theory by integrating Chamberlin monopolistic competition into well-established H-O framework. In the two country model, where countries have similar endowment ratios or where there is a differentiated good and homogeneous good, a ceteris paribus increase in the similarity of two nations relative economic sizes within an integrated equilibrium increases the volume of trade (all of which is IIT). In addition, when both goods are differentiated, volume of trade is determined solely by similarity in country size even when endowment ratios differ. Although H-K were able to show in the differentiated-homogeneous case, that increase in endowment similarity, holding relative country size constant, increased volume of trade, they did not provide the concise relationship between volume of trade and similarity in relative country size, holding endowment similarity constant. H-K also investigated how country size and endowment similarity affect the share (SIIT – generally referred to as Grubel-Lloyd IIT index) of trade that is intra industry trade. They showed that increases in endowment similarity, holding relative country size fixed, increased the SIIT. Nevertheless, numerous authors, including Balassa (1986), Helpman (1987) and Balassa and Bawens (1988) interpreted these findings and observed that in a multi-country world (model) the volume of IIT (SIIT) in bilateral trade of two nations would be larger the more similar and the two nations economic sizes and the more similar their endowment ratios. Shelburn (1991) introduced the iso-endowment similarity curves into 2-country H-K framework and
showed that ceteris paribus increase in country-size similarity, holding endowment similarity fixed, could either increase/decrease, or have no effect on share of IIT. Nevertheless, many researchers, including Greenaway, Hine and Milner (1994), Hummels and Levinsohn (1995) and recent literature reviews by Helpman (1999) and Greenaway and Torstensson (1997) continue to suggest that the HK CHO model provides a theoretical rationale for believing that relating country size should affect the volume and or share of IIT in countries bilateral trade flows.

Bucci (2003) comments that one of the main innovations of new growth theory is to consider technological change not simply as given from Heaven, rather as the outcome of some activity (R and D) intentionally conducted by private profit seeking agents. Thus the recent innovations driven growth models introduce R and D as major engine of technological progress. A successful innovation provides a monopolistic position in the market and therefore with monopolistic profits for some period of time (quality ladder models) or forever (expanding varieties models). From these approaches the prediction arises that greater the potential monopolistic position of the firm, greater the resources denoted to R and D, the higher the aggregate growth rate of economy. The purpose of this paper is to show that this story is not completely true. Aghion and Havitt (1992, 1997, 1998 a) pointed out that if technology program is assumed to be stochastic and to take the form of a continuous improvement in the quality of existing goods, then product market competition is bad for growth. Romer (1990) and Grossman and Helpman (1991) show that such a relationship can be positive or negative depends upon market power enjoyed
by innovator, type of technology in use and intensity of competition between R and D and production for the same resource. Recent empirical work (Basu, 1996, Blundell, et al, 1995; Nickell, 1996 and Nonbin, 1993, among others) suggests that this correlation is positive.

Choorikkad Veeramani (2003) discusses that intra-industry trade is the outcome of economic liberalization in India. He has estimated the levels of intra-industry trade across industries in India using a static and dynamic measure. It has been found that in a large number of industries, trade liberalization was biasing trade expansion towards intra-industry trade, that is, within industries, both exports and imports expanded simultaneously. This indicates that domestic industries are unlikely to go out of business because of trade liberalization. A significant amount of variation has been found in the level and growth of intra-industry trade across industries. It has been observed that studies explaining the inter-industry variations of such trade are rare might be because of data constraints. Using econometric analysis a number of industry-specific factors are pertinent to understand the pattern of intra-industry trade. It was observed that if an industry has relatively greater degree of product differentiation, then it would give rise to greater intra-industry trade. Trade liberalization also allows the country to embrace gains from specialization in distinct segments and operations consisting of production process in an integrated world industry. The regression results indicated the greater likelihood of intra-industry trade as a consequence of specialization in raw materials and intermediate goods. It was observed that industrial concentration also promotes intra-industry trade. The paper explained that small firms in
concentrated industries are forced to seek market niches abroad because of collusive behaviour by dominant firms on the home market. Multinational firms may have a mitigating effect on intra-industry trade because of overseas production of differentiated goods may substitute export sales. It was speculated that phenomenon of intra-industry trade will gain more importance in India in coming years.

Clark and Stanley (2003) investigate determinants of IIT between US and 22 industrial nations. Theoretical studies have attempted to explain IIT using models of MC with increasing returns. Krugman (1979, 80) and Lancaster (1980) first developed these models. Intra industry specialization combined with diverse consumer tastes leads to IIT. Helpman (1981) and Helpman and Krugman (1985) extend the analysis to show how share of IIT in total trade is related to differences in Per Capita Income and relative country size. The present study investigates country and industry level determinants of IIT in bilateral trade between US and 22 industrial nations. Helpman (1981) relates the share of IIT to country differences in factor endowment and country size. IIT share will be negatively correlated with differences in factor endowments based on capital to labor endowment ratio (KLDIFF), the skilled worker share of workforce (SLDIFF), and the land to labor endowment ratio (TLDIFF). The IIT share is positively related with size (GDP) of trading partner. The IIT share is negatively correlated with distance (DIST) between US and trading partners. Trade orientation and IIT are positively correlated. Falvey’s (1981) models show countries with lower trade barriers will have higher IIT shares. Following stone and Lee (1995), Balassa and Bauwens (1987), and Balassa (1986), trade orientation is provided by the residuals from a
regression of Per Capita trade on Per Capita Income and population. Grubel and Lloyd (1975) note their measure of IIT might be affected by a country's trade unbalance. Share of IIT is negatively correlated with trade imbalance (TIMB).

Lee and Sohn (2005) estimated Grubel-Lloyd indices for IIT in 1991 and 2001 and A indices for MIIT for the period 1991-2001. For all industries (SITC 0-9) in 2001, Singapore, the Philippines, Malaysia, Japan, China, the United States, and Thailand are the countries with relatively large GL indexes compared with those of South Korea's other trading partners. Among these seven countries, Singapore is the only country with a large GL index, even when it is measured only for non-manufactures (SITC 0-4). In addition, we found that countries with high GL indices in 1991 and 2001 tend to have high MIIT (that is, high A indices); the ranking of the eight countries with the larger GL indices is similar to the ranking of these countries according to their A indexes, even when MIIT with South Korea is measured for all industries between 1991 and 2001.

The effect on the extent of IIT is significantly positive for the constructed measure of trade orientation and significantly negative for those of trade imbalance and distance to market (proximity of the trading partner to South Korea). Neither GDP nor per capita GDP seems to affect the extent of IIT in the case of South Korea. The effects of these factors on the extent of MITT show a similar pattern. The size of the A index measured for the period 1991-2001 is positively dependent upon the size of the GL indexes and the trade orientation (degree of openness) of the beginning year, and negatively dependent upon geographical distance and the size of the trade imbalance of the beginning
The size of the A index is also dependent upon changes in trade orientation and the size of the trade imbalance between 1991 and 2001. Again, neither GDP nor per capita GDP has a significant effect on MIIT. The insignificant effects of GDP and per capita GDP, as measured by absolute levels and by relative differences, suggest that the effects of scale economies and consumer preferences on South Korea’s IIT and MIIT are insubstantial.

Thorpe and Zhang (2005) have investigated the development of intra-industry trade (IIT) among the East Asian economies over the 1970-1996 periods. A dynamic index is used to capture the changes in the structure of trade flows. Based on this approach, IIT is decomposed into horizontal (HIIT) and vertical components (VIIT) and the determinants of each are investigated. The results show that both HIIT and VIIT have exhibited increased importance over the sample period in manufacturing. Using pooled panel data the two-way trade, in all measures of IIT, is found to be positively related to the countriespecific variables, such as the market size, exchange rate depreciation, the levels of development and income, and negatively to the geographic proximity of the partners. Economies of scale are seen to have a positive influence on IIT and HIIT, but a negative relationship with VIIT. Although the relative openness of a country's trade regime shows no significant relationship with any form of IIT, a trade imbalance does affect IIT and HIIT flows. The findings have implications for assessing the structural adjustment costs associated with the trade liberalization process as HIIT is associated with demand for variety and relates to two-way trade in goods of similar quality,
while VIIT is driven by international specialization and differences in relative factor endowments.

**Zhang, Witteloostuijn and Zhou (2005)** examine the features and determinants of Chinese intra-industry trade during the 1992-2001 transition periods for 50 of China's trade partners. They disentangle total intra-industry trade (TIIT) into vertical intra-industry trade (VIIT) vis-à-vis horizontal intra-industry trade (HIIT), using data at the four-digit SITC level. The findings indicate that Chinese bilateral intra-industry trade, particularly VIIT, increased significantly during this transition period. VIIT appears to be positively related to differences in consumer patterns. HIIT is negatively related to these differences. In addition, they find that FDI has played an important role in determining IIT, especially VIIT. Other significant intra-industry trade drivers are geographical distance, economic size, trade openness and trade composition. Finally, the impact of China's liberalization policies and the special role of Hong Kong are demonstrated.

**Okubo (2007)** investigates novel determinants of intra-industry trade (IIT) of late 1990s Japanese trade. His empirical analysis shows that IIT increases not only by the similarity of GDP and factor endowment but also by technology transfer via Japanese FDI. In particular the current high proportion of Japanese IIT with Asian countries could be explained by technology transfer (licensing between headquarters and overseas affiliates) via FDI.

**Documentary studies** provide evidence regarding generalized relationship between intra-industry trade and level of
economic development of the product type. As the per capita income grows, demand for varieties, also grows. Hirsch (1977) and Havrylyshyn and Civan (1983) support the above proposition and agree that cross-section data are consistent with the hypothesis that intra-industry trade and per capita income are positively associated. Another hypothesis states that intra-industry trade is more prevalent in trade in manufactured goods than in primary products as technological possibility for product differentiation in manufacturing goods are far higher than those in primary products.

Econometric tests highlight the variables of intra-industry trade, which are empirically significant. Greenaway and Milner (1986) show how average levels of intra-industry trade in UK have increased in SITC sectors. Another hypothesis states that intra-industry trade is more prevalent in trade in manufactured goods than in primary goods. Since technological possibilities for product differentiation are higher for these goods. It is also hypothesized that intra-industry trade will be larger in large countries. Using a sample of 18 developed countries; Greenaway and Milner (1986) have computed rank correlation coefficient between average level of IIT and GDP (.20). It has also been observed that IIT will be larger in integrated countries. Balassa (1979) shows that for six countries of LAFTA, IIT is higher for “within region” trade.

(4) Gains from Intra-Industry Trade

Efforts have also been made to assess the impact of IIT on welfare. So far as gains from IIT are concerned, they are focused on lower prices, increase in efficiency (survival of only efficient
firms is possible) and expansion in the product variety. It has also been pointed out that a rigorous and more systematic treatment of trade costs (in terms of transport cost, pollution, exhaustion of non-renewable resources etc.) in the IIT need to be made to ascertain the net gains from the IIT. But no effort to assess the impact of expansion of product variety on welfare has been made so far. This forms one of the basic objectives of the present study. Some of the important studies in this direction are as follows:

**Fisher, Griliches and Kaysen (1962)** estimate the costs of the changes in private automobile specifications that took place during the 1950's. The cost estimates consist of increase in price due to increase in size and horsepower, increase in expenditures due to the wider use of automatic transmissions, power steering, and power brakes; and the increase in price due to the increase in advertising expenditures above the 1949 levels. The other most obvious cost of automobile model changes is the expenditures by the automobile manufacturers for the new tools, jigs and dies needed to produce new models. In addition to this, costs of research for developing design of new models are also incurred. Apart from the costs discussed above, secondary costs like added traffic and parking problems due to greater car length, or the costs in terms of human life and property damage that may have resulted from higher horsepower. Further, new model cars (especially as automatic transmissions became more and more widespread) tended to have higher repair costs than would presumably have been the case with 1949 specifications. On the other side, increases in horsepower and in the use of power steering and automatic transmissions may have led to an increase in the average speed of automobile travel of about 10%.
Whether changes from 1949 automobiles are improvements is an open question.

Ruffin (1999) states that IIT represents trade within industries rather than between countries. Such trade is more beneficial as it stimulates innovation and exploits economies of scale. According to him standard trade theory which comprises the views of Adam Smith, Ricardo, H-O etc consist of each country exporting the goods most suited to its factor endowment, technology and climate while importing the goods least suited for its national characteristics. In 1996, 57 percent of the US trade took place within rather than between four digit SITC industries. IIT constitutes more than 60 percent of European trade and 20 percent of Japanese trade. This tells us that Japan has less IIT because its factor endowment is significantly different from those of other advanced countries and also Japan doesn’t experience much border trade. To a large extent IIT arises from the facts that products are differentiated and production of any particular product requires some fixed cost. Thus, the more sport utility vehicles ford makes, lower the unit cost, more Mercedes Benz convertibles produced, lower the unit cost. One of the great benefits of IIT is that international trade (IT) need not cause dislocations associated with inter industry trade. The stolper–Samuelson theorem suggests that international trade can cause a redistribution of income from scarce factors to abundant factors but if most trade is IIT, the impact on internal income distribution is minor. IIT also enhances gains from trade through better exploitation of economies of scale rather than through comparative advantage as trade leads countries to concentrate on limited number of products within industry. According to standard theory, international trade causes an increase in GDP
level but no long run increase in the rate of economic growth. When we classify countries according to their degree of protectionism, economies with open trade regress appears to grow their per capita income from 10 percent to 20 percent faster per year (Gould and Ruffin 1995). Finally, IIT reduces the demand for protection because in any industry there are both exports and imports, making it difficult to achieve unanimity among those demanding protection (Marvel and Ray 1987).

Anam and Chiang (2003) discuss intra-industry trade in identical products through a portfolio approach. He emphasizes that in the traditional model, intra-industry trade in an identical product is driven by the profit margin each firm perceives in the rival market on the basis of Cournot model and explains that when markets are stochastic and potentially correlated, benefits from diversification create added incentives for cross hauling for risk-averse cournot duopolists. The portfolio motive for cross hauling makes the unusual pattern of trade a theoretically more robust phenomenon that has been recognized in the traditional models. The benefits from diversification can raise producer welfare in the intra-industry trade equilibrium, unlike in the deterministic model.

Dluhosch (2006) discusses intra-industry trade and the gains from fragmentation. The paper examined that fragmentation is associated with increasing returns as they might give rise to additional labor market and welfare effects. Though these effects tend to benefit high-skilled labor, it can be identified in cases in which it is the low skilled that benefit the most. In any case, there is a range of parameter values for which both skill levels do better.
Bergstrand and Egger (2006) discuss the trade costs and intra-industry trade. Formal economic modeling of intra-industry trade ignores transportation or, more broadly, trade costs. Yet, as Anderson and van Wincoop (2004) suggest, trade costs are quite large. This paper extends work by Bergstrand (1990) that addressed intra-industry trade in the explicit presence of trade costs. In the context of a Helpman-Krugman-cum-trade-costs model, four empirically testable hypotheses regarding intra-industry trade and trade costs are derived. These hypotheses are investigated empirically using a cross-section of bilateral OECD Grubel-Lloyd indexes. The results are strongly in accordance with the hypotheses, indicating the importance of a more rigorous and systematic treatment of trade costs in the intra-industry trade literature.

Benarroch and Weder (2006) examine the relationship between intra-industry trade in intermediate products, pollution and increasing returns. A two-country model in which production occurs in two stages, final and intermediate good production was developed. Intermediate goods are produced under monopolistic competition and final good production exhibits increasing returns with respect to the number of varieties of intermediates. Pollution occurs in the production of the final good when polluting intermediates are used. They analyze the effects of international trade in intermediate products on pollution, output and welfare under an endogenous tax scenario and with two types of pollution functions. The results show that, because of increasing returns, international trade either leads to lower total pollution in each country or lower pollution per unit of output in at least one country. In
addition, intra-industry trade causes countries to import the environmental quality of their trading partners.

Thus an attempt has been made to review the literature on different aspects. It has been observed that most of the existing studies have analyzed the measurement and determinants of IIT.

There has been no research so far on the welfare side of the IIT and its effects in the long run on developing countries. The present study endeavors to analyze this part of the intra-industry trade.