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„Analysis of Slovakia´s Foreign Trade with East and Southeast Asian Countries

Case Study of South Korea and Malaysia"

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Abstract

The aim of this master thesis is to analyze the bilateral trade between the Slovak Republic and its Asian trade partners from the perspective of intra- and inter-industry trade among 97 defined commodity chapters of Harmonized Commodity Description and Coding System. The analytical framework of this master thesis is structured by the commodity segmentation of the Harmonized Commodity Description and Coding System and the selected methodology arises from the calculation formula of the Grubel-Lloyd index and its aggregated form per each 2-digit commodity segment during the years: 2006, 2011 and 2016. The first chapter is dedicated to the topic introduction, literature review and formulation of the analytical framework and methodology. The second chapter deals with the application of the analytical framework and methodology in the research. The third chapter summarizes the results of trade development among examined countries and the impact of trade liberalization on trade from the intra- and inter-industry perspective and also the potential threats of South Korea´s automobile industry on Slovakia´s economy.

Zusammenfassung

Das Ziel dieser Masterarbeit ist es, den bilateralen Handel zwischen der Slowakischen Republik und den asiatischen Handelspartnern aus der Perspektive des intra- und interindustriellen Handels der 97 definierten Kapitel des Harmonisierten Systems zur Bezeichnung und Codierung der Waren zu analysieren. Der analytische Rahmen dieser Masterarbeit ist durch die Warensegmentierung des Harmonisierten Systems zur Bezeichnung und Codierung der Waren strukturiert. Die gewählte Methodik ergibt sich aus der Berechnungsformel des Grubel-Lloyd Index und seiner aggregierten Form für jedes zweistellige Warensegment aus den Jahren 2006, 2011 und 2016. Das erste Kapitel ist der Einführung in die Thematik, Literaturrecherche und Formulierung des analytischen Rahmens und der Methodik gewidmet. Das zweite Kapitel befasst sich mit der Anwendung des analytischen Rahmens und der analytischen Methodik in der Forschung. Das dritte Kapitel fasst die Ergebnisse der Handelsentwicklung der untersuchten Ländern und die Auswirkungen der Handelsliberalisierung auf den Handel aus der intra- und interindustriellen Perspektive zusammen, und erklärt wie die südkoreanische Automobilindustrie die slowakische Wirtschaft gefährden kann.

Subject of the Master thesis

The subject of the master thesis is to analyze Slovakia´s foreign trade with a developed economy representative of East Asian region (South Korea) and one transforming economy representative of Southeast Asian region (Malaysia) from the perspective of intra-industry and inter-industry trade and the changes in trade patterns over the years of 2006, 2011 and 2016. The author has chosen these representative countries, mainly due to the differences in achieved economic development levels and contractual trade regulations.

Research questions

1. How has intra-industry trade developed between Slovakia and its Asian trade partners in the time 2006 and 2016? Does the different economic stage influence the composition of foreign trade from INT/IIT perspective?
2. According to Balassa (1966, 1979), trade liberalization increases the amount of intra-industry trade. Is this statement valid in case of Slovakia-South Korea trade compared to Malaysia, a non-FTA trade partner?
3. Does South Korea represent a strong competitor or even a threat to Slovak domestic automobile producers?

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1. Introduction

1.1. Topic and case selection

International trade may be variously differentiated based on its different levels and categories of commodities. The traditional theories of international trade held that economy exports such products, which most suit to its natural factor endowments and thus gains the comparative advantage. This phenomenon has been defined as inter-industry (INT) trade, and the theory of comparative advantages and further neoclassical economic theory developments have explained it in the theoretical approaches and proved it in a theoretical and empirical sphere. After WWII, economists of modern theories observed an unnatural trend that classical and neoclassical theories could not explain. The prevailing global economic trend was of intra-industry trade (IIT). National economies around the world (mostly those of developed economies) started to omit trade based on exchanging commodities that resulted from different stages of production neither importing commodities produced from scarce production factors. Instead, the new trend in international trade is characterized by the exchange of products belonging to the same industry and stage of production.

Based on the new theory of international trade, the current global economic situation assumes that the more developed economies are, the more developed their bilateral intra-industry trade with other nations is.

The trading of products, which belong to the same industry, as opposed to the inter-industry trade of products of different sectors represents IIT. Intra-industry trade may be differentiated between horizontal and vertical per the quality of trade products.

The main subject of this master thesis is primarily to analyze the foreign trade between the Slovak Republic and two of its Asian trading partners (South Korea and Malaysia) from the perspective of intra-industry and inter-industry trade in all 21 commodity sections of Harmonizes System at its 2-digit commodity aggregation (HS 2) in the years of 2006, 2011 and 2016.

The chosen representative countries differ in achieved economic development levels and contractual trade regulations concerning Slovakia. South Korea is generally perceived as one of the most developed nations and global economic superpowers. South Korea is the member states of the Organization for Economic Co-operation and Development (OECD), as is Slovakia. Besides that, Slovakia is the fourth most important export market of South Korea within the area of the European Union (EU). The total trade exchange increased over ten-times during the last decade. From the economic and trade point of view, South Korea is one of the major and key non-European partners for Slovakia.

On the other hand, Malaysia is still considered to be a developing country by the United Nation (UN) despite its fast-economic growth. Malaysia is aspiring to transform from industrial production oriented country with low added value to a developed economy intensive on knowledge-based activities with higher added value by 2020. Another difference arises from different contractual basis regulating bilateral trade between the examined countries. South Korea signed FTA with the EU to eliminate obstacles and tariffs in trading manufactured and agricultural products. This agreement regulates the trade between Slovakia and South Korea due to the Common trade policy of the EU. In the case of Malaysia, this agreement had been negotiated between partners, however, was put on hold. However, in 2015, Malaysia and the Slovak Republic signed the *Double Taxation Avoidance Agreement between Malaysia and the Slovak Republic*. These two facts may be influencing the trade composition, which is the primary goal to investigate in this master thesis.

There representative years were chosen regarding the available data in convenient form. The ten-year period represents the most extensive time range of data that can be compared to each other regarding the method of data collection. The year 2006 represents the first year of the back-then newly adopted method of collecting data from the Statistical Office of Slovakia. All previously collected data used different methods and thus could not be exactly compared with later years. The year 2011 was chosen as the last representative year before FTA between South Korea and the EU was officially launched, and the year 2016 represents the last detailed data available to demonstrate the actual situation of intra- and inter-industry trade.

The further goal is to examine the bilateral trade in the automotive industry based on the HS 4-digit code of the commodity chapter 8703, between the Slovak Republic and its Asian trading partner, South Korea. If the IIT is present within the industry, the author will further investigate the form of IIT whether it is horizontal or vertical. The aim is to evaluate if South Korea represents significant Slovakia´s competitor in this sector. South Korea is one of the world's biggest car producers of developed countries. Per the International Organization of Motor Vehicles Manufacturers (OICA), South Korea represented the fourth global and the third Asian car producer in 2017. Per the Slovak Investment and Trade Development Agency (SARIO), Slovakia is the leading car producer in Central Europe. Since the 1990´s (after the Velvet revolution and establishment of the Slovak Republic), three world-class automotive manufacturing firms (Volkswagen, PSA Peugeot Citroen Slovakia, Kia Motors) were established in Slovakia. The automotive industry is the fastest growing industry in Slovakia and represents around 20 percent of total Slovak export. (Slovak Investment and Trade Development Agency 2012, 10) In 2017, OICA ranked Slovakia as the sixteenth global car producer and the sixth largest EU car producer. (International Organization of Motor Vehicle Manufacturers 2018)

Previously conducted researches (Verdoorn, Balassa, Grubel, Lloyd) indicated that countries with similar level of economic development had achieved higher IIT values while trading nations of different economic stages tend to reach higher INT values, and trade liberalization increases the trade of liberalized products.

1.2. The definition of foreign trade

Foreign trade is an important part of the national economic sectors that includes the circulation of commodities abroad. It is also a part of the national production process and maintains its independent position within the whole process. Foreign trade represents a commodity exchange across national borders between two or more foreign economies.

Foreign trade is a how a national economy may join the global economy platform and engage in the international labor division.

Foreign trade is an essential element in the process of forming external economic relations, and it is one of the oldest forms of international relations. The impact of external economic affairs on the domestic economic development of a country had increased rapidly at the end of WWII. The global trends became: relatively fast global economic growth rate, development of international economic relations, economic cooperation and integration. A production process of one economy started to infiltrate to the production processes of other countries and thus formed the mechanism of global commodity trade, followed by capital, loans, monetary and other international economic relations. In the new era of globalization and acceleration of internalization, foreign trade became the crucial factor that has influenced and determined the economic growth, not only of individual countries but also the global economy. Interconnections of national economies in the global economy grew in their importance by technological and information progress, resulting in a diminishing of distances between

national economies. The national economies have become more open towards international cooperation and geographical distance no longer presented a problem.

The comprehensive definition of foreign trade defines the phenomenon as the trade of a national economy with one or more foreign economies, while goods and services must cross the national borders (export/import). Irrespective of the utility value and origin, export, and import either from or to a national economy ensures the exchange of economic inputs and outputs. Vincur (2007) stated that foreign trade is an essential tool for the formation and effective functioning of an economy. Per Vincur, foreign trade is an international coordinator and the engine of the globalization of the modern economy. (Vincur 2007, 55)

Foreign trade is an essential part of the national production process in most countries while holding its relatively independent position with a significant share on GDP. Most national economies are not self-sufficient. In order to satisfy the needs of the population, there exists a high desire to expand in foreign markets to exchange goods and services produced by nations. Foreign trade is that part of the national economy that crosses national borders interacts with foreign markets and thus participates in international commodity flows. (Balaz 2001, 287) The smaller a national economy is, the higher is the need and importance for engaging in foreign trade. Foreign trade is composed of two parts: imported and exported commodities. The sum of these two parts equals the total trade on various levels from national to global.

Foreign trade is the oldest and most widespread form of international economic relations, and it is one of the most dynamic factors of the global economy and influences economic growth. (Lebiedzik, Majerova, and Nezval 2007, 67)

Foreign trade determines the national economic balance, commodity, and territorial structure. Foreign trade may positively or negatively affect economic stability, the proportionality of economic development and its effectiveness. It represents a general qualifying parameter for defining the position of a nation in the global economy.

Individual transactions of foreign trade can be differentiated per various perspectives such as the movement of goods and services, territorial classification and Standard International Trade Classification, Harmonized System Codes of Commodity Classification and differentiated per the conditions stated contracts. Selections and groupings help the economists to analyze specific components of foreign trade, gather statistics and further evaluate the national economies involved in international trade.

The factors that impact the structure of exported commodities are the foreign demand, price differentials, competitiveness of domestic exporters, exchange rates. (Krugman 2003, 502)

The commodity structure of international trade reflects the national economic structure. Export is mainly composed of commodities and materials, which are produced of abundant production factors within the domestic market and whose export provides further economic benefits for producers, which could not be gained on a domestic market. Export is understood as a positive national economy element. Foreign demand for certain commodities stimulates the growth of production of these commodities, thereby stimulating the growth of employment rate.

On the other hand, import compensates for the deficiency of those commodities and materials which are scarce within a domestic country. A negative aspect of import is the possible declining effect on the employment rate. A positive aspect of import is the increase of effective utilization of domestic resources by its influence on commodity consumption prices and commodity diversity. The trade balance is also known as net export (NX) reflects the difference between export and import (NX= X − M). If the trade balance is higher than zero (NX > 0); the country exports a higher number of commodities than it imports (trade surplus). That represents the net inflow of domestic currency from foreign markets. If the

trade balance of a country is less than zero (NX < 0), the country imports a higher number of commodities than it exports, which is called the trade deficit. If the trade balance equals to zero (NX = 0), the number of exported products equals the number of imported commodities. (Lisy 2007, 540)

National economies engage in foreign trade to increase their production and consumption possibilities. In a closed economy, the consumption possibilities are equal to the domestic production possibilities. This phenomenon is called autarchy and indicates that the economy is economically self-sufficient. In an open economy, consumption possibilities are higher than production possibilities due to the supply from abroad.

Foreign trade plays various essential functions in the national economy (Balaz 2001, 236-239):

- Transformation function: international trade stimulates the national economic stability (substitution of domestic products and resources by importing)
- The more sophisticated version of transformation function is transmission function. The transmission function presents the implementation of imported information, scientific and technological know-how in a national economy.
- Economic growth function: obtaining savings of national labor used as a benefit of successful transformation (the principle of time economy). The function helps to substitute non-effective or less effective domestic production by imports, and thus optimizes the output by national economic specialization. The formation of national specialization profile is underlined by applying the principle of time economy, which is the effect of the following factors:
  - o Differences in the absolute volume of labor costs
  - o Differences in the comparative labor costs
  - o Differences in abundance of economic inputs (labor, land, and capital)
  - o Differences in achieved technological, scientific and human capital level of development
  - o Geographical dislocation of comparative advantages
- Parametric function: the home economy lagging

There exist various economic approaches, which explain the circumstances when the foreign trade becomes the breaking factor for a national economy. This phenomenon is significant for less developed economies. Import then negatively impacts the process of development of domestic industrial production.

Proportionality function: effective distribution (in time and space) of productive processes existing in the national economy

The secondary reason explaining why a country decides on joining the international division of labor by extending its international economic relations is that foreign trade means possible savings on national labor - the principle of time economy. From the economic growth perspective, foreign trade substitutes inefficient domestic production and national lack of resources by import from abroad. That leads to forming a national specialization profile of economy, where the domestic economic structure is considerably influenced by the export efficiency and its competitiveness on foreign markets. For many years, the economists have looked for the right formula that could explain the decision–making the process of national economic specialization to reach economic growth by participating in international trade.

The territorial structure of an economy results from the historical bonds and geographical predispositions. An essential role in shaping the territorial structure of foreign trade plays political relations with other economies. Besides these determinants, the political interests and the commodity structure of a nation influence the territorial structure of foreign trade. States

prefer in international commodity exchange those economies that can adequately satisfy their export and import needs.

The commodity structure of foreign trade reflects the economic structure of a country. Export consists mostly of raw materials and commodities produced by a nation and those raw materials and products that an economy lacks substitutes by import. The current trend in foreign trade – IIT shows the commodity structure of international trade is also formed by the trade of products that are not close substitutes, however, are products within the same industry.

1.3. Inter-industry versus Intra-industry trade

The international trade is divided per its commodity composition into an inter-industry trade (INT) and intra-industry trade (IIT). Inter-industry trade includes the trade of commodities produced within different sectors (net trade for the specific industry). In the case of IIT, there do not exist relocation of factors, changes in the relative price of production factors and commodities and thus adverse effects on specific population groups. (Lipkova 2010, 166)

The principles of INT arise from classical and neo-classical economic theories that perfectly explain trade between the goods, composing of different production factors and thus produced within various industries. Classical theories assumed that the two nations would trade such goods at which production costs were relatively less compared to the trading partner.

Further, neoclassicists opposed the classical theory of comparative advantages and based their theories on their trade models believed that each country possessed both production factors; however, the abundance differs (H-O-T). Several production factors were reflected in the prices of those factors. The more abundant production factor within a country was the lower value it had and thus was cheaper in price and vice versa. The country participated in foreign trade by the production and export of those commodities which were intensive on abundant production factor as the source of comparative advantage and imported products consisting of a scarce production factor. This trade form is also termed one-way trade. The price of production factors influenced the commodity structure of foreign trade. Based on the factor endowments theory, the more significant difference in initial factor endowments exists, the higher importance of INT is present in bilateral trade in two countries.

The phenomenon of IIT was firstly defined by Balassa (1966). The functioning of IIT in world trade was later theoretically explained by Grubel and Lloyd (1975), and Krugman (1985, 1990) that is referred in the theoretical part of state of the art of this master thesis. An important source of IIT is the presence of economies of scale, product differentiation, imperfect competition and specific-country determinants such as country-specific factors and industry-specific characteristics. (Greenaway, Hine and Milner 1994, 77) The international specialization does not have to take place in the form of different countries specializing in the production of different commodities from different industries necessarily. Intra-industry trade does not have to be expressed by comparative advantages necessarily.

On the contrary, the greater the difference in initial factor endowments the less important IIT occurs in bilateral trade between two countries. If, on the contrary, the relative capital factor abundance is reflected in similarities of relative income per capita and the market size the higher volume of IIT on total trade occurs between the two countries. (Greenaway, Hine and Milner 1995, 1506) Since the 1960´s, the most prevailing trend in the global economy has been intra-industry specialization resulting in IIT taking place in commodities produced within different economies however within the same industries, also known as the two-way trade.

The economic literature on IIT categorizes intra-industry specialization based on product differentiation into horizontal and vertical. The very latter form of commodity differentiation is the quality of products. Horizontally differentiated products represent homogenous products that have the same quality, however, have different characteristics related to consumer preferences. The consumer demand is highly dependent on consumer preference for those characteristics. Horizontal product differentiation tends to be more significant between countries with similar factor endowments. Vertically differentiated products differ in the quality and price usually, although having similar product characteristics and features. Horizontal IIT may be associated with preference diversity and decreasing costs. The product differentiation arises from the fact that different countries possess different characteristics, which associate with products. The vertical IIT may be often associated with the traditional trade theories since the product achieved higher quality due to better input endowments or the production processes (capital, technology, human capital). Horizontal IIT refers mostly to the modern trade theories based on the imperfect competition and existence of economies of scale. Vertical IIT, on the other hand, may be expressed by traditional trade theories emerging from factor endowments differences.

The vertical and horizontal IIT differentiation represents the quality differences in IIT. (Greenaway, Hine and Milner 1995, 1507) Intra-industry trade decomposition is usually done by the unit value calculation that represents the average price of a specific volume of products from a given product aggregation. Based on the rational assumptions of the unit value, the higher price of one variety reflects higher quality compared to the cheaper variety. At a very disaggregated level, the relative prices reflect relative qualities. (Greenaway, Hine and Milner 1995, 1508) Economic models portrait, vertical IIT as the trade of similar products vertically differentiated in quality. The trade is explained by the 2x2x2 model where two countries have different factor endowments in labor and capital. The higher quality differentiated products are produced by using relatively higher capital-intensive techniques. The assumption of this approach created by Falvey (1981) assumes that a country with higher income level, relatively capital abundant specialized in the export of high-quality items. A country relatively abundant on labor production factor and lower income specializes in export of low-quality manufactures. (Greenaway, Hine, and Milner 1994, 79) The theoretical approaches by Krugman (1979) and Lancaster (1979) on horizontal IIT agree that horizontal IIT is determined by the preferences of consumer diversities and firms´ potential of decreasing costs. (Greenaway, Hine, and Milner 1994, 78-79) Horizontal IIT theoretical assumption is based on the 2x2x2 model where two countries are differently abundant on production factors – labor and capital. These countries produce two products, one is differentiated, and the other one is homogenous. Former product is produced at relatively high capital-intensity, latter one is produced at higher labor-intensive techniques. The labor abundant country exports both commodities – homogenous and differentiated. However, the abundant capital country exports only the differentiated product. The trade balance is maintained because abundant capital countries achieve a surplus in exporting the differentiated good. The higher the difference in factor abundance between the two countries is the lower the intensity of IIT is reported in their bilateral trade. The higher similarity in income level and market size between the two countries is the higher levels of IIT are present in their bilateral trade. (Greenaway, Hine, and Milner 1994, 79) The economists differ in horizontal IIT between love variety and favorite variety. (Greenaway, Hine, and Milner 1994, 78) Love variety represents all the commodities that individuals prefer to consume in many varieties. (Helpman, and Krugman 1985, 117) Each consumer has different preferences of the features of certain products. Ideal variety, on the contrary, is such variety that an individual prefers a variety of product distinguished from other products by many different attributes. (Helpman, and Krugman,

1985, 120) In the case of an ideal variety, a consumer chooses between products based on own product preferences arising from the product characteristics.

It is important to note that at a certain extent, IIT is understood as a statistical phenomenon. It is the result of individual products aggregation into commodity groups, which contain distinct products.

Tab.1 SWOT analysis of foreign trade after WWII

SWOT analysis of foreign trade after WWII	
Strengths	Weaknesses
• Source of comparative advantages is both IIT and INT • Effective utilization of production factors • Economic stability by transformation function • National specialization • Overcoming national limits • Higher product differentiation • Increase in the production possibility frontier • Increase in the consumption possibility frontier • Additional GDP increase • Additional demand and supply possibilities • Economies of scale, production optimization	• Higher dependency on foreign markets • Merging into monopolies and oligopolies • Lack of quality control • INT- relocation of production factors and thus changes of these factors may penalize some individuals • Lagging may be fatal
Opportunities	Threats
• New market opportunities • Additional demand • Additional supply sources • Internationalization of production processes • Source of calm development of economic relations • Exchange of information	• Higher competition • Merging into clusters • Removal domestic producers due to cheaper substitutes from abroad • Economic imbalance due to external social, political, economic situation • Exchange rate changes

Source: Author´s SWOT analysis

This SWOT analysis was based on the theoretical approaches and reality taking place in foreign trade. The analysis consists of four sections that summarized the strengths, weakness, opportunities, and threats of foreign trade. Strengths summarize all the internal benefits for a country that intends to step out from autarchy and engage in international trade. Opening a domestic market, and stepping away from an autarky economy, offers many opportunities for its markets. International trade is a source of comparative advantages and offers efficient utilization of production factors and production optimization. International trade helps countries to overcome domestic limits, increase production and further consumption possibilities frontier. A new export market represents a source of additional GDP growth and

related economic benefits such as low unemployment rate, higher average income, and an increase in investments. The current trend of forming international commodity and territorial structure of trade emphasizes economies of scale as the source of production optimization and product diversification and thus provides comparative advantages in modern understanding different from the traditional understanding. The weaknesses created by the higher level of participation in international trade are a higher dependence on external markets (supply, demand), which in some cases may cause destabilization of a domestic market. Inter-industry trade may influence and change the development of prices in production factors, which may negatively hurt some individuals. For instance, if the global prices of raw material rapidly drop, the owner, exporter or producer may be adversely affected by this change. International trade, mainly on an intra-industry level, is represented by higher competition and in some matters, may be fatal for domestic producers significantly in those production industries that are less developed compared to the external competitors. Increasing economies of scale can cause firms to merge into oligopolies and establish monopolies to control the price of commodities, and market entry and exit of potential competitors into the market. Opportunities arising from engaging in international trade are additional demand and supply markets, internationalization of production processes, exchange of information, the source of a friendly environment of international relations and new market opportunities for a domestic economy. The threats of international trade arise from the competition and the inability to adjust to the new market situation. The higher the dependency of a country on the international market is the stronger adverse effect on a nation´s economy may have an external development of the social, political and economic situation and may affect a nation's economy. However, this is a question of economic policy on the national and global level.

1.4. State of the art

1.4.1. The first researches documenting changes in international trade patterns

After WWII, the validity of theories explaining the international trade patterns was questioned. Back then valid economic theories of international trade such the Theory of comparative advantages (In 1918, Ricardo in his theory of comparative advantages assumed that trade liberalization would cause that trading countries would focus on production and export of those commodities, which they produce at the lower relative costs and thus achieve comparative advantages.) and Heckscher-Ohlin theorem (H-O-T) was sufficient in explaining the trade patterns of INT. Heckscher and Ohlin (1919) stated that international trade is the result of the relative difference in production factor endowments. In their case, a country *A* would achieve a comparative advantage in products that consisted of such production factor that is abundant within the country *A*. Inter-industry trade includes trade composed of commodities produced within different sectors (net trade for the specific industry). The theory formed by Heckscher and Ohlin disagreed with the classical theories considering the labor theory of value and criticized the belief in classical theories that the comparative advantages resulted from relatively different amounts of labor used in the commodity production process. The Heckscher-Ohlin model was based on different factor endowments, prices of production factors and based on the assumptions expressed by the comparative advantages. Heckscher and Ohlin found their model on the principles of (Lipkova 2010, 20-24):

- Model 2x2x2 (model of general balance, where two countries possessed two productions factors and produce two commodities): the difference between traditional beliefs is that there exist two production factors – labor and capital. The theory assumed that capital belonged to private possession and its utilization meant rent to the owner. The reward of labor was a wage. The trade consisted of barter exchange.

- Same technologies: the trading countries used the same technologies. The production function in both countries was equal in the same sectors.
- All production inputs were fully utilized: the economies produced on the limit of the production possibilities curve, which meant that it was not possible to increase production of one commodity without a decrease in production of another product the production factors were mobile within the country, but not abroad
- The countries shared the same commodity preferences
- Perfect competition in both sectors
- Constant returns to scale
- Different production factor abundance
- Different production factor intensity of commodities

H-O-T assumptions explained that each country possessed both production factors. However, the abundance differed. Many production factors were reflected in the prices of those factors. The more abundant production factor within a country was the lower value it had and thus was cheaper in price and vice versa. The state engaged in foreign trade by the production and export of those commodities which were intensive on the abundant production factors that were the source of comparative advantage. The price of production factors influenced the commodity structure of foreign trade. Based on their assumption, the international trade would take place between countries that differ in factor endowments the most such developing and developed economies.

However, the reality of counting with different consumer preferences, the demand, and indifference curve may influence and change the comparative advantages, and thus change the trade directions.

The first problem with H-O-T occurred when Leontief (1953) collected data and examined trading trends of the United States of America (USA). Leontief observed that the USA performed such trade that did not follow the H-O-T assumptions. He collected data on labor and capital used in industrial production and exports and import data for each industry. Based on the H-O-T assumption the USA, being a capital-intensive nation should have imported labor-intensive products and export products intensive on capital. The result was the following; the USA imported highly-capital intense outputs and exported labor-intensive outputs in 1947, which contradicted the H-O-T. (Leontief 1953, 343)

Leontief´s paradox was explained by Vanek (1968) who extended the H-O-T 2x2x2 model to many industries and many production factors. (Vanek 1968, 750) He aimed to relate the factor content to underlying national factor endowments. Leamer (1980) implemented H-O-V assumptions and explained other possibilities of interpreting trade data. If in country *A* capital is the abundant factor compared to labor factor, then the capital/labor ratio used in production must exceed the capital/labor ratio of consumption in this country by his theorem. He re-examined the US export and import data of 1947 and revealed that the country was a net exporter of both production factors. Based on his assumptions and appropriate comparison, he proved that the US net exports were more capital intensive than consumption. (Leamer 1980, 502-503)

There was the significant importance of the comparative advantages, determined by the factor endowment of trading countries. However, the trend of economic relations had moved somewhere else. The precursory trend that mostly persists to the current times has been the increasing importance of trade between countries, which have reached the same level of industrialization and primarily focused on production and trading of the similar commodities. The proportion of IIT in the world trade has increased. The classical and neoclassical theories (Ricardo, H-O-T, H-O-V, Leamer´s theorem) predicted INT, however, could not explain the tendencies of continually increasing volume of IIT.

Linder (1961) was one of the first economists who in *An essay on trade and transformation* examined the demand as a significantly important part of foreign trade. Linder (1961) held that the foreign trade composition is not driven exclusively by the supply but also by the demand. Linder stated that the more similar the demand structure of two countries, the more intensive, potentially, was the trade between these two countries. (Linder 1961, 94) Linder stated that the international trade of two countries was determined by the similar demand for commodities. In order to export a particular commodity abroad, there had to be an adequate domestic demand for the commodity. Consumer baskets depended on the income per capita and thus formed demand structure. From similar income levels, per capita rose the potential of trade due to similar consumer preferences. Other determinants of the foreign trade potential were cultural similarities, geographical distance, tariffs, and other trade obstacles.

Besides general knowledge of the level of income, it is important to understand the differences in income distribution per capita (the distribution of wealth in a country).

The theory also explained why a country exported only standardized product on domestic markets. The launching of a new product was more economical on the domestic market that abroad, which would be costly. After a successful domestic launch, the commodity could be exported. Only a standardized product with high domestic demand could be exported abroad. (Linder 1961, 88-90)

1.4.2. The first notification of intra-industry trade

After WWII, there increased mutual trade between developed countries significantly, which factor endowments were almost identical. Besides this fact, these countries traded commodities produced within the same industrial sectors.

The first empirical studies on IIT were conducted by Verdoorn (1960), Balassa (1966, 1979), Grubel (1967) and further Grubel and Lloyd (1971) and were not based on one specific theoretical model. IIT phenomenon had been tested via various hypotheses in the context of the observed facts.

Verdoorn (1960) in his analysis of trade between the Benelux countries noticed the newly observed trend in international trade, that countries with similar factor endowments traded mostly the products belonging to the same commodity group. In his article: The intra-bloc trade of Benelux, Verdoorn aimed to clarify the trade patterns occurring after the formation of the Benelux union. While analyzing the respective trade ratios of a sample of various products before and after the formation of Benelux, he observed that the ration values tend to decrease in time, while their medians increased. Verdoorn calculated the extent of IIT as the ration of export and import of products belonging to the same industry:

$$\text{Verdoorn formula} = \frac{Xi}{Mi}$$

The intra-industry specialization was then expected when the value moved towards unity over time. Inter-industry specialization was expected when the ratio over time diverged from unity. Verdoorn measured the extent of intra-industry specialization, however not the proportion of total IIT. He observed the prevailing trade within a product category rather than between different categories.

Later, Balassa (1966) confirmed the prevailing trend of trade between countries with similar factor endowments. Balassa wanted to test Lawrence Krause´s hypothesis, which stated that formation of a common market of European Economic Community (EEC) would severely harm the US exporters, since "dominant suppliers" received increased protection from the averaging of national tariffs. Subsequently, based on his findings reinterpreted the

effects of tariff reduction on the domestic economy, and additionally proved the predominance of intra-industry specialization in trade of manufactures. To confirm or negate Krause´s hypothesis Balassa segmented the EEC manufactured products into 91 segments to investigate the changes in intra-EEC trade during 1958-1963. The segmentation resulted from the degree of a subsidiary in production. Balassa compared the market share of domestic suppliers during the examined period. The result was that the dominant suppliers represented over one-half of trade among intra-EEC trade. However, their share increment over the observed period decreased. Balassa further examined the composition of exports among intra-EEC trade regard to his 91 industries. He calculated and ranked correlation coefficients for the structure of intra-EEC exports of manufactured goods. He calculated the extent of IIT as the ratio of net export of commodities of the same grouping and total trade. The importance of IIT grew as the resulted ration decreased. The result of the trade observation between countries of the EEC showed that the international trade consisted mainly of products of the same commodity group (produced within the same industry) by measuring the overlap of simultaneous export and import of goods within the same industry. He named the phenomenon as intra-industry trade.

Grubel and Lloyd (1975) criticized Balassa for drawing his conclusion of the EEC IIT research from the basis of observing uniformity of the product export patterns and based on an unweighted average measure of INT. (Grubel, and Lloyd 1975, 135)

In 1967, Grubel conducted a study on international trade between the countries of the European Economic Community (EEC) and confirmed that these countries export and import commodities, which are similar however not the perfect substitutes. He started in his work by stating that in the international trade appeared a new trend, which is significant for exchanging products that were close substitutes in both production and consumption, and thus belonged to the same statistical industry classification. Trade between commodities of the same statistical classification indicated intra-industry specialization. (Grubel 1967, 375-376)

Grubel (1967) intended to clarify the influence of the trade liberalization process on the EEC market by looking at the trade development of manufactured commodities during the years of 1955, 1958 and 1963.

Grubel (1967) measured the two sets of observed data to estimate the extent of IIT rather than INT on the EEC market. The first set consisted of statistics covering IIT of 3-digit of 74 manufacturing industries from class 511 to class 899 from the *OECD Statistical bulletins, Foreign trade, Trade by commodities* for the years 1955, 1958, and 1963. The second set of user data consisted of import and export statistics for the years 1959 and 1963 aggregated on the 1-digit level conducted from the *OECD Statistical bulletins, Foreign trade, Trade by commodities*. The group of the 3-digit aggregated products consisted of output, which served similar functions; however, differ in product characteristics such as quality, style, and ceteris paribus. The beginning of the selected period, 1955 was significant for rigid trade policy and high foreign tariffs mainly in agricultural products. In 1958 the *Treaty of Rome* came into effect, which was the primary pillar for tariff reduction in manufacturing and thus trades liberalization. By the year 1963, the intra-community market indicated lowering tariff rates. (Grubel 1967, 376)

In his empirical analysis, he computed the ratio of all industries (export, import) and all countries for each of the chosen years. The calculated ratios were further segmented into a group of all cases when export exceeded import, all instances when import exceeded exports and switch-overs when net imports and vice versa replaced net exports. Grubel had assumed that if an examined country traded output based on national specialization, the state would trade such product in which achieves a comparative advantage. Such export concentration was presumed to be shown in the relative shares held by a country´s industrial exports comparing

to other partners of the formation. The changes in relative shares of export suggested the type of specialization. Examined countries (except Italy) indicated the decrease in variance of a share on export and the increase in mutual trade of commodities belonging to the same industry aggregate. The result was that EEC countries simultaneously exported and imported products of the same industry and the increase in total trade between EEC resulted from the rise of intra-industry specialization, not inter-industry specialization. The key finding of his examination was that the researched countries involved more in IIT than in INT, which made them intra-industry specialized.

In the second part, he tried to explain the phenomenon of intra-industry specialization theoretically and to predict the location of production and direction of trade. The increasing importance of IIT over INT in international trade resulted in lacking predictions of national specialization on single products. Grubel (1967) explained that trade with homogenous commodities did not share the same trade patterns as trade with differentiated commodities. The trade with homogenous commodities is the result of the location of production and direction, transportation costs, economies of joint production including technical production and other distribution costs. (Grubel 1967, 381)

In the case of differentiated products, the motivation to trade is different. Grubel (1967) stated that the trade of differentiated product and thus the presence of intra-industry specialization was the result of monopolistic competition. Grubel defined, differentiated products as those, which serve the same consumer functions, however, differ in quality, size, performance, design, style, brand-identification, and other product features (Grubel 1967, 381)

Grubel (1967) created a specific model explaining and predicting international trade patterns in perfectly homogenous products and differentiated products. He looked for the answer to the question if there existed a predictable pattern in case of national specialization of products with a specific style or quality. He created a model of intra-industry specialization in industries with constant/increasing costs and decreasing costs as:

- One industry
- Two countries
- Two products – close substitutes
- Several different brands

Based on his model, the trade liberalization could have two impacts on domestic products. In case of constant or increasing costs, the pricy domestic product would be replaced by its foreign substitute. The way how a domestic producer could have increased its attractiveness in the eyes of domestic consumption was to increase investment in advertising to reduce the subsidiary of foreign product. In case of decreasing costs (due to several reasons: scale economies, practical use of inputs: different technology or lower input price), the domestic producer could have benefited from entering foreign markets. From the consumer's perspective, trade liberalization would be beneficial either way – the same quality of product at a lower price, replacing the insufficient product in quality or high price and a higher diversity of products. Grubel suggested that from the perspective of IIT it would be better to form custom unions between countries of a similar stage of economic development. Otherwise, it could be harmful to less developed economies due to the higher competitiveness of more developed economies. If the level of economic development were too different, then under constant cost conditions, the less developed economy product would be replaced for its competitive substitutes. In effect, inter-industry specialization would tend to dominate over intra-industry specialization with the accompanying need to shift resources between industries. (Grubel 1967, 387)

Grubel and Lloyd (1975) criticized Grubel´s research for observing relative shares that the examined economies held in intra-EEC exports of individual industries and the rations of export/import and import/export whichever was higher of the examined industry. The fall in the variance of the former shares and the movement towards the unity of the latter ratios were taken as evidence of increase IIT specialization. (Grubel, and Lloyd 1975, 135) Both Balassa (1966) and Grubel (1967) were criticized for concluding IIT only from examining the trade of manufactures.

Grubel and Lloyd (1971) tried to empirically prove the importance of IIT under Standard International Trade Classification (SITC) product classification and based on SITC commodity aggregation to confirm whether the IIT is a real phenomenon or a statistical accident by examining Australia´s trade and later the trade of major industrial representatives of the OECD. In the analysis, they calculated IIT as the subtraction of total trade by net exports or imports of a specific industry. The results of their research were proof of the dimension of IIT and its realness and growing importance in industrialized countries.

Grubel-Lloyd Index

Grubel-Lloyd index (GL index) was firstly presented in 1971 and frequently used to calculate IIT. Grubel and Lloyd defined IIT as the value of exports of one (aggregated) industry that matches the value of imports of the same industry. Inter-industry trade was then defined as net exports or net imports. The GL index measures the difference between the country´s trade divided by the country´s total trade. The GL index measures the trade overlap for a specific industry.

$$\text{GL index} = \frac{(X_i + M_i) - |X_i - M_i|}{X_i + M_i} = 1 - \frac{|X_i - M_i|}{X_i + M_i}; \ 0 \leq \text{GL index} \leq 1$$

The GL index lies between 0 and 1, where 0 indicates there all trade is inter-industry and thus low rated of intra-industry trade. The values close to unity (1) indicate a high rate of intra-industry trade. If the entire trade in industry i is an intra-industry trade, then export i equals the import i and the GL Index equals unity ($X_i = M_i$ and IIT = GL index = 1). If the entire trade in industry i is inter-industry trade either the export i equals or import i equals zero, the GL index equals zero ($X_i = 0$ or $M_i = 0$, then INT = GL index$_i$ = 0). (Grubel, and Lloyd 1971, 496-499)

1.4.3. Theoretical explanation of IIT

As it was previously mentioned, the first studies conducted on the new phenomenon occurring in the field of international trade, which was the simultaneous trade of products produced within the same industry and traded between countries of similar economic status, were not based on one and single theoretical model. The phenomenon was first noticed by Verdoorn (1960), Balassa (1966) and Grubel (1967) and Grubel and Lloyd (1971). The first underpinnings of IIT such monopolistic competition and economies of scale were firstly conducted and presented in the work of Grubel and Lloyd (1975).

Grubel and Lloyd (1975) segmented their work into three parts: measurement of IIT phenomenon, models predicting IIT and implications for international trade theory and policy. In their introduction, they presented IIT as a dimension of international trade in differentiated products, which are close substitutes and belong to the same statistical trade classification. They defined IIT as the import and export of products belonging to the same industry as the exchange of goods and services within rather than between the same industries. (Grubel, and Lloyd 1975, 1) The authors opposed the traditional theory patterns of international trade, which stood on the assumptions, such: the production of each commodity is the subject to constant returns to scale and perfectly competitive markets. They uncovered new evidence of

economies of scale resulting from efficient production organization, the indivisibilities of capital equipment and skilled workers and costs which increased less than proportionately with the output. (Grubel, and Lloyd 1975, 5-9) Another assumption different from the traditional was the development and effect of trade liberalization which led to the increase of trade in products belonging to the same industry. The traditional assumption was that the trade liberalization would increase the national specialization in the production and further export of individual industries. (Grubel, and Lloyd 1975, 9) The third main assumption opposing the traditional beliefs of international trade was the presence of imperfect competition. The commodities traded internationally were determined by income level of traded countries (countries with similar income level tended to engage in mutual trade more), demand for more varieties of commodities and technological gaps and product life-cycle. (Grubel, and Lloyd 1975, 10-11)

Grubel and Lloyd (1975) presented a whole concept of measurements of IIT. The perfect situation for IIT would take place if the exports of an industry exactly matched imports of the same industry.

On the other hand, INT represents net exports. Grubel and Lloyd (1975) pointed out the importance of maintaining the same currency and aggregation of commodities in calculations. In this work, the authors used the GL index, however, converted to a percentage.

$$\text{GL index} = \frac{(X_i + M_i) - |X_i - M_i|}{X_i + M_i} * 100, \; 0 \leq \text{GL index} \leq 100$$

Intra-industry specialization takes place if the result moves toward 100. In the case of vice versa, inter-industry specialization with a presence of INT takes place. When imports match exactly the exports of an industry, the result is 100 and thus IIT takes place. If export took place without reciprocal import, the resulted measure is 0, and thus no IIT take place. In the case of measuring multiple n industries, the formula extends by summing all the formula particles:

$$\text{GL index} = \frac{\sum_i^n (X_i + M_i) - \sum_i^n |X_i - M_i|}{\sum_i^n (X_i + M_i)} * 100$$

Grubel and Lloyd (1975) criticized various economists as mentioned earlier calculating the extent of IIT and INT. Verdoorn´s most significant disadvantage was that the results of ratios (X_i/M_i, M_i/X_i) to his definition differed per the authors. Grubel work from 1967 was also criticized. Back then, he calculated the extent of IIT as the ratio of net export of commodities of the same grouping and total trade of intra-EEC exports. Grubel in his calculations took the ratio of the greater of the export and import values to the lower. Under that measure, the authors assumed that the IIT specialization increased in time if the ratios moved towards 1 and vice versa. (Grubel, and Lloyd 1975, 25) In this specific work, they examined IIT of 6 EEC countries and Canada, the US, Japan, and Australia. They investigated the trade patterns based on the formula mentioned above. Since they criticized Balassa (1966) and Grubel (1967), they re-measured their previous calculations and re-examined the trade among EEC between the years 1959-1967 based on their newly conducted theoretical and measure assumptions. The theoretical approach on IIT by Grubel and Lloyd will the author of this MA thesis summarize in the next section of this chapter.

The authors defined two types of products per their functions. The first type of products consisted of functionally homogenous products. From the perspective of IIT, the trade of these products tended not to be significant. This is due to its functional and feature

similarities. The trade between two countries of homogenous products would depend on the costs of production, geographical distribution of potential consumers, transaction costs, time (seasonal goods and products with limited economic life), re-export and government regulations. The second type of products consisted of functionally differentiated products. These products were divided into groupings per its input requirements if similar or different. Per the authors, countries engage in international trade with differentiated products more often than with homogenous products. A differentiated product from country A is exported when his domestic prices can compete in foreign markets, and their domestic market share is larger compared to other domestic competitors. The differentiated products of country B where the newly differentiated product from country A entered will either adjust to the new competitor or will be removed from the market. The products, which will meet customer requirements, stay in the market due to increased sales and substantial cost savings. Differentiated goods differ in style and quality per Grubel and Lloyd. Grubel and Lloyd assumed that differentiated products by style would be included in international trade due to consumer taste. Countries would export such close-substitute products differentiated by a style that was the most popular within the domestic country and import styles appealing to a minority. (Grubel, and Lloyd 1975, 96) The international trade pattern of exchanging quality-differentiated products consisting of almost identical production factors and representing the subject of rising returns to scale would take place with the presence of similarities in income distribution and the elasticity of demand for quality concerning levels of income. (Grubel, and Lloyd 1975, 99)

Per the authors, participation in international trade increases the production-possibility frontier and a further consumption-possibility frontier because of trade of products between economies on terms more favorable than the relative prices of an autarkic economy. International trade enables countries to gain comparative advantages even in differentiated products due to the implied production possibilities – decreasing production costs and thus also the consumption possibilities expand.

From the perspective of present economies of scale, a country or a firm may change its product specialization. Imagine that a country A specializes in production of a product Y at price P. In an autarkic situation, the country A would not suffer nor gain from the external economic influences leading to changes in P. However, on an open market if the world price WP of product Y negatively changes, the country A may reconsider to switch its product to a product X. In the case of open market economy of the country A the decision-making process would consider the presence of sufficient economies of scale due to its knowledge and capital. Economies of scale are divided based on their initial form into internal or external. Internal economies of scale represent a fast profit gains for a producer immediately. However, the presented trend showed that producers might internalize external economies of scale by creating industry-sponsored agencies to produce human and knowledge capital Economies of scale increase their values by lowering the costs of production. As the authors pointed out, the engagement to international trade did not provide gains exclusively. In either national or global market, there exist situations when the economies of scale lead towards the establishment of oligopolies and monopolies by competitor expulsion of that, in the end, decrease the economic welfare. In such cases, the price of the product may be set upward or downward per the decision of the producer.

The opening of the trade increases consumer choice by the presence of more brands, product substitutes, variables, styles and functional characteristics of products. From the perspective of the consumer, product differentiation is favored due to presenting consumer patterns expressing demanded individual taste and style and thus consumer welfare gains.

Expansion of differentiated products leads towards lowering the output price. However, it is necessary to add that in some undesirable situations product differentiation may lead towards the increase of average cost per unit.

From the perspective of trade protection, lowering the levels of protection lead to an expansion of export and imports subsequently of both INT and IIT. However, lower average protection in-high protection areas would lead to a decrease of products produced each on a larger scale or in extended production runs to lower the production unit costs. (Grubel, and Lloyd 1975, 128)

The assertion Laissez-Faire in its natural form is not possible to be practiced in the real-world perspective. While practicing free trade, situations occur when the market regulations necessary to function without loss. On the one hand, trade liberalization leads towards greater trade and its players' related benefits.

Regarding healthy IIT, the authors suggest practicing a trading strategy, when the countries authorities would implicate policies of well-specified narrow product lines of a certain quality and product features and permit free imports or at low protection on differentiated commodities of the same industry. This strategy should be implicated on national, regional even international level and suggests producing a narrow product line of output, in which a country A has a comparative advantage in comparison to its trading partners.

Previous empirical and also theoretical approaches already proved that IIT is a natural development of international trade instead of a statistical deviation that back-then valid theories could not explain. Grubel and Lloyd in mutual works explained the phenomenon and later Krugman started to investigate IIT further. Each of these economists dealt with the theoretical explanations that initiated the occurrence of IIT among trading countries from the viewpoint of the existence of economic scales and competition. However, they did not focus on the combined determinants of IIT from the country and industry aspect. Loertscher and Wolter (1980) provided empirical evidence of combined determinants of IIT. In their study *Determinants of Intra-Industry Trade: Among Countries and across Industries*, they focused on explaining differences in IIT intensity among countries and across industries simultaneously and the importance of combined determinants of IIT, which were newly introduced on the example of IIT among OECD countries.

They selected the IIT determinants based on the factors into country-specific differentials and industry-specific variables and then tested them according to various hypotheses. Based on the hypotheses, they could reveal the correlation among the IIT determinants and IIT. Presented country-specific differentials were development stage, average development stage, market size differential, average market size differential, distance, customs union dummy, language group dummy, border trade dummy, and cultural group dummy. Industry-specific variables were introduced as product differentiation, scale economies, transaction costs, level of aggregation, product group and the constant term.

Loertscher and Wolter (1980) stated that countries with high levels of economic development tended to achieve higher levels of IIT due to the relationship between stage of development and the capability to innovate that is one of the fundamental pillars to produce differentiated products. Secondly, development stage closely related to differentiated demand that promoted the production of differentiated output and thus the existence of economies of scale. Thirdly, they held that highly developed economies maintained highly developed information and communication linkages. All these factors were represented by average development stage that was measured as the average of trading partners' per capita income (PCIA) of one representative year. They tested if a high average level of development had a positive impact on the extent of IIT. However, if the results reported a low and a high level of economic development, the extent of IIT tended to be poor due to a high difference in

consumer preference structures and factor price relations. The correlation between the intensity of IIT and average development stage, however, was not supported. The development stage differential was represented as the absolute difference in per capita income of selected year (PCID). (Wolter, and Loertscher 1980, 282-283)

The market size also closely related to the extent of IIT among countries. If the average market size between examined counties was large, the potential of production differentiated goods under conditions of scale economies is higher. They used the average gross domestic product (GDP) to measure the average market size. Also, if the difference in market size is small, the extent of IIT was greater. They calculated as the absolute difference in GDP. (Wolter, and Loertscher 1980, 283)

Wolter and Loertscher (1980) stated that the potential of IIT increased when the barriers to trade are low. They took into account not only tariff trade barriers but also non-tariff barriers such as information, communication, and transportation costs represented by distance transport cost variable, customs union dummy, language group dummy, border trade dummy, and cultural group dummy. Transport cost variable (DIST) was measured as the distance between countries. Custom union dummy (CUUN) was evaluated either one or zero if the states belonged to the same customs union; the result was one and vice versa. Language group dummy (LAGR) was evaluated either one of zero. If the countries belonged to a common language group, the result was one and vice versa. The same evaluation was used for assessment of cultural group dummy (CUGR) and border trade dummy (BOTR) if the countries shared borders then the result was one and vice versa. (Wolter, and Loertscher 1980, 283-284)

Industry-specific variables were used to measure the potential IIT across industries of examined trade partners. Product differentiation variable for industry (PRDI) was measured as the number of tariff positions at the lowest level aggregation of Brussels tariff mononuclear of products within each 3-digit SITC class. Scale economies indicator (SCEC) represented the potential of economies of scale by measuring the added values per establishment. These two indicators were used to test the hypotheses that IIT was intense if the possibility of product differentiation was high and significant barriers impeded market entry in narrow product lines. (Wolter, Loertscher 1980, 284)This hypothesis related to the *reference demand* that resulted in country-specialization in the production of narrow lines. However, the consumer preferences may have varied, and thus an additional demand arose, which could be satisfied by substitutes from abroad. Transaction costs represented another indicator of an industry-specific variable. Wolter and Loerscher (1980) held that transaction costs (TRCO) significantly determined the degree of product differentiation and the lower they were, the higher intensity of IIT could be achieved. TRCO was measured as the mean distance products of industry *i* shipped to the representative country (USA). In all measured variable, the same aggregation was needed to prevent a statistical deviation.

The results of the tested hypothesis unveiled that IIT intensity increased with a decreasing development stage differential, a decreasing market size differential, increasing average market size and a decreasing distance between countries. Custom union dummy also represented a discernible determinant. Language group dummy and cultural group dummy did not prove a clear correlation with IIT, and average development stage was not supported either. Industry-specific variable such transaction costs, the level of aggregation and scale economies were proved as invariably significant in the intensity of IIT.

In 1990, Krugman introduced a new concept explaining new international trade patterns in his work Rethinking International Trade. In this work, he opposed traditional beliefs explaining international trade as it was previously mentioned. Krugman included in his new theory of international trade the knowledge of imperfect competition and economies of scale.

Krugman explained economies of scale as a comparative advantage of specialization and international trade. Each country gains from the practical use of economies of scale and both trading countries gain from higher diversification of products. Economies of scale represented the phenomenon when a firm decreases production costs by the increase in production. The most accessible form of economies of scale (increasing returns) is on the level of an individual firm by allowing either the fuller use of capacity, higher specialization and thus decreases of production cost per unit. (Helpman, and Krugman 1985, 33) On the sector level, increasing returns would occur when the growth of industrial sector led towards a decrease of cost per unit. The increasing returns have an essential impact on the market structure. If increasing economies of scale remain constant, the result will be perfect competition. If enormously growing economies of scale take place within an economy, the adverse effect may be the establishment of monopolies. In case of possible increasing economies of scale and product differentiation, the market structure would be monopolistic competition. Krugman (1990) proved that international trade is not determined by technology and factor endowments rather economies of scale. Krugman (1990) desired to explain the reasons why traditional economic approaches to international trade cannot explain the prevailing trend of spreading trade among countries with similar factor endowments. Krugman created a basic model for his research by following these assumptions (Krugman 1990, 23-24):

- A large number of potential goods, all of which enter systematically into demand, all the individual economies share the same utility curves, and the number of produced goods is large however smaller than the potential range of products
- Only one production factor – labor
- The output equals the sum of individual consumption
- Full employment
- The natural desire of firms to maximize production and free entry and exit to the market.

Two countries with the same taste and technology would trade even though there existed only one production factor. Each type of product is produced in one country and economies of scale are the result of adequate production. Each country gains from the practical use of economies of scale and both trading countries gain from higher diversification of products. Economies of scale represented the phenomenon when a firm decreases production costs by the increase in production. Economies of scale are the product of the presence of imperfect competition.

The economies of scale, products differentiation, and monopolistic competition are the features of IIT. Krugman created a model which emphasized scale economies. Economies of scale are internal from production firms for not perfectly substituted products. Intra-industry trade takes place between countries which may share or may not share the same factor endowments. If countries share the same factor endowments, IIT and its profit will take place due to sharing consumer preferences, technological level, and factor endowments. The greater number of products in one sector of imperfect competition at a lower cost per produced unit is beneficial for all due to higher product differentiation. (Krugman 1990, 47-50)

This work explained, the determinants that initiated the trade between countries and their products of the same industry such as scale economies and thus increasing returns and broader product diversification. Because of economies of scale is the reduction of costs per unit. In a sector of imperfect competition, firms produce different products. Each firm produces such some products that cover the global demand. Each type of product is manufactured within one country and economies of scale are the result of adequate production. Each country gains from the practical use of economies of scale and both trading countries gain from higher diversification of products available on the market.

If two countries indicate the same factor endowments, they do not perform INT rather IIT. Intra-industry trade is hence based on the same preferences, technological level, and factor endowments. Because of IIT is the higher number of products available on the market of imperfect competition produced at lower costs per unit, which is beneficial for all market participants.

To conclude, Krugman provided a complementary explanation of trade occurring between countries with similar factor endowments structures that could not be explained by H-O-T.

IIT has become a worldwide phenomenon, which was the subject of many global, regional and national economic researchers. The economic literature on IIT categorizes it based on product differentiation into horizontal and vertical. Horizontally differentiated products represent all the products that have the same quality, however, have different characteristics (automobiles). The consumer demand is highly dependent on consumer preference of those characteristics. Vertically differentiated products differ in the quality but have similar characteristics (IT industry).

Per Greenaway, Hine, and Milner (1994), the products quality is one of the essential attributes of differentiating goods per horizontal or vertical categories. In their work, they presented a concept of calculation the segmentation of IIT. Intra-industry trade was defined as the two-way trade of similar products. However, products differentiated either in characteristics, but the same quality (horizontal intra-industry trade) or different quality, but the same characteristics (vertical intra-industry trade). Thus, horizontally differentiated products represent all the products that have the same quality, however, have different characteristics. Vertically differentiated products differ in the quality but have similar features. In their examination of intra-industry trade of UK presented a new method how to calculate vertical and horizontal IIT and to identify whether country-specific factors are essential in explaining the relative importance of diversified IIT of UK. In their study, they used a 5-digit SITC classification and applied the Grubel-Lloyd index to calculate IIT.

Further to investigate whether the IIT products belong to either vertical or horizontal IIT trade they applied the relative unit value for exports and imports. If the relative unit values equal to the range of 0.85-1.15 the IIT was horizontal. If the values differed from those above, then the trade was vertical IIT.

Based on the Greenway, Hine, and Milner (1994) research, IIT decomposition is calculated as follows:

$$1 - \alpha \le \frac{UV(X_i)}{UV(M_i)} \le 1 + \alpha, \alpha = 0,15; \qquad UV(X_i) = \frac{VALUE\ (X_i)}{UNITS\ (X_i)}, UV(IMP_i) = \frac{VALUE\ (M_i)}{UNIT\ (M_i)}$$

The parameter α is fixed, and according to Greenway, Hine, and Milner (1994), it assumes the value 0, 15. When the value satisfies the following terms:

$1 - \alpha \le \frac{UV(X_i)}{UV(M_i)} \le 1 + \alpha$, then it is the horizontal intra-industry trade (HIIT). If not, the products are classified as the vertical intra-industry trade (VIIT). (Greenaway, Hine, and Milner 1994, 81-82)

1.4.4. Further empirical studies on INT and IIT

Since Grubel and Lloyd in their mutual work criticized Balassa (1966) and Grubel (1967), they re-measured the calculations and re-examined the trade among EEC between the years 1959-1967 based on their theoretical and measurement assumptions. IIT of the member countries of EEC during the specified period increased steadily from 53 percent to 66 percent in 1967. The increase of IIT coincided the period of tariff reduction. The total trade among

EEC countries increased during the selected period by 70.9 percent of SITC 2-digit aggregation of products. Comparing the results of total trade within the EEC and with other trading partners, the intra-EEC trade indicated a higher percentage than the trade with rest of the world by 10.9 percent during the selected period. However, they could not compare the results of IIT in this specific case due to the difference in digit aggregation. The other problem to compare the increase in IIT between these two cases was the difficulty to obtain detailed information on production and costs about other non-EEC trading partners. The authors stated that the increase in the total trade and the IIT imply the fact that intra-industry specialization in the pattern of international exchange of commodities had to be accompanied by the rise in the intra-industry specialization in the patterns of production among EEC countries. (Grubel, and Lloyd 1975, 137-138)

In another empirical study, Grubel and Lloyd (1975) examined IIT of 6 EEC countries and Canada, the US, Japan and Australia based on the measurement formulas above. The states and the selected period were precisely chosen per the authors' criteria. 1959-1967 were significant for enormous western world economic growth, return to the currency convertibility and trade liberalization (EEC, EFTA). The authors used the SITC classification of 9 product groups and the 3-digit level of aggregation of these products. The OECD statistics for exports and imports conducted the trade data during 1959-1967. During the observed period, there was significant variance among the measures for IIT in 3-digit industries. Within the examined countries, IIT prevailed in all sectors (primary products, raw materials, manufactures, and semi-processed products) except coffee and crude fertilizers. Even though all research participants signalized high values of IIT, the composition of prevailing industries varied from country to country. Based on the H-O-T, the trade liberalization would increase the national specialization; however, in this case, it differed. The results of total trade, net trade, and IIT showed that IIT grew proportionally with the total trade.

Aquino (1978) noted that international trade was not anymore composed of net international specialization among countries. The orthodox belief of international trade consisting of international specialization became old-fashioned, and the trend among states engaged in international trade started to consist of exchanging of homogeneous commodities. His work aimed to find the correct measurements on how to distinguish between intra-industry and inter-industry specialization. Aquino (1978) stated that the trade composition from the perspective of INT and IIT is essential due to various reasons. The first reason was the high correlation between IIT and consumer preferences that have an impact on trade. The second reason was that the price elasticities of export and import of a single economy were likely to be greater in case of IIT that INT. The third reason was the welfare gains from trade were in connection to INT rather than to IIT. (Aquino 1978, 275-276) Based on Linder (1961) and Hufbauer and Chilas (1974) assumptions, Aquino stated in his work that IIT between countries was an insignificant correlation with income levels of these countries and tariff policy. (IIT rose simultaneously with the income level similarity. Tariff regulation with the tendency of trade liberalization positively influenced IIT rather than INT.) Another assumption on IIT by Aquino was that the presence of scale economies positively increases the share of IIT on international trade.

Aquino (1978) in his experimental section questioned the generally used indexes and formulas used to calculate the extent of INT and IIT presented by Grubel and Lloyd (1971, 1975) while examining the international trade with manufactures. Aquino emphasized that the GL index as downward bias is underestimating the real extent of IIT of total trade. Regarding investigating the type of trade, Aquino stressed the importance of correct identification of the degree of production and the kind of homogeneous commodities. Aquino´s distinguishing

factor was technology-intensity. Aquino considered being homogenous commodities those with same technological intensity.

On the other hand, traded manufactures consisting of different technology intensity were found to be the source of INT. Based on this assumption; he divided manufactures into 25 products. Aquino used his disaggregation based on the degree of homogeneity of products and technology-intensity rather than SITC. The result of the empirical investigation was that relatively high-value exports were more often associated with relatively high-value imports, which contradicted the conservative assumption that relatively high-value exports had been associated with relatively low-value imports. (Aquino 1978, 287) The results for measuring the INT of particularly 25 manufactured products indicated a downfallen trend. Over the investigated period 1951 – 1974 in pre-selected countries, the share of IIT with a positively increasing tendency prevailed over the share of INT with further decreasing tendency in trade of manufacturing.

Balassa (1979) analyzed and compared the development of IIT between member countries of the Latin American Free Trade Association (LAFTA) and the Central American Common Market (CACM). He analyzed 91 industries with high substitution elasticities in production 3- and 4- digit SITC. In both cases, IIT was assumed to be more common among countries belonging to its regional economic community than to external countries. The higher levels of industrial development in states of the LAFTA reached greater IIT with developed counties. The countries of the LAFTA that reported greater intra-industry specialization represents those LAFTA countries, which possessed more sophisticated industrial production. In the case of the CACM, the intra-industry trade was more wide-spread among the formation partners than with developed industrial countries. There still prevailed INT, which confirmed the assumption that the level of industry development played an essential role in intra-industry specialization and trade among nations. While comparing regional trade among the LAFTA, the CACM and additionally the EEC, Balassa came up with the statement that formation of common market or way to reduce trade obstacles had a positive influence on intra-industry trade. Both the CACM and the EEC achieved higher levels of intra-industry regional trade due to diminishing tariff regulations in manufactured goods. In Balassa´s conclusion, the different trade barriers had an impact on IIT and IIT is more commonly observed in more industrialized countries that less industrialized countries.

Havrylyshyn and Kunzel (1997) used the GL index to indicate the level of industry specialization of Arab countries and their competitiveness in newly liberalized markets (EU). Havrylyshyn and Kunzel (1997) used 3-digit SITC to determine the type of trade they calculated the GL index. The result was that IIT between Arab countries with the EU was lower than its regional trading partners or developing countries, which signalized their low competitiveness on the EU market.

Qausmi, Fausti, and Liuyi (2002) used the GL index in the analysis of U.S.-Canada IIT in 3 industry categories: food and live animals, manufacturing products, and machinery and transportation. More precisely they wanted to test 3 hypotheses arising from the knowledge of IIT such were, the level of IIT was expected to be higher in industries with higher product differentiation, industries with potential gains from scale economy should have indicated higher IIT and in sectors of the oligopolistic market should have indicated higher IIT. They analyzed data came from the OECD database based on SITC and the North American Industrial Classification System (NAICS). The authors matched data 31 SITC products at the 4-digit classification with 31 industries of the NAICS to identify them in both data providers. The primary objective of the analysis was to find out how did the FTA taken in to effect in 1989 impacted the bilateral trade of these industries. The results of this empirical research showed that product differentiation; economies of scale, and oligopolistic behavior were

essential determinants in trade of 3 examined industry categories. Manufactured products indicated a higher level of IIT. Inter-industry trade was significant in food and live production and chemical industry. Product differentiation was a significant determinant of IIT in manufacturing industries. The authors assumed that industries with higher product differentiation are significant for higher advertising costs. The research confirmed this assumption. The result was that the manufactured products indicated higher advertisement variables (higher advertisement costs), higher brand differentiation, non-competitive market structure, and higher IIT. Agricultural production was significant for value-added variables (value added per dollar of shipment). Agrarian production indicated higher levels of one-way trade with larger economies of scale and the tendency to comparative advantages. The variable of labor intensity tested the degree of product differentiation. The result confirmed the hypothesis that products of higher differentiation tend to be intensive on capital production factor with higher IIT and that economies of scale were negatively associated with IIT and were significant only for agricultural production.

Leitao and Faustino (2008) in their analysis of Portuguese intra-industry trade of food processing sector with the EU-15 they used an econometric model by Grubel and Lloyd (1975) index as dependent variables. Further, they used Fontange and Freudenberg method to determine country-specific determinants of horizontal and vertical intra-industry trade between Portugal and the EU. The obtained results showed the presence and increase of IIT in food and agrarian trade between Portugal and the EU-15. The authors agreed on the validity of the new trade theory and that internal economy of scale, and market structure is the variables, which determine IIT in food and agrarian industry.

Yoshida, Leitao, and Faustino (2008) applied the same methodology in the research paper of IIT between Japan and European countries. The goal was to provide an overview of the development of IIT between old and new EU member states and Japan from 1988 to 2004. Besides observing bilateral IIT between countries for entire industries, they also observed it in aggregates of industries. They proved that over the observed period IIT increased in correspondence of GDPs. However, they suggested further research be done based on relative prices rather than traditional ratios.

Jing, Leitao, and Faustino (2010) continued with the same previously used methodology to research IIT in agrarian products in China. The results of the GL index of Chinese agricultural trade with 13 crucial trading partners were low. Chinese agricultural products with high total trade indicated low IIT and vice versa. The determinants, which influenced either positively or negatively Chinese agrarian IIT, were a geographical location, trade liberalization, and cultural similarities.

IIT trade between Central, Eastern, and South-Eastern European countries (CESEE) and the EU-15 was the subject of working paper done by Dautovic, Orszaghova, and Schudel (2014). The primary motive of this research paper was the fact that after the collapse of Soviet Union IIT has rapidly grown. The CESEE have experienced tremendous economic change from centrally planned economies to open market economies. On their way towards enlarging the European common market the composition of trade commodities changed from one-way trade to two-way trade. Dautovic, Orszaghova, and Schudel (2014) analyzed different factors, which impacted the development of IIT between the CESEE and the EU-15 during 1998-2010. They examined trade commodities based on the 6-digit disaggregation of HS classification (HS 1996). They removed import and export values discrepancies that could obscure the results, provided comparable harmonized amounts and calculated products based on unit product values. In the first stage of their research, they examined annual data form nineteen CESEE countries and the EU-15. In the next step, the nineteen CESEE countries were divided into two groups of eleven EU new member states (NMS) and eight candidate

countries and potential candidates (CCPC). The extent of IIT between groupings was estimated per the GL index. Besides the GL index, the authors used Fontagne and Freudenberg index to compute the one-way and two-way trade. For calculating types of IIT (horizontal and vertical) they used the Greenaway, Hine and Milner formula. Intra-industry trade between examined countries had been an essential object in the forming process of economic integration due to reasons. Intra-industry trade was a tool for achieving synchronized business cycles and thus eliminating effects of asymmetric shocks, a determinant of competitiveness and positive account balance, an indicator of convergence for the CCPC on their way to join the European Common Market. The research results unveiled that the CCPC lagged regarding IIT with the EU-15 comparing to NMS. One of the identified differentiation causing factors were fiscal incentives – corporate tax, which could promote faster convergence process towards increasing IIT. The difference between the NMS and the CCPC in the trade with the EU-15 is conditioned to FDI and institutional quality in the countries. The CCPC indicated significant corruption remarks that make the integration process more difficult. The researchers noted significant macroeconomic imbalances that have an impact on trade composition.

Ishchukova and Smutka (2014) analyzed Russian agrarian trade structure based on the diversification of INT and IIT. The methods used provide the framework for following master thesis. The examining commodities were classified by Harmonized System Classification (HS) as decomposition of products for 4-digit data. Ishchukova and Smutka used Grubel and Lloyd index and Fontagne and Freudenberg methodto determine the specific type of trade. Further, they used the Greenway and Miller method to specify the IIT – horizontal of vertical. The final findings of the systematic trade decomposition were that INT in Russian agrarian trade is dominating, however, over the observed period (1996-2006) IIT of this sector increased. The more the economic, cultural and geographical similarities between trading partners occurred, the higher IIT could be observed.

1.5. Analytical framework

The analytical framework of this master thesis results from the previously studied books, articles, and researches mentioned in state of the art. This master thesis analyzes Slovakia´s foreign trade with two of its Asian trade partners from the perspective of intra-industry and inter-industry trade. The representative countries were chosen based on their different stages of economic development and contractual basis regulating foreign trade.

In state of the art, eight newly conducted empirical studies were summarized, which examined foreign trade of various countries from the perspective of intra-industry and inter-industry trade. All the empirical studies conducted by Havrylyshyn and Kunzel (1997), Qausmi, Fausti and Liuyi (2002), Leitao and Faustino (2008), Yoshida, Leitao and Faustino (2008), Jing, Leitao and Faustino (2010), Dautovic, Orszaghova and Schudel (2014) and Ishchukova and Smutka (2014) applied a common analytical framework that was firstly introduced by Grubel and Lloyd in 1975. Grubel and Lloyd in their comprehensive work on intra-industry trade, *Intra-industry trade, the theory and measurement of international trade in differentiated product*, provided a theoretical explanation on intra-industry trade pattern. Besides that, they provided calculation formulas for measuring the extent of intra-industry trade and evaluation of the results.

It is important to mention that Grubel and Lloyd were not the first economists who came across intra-industry trade. It was Verdoorn (1960) who noticed as one of the first economists the increasing share of commodities belonging to the same industry on total trade within intra-block trade of Benelux. Later in 1966, Balassa named the new trade pattern as intra-industry trade while analyzing the trade of the EEC. Afterward, many other economists and

researchers started to investigate the international trade from the new perspective. Most of the works were based on only hypothetical assumption lacking the theoretical explanation. Theoretical explanation of new trade pattern was later provided by Grubel and Lloyd (1975), Krugman (1980, 1990) and Krugman and Helpman (1985). Grubel and Lloyd introduced the first commonly used formula for measuring the extent of intra-industry trade in 1971. In 1975, they updated their formula to calculate the result in percentage values. In the table below, the summary of state of the art provides all observed attributes included in the studies researches.

Tab. 2 Overview of observed attributes in the researches

	Author(s)	Year	SITC	HS	Verdoorn index	Balassa index	Grubel and Lloyd index	Aquino index	Fontagne and Freudenberg index
1.	Verdoorn	1960	NO	NO	YES	NO	NO	NO	NO
2.	Balassa	1966	NO	NO	NO	YES	NO	NO	NO
3.	Grubel	1967	NO	NO	NO	NO	NO	NO	NO
4.	Grubel and Lloyd	1971	YES	NO	NO	NO	YES	NO	NO
5.	Grubel and Lloyd	1975	YES	NO	NO	NO	YES	NO	NO
6.	Aquino	1978	NO	NO	NO	NO	YES	YES	NO
7.	Balassa	1979	YES	NO	NO	YES	YES	NO	NO
8.	Greenaway, Hine, Milner	1994	YES	NO	NO	NO	YES	NO	NO
9.	Havrylyshyn and Kunzel	1997	YES	NO	NO	NO	YES	NO	NO
10.	Qausmi, Fausti and Liuyi	2002	YES	NO	NO	NO	YES	NO	NO
11.	Leitao and Faustino	2008	YES	NO	NO	NO	YES	NO	YES
12.	Yoshida, Leitao and Faustino	2008	NO	YES	NO	NO	NO	NO	NO
13.	Jing, Leitao and Faustino	2010	NO	YES	NO	NO	YES	NO	NO
14.	Dautovic, Orszaghova, Schudel	2014	NO	YES	NO	NO	YES	NO	YES
15.	Ishchukova and Smutka	2014	NO	YES	NO	NO	YES	NO	YES

State of the art provides 15 research studies on intra- and inter-industry trade topic. It is significant that the most commonly used index measuring the extent of IIT is the Grubel and Lloyd index firstly introduced in 1971 and later in 1975 from the table above. Grubel Lloyd index is defined as the overlap of the specific industry in the trade or, in other words, the value of exports of one aggregated industry that matches the value of imports of the same industry at the same aggregated level. The result can be either IIT or INT depending on whether the result moved towards 0 (INT) or unity represented frequently by 100 percent (IIT).

In this master thesis, the author set out to investigate the type of commodity trade between selected economies from the perspective of INT and IIT. The analytical framework of this master thesis is structured by the commodity segmentation of the *Harmonized Commodity Description and Coding System*, known as the *Harmonized System* (HS). Harmonized system represents a generally applied nomenclature for the classification of commodities, which

classifies traded products on a general basis for customs purposes based on different levels of aggregation. For this research, the HS 2-digit aggregation of traded goods will be applied. The twenty-one sections of the harmonized system at 2-digit aggregation consist of 99 product groups called chapters where chapters 77, 98 and 99 have not been specified yet and have been left blank in case of a new product chapter will arise in the future. The history of the harmonized system dated to 1988 when all countries adopted a standard system to classify the traded goods. Due to several changes over the period, HS underwent revision in 1996, 2002, 2007, 2012 and 2017. (The United Nations 2017) The analytical framework of this master thesis is structured by the HS 2002 where all the sections and their chapters of the HS 2-digit level were specified.

Tab. 3 Analytical framework of the intra- and inter-industry of investigation among all traded commodities based on Harmonized System Classification (2002) HS 2

Harmonized System				Export	Import	GL index
Section	Name of section	HS 2 code	Name of chapter	2006-2011-2016	2006-2011-2016	2006-2011-2016
Section I	Live animals, animal products	01	Live animals			
		02	Meat and edible meat offal			
		03	Fish and crustaceans, mollusks and other aquatic invertebrates			
		04	Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included			
		05	Products of animal origin, not elsewhere specified or included			
Section II	Vegetable products	06	Live trees, and other plants, bulbs, roots, and the like, cut flowers, ornamental foliage			
		07	Edible vegetables and certain roots and tubers.			
		08	Edible fruit and nuts; peel of citrus fruit or melons			
		09	Coffee, tea, mate and spices			
		10	Cereals			
		11	Products of the milling industry; malt; starches; inulin; wheat gluten			
		12	Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal plants; straw and fodder			
		13	Lac; gums, resins and other vegetable saps and extracts			

		14	Vegetable plaiting materials; vegetable products not elsewhere specified or included.			
Section III	Animal or vegetable fats and oils and their cleavage, Products prepared edible fats, animal or vegetable waxes	15	Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes			
Section IV	Prepared foodstuffs, beverages, spirits and vinegar, tobacco and manufactured tobacco substitutes	16	Preparations of meat, of fish or of crustaceans, mollusks or other aquatic invertebrates			
		17	Sugars and sugar confectionery			
		18	Cocoa and cocoa preparations			
		19	Preparations of cereals, flour, starch or milk; pastry cooks' products			
		20	Preparations of vegetables, fruit, nuts or other parts of plants.			
		21	Miscellaneous edible preparations			
		22	Beverages, spirits and vinegar			
		23	Residues and waste from the food industries; prepared animal fodder			
		24	Tobacco and manufactured tobacco substitutes			
Section V	Mineral products	25	Salt; sulfur; earths and stone; plastering materials, lime and cement			
		26	Ores, slag and ash			
		27	Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes			
Section VI	Products of the chemical or allied industries	28	Inorganic chemicals; organic or inorganic compounds of precious metals, of rare-earth metals, of radioactive elements or of isotopes			
		29	Organic chemicals			
		30	Pharmaceutical products			
		31	Fertilizers			
		32	Tanning or dyeing extracts; tannins and their derivatives; dyes, pigments and other coloring matter; paints and varnishes; putty and other mastics; inks			
		33	Essential oils and resinoids; perfumery, cosmetic or toilet preparations			

		34	Soap, organic surface-active agents, washing preparations, lubricating preparations, artificial waxes, prepared waxes, polishing or scouring preparations, candles and similar articles, modelling pastes, "dental waxes" and dental preparations with a basis of plaster			
		35	Albuminoidal substances; modified starches; glues; enzymes			
		36	Explosives; pyrotechnic products; matches; pyrophoric alloys; certain combustible preparations			
		37	Photographic or cinematographic goods			
		38	Miscellaneous chemical products			
Section VII	Plastics and articles thereof, rubber and articles thereof	39	Plastics and articles thereof			
		40	Rubber and articles thereof			
Section VIII	Raw hides and skins, leather, fur skins and articles thereof, saddler and harness, travel goods, handbags and similar containers, articles of animal gut (other than silk-worm gut)	41	Raw hides and skins (other than fur skins) and leather			
		42	Articles of leather; saddlery and harness; travel goods, handbags and similar containers; articles of animal gut (other than silk-worm gut).			
		43	Fur skins and artificial fur; manufactures thereof			
Section IX	Wood and articles of wood, wood charcoal, cork and articles of cork, manufactures of straw, of esparto or of other plaiting materials, basketware and wickerwork	44	Wood and articles of wood; wood charcoal			
		45	Cork and articles of cork			
		46	Manufactures of straw, of esparto or of other plaiting materials; basket ware and wickerwork			
Section X	Pulp of wood or of other fibrous cellulosic material, recovered (waste and scarp) paper or paperboard, paperand paperboard and articles thereof	47	Pulp of wood or of other fibrous cellulosic material; recovered (waste and scrap) paper or paperboard			
		48	Paper and paperboard; articles of paper pulp, of paper or of paperboard			

		49	Printed books, newspapers, pictures and other products of the printing industry; manuscripts, typescripts and plans			
Section XI	Textiles and textile articles	50	Silk			
		51	Wool, fine or coarse animal hair; horsehair yarn and woven fabric			
		52	Cotton			
		53	Other vegetable textile fibers; paper yarn and woven fabrics of paper yarn			
		54	Man-made filaments			
		55	Man-made staple fibers			
		56	Wadding, felt and nonwovens; special yarns; twine, cordage, ropes and cables and articles thereof			
		57	Carpets and other textile floor coverings			
		58	Special woven fabrics; tufted textile fabrics; lace; tapestries; trimmings; embroidery			
		59	Impregnated, coated, covered or laminated textile fabrics; textile articles of a kind suitable for industrial use			
		60	Knitted or crocheted fabrics			
		61	Articles of apparel and clothing accessories, knitted or crocheted			
		62	Articles of apparel and clothing accessories, not knitted or crocheted			
		63	Other made up textile articles; sets; worn clothing and worn textile articles; rags			
Section XII	Footwear, headgear, umbrellas, sun umbrellas, walking-sticks, seat-sticks, whips, riding-crops and parts thereof, prepared feathers and articles made therewith, artificial flowers, articles of human hair	64	Footwear, gaiters and the like; parts of such articles			
		65	Headgear and parts thereof			
		66	Umbrellas, sun umbrellas, walking-sticks, seat-sticks, whips, riding-crops and parts thereof			

		67	Prepared feathers and down and articles made of feathers or of down; artificial flowers; articles of human hair			
Section XIII	Articles of stone, plaster, cement, asbestos, mica or similar materials, ceramic products, glass and glassware	68	Articles of stone, plaster, cement, asbestos, mica or similar materials			
		69	Ceramic products			
		70	Glass and glassware			
Section XIV	Natural or cultured pearls, precious or semi-precious stones, precious metals, metals clad with precious metal and articles thereof, imitation jewelry, coin	71	Natural or cultured pearls, precious or semi-precious stones, precious metals, metals clad with precious metal and articles thereof; imitation, jewelry; coin			
Section XV	Base metals and articles of base metal	72	Iron and steel			
		73	Articles of iron or steel			
		74	Copper and articles thereof			
		75	Nickel and articles thereof			
		76	Aluminum and articles thereof			
		77				
		78	Lead and articles thereof			
		79	Zinc and articles thereof			
		80	Tin and articles thereof			
		81	Other base metals; cermets; articles thereof			
		82	Tools, implements, cutlery, spoons and forks, of base metal; parts thereof of base metal			
		83	Miscellaneous articles of base metal			
Section XVI	Machinery and mechanical appliances, electrical equipment, parts thereof, sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles	84	Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof			
		85	Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles			
Section XVII	Vehicles, aircraft, vessels and associated transport equipment	86	Railway or tramway locomotives, rolling-stock and parts thereat railway or tramway track fixtures and fittings and parts thereof; mechanical (including electro-mechanical) traffic signaling equipment of all kinds			

		87	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof			
		88	Aircraft, spacecraft, and parts thereof			
		89	Ships, boats and floating structures			
Section XVIII	Optical, photographic, cinematographic, measuring, checking, precious, medical or surgical instruments and apparatus, clocks and watches, musical instruments, parts and accessories thereof	90	Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; parts and accessories thereof			
		91	Clocks and watches and parts thereof			
		92	Musical instruments; parts and accessories of such articles			
Section XIX	Arms and ammunition, parts and accessories thereof	93	Arms and ammunition; parts and accessories thereof			
Section XX	Miscellaneous manufactured articles	94	Furniture; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings; lamps and lighting fittings, not elsewhere specified or included; illuminated signs, illuminated name-plates and the like; prefabricated buildings.			
		95	Toys, games and sports requisites; parts and accessories thereof			
		96	Miscellaneous manufactured articles			
Section XXI	Works of art, collectors ´pieces and antiques	97	Works of art, collectors' pieces and antiques			
		98				
		99				

Based on the previously conducted studies on this topic, a fully applicable analytical framework was created to analyze the issue. It mainly arises from the HS segmentation of goods per section and its chapter. The data on trade will be collected and further calculated for the years of 2006, 2011 and 2016; however, due to the clarity of the table, the cells of chosen years were merged into one table cell. The representative years were chosen regarding the availability of data in convenient form. The ten-year period of 2006 to 2016is the most comprehensive time range of available data. The year 2006 is the first year of a newly adopted

method of collecting data from the Statistical Office of Slovakia. All previously collected data used different methods and thus could not be exactly compared to each other in later years. The year 2011 was the year of singing the FTA between South Korea and the EU and the year 2016 represents the last detailed data available to demonstrate the actual situation of intra- and inter-industry trade.

The collected trade data will be analyzed over the period by applying the calculation formula of the GL index and its aggregated form per each 2-digit commodity segment. The results will be evaluated following the measurement formula explicitly mentioned in state of the art. This framework is assumed to uncover the prevailed type of trade in all commodity chapters in certain years. Based on this framework it will be possible to determine the changes in trade patterns of presented commodities.

For this research, the HS 2-digit commodity aggregation will be provided. The Statistical Office of the Slovak Republic provides annual statistics on export and import data for every trade partner. However, these statistics are provided in HS 4-digit commodity aggregation. Thus, an additional calculation will be needed to calculate the values of single commodity chapters. It is important to add that the Statistical Office of the Slovak Republic provides the statistic for the year 2006 in the currency of Slovak crown. Therefore, the values of this year will be converted by the official conversion rate in the ratio 1 Euro (€) equals 30, 1260 SKK.

In the introductory part, the importance of trade with vehicles in South Korea and Slovakia was presented. Therefore, the author decided to further investigate IIT of the Section XVII of HS 4 at its accurate aggregation of the 8703 chapter. To evaluate the extent of the competition, the author will use the Greenaway, Hine, and Milner (1994) calculation. The formula will uncover the extent of either horizontal intra-industry trade or vertical intra-industry trade in case that the intra-industry takes place in the trade between selected countries. This commodity aggregation and calculation will provide the information to estimate the potential gains and threats for Slovak producers of motor cars and motor vehicles. This table represents an enhanced framework of this master thesis adding accurate aggregation of commodities included.

Tab. 4 Analytical framework of the intra- and inter-industry of investigation among motor cars and motor vehicles, principally designed for the transport of persons including station wagons and racing cars of HS 8703 commodity subchapter

YEAR	HS 4 CODE	EXPORT		IMPORT		GL INDEX	UNIT VALUE EXPORT	UNIT VALUE IMPORT	UVM/UVM	RESULT
		VALUE	AMOUNT	VALUE	AMOUTNT					
2006	8703									
2011	8703									
2016	8703									

The presented framework can be generally applied to investigate the extent of intra- and inter-industry trade and decomposition of intra-industry in all cases of international trade if the data for export and import for aggregated commodities are available.

1.6. Methodology

The subject of this master thesis is to determine the extent of IIT between Slovakia and two of its Asian trade partners in all 21 commodity sections of HS 2-digit aggregation and to identify trade patterns in the selected commodity chapters. The author used the HS aggregation of commodities, and all the data are provided in the currency of Euro from the Statistical Office of the Slovak Republic and the Eurostat.

In the empirical part of the research, the exported and imported commodities were systematically sectionalized to calculate the extent of either INT or IIT. In the first two subchapters of the empirical part of this master thesis, the formula of the GL index will be applied to measure the extent of INT and IIT in all defined 96 HS chapters. This method was chosen concerning its verification of the previously studied economic literature on the topic of international trade from the perceptivity of INT and IIT. This method was firstly presented in 1971 with a revision in 1975 by economists Grubel and Lloyd.

As it was mentioned in the previous chapter, IIT is defined as the value of export of an industry, which is precisely matched by the import of the same industry. INT is thus defined as the value of export of an industry, which does not match by the import of the same industry, rather consists of import of different industry.

The GL index is calculated as follows:

$$\text{GLI}_i = \frac{(X_i + M_i) - |X_i - M_i|}{X_i + M_i} = 1 - \frac{|X_i - M_i|}{X_i + M_i}; \; 0 \leq \text{GLI}_i \leq 1$$

where Xi represents the export value in a country's currency and Mi represents the import value in a country´s currency, both same industry i. The GL index takes values from 0 to 1. Since the level of INT is always given by 1 minus the measured level of IIT all further discussion is in terms of IIT, GL index. (Grubel, and Lloyd 1975, 21) As the GL index moves towards unity the extent of IIT increases. If the GL index indicated numbers close to 0, the extent of INT increases. The author provided the calculated values in percentages, thus:

$$\text{GLI}_i = \frac{(X_i + M_i) - |X_i - M_i|}{X_i + M_i} * 100, \; 0 \leq \text{GLI}_i \leq 100$$

the GL index takes values from 0 to 100. As the GL index$_i$ moves towards 100 the extent of IIT increases. If the GL index $_i$ indicated numbers close to 0, the extent of INT increases.

For the cases of measuring multiple n industries, the formula will be extended by summing all the formula particles:

$$\text{GLI}_i = \frac{\sum_i^n (X_i + M_i) - \sum_i^n |X_i - M_i|}{\sum_i^n (X_i + M_i)} * 100$$

In the further empirical analysis of the commodity category road vehicles -section XVII of HS 4 at its accurate 4-digit aggregation of the code chapter 8703, the author will calculate the GL index to estimate the extent of INT and IIT. This empirical research will be applied only for the case of South Korea due to the available data. All the currency values will be calculated in the currency of the Euro.

In case of presence of IIT in chapter 8703of motor cars and other motor vehicles, principally designed for the transport of persons including station wagons and racing cars, the author will calculate the type of IIT from the perspective of vertical or horizontal IIT, firstly introduced by Greenaway, Hine, and Milner in 1994. If the results of IIT are positive in this specific commodity aggregation per the GL index; the following steps will be to calculate the type of IIT by decomposition IIT into vertical or horizontal IIT. Greenaway, Hine, and Milner firstly presented the method applied for decomposition of IIT in 1994.

IIT decomposition is calculated by the unit values as follows:

$$1 - \alpha \leq \frac{UV(X_i)}{UV(M_i)} \leq 1 + \alpha, \alpha = 0.15; \qquad UV(X_i) = \frac{VALUE\ (X_i)}{UNITS\ (X_i)}, UV(IMP_i) = \frac{VALUE\ (M_i)}{UNIT\ (M_i)}$$

The unit value (UV) of export *i* represents the calculation of the value of export *i* divided by the unit amount of export *i* of industry *i*. The unit value of imports *i* represents the calculation of the value of import *i* divided by the unit amount of import *i* of industry *i*. The author will compute the unit values of commodities of the 4-digit aggregation by dividing the unit value of export by unit value of the import. The parameter α is fixed, based on the method presented by Greenaway, Hine, and Milner, and it assumes the value of 0.15. When the value meets the following requirements: $1 - \alpha \leq \frac{UV(X_i)}{UV(M_i)} \leq 1 + \alpha$, it is a horizontal intra-industry trade (HIIT). If the unit value lies somewhere between the value of 0.85 and 1.15 then the HIIT is present. If the unit value differs from the range, the products are classified as vertical intra-industry trade (VIIT). All the currency values in this calculation will be represented in the currency of Euro, and the amount values were presented in tons.

The unit value method is generally applied by economists to investigate whether the IIT consists of differentiated commodities in quality. HIIT includes products of the same quality, and the VIIT represents commodities of higher quality. Unit values represent a rational element to adjust the quality of traded commodities; the higher quality is reflected in, the higher price of products and vice versa. Economists dealing with IIT decomposition based on the unit values assume that the relative prices reflect relative qualities of products. As it was in the theoretical part mentioned, the economic literature on intra-industry trade decomposes intra-industry based on product differentiation into horizontal and vertical. Horizontally differentiated products represent homogenous products in quality, however, differentiated in product characteristics important to consumers´ demand. The trade of horizontally differentiated products is more significant for countries with similar factor endowments. Vertically differentiated products differ in the quality and usually price but have similar product characteristics and features and tend to be traded based on the traditional economic theories resulting from different factor endowments. The higher quality of products is usually the result of input or the technological production processes. Based on the theoretical assumptions the result provides information of more sophisticated production in certain countries, factor endowments differences, market size, and income levels and consumer preferences.

2. Bilateral Trade Decomposition of Selected Countries from the Perspective of Intra- and Inter-Industry Trade since 2006, 2011 and 2016

2.1.1. Bilateral Trade with Commodities of Section I

Section I of harmonized system consists of live animals and animal products, sectionalized into five commodity chapters based on their origin: live animals, meat and edible meat offal, fish and crustaceans, mollusks and other aquatic invertebrates, dairy products, birds´ eggs, natural honey and edible products of animal origin not elsewhere within the harmonized system specified either included.

Tab. 5 Bilateral trade with commodities of section I

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section I	Live animals, animal products	01	Live animals	1 785	0	0.00	0	0	-	7 954	0	0.00
		02	Meat and edible meat offal	295 789	0	0.00	0	1 791	0.00	0	0	-
		03	Fish and crustaceans, mollusks and other aquatic invertebrates	0	0	-	0	31 228	0.00	0	10 279	0.00
		04	Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included	0	0	-	0	76	0.00	3 132	0	0.00
		05	Products of animal origin, not elsewhere specified or included	0	0	-	0	0	-	0	0	-

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

The table above represents the bilateral trade in commodities of animal production including live animals. The trade in animal products was unstable and mostly one-way trade when only one country exported specific commodity and did not import this commodity. In 2006, Slovakia exported live animals and meat to South Korea without reciprocal import. Trade with other products included in this section did not take place that year. In 2011, South Korea was the net exporter in this section of HS. South Korea exported commodities included in chapter 02, 03 and 04 without reciprocal import from Slovakia. Other products covered in chapters 01 and 05 were not the subjects of trade in 2011. In 2016, traded commodities of section I were products included in chapter 01, 03 and 04. Slovakia exported live animals and products included in chapter 04 and South Korea exported products of aquatic origin. Total trade value of products included in section I rapidly decreased and almost diminished, over the past decade. The measured GL index was of zero value. The results of the GL index indicated that the trade in these goods included in section I persisted net INT during the examined period.

2.1.2. Bilateral Trade with Commodities of Section II

Bilateral trade consisting of vegetable products exchange indicated greater stability and less fluctuation compared to the previous commodity chapter. South Korea´s export of vegetable products significantly exceeded reciprocal export from Slovakia. Slovakia did not export any of the listed commodities to South Korea except for presuming private export of vegetable saps and extract in 2016. The calculated GL index reported zero value in each commodity chapter during the selected years, which indicated net INT.

Tab. 6 Bilateral trade with commodities of section II

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section II	Vegetable products	6	Live trees, and other plants, bulbs, roots, and the like, cut flowers, ornamental foliage	0	1 048	0.00	0	1 890	0.00	0	0	-
		7	Edible vegetables and certain roots and tubers.	0	476	0.00	0	14 054	0.00	0	2 166	0.00
		8	Edible fruit and nuts; peel of citrus fruit or melons	0	20	0.00	0	5 851	0.00	0	400	0.00
		9	Coffee, tea, mate and spices	0	1 776	0.00	0	26 881	0.00	0	13 350	0.00
		10	Cereals	0	0	-	0	31 109	0.00	0	4 463	0.00
		11	Products of the milling industry; malt; starches; inulin; wheat gluten	0	19	0.00	0	600	0.00	0	287	0.00
		12	Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal plants; straw and fodder	0	601	0.00	0	68 252	0.00	0	3 149	0.00
		13	Lac; gums, resins and other vegetable saps and extracts	0	0	-	0	12109	0.00	8	43 120	0.00
		14	Vegetable plaiting materials; vegetable products not elsewhere specified or included.	0	0	-	0	535	0.00	0	0	-

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

Over the past ten years, the importance of trade with vegetable products decreased.

2.1.3. Bilateral Trade with Commodities of Section III

Section III includes animal and vegetable fats, oils their cleavage products, also prepared edible fats and animal and vegetable waxes. This section reported the GL index of zero at the HS 2 code 15 during the selected years. Based on the measured value of the GL index, the trade in this commodity section was defined as net INT. The net exporter of the products of these commodities was South Korea. The value of the total traded goods of this section decreased more than12 times over the past ten years.

Tab. 7 Bilateral trade with commodities of section III

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section III	Animal or vegetable fats and oils and their cleavage, Products prepared edible fats, animal or vegetable waxes	15	Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes	0	107 974	0.00	0	24 868	0.00	0	8 412	0.00

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

2.1.4. Bilateral Trade with Commodities of Section IV

Section IV consists of prepared foodstuff including the output of processed products of section I and section II, beverages, spirits and vinegar, and tobacco and manufactured tobacco substitutes.

The trade of section IV reported higher stability in goods exchange compared to the previous chapters. The net exporter of preparations of animal products was South Korea in bilateral trade with Slovakia except for the year of 2011. In 2011, the GL index equaled almost 0.25, which represented 25 percent of IIT. Sugars and sugar confectionery was

exclusively imported from South Korea to Slovakia by reporting the GL index of zero value, net INT. Cocoa and its preparations reported no product exchange in 2006 and 2011. In 2016, the trade statistics showed that products of HS 2 code 18 at the value of 167 € were exported from Slovakia as one-way trade with the GL index equal to zero. More interesting was the development of trade with preparations of cereals and final products contacting them as an ingredient. In 2006 and 2011 the trade was reported net one-way trade originated in South Korea, however, in 2016, the GL index increased from zero to 0.45. In 2016, IIT grew by 45 percent. It is important to state that the final number of South Korean export is not exact due to the confidentiality of HS 4 code 1902. A similar situation took place in trade of preparations of vegetables, fruits, and nuts. Between the years 2011 and 2016, IIT grew by 26 percent. The total value of trade in this commodity chapter decreased nevertheless Slovakia´s export value increased. South Korea´s export value dropped by 81 percent compared to 2011.

Tab. 8 Bilateral trade with commodities of section IV

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section IV	Prepared foodstuffs, beverages, spirits and vinegar, tobacco and manufactured tobacco substitutes	16	Preparations of meat, of fish or of crustaceans, mollusks or other aquatic invertebrates	0	975	0.00	5 775	48 411	0.21	0	20290	0.00
		17	Sugars and sugar confectionery	0	2278	0.00	0	5 724	0.00	0	1 679	0.00
		18	Cocoa and cocoa preparations	0	0	-	0	0	-	167	0	0.00
		19	Preparations of cereals, flour, starch or milk; pastry cooks' products*	0	4 227	0.00	19	410 085	0.00	168 969	49 229	0.45
		20	Preparations of vegetables, fruit, nuts or other parts of plants.	0	6 780	0.00	0	340 028	0.00	9 449	62 195	0.26
		21	Miscellaneous edible preparations	209	56 447	0.01	13 009	113 483	0.21	34 862	244 200	0.25
		22	Beverages, spirits and vinegar	11 778	37 226	0.48	210	25 260	0.02	14 861	36 942	0.58
		23	Residues and waste from the food industries; prepared animal fodder	0	0	-	0	0	-	0	0	-
		24	Tobacco and manufactured tobacco substitutes	0	0	-	0	0	-	0	0	-

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

More stable development of the GL index was identified with products of HS 2 code 21 by a continuous increase in the GL index from 0.01 in 2006 to 0.25 in 2016. IIT increased by 24 percent. Trade with these commodities took place in each of the examined years with increasing tendency. Total trade increased by 392 percent during the past decade. Beverage, spirits and vinegar trade indicated fluctuating development of the GL index during the selected period. In 2006, the GL index reported the value of 0.48 that decreased to 0.02 in 2011 and back increased to the values of 0.25 in 2016. Commodities included in HS 2 code 23 and 24 were traded bilaterally in neither of representative years.

2.1.5. Bilateral Trade with Commodities of Section V

Trade with mineral products of salt, sulfur, earths, and stone, plastering material, lime, and cement had fluctuating development during the selected years resulting in the GL index value of 0.46 in 2016.

Slovakia had achieved positive trade balance in trade of these products, which changed by the increase in imports from South Korea in 2016. Trade of the commodities included in chapter HS 2 code 25 did not undergo stable development. Trade with ores, slag, and ash, took place, neither of the representative years. Mineral fuels, mineral oils and products of their distillation, bituminous substance, and mineral waxes indicated almost net INT with negative Slovak trade balance. South Korea´s export of commodities included in the chapter of HS 2 code 27 maintained stable growth, over the past decade. The exports grew by 395 percent.

Section V reported an increase in IIT and decrease in INT, in trading commodities over their ten-year period; however, INT dominated over the time.

Tab. 9 Bilateral trade with commodities of section V

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section V	Mineral products	25	Salt; sulfur; earths and stone; plastering materials, lime and cement	37 570	5 864	0.27	0	5 617	0.00	7650	25644	0.46
		26	Ores, slag and ash	0	0	-	0	0	-	0	0	-
		27	Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes	0	122 486	0.00	10	202 070	0.00	23 656	605 737	0.08

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

2.1.6. Bilateral Trade with Commodities of Section VI

Trade of chemicals and their allied industries reported growth in total commodity exchange. For the year 2006, the data on export values of HS 2 code 28 from Slovakia were not available. Trade in these products reported a negative trade balance for Slovakia with almost net INT during the years of available data. Slovakia had achieved positive trade balance in the trade of organic chemicals until 2016 when Korea´s export exceeded Slovakia´s export by more than three times. South Korea´s import of Slovak organic chemicals decreased during the past decade by almost 83 percent. The GL index grew until 2016 when it dropped to less than 0.5. Trade with pharmaceutical products reported practically net INT with negative trade balance for Slovakia and stably rising values of South Korea´s export. In 2006, the trade with fertilizers did not take place. The situation changed in 2011 when Slovakia was the net exporter of this commodity concerning South Korea. In 2016, the value of total exports of HS 2 code 31 products increased five times. Almost net INT was reported in HS 2 code 32 products with positive trade balance for South Korea with stably growing values of exports. Increasing GL index took place in commodities of HS 2 code 33. In ten years, the value of the GL index rose from zero to 0.13. Both countries increased the export values since 2006.

On the other hand, GL index values decreased in HS 2 code 34 products in the ten-year period as the result of decreasing Slovakia´s export to South Korea and growth of South Korea´s export to Slovakia. Trade with albuminoidal substances, modified starches, glues and enzymes reported the unstable development. In 2006, there took place almost net INT between countries, which changed by the GL index increase of 0.66 value in 2011, followed by zero GL index in 2016. Products of pyrotechnic industries represented non-traded products

in bilateral trade of presented two countries. South Korea may be defined as a net exporter of commodities belonging to HS 2 code 37 concerning Slovakia. During the ten-year period reached net zero values of the GL index except 2011. In 2011, the value of the GL index increased by 0.09. Trade with miscellaneous chemicals reported decreasing IIT. In 2006, the trade indicated more than the value of 0.53 GL index. However, the values of Slovakia´s export declined during the selected period and were replaced by increasing import from South Korea.

Section VI of chemical products reported a high level of INT within the sector. Higher share on IIT between Slovakia and South Korea were observed in organic chemicals with 56 percent in 2006, 67 percent in 2011 and the decrease to 46 percent in 2016. The share of IIT in essential oils reported an increase between 2001 and 2016 from 4 percent to 13 percent. Trade with miscellaneous chemicals reported a continuous decreased in the share of IIT from 53 percent in 2006, 12 percent in 2011 and zero percent in 2016.

Tab. 10 Bilateral trade with commodities of section VI

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section VI	Products of the chemical or allied industries	28	Inorganic chemicals; organic or inorganic compounds of precious metals, of rare-earth metals, of radioactive elements or of isotopes*	C	66 705	-	50	53 521	0.00	700	201 618	0.01
		29	Organic chemicals	8 475 501	3 323 700	0.56	4 553 895	2 284 741	0.67	1 482 204	5 016 730	0.46
		30	Pharmaceutical products	374	1 020 398	0.00	1 050	126 400	0.02	1 207	2 239 964	0.00
		31	Fertilizers	0	0	-	142 863	0	0.00	211 809	1 440	0.01
		32	Tanning or dyeing extracts; tannins and their derivatives; dyes, pigments and other coloring matter; paints and varnishes; putty and other mastics; inks	0	3 012 013	0.00	111	5 624 024	0.00	0	10 830 987	0.00
		33	Essential oils and resinoids; perfumery, cosmetic or toilet preparations	0	0	-	2 919	136 839	0.04	21 785	311 576	0.13
		34	Soap, organic surface-active agents, washing preparations, lubricating preparations, artificial waxes, prepared waxes, polishing or scouring preparations, candles and similar articles, modeling pastes, "dental waxes" and dental preparations with a basis of plaster	3 090	195 236	0.03	299	344 412	0.00	993	738 791	0.00
		35	Albuminoidal substances; modified starches; glues; enzymes	13	333 226	0.00	93 458	191 306	0.66	0	427 250	0.00
		36	Explosives; pyrotechnic products; matches; pyrophoric alloys; certain combustible preparations	0	0	-	0	0	-	0	8	0.00
		37	Photographic or cinematographic goods	0	156 449	0.00	4 650	96 422	0.09	0	2 097	0.00
		38	Miscellaneous chemical products	684 158	1 907 539	0.53	382 929	4 954 806	0.14	4 305	80 858 885	0.00

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

2.1.7. Bilateral Trade with Commodities of Section VII

The value of the total trade with plastics and rubbers increased over the past ten years. An increase was also reported in the GL index for both commodity chapters, despite Slovakia´s long-term negative trade balance. South Korea´s import of Slovak plastics and rubbers significantly increased in the past five years by more than 319 percent, nevertheless Slovakia maintained negative trade balance concerning the trade of plastics, rubber, and related articles.

Trade development of section VII reported a continuous increase of the IIT share on total trade within included commodity chapters. The share of INT in trade of plastics´ dominated in the report years, however, the share of IIT continuously increased from zero percent in 2006 to 7 percent in 2016. Faster development of IIT was reported in the trade with rubber and articles thereof. In 2006 the share of IIT was calculated as zero percent and by 2016 it increased to 56 percent of IIT with 44 percent of INT.

Tab. 11 Bilateral trade with commodities of section VII

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section VII	Plastics and articles thereof, rubber and articles thereof	39	Plastics and articles thereof	82 359	71 959 888	0.00	1 084 548	55 245 437	0.04	3 807 637	109 909 956	0.07
		40	Rubber and articles thereof	5 849	7 469 029	0.00	5 072 635	59 623 167	0.16	21 991 788	56 361 041	0.56

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

2.1.8. Bilateral Trade with Commodities of Section VIII

At the beginning of the examined period, the trade with commodities included in section VIII was realized exclusively on an inter-industry level. Slovakia was a net importer of South Korean materials of animal origin. Currently, trade maintains INT structure in commodity chapter with code 41. However, the trade pattern changed a little bit in 2016, and two-way trade took place in certain commodities. The GL index of the value 0.02 and 0.11 was calculated in products such are articles of leather, saddler and harness, travel goods, handbags and similar containers, items of animal gut (other than silk-worm gut) and fur skins and artificial fur and manufactures thereof. Trade of rawhides and skins prevailed unstable since 2006. More stabilized development was achieved in the trade with articles of leather, saddler, harness, travel good and handbags. South Korea´s export increased from 2006 to 2016 by 5 699 percent and Slovakia´s export to South Korea increased by 82 percent in the past five years.

Tab. 12 Bilateral trade with commodities of section VIII

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section VIII	Raw hides and skins, leather, fur skins and articles thereof, saddler and harness, travel goods, handbags and similar constrainers, articles of animal gut (other than silk-worm gut)	41	Raw hides and skins (other than fur skins) and leather	0	43	0.00	0	2 712	0.00	176 740	0	0.00

| 42 | Articles of leather; saddler and harness; travel goods, handbags and similar containers; articles of animal gut (other than silk-worm gut). | 0 | 32 848 | 0.00 | 2 671 | 2 447 154 | 0.00 | 221 691 | 19 047 162 | 0.02 |
| 43 | Fur skins and artificial fur; manufactures thereof | 0 | 4 173 | 0.00 | 0 | 35 | 0.00 | 1 993 | 111 | 0.11 |

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

The share of INT dominated trade within section VIII during the selected period. In 2016, an increase in the share of IIT was reported from 0 percent in 2006 by 2 percent in chapter 42 and by 11 percent in chapter 43.

2.1.9. Bilateral Trade with Commodities of Section IX

Section IX consists of products prepared of wood including articles of wood, wood charcoal, cork and items of cork, manufactures of straw, of esparto or other plaiting materials, basket ware and wickerwork. The wood trade including wood articles and wood charcoal is realized on significant INT level with persisting Slovakia´s positive trade balance. Cork articles and manufactures of straw, of esparto or other plaiting materials, basket ware and wickerwork took place on INT level with prevailing Slovakia´s negative trade balance during the selected years. The trade development of all commodities included in HS 2 code 45 and 46 did report stabilized development of zero GL index.

Tab. 13 Bilateral trade with commodities of section XI

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section IX	Wood and articles of wood, wood charcoal, cork and articles of cork, manufactures of straw, of esparto or of other plaiting materials, basketware and wickerwork	44	Wood and articles of wood; wood charcoal	124 220	35 611	0.45	482 811	23 184	0.09	346 532	83 073	0.39
		45	Cork and articles of cork	0	8 404	0.00	0	612	0.00	4	0	0.00
		46	Manufactures of straw, of esparto or of other plaiting materials; basketware and wickerwork	0	201	0.00	0	41 077	0.00	0	27 219	0.00

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

Trade within commodity section XI also reported the dominance of INT over IIT. IIT was presented only in chapter 44 with reported fluctuated development resulting in 39 percent in 2016.

2.1.10. Bilateral Trade with Commodities of Section X

Commodity section X consists of pulp of wood or other fibrous cellulosic material, recovered (waste and scrap) paper or paperboard, paper and paperboard and articles thereof. Trade of commodity chapter HS 2 code 47 that include products such as pulp of wood or other fibrous cellulosic material, recovered paper or paperboard did not take place during the selected years. Trade of HS 2 code 48 product chapter had an increasing tendency in the past

ten years. The GL index almost doubled from 2001 to 2016. Slovakia´s export maintained a rising trend since 2006; however, South Korea´s exports to Slovakia fluctuated. In 2016, the negative trade balance of Slovakia was the lowest in this commodity chapter during the selected period. Trade with printed books, newspapers and pictures had not such a stable development as the previous product chapter. The highest GL index was measured in 2011, but in the next five years in dropped to almost the same value of 2006.

Tab. 14 Bilateral trade with commodities of section X

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section X	Pulp of wood or of other fibrous cellulosic material, recovered (waste and scarp) paper or paperboard, paper and paperboard and articles thereof	47	Pulp of wood or of other fibrous cellulosic material; recovered (waste and scrap) paper or paperboard	0	0	-	0	0	-	0	0	-
		48	Paper and paperboard; articles of paper pulp, of paper or of paperboard	19 691	542 190	0.07	199 026	1 018 405	0.33	224 763	475 002	0.64
		49	Printed books, newspapers, pictures and other products of the printing industry; manuscripts, typescripts and plans	453	130 689	0.01	30 917	23 468	0.86	3 506	88 031	0.08

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

Decomposition of trade within section X reported the presence of IIT and INT. In 2011, the IIT dominated over INT, which changed in the next reporting period. Chapter 48 reported a continuous increase in the share of IIT from 7 percent in 2006 to 33 percent in 2011 and 64 percent in 2016. Chapter 49, on the other hand, reported a fluctuated development from the intra- and inter-industry perspective. In 2011, INT dominated over IIT by 99 percent. The dominance switched to IIT of 86 percent in 2011 and 2016 dropped to 2 percent of IIT and 98 percent of INT.

2.1.11. Bilateral Trade with Commodities of Section XI

Commodity section XI consists of textiles and textile articles including 13 chapters. Chapter HS 2 code 50 comprises trade with silk with 100 percent positive South Korean trade balance and zero GL index. Slovakia is a net importer of Korea´s silk with fluctuating tendency in value. The trade with wool, fine, coarse hair, horsehair yarn, and woven fabric disappeared since 2006. In 2006, trade with these commodities reported the GL index of 0.16, however, in the following years, the trade did not occur. It is important to state that the final number of South Korea´s export is not exact due to data confidentiality of HS 4 code 5104. Cotton is another commodity exported solely from South Korea to Slovakia with zero GL index and fluctuating total export values. Trade with vegetable textile fibers, paper yarn and woven fabrics of paper yarn had disappeared since 2006 when it was exclusively imported from South Korea to Slovakia. Man-made filaments trade indicated the GL index of 0.12 in 2006 and 0.11 in 2016. In 2011, the trade occurred at net INT structure due to a rapid drop in the value of Slovakia´s export. The GL index of wadding felt, and nonwovens, special yarns, twine, cordage, ropes and cables including articles made thereof increased from zero in 2006

to 0.25 in 2016 with a continuous value increase in both export and import. Trade with carpets and other textile floor coverings in 2006 and 2011 took place by net INT exported from South Korea to Slovakia. In 2016, the bilateral trade between Slovakia and South Korea took place with the measured GL index of 0.02. Almost net one-way trade took place in commodities of chapters with code 2 code 58 except for small exceptions. South Korea prevailed to be the net exporter of HS 2 code 58 with unstable export values in selected years. Trade of HS 2 code 59 commodity chapter prevailed to be INT. South Korea´s export to Slovakia reported an unstable development in the values. However, the importance of Slovakia´s export rose with an increase of more than 830 percent between 2006 and 2011 and an additional increase of 200 percent from 2011 to 2016. The value of South Korea´s export of knitted and crocheted fabrics decreased over the past years. The trade prevailed to be INT except 2011 when the reported GL index was of the value 0.68.

On the other hand, export of Slovak articles and apparel of knitted and crocheted fabrics specified in chapter HS 2 code 61 increased and also the calculated GL index grew from 0.01 in 2011 to 0.54 in 2016. The total value of trade of these commodities indicated fluctuating development with the lowest reported values in 2016. A fluctuating development was also reported in commodity chapter HS 2 code 62. In 2006, the total trade value exceeded 1.5 million € with the GL index of 0.70. In 2011, the total value dropped by 87 percent, and the GL index reported the value of 0.04. In 2016, Slovakia´s negative trade balance changed by exceeding Slovakia´s exports over South Korea´s. Slovakia reported a positive trade balance in the trade of commodity chapter 2 code 62 and the GL index reached 0.38. Unstable trade development of total trade in commodity chapter HS 2 code 63 was reported in selected years. Trade in these commodities took place with calculated GL index of 0.07 in 2006, 0.03 in 2011 and 0.04 in 2016.

Tab. 15 Bilateral trade with commodities of section XI

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section XI	Textiles and textile articles	50	Silk	0	419	0.00	0	9 674	0.00	0	5 827	0.00
		51	Wool, fine or coarse animal hair; horsehair yarn and woven fabric*	871	10 216	0.16	0	0	-	0	0	-
		52	Cotton	0	90 628	0.00	0	19 054	0.00	0	89 977	0.00
		53	Other vegetable textile fibers; paper yarn and woven fabrics of paper yarn	0	8 586	0.00	0	0	-	0	0	-
		54	Man-made filaments	56 668	856 646	0.12	118	827 772	0.00	140 639	2 509 470	0.11
		55	Man-made staple fibers	0	278 208	0.00	0	534 930	0.00	0	2 268 236	0.00
		56	Wadding, felt and nonwovens; special yarns; twine, cordage, ropes and cables and articles thereof	0	1 194 529	0.00	33 593	1 005 417	0.06	206 490	1 446 438	0.25
		57	Carpets and other textile floor coverings	0	85 226	0.00	0	53 623	0.00	3 470	276 218	0.02
		58	Special woven fabrics; tufted textile fabrics; lace; tapestries; trimmings; embroidery	0	213 134	0.00	100	68 666	0.00	0	138 087	0.00
		59	Impregnated, coated, covered or laminated textile fabrics; textile articles of a kind	519	4 440 379	0.00	4 873	3 832 021	0.00	14 660	7 644 590	0.00

	suitable for industrial use										
60	Knitted or crocheted fabrics	0	823 910	0.00	177 050	90 581	0.68	0	28 517	0.00	
61	Articles of apparel and clothing accessories, knitted or crocheted	2 748	864 618	0.01	2 261	1 130 279	0.00	243 509	651 306	0.54	
62	Articles of apparel and clothing accessories, not knitted or crocheted	517 884	967 291	0.70	4 033	188 857	0.04	291 370	67 780	0.38	
63	Other made up textile articles; sets; worn clothing and worn textile articles; rags	39 954	1 148 921	0.07	11 924	683 084	0.03	73 899	4 144 143	0.04	

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

Section XI reported higher values of INT than IIT. 100 percent of INT was reported within chapters 50, 52, 58 and 59. Other commodity chapters reported fluctuated development of the share of IIT with less than 50 percent, which signalized the dominance of INT within the commodity section over the examined period.

2.1.12. Bilateral Trade with Commodities of Section XII

Commodity section XII includes various products. Chapter 64 consists of products such as footwear, gaiters, and like articles. In 2006, bilateral trade consisting of these commodities was realized on the net inter-industry level of calculated zero GL index with South Korea´s positive trade balance of 232 325 €. In 2011, the GL index increased from zero to 0.23, South Korea´s export maintained exceeding position over Slovakia´s export. In 2016, the trade situation changed, and Slovakia achieved a positive trade balance in trading commodities included in this chapter. The GL index grew to 0.52. Trade with headgears did not develop continuously. Trade products covered in the chapter of HS 2 code 65 maintained INT with Slovakia´s negative trade balance during the examined years. Umbrellas, sun umbrellas, walking-, seat-tricks, whips, and riding crops were not traded during the selected period. A very negligible amount was exported to South Korea in 2011. An unstable trade development occurred with the commodities included in chapter HS 2 code 67. In 2006 a value of 9 753 € was imported from South Korea with no Slovak export. In 2011, the exchange of goods took place at 0.83 GL index with Slovak negative trade balance. In 2016, trade of these commodities took the place of net INT.

Tab. 16 Bilateral trade with commodities of section XII

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL Index	Export	Import	GL Index	Export	Import	GL Index
Section XII	Footwear, headgear, umbrellas, sun umbrellas, walking-sticks, seat-sticks, whips, riding-crops and parts thereof, prepared feathers and articles made therewith, artificial flowers, articles of human hair	64	Footwear, gaiters and the like; parts of such articles	7	232 332	0.00	10 479	82 253	0.23	460 762	163 086	0.52
		65	Headgear and parts thereof	128	33 810	0.01	16	19 332	0.00	7 845	207 360	0.07

| 66 | Umbrellas, sun umbrellas, walking-sticks, seat-sticks, whips, riding-crops and parts thereof | 0 | 0 | - | 133 781 | 0 | 0.00 | 0 | 302 | 0.00 |
| 67 | Prepared feathers and down and articles made of feathers or of down; artificial flowers; articles of human hair | 0 | 9 753 | 0.00 | 5 926 | 8 271 | 0.83 | 0 | 21 037 | 0.00 |

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

Commodity section XII consisting of chapters 64, 65, 66 and 67 reported higher levels of INT between 93 percent and 100 percent. The only exception took place in 2011 within chapter 67. Based on the measured GL index the share of IIT was reported by 83 percent.

2.14.13. Bilateral Trade with Commodities of Section XIII

Articles of stone, plaster, cement asbestos, mica, and similar materials persisted stable over the researched years. In 2006, the trade with these goods took place at zero GL index with zero Slovakia´s export and its import of 280 669 €. After 2011, the GL index increased by the value of 0.23 in 2011 and 0.91 in 2016 with a significant increase in total trade value. Trade with ceramic products changed from exclusively South Korean dominance in exports in 2006 to reported 0.5 GL index in 2011 and 2016. In 2006, the trade with glass and glassware represented by 0.53 GL index, however, in 2011, the GL index decreased to 0.04. Slovakia´s export rapidly dropped from the year 2006 to 2011. However, in 2016 the exports reached a value of 503 213 €, and South Korea´s export increased compared to 2006 by almost1 193 percent. In 2016, the GL index of these commodities decreased to the value of 0.06.

Tab. 17 Bilateral trade with commodities of section XIII

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL Index	Export	Import	GL Index	Export	Import	GL Index
Section XIII	Articles of stone, plaster, cement, asbestos, mica or similar materials, ceramic products, glass and glassware	68	Articles of stone, plaster, cement, asbestos, mica or similar materials	0	280 699	0.00	133 781	1 035 599	0.23	704 865	844 963	0.91
		69	Ceramic products	0	13 385	0.00	5 926	17 730	0.50	22 461	64 600	0.52
		70	Glass and glassware	430 626	1 201 531	0.53	84 423	3 893 189	0.04	503 213	15 531 892	0.06

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

The trade composition of section XIII changed significantly during the last decade. In 2006, the share of INT dominated over IIT. A higher share of IIT was reported only within chapter 70 by 53 percent to 47 percent share of INT. In 2016, the share of IIT increased continuously to 91 percent within chapter 68, to 52 percent of IIT within chapter 69 and 49 percent of IIT within chapter 70. In 2016, IIT share dominated over the share of INT.

2.1.14. Bilateral Trade with Commodities of Section XIV

Trade with commodities such as natural and cultured pearls, precious and semi-precious stones and metals, metals clad with precious metal and articled thereof including imitations, jewelry, and coins maintained INT over the examined years. In 2006, the GL index value was

0.08. In 2011, there was calculated the zero GL index, and in 2016, the GL index represented the value of 0.04 of the total trade of these products. South Korea in all three years reached a positive trade balance with continuously increasing export values. Slovakia´s export values of commodities included in this chapter fluctuated and remained unstable.

Tab. 18 Bilateral trade with commodities of section XIV

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL Index	Export	Import	GL Index	Export	Import	GL Index
Section XIV	Natural or cultured pearls, precious or semi-precious stones, precious metals, metals clad with precious metal and articles thereof, imitation jewelry, coin	71	Natural or cultured pearls, precious or semi-precious stones, precious metals, metals clad with precious metal and articles thereof; imitation, jewelry; coin	1 340	31 989	0.08	0	91 446	0.00	5 111	250602	0.04

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

The trade pattern of decomposed trade of section XIV maintained prevailingly inter-industry specialization of 92 percent of INT and 8 percent of IIT in 2006, net INT in 2011 and 96 percent of INT and 4 percent of IIT in 2016.

2.1.15. Bilateral Trade with Commodities of Section XV

Trade with base metals and articles made of base metals maintained INT in chosen years. Total trade with iron and steel increased by 1 688 percent, on both import and export sides in the past ten years. In 2006, the trade with articles made of iron and steel reached the inter-industry level with the GL index of 0.58 and the trade with base metals and cermets included in chapter HS 2 code 81 of 0.69 GL index. However, in 2011 and 2016 the GL index decreased rapidly. Trade with copper, nickel, and articles made of these metals took place at net inter-industry level. Aluminum and items made of aluminum were traded on both sides; however, South Korea´s export exceeded thirty-one times their imports in 2016. Trade with lead and products made of lead took place in the form of one-way trade in 2006 and did not occur in the following observed years at all. Tin, zinc, and articles made of these metals were not exported from Slovakia to South Korea during the observed years the trade took place at the exclusively one-way level at zero value of GL index. In all traded commodities of this section, South Korea achieved positive trade balance during the observed years. Articles included in the chapter of HS 2 code 82 and83 took place on both sides at mostly INT level during the observed period. It is important to note that the import data in HS 2 code 75 was not exact due to the confidentiality of available data.

Tab. 19 Bilateral trade with commodities of section XV

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL Index	Export	Import	GL Index	Export	Import	GL Index
Section XV	Base metals and articles of base metal	72	Iron and steel	30 395	6 743 459	0.01	294 332	80 056 190	0.01	101 386	121 025 513	0.00
		73	Articles of iron or steel	4 276 726	10 487 627	0,58	1 459 510	86 113 429	0.03	3 688 841	72 502 518	0.10
		74	Copper and articles thereof	0	117 846	0.00	2	906 007	0.00	6 864	1 336 391	0.01
		75	Nickel and articles thereof*	0	11 396	0.00	0	0	-	0	16 115	0.00

76	Aluminum and articles thereof	1 268	1 876 233	0..00	150 549	5 828 202	0.05	592 299	18 550 667	0.06
77	-	-	-	-	-	-	-	-	-	-
78	Lead and articles thereof	0	3 218	0.00	0	0	-	0	0	-
79	Zinc and articles thereof	0	33 698	0.00	0	21 671	0.00	0	2 010	0.00
80	Tin and articles thereof	0	376 012	0.00	0	40 475	0.00	0	61 612	0.00
81	Other base metals; cermets; articles thereof	35 949	67 541	0.69	0	6 101	0.00	0	2 035	0.00
82	Tools, implements, cutlery, spoons and forks, of base metal; parts thereof of base metal	2 897	1 896 656	0.00	3 939	3 560 324	0.00	616 595	12 216 037	0.10
83	Miscellaneous articles of base metal	19 905	1 691 023	0.02	8 492	11 420 606	0.00	806 272	22 848 840	0.07

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

Trade pattern presented in trade of iron and steel maintained on the inter-industry level. In 2006 and 2011, the share of INT was 99 percent, which increased to net INT in 2016. Trade of articles of these two metals reported fluctuating development over the chosen years. In 2006, the trade of these commodities consisted of 58 percent of IIT and 42 percent of INT. In 2011, there was noticed hider dominance of INT by total 97 percent and 3 percent of IIT. In 2016, the share of IIT was 10 percent and 90 percent of INT. Trade with copper maintained mostly on an inter-industry level in each of selected years, only in 2016, the share of IIT reported 1 percent of total trade with copper and articles thereof. Trade with nickel reported in chapter 75 took place in the form of net INT. In trade decomposition with aluminum prevailed inter-industry specialization with a gradual increase of IIT. In 2006, there was reported net INT by 100 percent, the share of INT decreased by 5 percent to 95 percent in 2011 and 2016, and the share of INT represented 94 percent. Trade with lead took place only in 2006 at net intra-industry specialization. Decomposition of trade detected net inter-industry specialization in bilateral exchange of zinc and tin in each of reported years. A significant decrease in IIT occurred in the trade of chapter 81. In 2006, total trade of commodities included in this chapter represented consisted of 69 percent of intra-industry exchange and 31 percent of inter-industry exchange. However, the following years reported a net INT. Trade of chapter 81 reported net INT until 2016 when the share of IIT increased by 10 percent. On trade within chapter 83 dominated INT by 98 percent in 2006, 100 percent in 2011 and 93 percent in 2016.

2.1.16. Bilateral Trade with Commodities of Section XVI

Total trade with nuclear reactors, boilers, machinery, and mechanical appliances and parts made thereof increased enormously over the past ten years. Trade maintains inter-industry level. Between the years of 2006 and 2011, Slovakia´s export increased by 33 percent. Compared 2011 and 2016, the export increased by 156 percent. South Korea´s export grew by 260 percent comparing the years of 2006 and 2011 and by another 33 percent in the following five-year horizon. Slovakia´s export of electrical machinery and equipment and other commodities included in HS 2 code 85 increased over the past ten years; however, the maximum was reached in 2011. South Korea´s export increased continuously during the examined years by 149 percent in 2011 and another 496 percent in 2016.

Tab. 20 Bilateral trade with commodities of section XVI

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2	Name of chapter	Export	Import	GL Index	Export	Import	GL Index	Export	Import	GL Index

Section	Name of section	code	Name of chapter	2006 Export	2006 Import	2006 GL	2011 Export	2011 Import	2011 GL	2016 Export	2016 Import	2016 GL
Section XVI	Machinery and mechanical appliances, electrical equipment, parts thereof, sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles	84	Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	8 422 956	199 994 654	0.08	11 238 433	720 401 045	0.03	28 796 412	959 973 262	0.06
		85	Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles	5 037 541	643 059 949	0.02	32 978 128	1 602 380 800	0.04	12 001 069	953 740 391	0.02

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

The share of prevailing INT of within chapter 84 decreased over the ten-year time horizon. In 2006, the trade consisted of 8 percent IIT and 92 percent INT, in 2011, INT increased by an additional 5 percent and in 2016; the share of INT represented 94 percent. Trade of chapter 85 fluctuated. In 2006, the trade consisted of the share of 2 percent IIT and 98 percent of INT. In 2011, the share value of IIT in percentage doubled; however, in 2016 the proportions of trade decomposition indicated the same value of 2006.

2.1.17. Bilateral Trade with Commodities of Section XVII

Trade with commodities of HS 2 code 86 took place once during the examined period of the form of South Korea´s export to Slovakia as a one-way trade. Trade with vehicles other than included in HS 2 code 87 chapter remained stable with decreasing GL index values. The values of export from both countries maintained a growing tendency with Slovakia´s negative trade balance. In the past ten years, Slovakia´s export increased by 142 percent and South Korea´s export to Slovakia increased by 746 percent. Trade with aircraft and spacecraft commodities maintain its one-way trade form of net exclusive Slovakia´s import. Total trade equaled net South Korea´s export increased 2700-times over the past ten years. Slovakia achieved positive trade balance in trade of ships, boats and floating instruments with South Korea and the trade took place in the form of net one-way trade.

Tab. 21 Bilateral trade with commodities of section XVII

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL Index	Export	Import	GL Index	Export	Import	GL Index

Section XVII	Vehicles, aircraft, vessels and associated transport equipment	86	Railway or tramway locomotives, rolling-stock and parts thereat railway or tramway track fixtures and fittings and parts thereof; mechanical (including electro-mechanical) traffic signaling equipment of all kinds	0	0	-	0	0	-	0	58 670	0.00
		87	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	20 541 795	94 364 073	0.36	33 217 339	567 340 904	0.11	49 271 892	798 396 073	0.12
		88	Aircraft, spacecraft, and parts thereof	0	10	0.00	0	2 291	0.00	0	27 161	0.00
		89	Ships, boats and floating structures	30 367	0	0.00	35 532	0	0.00	37 854	0	0.00

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

Section XVII reported a clear trade pattern of prevailing net INT, except trade of vehicles other than tramway, rolling-stock, and railway. The trade decomposition based on the GL index showed a prevalence of the INT. However, a significant share of IIT was reported as well with fluctuating importance over the years. In 2006, IIT represented 36 percent, in 2011 it dropped to 11 percent, and in 2016 the share of IIT increased to 12 percent.

2.1.18. Bilateral Trade with Commodities of Section XVIII

Trade with commodities included in HS 2 code 90 took place in the form almost zero GL index. During the selected years, Slovakia´s export increased, however in 2016 the export dropped by 6.4 percent. The similar situation hit South Korea´s export, which decreased by almost 41 percent. Slovakia´s exports of clocks, watches and associated products reported an enormous increase in 2011; however, in 2016, the export dropped. South Korea´s exports of these commodities reported continuous growth in the past ten years. Slovakia remains a positive trade balance in trading of these commodities. The GL index increased from 0.17 in 2006 to 0.65 in 2016. Total trade with musical instruments decreased over the selected period by almost 13 percent. The GL index of HS 2 92 decreased from 0.38 in 2006 to zero in 2016.

Tab. 22 Bilateral trade with commodities of section XVIII

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL Index	Export	Import	GL Index	Export	Import	GL Index
Section XVIII	Optical, photographic, cinematographic, measuring, checking, precious, medical or surgical instruments and apparatus, clocks and watches, musical instruments, parts and accessories thereof	90	Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; parts and accessories thereof	3 849 386	618 706 979	0.01	4 806 676	954 932 798	0.01	4 498 365	563 559 373	0.02
		91	Clocks and watches and parts thereof	688	7 178	0.17	295 757	67 594	0.37	183 756	88 989	0.65

| 92 | Musical instruments; parts and accessories of such articles | 36 536 | 154 221 | 0.38 | 4 050 | 69 144 | 0.11 | 0 | 165 989 | 0.00 |

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

Trade with photographic, cinematographic, measuring and checking precisions, medical and surgical instruments and apparatus included in chapter 90 reported almost net INT over the model years with 1 percent of IIT in 2006 and 2011 and 2 percent in 2016. Uninterrupted development of IIT was detected by the calculation of the GL index within chapter 91. IIT with clocks and watches increased from 17 percent in 2006 to 65 percent in 2016. On the other hand, development of IIT with musical instruments included in chapter 92 decreased from 38 percent in 2006 to net INT.

2.1.19. Bilateral Trade with Commodities of Section XIX

Trade with arms and ammunition did not report a stable development. In 2006, these commodities were not the object of mutual commodity exchange. In 2011, the two-way trade was reported with the valued of 0.34 GL index, which dropped to zero by 2016.

Tab. 23 Bilateral trade with commodities of section XIX

Harmonized System			2006				2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL Index	Export	Import	GL Index	Export	Import	GL Index
Section XIX	Arms and ammunition, parts and accessories thereof	93	Arms and ammunition; parts and accessories thereof	0	0	-	1 258	6 092	0.34	0	1 368	0.00

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

In 2006 and 2016 the trade was reported as 100 percent of INT, however, in the middle of the reported period, the share of IIT increased to 34 percent. Generally, INT prevailed over IIT within the section XIX.

2.1.20. Bilateral Trade with Commodities of Section XX

Trade with miscellaneous manufactured articles increased in the past ten years. Slovakia´s export did not report such a continuous increase of trade in specific chapters compared to South Korea. South Korea´s commodities of chapter HS 2 code 94 reported an enormous growth of 6 778 percent over the past ten years. In 2006, the GL index reported the value of 0.03. In 2011, the GL index was measured at 0.62 of this commodity chapter. In 2016, the value of the GL index dropped to 0.02 of the total trade of this commodity chapter. Slovakia´s export of commodity chapter including toys, games and sports requisites doubled during 2006 and 2011; however, in 2016 Slovakia´s export of this commodity chapter decreased by 34 percent. South Korea reported a continuous growth in export of the commodities to Slovakia by 11 percent in 2011 and almost 671 percent in 2016. The trade balance in 2006 and 2011 was positive for Slovakia in these commodities, however, in 2016, the data reported that Korea exceeded Slovakia´s export. In 2006, the GL index reached the value of 0.55 that dropped to 0.31 in 2011, and in the last reported year, the GL index value was 0.63.

Trade with miscellaneous manufactured articles did not report a stable GL index development. In 2006, the trade took place in the form of one-way trade with zero GL index. In 2011, both countries traded the commodities included in HS 2 code 96 at 0.08 GL index. In 2016, there took place a two-way trade with a significant difference in export values. Therefore, there was measured almost zero GL index.

Tab. 24 Bilateral trade with commodities of section XX

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL Index	Export	Import	GL Index	Export	Import	GL Index
Section XX	Miscellaneous manufactured articles	94	Furniture; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings; lamps and lighting fittings, not elsewhere specified or included; illuminated signs, illuminated name-plates and the like; prefabricated buildings.	12 094	933 128	0.03	974 835	2 183 281	0.62	1 147 490	96 295 532	0.02
		95	Toys, games and sports requisites; parts and accessories thereof	238 955	91 262	0.55	545 649	101 658	0.31	358 510	783 668	0.63
		96	Miscellaneous manufactured articles	0	350 006	0.00	13 024	325 228	0.08	6	994 119	0.00

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

Trade with furniture and other commodities included in chapter 94 consisted mostly of INT which dramatic increase of IIT during 2011. In 2006, IIT was reported at 2 percent, which changed in 2011 when the share of IIT grew to 62 percent, however, in 2016, the share of IIT dropped back to 2 percent. In chapter 95 IIT prevailed over INT, during the selected period. In 2006, there reported the share of IIT was 55 percent, which dropped by 24 percent compared to 2011 and in 2016 IIT was reported at 63 percent. Trade with miscellaneous manufactured articles included in section XX, reported almost net INT except 2011 when the share of IIT was calculated as 8 percent of the GL index.

2.1.21. Bilateral Trade with Commodities of Section XXI

During the observed years, trade with commodities of section XXI did not occur.

Tab. 25 Bilateral trade with commodities of section XXI

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL Index	Export	Import	GL Index	Export	Import	GL Index
Section XXI	Works of art, collectors´pieces and antiques	97	Works of art, collectors' pieces and antiques	0	0	-	0	0	-	0	0	-
		98	-	-	-	-	-	-	-	-	-	-
		99	-	-	-	-	-	-	-	-	-	-

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

2.2. Malaysian-Slovak bilateral trade with Commodities aggregated per the Harmonizes System (HS2)

2.2.1. Bilateral Trade with Commodities of Section I

Bilateral trade between Malaysia and Slovakia with animal products and live animals included in this commodity section took place occasionally. In each of the commodity chapters that reported trade during the examined period, the form of trade was exclusively on an inter-industry level. Trade with these products did not indicate a specific trade pattern. In

2006 and 2011, trade with live animals did not take place; however, in 2016, Slovakia exported a certain amount of live animal to Malaysia. Trade with meat and meat offal did not occur during any of selected years. Fish, crustaceans, mollusks and other aquatic invertebrates were imported in 2006 and 2016 from Malaysia; however, in 2011, a small amount was exported from Slovakia to Malaysia. In all three examined years, the trade took place on a net inter-industry level. Trade with dairy production, birds' eggs, natural honey, and other animal products not elsewhere specified did not either indicate a specific trade pattern based on the GL index calculation. In 2006 and 2016, the trade with these commodities did not occur, and in 2011 a certain amount of output was imported from Malaysia. The value of imported commodities of products of animal origin covered in HS 2 code 05 from Malaysia persists negligible. The GL index was calculated in all commodities at the value zero in each or observed years.

Tab. 26 Bilateral trade with commodities of section I

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section I	Live animals, animal products	1	Live animals	0	0	-	0	0	-	2 130	0	0.00
		2	Meat and edible meat offal	0	0	-	0	0	-	0	0	-
		3	Fish and crustaceans, mollusks and other aquatic invertebrates	0	25 229	0.00	0	61	0.00	0	5 104	0.00
		4	Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included	0		-	0	1 494	0.00	0	0	-
		5	Products of animal origin, not elsewhere specified or included	0	22	0.00	0	43	0.00	0	0	-

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

Trade with products of animals reported 100 percent of INT during the reported years with less than 0.00 percent on the total trade.

2.2.2. Bilateral Trade with Commodities of Section II

Trade with vegetable products included in section II of the harmonized system did not report any continuous trade development. In case that the trade took place, it was solely on the inter-industry level with the GL index of zero. Trade with live trees and other plants including cut flowers and ornamental foliage were purely imported from Malaysia with a decreasing tendency in the past ten years. Unstable trade took place with edible vegetables and certain roots and tubers in selected years. Malaysia´s one-way trade with edible fruits, nuts, citrus fruit, and melons took place in each of the three examined years. Coffee, tea, matte and spices were not traded during the model years, except trade in 2016. Cereals of HS 2 code 10, products of the milling industry, malts, starches, inulin and wheat gluten of HS 2 code 11 and vegetable planting materials of HS 2 code 14 were not traded subjects in bilateral trade of Malaysia and Slovakia during the reported years. Trade with oil seeds and oleaginous fruits reported one-way trade of negligible importance on total trade. In cases when the trade with vegetable products took place between Slovakia and Malaysia, it was done only on an inter-industry level with positive Malaysian trade balance. Slovakia achieved positive trade balance in commodity chapter HS 2 code 13 of lac; gums, resins and other vegetable saps and extracts in 2006 and 2011. In 2016, the situation rapidly changed and Malaysia exported significantly higher value of products included in this commodity chapter. Malaysian exports in 2016

exceed Slovak exports of 2006 and 2011 by 7 557 percent. The trade was made exclusively on an inter-industry level in all three years.

Tab. 27 Bilateral trade with commodities of section II

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section II	Vegetable products	6	Live trees, and other plants, bulbs, roots, and the like, cut flowers, ornamental foliage	0	9 481	0.00	0	3 752	0.00	0	146	0.00
		7	Edible vegetables and certain roots and tubers.	0	182	0.00	0	27 993	0.00	0	0	-
		8	Edible fruit and nuts; peel of citrus fruit or melons	0	14 356	0.00	0	23 705	0.00	0	12029	0.00
		9	Coffee, tea, mate and spices	0	0	-	0	0	-	0	955	0.00
		10	Cereals	0	0	-	0	0	-	0	0	-
		11	Products of the milling industry; malt; starches; inulin; wheat gluten	0	0	-	0	0	-	0	0	-
		12	Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal plants; straw and fodder	0	0	-	0	4 421	0.00	0	365	0.00
		13	Lac; gums, resins and other vegetable saps and extracts	4 960	0	0.00	0	4 762	0.00	0	744388	0.00
		14	Vegetable plaiting materials; vegetable products not elsewhere specified or included.		0	-	0	0	-	0	0	-

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

Trade with products of vegetable origin and fats, oils and waxes of animal and vegetable origin reported as net INT.

2.2.3. Bilateral Trade with Commodities of Section III

Bilateral trade with fats, oils, and their derivate of animal and vegetable origin was continuously increasing with measured zero GL index during the model years. The net exporter in this bilateral trade was Malaysia.

Tab. 28 Bilateral trade with commodities of section III

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section III	Animal or vegetable fats and oils and their cleavage, Products prepared edible fats, animal or vegetable waxes	15	Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes	0	66 116	0.00	0	80 063	0.00	0	744388	0.00

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

Trade with products of animals and vegetable origin and fats, oils and waxes of animal and vegetable origin reported 100 percent of INT during the reported years with less than zero percent on total trade.

2.2.4. Bilateral Trade with Commodities of Section IV

In 2006, the trade with products included in section IV was solely INT with the position of Malaysia as a net exporter. In that year, the bilateral trade did not take place in products such as preparations of cereals, flour, starch or milk, pastry and cooks´ products, beverages, spirits

and kinds of vinegar and tobacco and manufactured tobacco substitutes. In 2011, trade of preparations of animal origin (meat, fish, mollusks, and other aquatic invertebrates), preparations of milling industry and preparations of vegetable origin took place like INT. Slovakia was a net exporter of meat, aquatic and milling industry preparations while Malaysia was sole exporter of vegetable preparations. 2011 was the only year when IIT took place within section IV in model years. The GL index of the value 0.31 was present in the trade with miscellaneous edible preparations. In the case of trade with beverages, spirits, and vinegar, the calculated value of the GL index was 0.15 and residues and waste from the food industries, the prepared animal fodder of the value 0.42. Trade with sugar, cocoa and tobacco, and their preparation did not occur. In 2016, the non-traded commodities were preparations of meat, fish and other aquatic animals and tobacco including its manufactured substitutes. In 2016, the trade with all products within section IV took place in the form of one-way trade, except two-way vegetable preparations trade with 0.08 GL index.

Tab. 29 Bilateral trade with commodities of section IV

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section IV	Prepared foodstuffs, beverages, spirits and vinegar, tobacco and manufactured tobacco substitutes	16	Preparations of meat, of fish or of crustaceans, mollusks or other aquatic invertebrates	0	22 169	0.00	1 925	0	0.00	0	0	-
		17	Sugars and sugar confectionery	0	410	0.00	0	0	-	0	940	0.00
		18	Cocoa and cocoa preparations	0	17 068	0.00	0	0	-	0	20967	0.00
		19	Preparations of cereals, flour, starch or milk; pastry cooks' products	0	0	-	1 224	0	0.00	0	7845	0.00
		20	Preparations of vegetables, fruit, nuts or other parts of plants.	0	1 236	0.00	0	1 357	0.00	805	20554	0.08
		21	Miscellaneous edible preparations	0	8 892	0.00	11 772	63 356	0.31	0	574136	0.00
		22	Beverages, spirits and vinegar	0	0	-	2 622	215	0.15	4 812	0	0.00
		23	Residues and waste from the food industries; prepared animal fodder	0	242 345	0.00	108	409	0.42	0	378	0.00
		24	Tobacco and manufactured tobacco substitutes	0	0	-	0	0	-	0	0	-

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

A commodity section of preparations of foodstuff of animal origin, sugar, cocoa, and cereal preparations reported 100 percent of INT during the model years when the trade took place. Preparations of vegetables, fruit, and nuts reported net INT in 2006 and 2011. In 2016, the GL index increased to 0.08 which stood for an 8 percent increase of IIT with the dominance of INT. Miscellaneous edible preparations reported fluctuated development regarding the GL index. Net INT was reported in 2006 and 2016 for this commodity chapter; however, in 2011 IIT share of 31 percent was measured on total trade. Beverages, spirits and vinegar trade did not take place in 2006. In 2011, there was calculated the GL index of 0.15 with the presence of the IIT share of 15 percent. Residues and waste from the food industries; prepared animal fodder reported overall INT dominance except in 2011 by 42 percent of IIT

and 58 percent of INT. Tobacco and its preparation were not the subjects of bilateral trade between Slovakia and Malaysia during the reported period.

2.2.5. Bilateral Trade with Commodities of Section V

Generally, the bilateral trade with mineral products took the place of INT during the researched years. Only Malaysia exported salt, sulfur, earths, stones, plastering materials, lime, and cement in 2006. In 2011, these minerals were not traded whatsoever and in 2016, both countries two-way traded products of this chapter with Slovakia´s positive trade balances. Slovakia´s export exceeded Malaysia´s export by 91 percent. Ores, slag, and ash represented non-traded commodities in all three model years. Mineral fuels, mineral oils, and products of their distillation, bituminous substances, and mineral waxes were one-way exported from Malaysia to Slovakia in 2006 and 2016. In 2011, the GL index of trade in these commodities was calculated at 0.01.

Tab. 30 Bilateral trade with commodities of section V

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section V	Mineral products	25	Salt; sulfur; earths and stone; plastering materials, lime and cement	0	203 386	0.00	0	0	-	40 800	3631	0.16
		26	Ores, slag and ash	0	0	-	0	0	-	0	0	-
		27	Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes	0	63	0.00	23	8 106	0.01	0	107094	0.00

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

Trade with mineral products took place in each of the reported years. Net INT took place in 2006 in trading commodity chapter consisting of salt, sulfur, earths and stone, plastering materials, lime and cement, and mineral fuels, mineral oils and products of their distillation, bituminous substances, and mineral waxes. In 2011, the only traded commodity chapter was 27 with 99 percent share of INT and 1 percent of IIT on total trade. In 2016, IIT of 16 percent was reported in chapter 25. Ores, slag and ash were not the subjects of trade in neither of reported years.

2.2.6. Bilateral Trade with Commodities of Section VI

Trade with chemicals and to them allied industries was turbulent during the observed period. From the perspective of inter- and intra-industry trade, the commodities were traded on the inter-industry basis by looking at the results of the GL index. In 2006, all traded commodities included in section VI were traded on the inter-industry level. Organic chemicals entered two-way trade between Malaysia and Slovakia; however, due to great disproportion in export and import, the GL index indicated high values of INT. Commodities of HS 2 code 28, 31 and 33 were not the object of bilateral trade between presented courtiers in reported years. In 2011, all commodities included were traded mostly on the inter-industry level. Small values of the GL index were reported in pharmaceutical products of 0.02 and soap, organic surface-active agents, washing preparations, lubricating preparations, artificial waxes, prepared waxes, polishing or scouring preparations, candles, and similar articles, modeling pastes, "dental waxes" and dental preparations with a basis of plaster chapter of 0.0.1. Fertilizers were not traded commodity that year. In 2016, there took place trade with each commodity included in section VI. The objects of two-way trade were products of HS 2 code 28 at the GL index value 0.16, of HS 2 code 29 at 0.09 of IIT and HS 2 code 34 at 0.84.

Commodities of HS 2 code 30, 31, 32, 33, 35, 37 and 38 entered one-way trade worth zero GL index. Malaysia imported pharmaceutical products and fertilizers with no reciprocal export. Slovakia imported commodities of HS 2 code 32, 33, 35, 37 and 38 with no reciprocal export. Explosive chemicals and articles consisting of chemicals with code 36 were not the objects of bilateral trade in any of the model years.

Tab. 31 Bilateral trade with commodities of section VI

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section VI	Products of the chemical or allied industries	28	Inorganic chemicals; organic or inorganic compounds of precious metals, of rare-earth metals, of radioactive elements or of isotopes	0	0	-	0	358 569	0.00	70 113	6104	0.16
		29	Organic chemicals	349 015	53	0.00	0	165 779	0.00	33 422	1508	0.09
		30	Pharmaceutical products	0	64 064	0.00	381 492	3 968	0.02	433 775	0	0.00
		31	Fertilizers	0	0	-	0	0	-	17 242	0	0.00
		32	Tanning or dyeing extracts; tannins and their derivatives; dyes, pigments and other coloring matter; paints and varnishes; putty and other mastics; inks	0	128 485	0.00	316	187 927	0.00	0	11574	0.00
		33	Essential oils and resinoids; perfumery, cosmetic or toilet preparations	0	0	-	0	98 309	0.00	0	70796	0.00
		34	Soap, organic surface-active agents, washing preparations, lubricating preparations, artificial waxes, prepared waxes, polishing or scouring preparations, candles and similar articles, modeling pastes, "dental waxes" and dental preparations with a basis of plaster	0	38 467	0.00	1 148	193 670	0.01	60 828	83686	0.84
		35	Albuminoidal substances; modified starches; glues; enzymes	0	1 442	0.00	21 620	262	0.02	0	3244	0.00
		36	Explosives; pyrotechnic products; matches; pyrophoric alloys; certain combustible preparations	0	0	-	0	0	-	0	0	-
		37	Photographic or cinematographic goods	0	23 967	0.00	0	17 676	0.00	0	3574	0.00
		38	Miscellaneous chemical products	3 764	2 215 159	0.00	926	8 195 916	0.00	0	7705746	0.00

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

Development of IIT in products of chemical industry varied between the years 2006 and 2016, with a significant dominance of INT. Net INT was reported in commodity chapters in 32, 33, 37 and 38. IIT in inorganic chemicals reported an increase of 16 percent compared to 2011. In the trade of organic chemicals, the share of IIT increase increased in 2016 by 9 percent. Trade of albuminoidal substances, modified starches, glues, and enzymes oscillated around 100 percent INT in 2006 and 2016, with an increase of IIT share of 2 percent in 2011.

2.2.7. Bilateral Trade with Commodities of Section VII

Plastics, rubber, and articles thereof were traded commodities in each of model years. In 2006, the GL index of output made of plastics at the value of 0.16. In 2011, the GL index of trade with plastics dropped to 0.05. In 2016, both Malaysia´s and Slovakia´s exports reached their export maximum in bilateral trade with the GL index of 0.14. Malaysian export raised continuously in the ten-year interval, whereas Slovakia´s export of plastics to Malaysia fluctuated. One-way trade with rubber and associated products took place in 2006 with no real Slovak export. In 2011, the volume of trade increased on both sides. Slovakia´s export rose by almost 40 000 €, and Malaysia´s export rose to more than 92.5 million €. Due to the wide difference in values of import and export, the GL index did not provide value at two-decimal places despite the fact of present two-way trade. In 2016, Slovakia´s rubber export increased rapidly compared to 2011, and Malaysia´s export to Slovakia dropped by 96 percent. Slovakia reached a positive trade balance, and the measured GL index reached the value of 0.33.

Tab. 32 Bilateral trade with commodities of section VII

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section VII	Plastics and articles thereof, rubber and articles thereof	39	Plastics and articles thereof	298 781	3 434 795	0.16	169 090	6 249 226	0.05	678 268	8973569	0.14
		40	Rubber and articles thereof	0	57 769 384	0.00	39 768	92 598 628	0.00	6 467 760	3254902	0.33

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

Trade with rubber and plastic reported prevailing INT share over IIT of total trade. In 2006, trade with plastics and plastic articles reported 16 percent of IIT, which decreased in 2011 to 5 percent and again increased to 14 percent of IIT in 2016. In the trade with rubber and rubber articles dominated INT by net INT in 2006 and 2011. In 2016, the share of INT decreased by 33 percent compared to the previous years.

2.2.8. Bilateral Trade with Commodities of Section VIII

Raw hides, skins, leather, fur skins, artificial fur and neither manufactures composed of these materials were commodities that were not the subjects of bilateral trade between Malaysia and Slovakia in presented years. However, articles made of leather, saddler, harness, travel good, bags and similar products including articles of animal gut were exchanged at high values of the GL index, 0.94 in 20011 and 0.75 in 2016 on the total trade within the commodity chapter.

Tab. 33 Bilateral trade with commodities of section VIII

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section VIII	Raw hides and skins, leather, fur skins and articles thereof, saddler and harness, travel goods, handbags and similar containers, articles of animal gut (other than silk-worm gut)	41	Raw hides and skins (other than fur skins) and leather	0	0	-	0	0	-	0	0	-
		42	Articles of leather; saddler and harness; travel goods, handbags and similar	0	43 788	0.00	2 455	2 755	0.94	12 846	7713	0.75

	containers; articles of animal gut (other than silk-worm gut).									
43	Fur skins and artificial fur; manufactures thereof	0	0	-	0	0	-	0	0	-

Source: Data source Statistical Office of the Slovak Republic and author's calculations (2018)

The commodity chapter of section VIII that was a subject of bilateral trade in each of selected years reported dominance of IIT. The share of IIT on trade with articles of leather, saddler and harness, travel goods, handbags, and similar containers, articles of animal gut dominated by 94 percent in 2011 and 75 percent in 2016.

2.2.9. Bilateral Trade with Commodities of Section IX

Wood and articles made of wood including wood charcoal were the only commodities traded of section IX between Slovakia and Malaysia during the model years. Despite the turbulent performance of Slovakia´s export, Slovakia achieved positive trade balance in trading commodities of chapter 44 in 2001 and 2016. Malaysia´s export in 2006 decreased over the model years by more than 93 percent. The GL index also fluctuated during the years. In 2006, its value represented 0.17. In 2011, the value dropped to the GL index of 0.07, and in 2016, the GL index value increased to 0.47.

Tab. 34 Bilateral trade with commodities of section IX

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section IX	Wood and articles of wood, wood charcoal, cork and articles of cork, manufactures of straw, of esparto or of other plaiting materials, basketware and wickerwork	44	Wood and articles of wood; wood charcoal	26 712	291 332	0.17	388 038	15 096	0.07	63 667	19540	0.47
		45	Cork and articles of cork	0	0	-	0	0	-	0	0	-
		46	Manufactures of straw, of esparto or of other plaiting materials; basketware and wickerwork	0	0	-	0	0	-	0	0	-

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

Trade with wood, articles of wood and wood charcoal prevailed on the inter-industry level with 17 percent of IIT in 2006. In 2011, the share of INT on the total trade increased by 10 percent. In 2016, the IIT was measured at 47 percent.

2.2.10. Bilateral Trade with Commodities of Section X

Pulps of wood and other fibrous cellulosic material were not traded in 2006 and 2016. In 2011, the value of 9 078 € was imported from Malaysia without reciprocal exports. Trade with paper and paperboard, articles of paper pulp indicated a high value of the measured GL index at 0.77 in 2006. In 2011, the exchange took place in the form of two-way trade; however, the share of IIT was negligible. That year, Malaysia´s exports increased by almost ten-times compared to the value of exports in 2006. In 2016, the total value of trade decreased below the value of trade of 2006; however, the GL index increased by 0.18 compared to 2011. Commodities of HS code 49 were two-way traded in all model years. The values of trade of these commodities to the annual total trade values represent a negligible portion. The

development of trade from the perspective of INT and IIT fluctuated. In 2006, the trade was performed at almost 100 percent inter-industry level. In 2011, the value of the measured GL index of 0.88 and in 2016, the value of the GL index dropped by 0.81 compared to the previous year of the research.

Tab. 35 Bilateral trade with commodities of section X

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section X	Pulp of wood or of other fibrous cellulosic material, recovered (waste and scarp) paper or paperboard, paper and paperboard and articles thereof	47	Pulp of wood or of other fibrous cellulosic material; recovered (waste and scrap) paper or paperboard	0	0	-	0	9 078	0.00	0	0	-
		48	Paper and paperboard; articles of paper pulp, of paper or of paperboard	37 766	23 400	0.77	150	221 814	0.00	1 334	13543	0.18
		49	Printed books, newspapers, pictures and other products of the printing industry; manuscripts, typescripts and plans	179	73 801	0.00	4 320	5 537	0.88	1 229	34051	0.07

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

In section X, a high prevalence of IIT was reported in 2006, which changed over the ten years. In 2006, IIT of 77 percent was measured in the commodity chapter 48. In 2011, net INT took place within this chapter with a decrease of INT by 18 percent in 2016. Chapter 49 reported net INT in 2006, with a significant decline of 88 percent in 2011 and the resultant increase of 81 percent in 2016. Trade with commodity chapter 47 took place only once during the reported years of net INT in 2011.

2.2.11. Bilateral Trade with Commodities of Section XI

During the observed years, the materials that were not the subjects of trade of section XI included silk, wool, fine and coarse animal hair, horse hair yam and woven fabrics, material and articles included in HS 2 code 53, carpets and carpet textiles. In 2006, net INT trade was reported in commodity chapter with codes 52, 54, 55, 59, 60, 62 and 63. Two-way trade indicating a certain presence of IIT included commodities such as wadding felt and nonwovens; special yarns; twine, cordage, ropes and cables and articles thereof at the GL index value of 0.19 and commodity chapter with articles of apparel and clothing accessories, knitted or crocheted at 0.03. In 2011, almost all traded articled within the section XI reported zero GL index except articles of apparel and clothing accessories, not knitted or crocheted with 0.93 and other made up textile articles, sets, worn clothing and worn textile articles, rags of 0.51. In 2016, pure INT took place with items included in the chapters of HS 2 code 54, 58, 59, 60 and 61. Two-way trade took place with commodities chapters of HS 2 codes 62 and 63 with low values of the GL index. High values of the GL index were measured in trade within chapter HS 2 code 56; however, the value of this exchange was negligible to total trade per annum.

Tab. 36 Bilateral trade with commodities of section XI

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section XI	Textiles and textile articles	50	Silk	0	0	-	0	0	-	0		-
		51	Wool, fine or coarse animal hair; horsehair yarn and woven fabric	0	0	-	0	0	-	0	0	-
		52	Cotton	0	4 685	0.00	0	0	-	0	0	-
		53	Other vegetable textile fibers; paper yarn and woven fabrics of paper yarn	0	0	-	0	7	0.00	0	0	-
		54	Man-made filaments	479	379 490	0.00	0	354 343	0.00	0	478151	0.00
		55	Man-made staple fibers	0	432 847	0.00	0	80 812	0.00	0	0	-
		56	Wadding, felt and nonwovens; special yarns; twine, cordage, ropes and cables and articles thereof	3 985	414	0.19	0	3 135	0.00	65	77	0.92
		57	Carpets and other textile floor coverings	0	0	-	0	0	-	0	0	-
		58	Special woven fabrics; tufted textile fabrics; lace; tapestries; trimmings; embroidery	0	0	-	0	15	0.00	28	0	0.00
		59	Impregnated, coated, covered or laminated textile fabrics; textile articles of a kind suitable for industrial use	0	5 782	0.00	43	0	0.00	0	23035	0.00
		60	Knitted or crocheted fabrics	0	12 681	0.00	72 974	0	0.00	7 282	0	0.00
		61	Articles of apparel and clothing accessories, knitted or crocheted	9 927	678 822	0.03	753	592 468	0.00	483	430229	0.00
		62	Articles of apparel and clothing accessories, not knitted or crocheted	0	333 379	0.00	3 102	91 047	0.07	4 637	371870	0.02
		63	Other made up textile articles; sets; worn clothing and worn textile articles; rags	0	910	0.00	1 057	339	0.49	1 500	60292	0.05

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

In section XI, the presence of IIT was calculated at 19 percent in chapter 56 and 3 percent in chapter 61 in 2006. In 2011, IIT share of 7 percent was measured in chapter 62. The highest percentages of IIT were measured among the commodities included in section XI in 2016. In chapter 56 was measured share of IIT of 92 percent in the last reported year. 2 percent share of IIT was calculated for chapter 62, and 5 percent of IIT was reported in chapter 63 in 2016. All other traded commodities reported net INT.

2.2.12. Bilateral Trade with Commodities of Section XII

Commodity section XII includes products with HS codes 64, 65, 66 and 67. In 2006, the traded commodities belonged to chapters 64 and 65. Both commodities were traded purely on inter-industry level represented by Malaysia´s export. Products with codes 66 and 67 were not the subject of trade that year. In 2011, two-way trade took place with footwear commodity group at the value 0.34 of the GL index. In 2016, the GL index value for the product group of footwear was calculated at 0.35. Malaysia´s export of footwear was conducted in each of the observed years with the maximal value in 2011. Slovakia´s export took place in 2011 and 2016. In 2016, Slovak exports exceeded the valued of Malaysia´s exports, and thus Slovakia reported positive trade balance in this commodity trade. Trade with headgear was reported as one-way trade with pure Malaysia´s exports in 2011. The following reported year, the GL

index increased to 0.26. The commodities of chapter 66 and 67 were exchanged on a net inter-industry level in 2016. The previous years, these commodities were not traded in bilateral trade between Malaysia and Slovakia.

Tab. 37 Bilateral trade with commodities of section XII

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section XII	Footwear, headgear, umbrellas, sun umbrellas, walking-sticks, seat-sticks, whips, riding-crops and parts thereof, prepared feathers and articles made therewith, artificial flowers, articles of human hair	64	Footwear, gaiters and the like; parts of such articles	0	44 241	0.00	37 384	185 120	0.34	32 530	6797	0.35
		65	Headgear and parts thereof	0	4 697	0.00	0	74 914	0.00	1 430	9472	0.26
		66	Umbrellas, sun umbrellas, walking-sticks, seat-sticks, whips, riding-crops and parts thereof	0	0	-	0	0	-	160	0	0.00
		67	Prepared feathers and down and articles made of feathers or of down; artificial flowers; articles of human hair	0	0	-	0	0	-	0	4843	0.00

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

The IIT share of total trade continuously increased in trade of footwear, gaiters and the like and parts of such articles from 34 percent in 2011 to 35 percent in 2016. Chapter of headgear and parts thereof grew from net INT in 2006 and 2011 to 26 percent of IIT in 2016. All other traded commodities reported net INT during the observed periods.

2.2.13. Bilateral Trade with Commodities of Section XIII

Trade with articles of stones, plaster, cement asbestos, mica and similar material included in chapter 68 of the section XIII took place in the form of net INT with sole Malaysia´s export during reported years. The values or Malaysia´s export achieved negligible values of total trade per annum. Trade with ceramic products can be classified as pure INT with the two-way exchange in 2016 at 0.01 measured GL index. High values of IIT trade were reported in exchange for glass and glassware in 2011 and 2016. In both years, the GL index reported the value of 0.95.

Tab. 38 Bilateral trade with commodities of section XIII

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section XIII	Articles of stone, plaster, cement, asbestos, mica or similar materials, ceramic products, glass and glassware	68	Articles of stone, plaster, cement, asbestos, mica or similar materials	0	142	0.00	0	590	0.00	0	2795	0.00
		69	Ceramic products	0	31 079	0.00	0	16 440	0.00	438	62485	0.01

| 70 | Glass and glassware | 0 | 12 195 | 0.00 | 463 141 | 417 595 | 0.95 | 1 412 568 | 1269645 | 0.95 |

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

INT dominated overall commodity chapters included in section XIII, except trade with glass and glassware with a constant IIT share increase of 90 percent between 2011 and 2016.

Trade within commodity section XIV was reported as net INT.

2.2.14. Bilateral Trade with Commodities of Section XIV

Trade with natural and cultured pearls, precious, semi-precious stones and metals, metals clad with precious metal and imitation jewelry and coins took place in one-way form with measured GL index at the zero value. In 2006, a negligible value was exported from Slovakia to Malaysia. In 2011 and 2016, it was Malaysia that achieved positive trade balance in exporting mentioned commodities.

Tab. 39 Bilateral trade with commodities of section XIV

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section XIV	Natural or cultured pearls, precious or semi-precious stones, precious metals, metals clad with precious metal and articles thereof, imitation jewelry, coin	71	Natural or cultured pearls, precious or semi-precious stones, precious metals, metals clad with precious metal and articles thereof; imitation, jewelry; coin	125	0	0.00	0	3 316	0.00	0	529619	0.00

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

Trade with natural, cultured pearls, precious, semi-precious stones, precious metals, metals clad with precious metal and articles thereof, imitation jewelry and coin reported net INT in each of the observed years.

2.2.15. Bilateral Trade with Commodities of Section XV

Bilateral trade with metals included in section XV represented a continues development compared to other so far observed sections if excluded metals and articles thereof that were not traded in any of the three years such as nickel, lead and zinc with a negligible traded value. Total trade of iron and steel increased in the observed period. In 2006, both metals represented non-tradable articles. In 2011, Slovakia´s export exceeded reciprocal Malaysia´s export in bilateral trade with the measured GL index of 0.32. In 2016, the trade was exclusively one-way trade with Malaysia´s export. Cooper and cooper articles were the subjects of net INT in 2006 and 2011. Copper and articles made of copper were exported from Malaysia to Slovakia without reciprocal import. In 2016, commodities of this chapter were traded two-way with the measured GL index of 0.84. Aluminum and aluminum articles entered two-way trade during the three observed years with the GL index of 0.06 in 2006, 0.01 in 2011 and 0.02 in 2016. The total trade value increased over the past ten years continuously. Malaysia achieved a positive trade balance in exchange for these commodities in each of the three years. Articles of tin and metal tin itself represented one-way trade with zero GL index during the observed years. Metal tools such as cutlery were traded exclusively as one-way trade in 2006. In the next of observed years' commodities included in this chapter entered two-way trade with low GL index of 0.05 in 2011 and 0.01 in 2016. Miscellaneous articles of base metal were traded two-way in 2006, and the following observed years it was net INT by Malaysian export.

Tab. 40 Bilateral trade with commodities of section XV

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section XV	Base metals and articles of base metal	72	Iron and steel	0	0	-	30 192	5 667	0.32	0	184481	0.00
		73	Articles of iron or steel	49 060	1 261 976	0.07	12 661	1 196 400	0.02	71 672	3853111	0.04
		74	Copper and articles thereof	0	2 848	0.00	0	21 787	0.00	92	1204	0.14
		75	Nickel and articles thereof	0	0	-	0	0	-	0	0	-
		76	Aluminum and articles thereof	49	1 591	0.06	981	280 744	0.01	12 379	1185990	0.02
		77	-	-	-	-	-	-	-	-	-	-
		78	Lead and articles thereof	0	0	-	0	0	-	0	0	-
		79	Zinc and articles thereof	0	0	-	0	19	0.00	0	0	-
		80	Tin and articles thereof	0	27 816	0.00	0	2 416	0.00	0	7491	0.00
		81	Other base metals; cermets; articles thereof	0	0	-	0	92	0.00	0	0	-
		82	Tools, implements, cutlery, spoons and forks, of base metal; parts thereof of base metal	0	23 985	0.00	12 452	532 874	0.05	1 208	299644	0.01
		83	Miscellaneous articles of base metal	867	127 371	0.01	0	113 408	0.00	0	123511	0.00

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

The importance of trade with base metals increased over the past ten years. Even though, the trade of base metals increased in total over the past decade, the small share of IIT gradually decreased during the period.

2.2.16. Bilateral Trade with Commodities of Section XVI

Trade with machinery and electrical equipment underwent continuous trade development in the past ten years. Slovakia achieved continues negative trade balance in bilateral trade of commodities included in section XVI with Malaysia. Malaysia´s exports rose continuously while Slovak exports fluctuated. The development of IIT of nuclear reactors, boilers, machinery, and mechanical appliances was traded two-way in 2006 with low IIT indicator. Within five years, the GL index of commodities included in HS 2 code 84 increased by 0.53 in 2011. In 2016, the values of total trade – import and export of products of chapter 84 and the GL index reported little increase comparing to 2011. Malaysia´s export of electrical equipment reported an enormous growth of 206 percent in the past ten years while Slovakia´s export and the GL index reported unstable development. The GL index results indicated that the trade of electrical equipment precisely specified within chapter 85 is the two-way trade of high inter-industry level.

Tab. 41 Bilateral trade with commodities of section XVI

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index

Section XVI	Machinery and mechanical appliances, electrical equipment, parts thereof, sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles	84	Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	1 015 231	43 514 491	0.05	5 530 668	12 227 489	0.05	5 859 241	12846533	0.63
		85	Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles	5 719 050	85 392 125	0.13	2 580 436	94 432 635	0.13	9 061 831	307635029	0.06

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

A significant increase over the past decade based on a GL index calculation was reported in the section XVI that has the highest share of total bilateral trade, particularly in chapter 84. The IIT share of chapter 84 increased by 58 percent between 2006 and 2016. IIT share in chapter 85 decreased from 13 percent measured in 2006 and 2011 to 6 percent in 2016.

2.2.17. Bilateral Trade with Commodities of Section XVII

Section XVII consists of commodities that primary function is to transport persons or load. Chapter 86 included railway or tramway locomotives, rolling-stock and parts thereat railway or tramway track fixtures and fittings and parts thereof; mechanical (including electro-mechanical) traffic signaling equipment of all kinds. In 2006 and 2011, commodities included in this chapter were not the subjects of bilateral trade between Malaysia and Slovakia. In 2016, a specific value was exported from Malaysia at net inter-industry level. Similar trade situation took place with commodities included in the chapter of the code 88: aircraft, spacecraft, and parts thereof the code 89: ships, boats, and floating structures when Slovakia exported a specific value to Malaysia without reciprocal import in 2016. The higher GL index value was present in the trade of vehicles included in chapter 83. During each of the observed years, the inter-industry trade exceeded inter-industry exchange. In 2006, the GL index reported the highest measured value of 0.94. In 2011, the share of IIT on the trade dropped to 51 percent with exceeding Slovakia´s export over Malaysia´s export. That year Slovakia achieved positive trade balance over Malaysia in bilateral trade of commodities included within this chapter. In 2016, the GL index was 0.76. The maximal total trade of vehicles was reported in 2011, which dropped by almost 35 percent. Trade with natural, cultured pearls, precious, semi-precious stones, precious metals, metals clad with precious metal and articles thereof, imitation jewelry and coin reported net INT in each of the observed years.

Tab. 42 Bilateral trade with commodities of section XVII

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index

Section	Name of section	HS 2 code	Name of chapter	2006 Export	Import	GL index	2011 Export	Import	GL index	2016 Export	Import	GL index
Section XVII	Vehicles, aircraft, vessels and associated transport equipment	86	Railway or tramway locomotives, rolling-stock and parts thereat railway or tramway track fixtures and fittings and parts thereof; mechanical (including electro-mechanical) traffic signaling equipment of all kinds	0	0	-	0	0	-	0	4653	0.00
		87	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	2 607 420	2 939 140	0.94	4 111 505	1 389 331	0.51	1 362 378	2221801	0.76
		88	Aircraft, spacecraft, and parts thereof	0	0	-	0	0	-	485	0	0.00
		89	Ships, boats and floating structures	0	0	-	0	0	-	4 937	0	0.00

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

The development of IIT fluctuated within the section XVII. The most traded commodity chapter included vehicles designed for transportation of people. In 2006, IIT represented 94 percent share, with 6 percent of INT share, which rapidly changes in 2011 to 51 percent of IIT and 49 percent of INT. In 2016, the share of IIT increased by 25 percent compared to 2011. The other chapter reported net INT particularly from each year which the trade took place.

2.2.18. Bilateral Trade with Commodities of Section XVIII

Section XVIII includes optical, photographic, cinematographic, measuring, checking the precision of medical, surgical instruments and apparatus, clocks, and watches, musical instruments, parts, and accessories. In 2006, the calculated GL index was 0.52 in traded commodities include in chapter 90 and 0.87 in trade of products of chapter 92. In 2011, the GL index rapidly dropped because of the disproportion of import and export. While Slovakia´s import increased compared to 2006, Malaysia´s import from Slovakia fell by 57 percent in chapter 90 and 92 percent in chapter 92. In 2016, the total trade of chapter 90 increased on both side with Malaysia´s positive trade balance and the measured GL index value was 0.32. The total trade with musical instruments of chapter 92 increased that year as well, and the trade was performed with the GL index 0.87. The trade with clocks and watches occurred purely on the inter-industry level of 100 percent with low Malaysia´s exports compared to the total trade per each annum.

Tab. 43 Bilateral trade with commodities of section XVII

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section XVIII	Optical, photographic, cinematographic, measuring, checking, precious, medical or surgical instruments and apparatus, clocks and watches, musical instruments, parts and accessories thereof	90	Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; parts and accessories thereof	968 720	2 735 600	0.52	412 256	6 303 812	0.12	1 455 335	7 559 479	0.32
		91	Clocks and watches and parts thereof	0	101	0.00	0	2 509	0.00	0	1 262	0.00

| 92 | Musical instruments; parts and accessories of such articles | 2 761 | 2 144 | 0.87 | 216 | 7 288 | 0.06 | 4 150 | 5 393 | 0.87 |

In section XVIII dominated INT in each of selected years. The largest share of IIT was calculated for chapters 90 and 92 in 2006. Trade with optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments, and apparatus consisted of 52 percent IIT, and 48 percent of INT and trade with musical instruments consisted of 87 percent of IIT and 13 percent INT. In 2011, in both commodity chapters was reported a drop in IIT. However, in 2016, IIT reported an increase in both. Trade with clocks and watches took place as net INT.

2.2.19. Bilateral Trade with Commodities of Section XIX

Arms and ammunition do not belong to a category of commonly and often exchanged goods. In 2006, commodities in section XIX were not the subjects of trade between Slovakia and Malaysia. In 2011 and 2016, one-way took place with these products. In 2011, Slovakia imported a certain amount of output originating in Malaysia while in 2016; it was purely Malaysia that imported Slovak production. The two-way trade did not occur in any of selected years.

Tab. 44 Bilateral trade with commodities of section XIX

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section XIX	Arms and ammunition, parts and accessories thereof	93	Arms and ammunition; parts and accessories thereof	0	0	-	0	6 000	0.00	2 607	0	0.00

Section XIX was not the subject of bilateral trade in 2006, and in the following observed year, the trade took place in a form of IIT.

2.2.20. Bilateral Trade with Commodities of Section XX

The performance of trade in commodities included in section XX did not report a stable pattern from the perspective of INT and IIT. Bilateral trade with furniture decreased over the past ten years. In 2006, the GL index reported the value of 0.63 which was the maximum of the reported period. The following years, the GL index diminished to zero value. The trade development with toys, games and sports requisites increased in the past decade. In 2006, the exchange of commodities included in chapter 95 was exclusively one-way composed of Malaysia´s export to Slovakia. In 2011, the exports on both sides increased in their values and the GL index increased by 0.04. The year 2016 reported a drop-in Slovakia´s export to Malaysia compared to 2011, while Malaysia´s export to Slovakia maintained the growth trend. Although the two-way trade was performed, the GL index value was to 0.45.

Tab. 45 Bilateral trade with commodities of section XX

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index

Section XX	Miscellaneous manufactured articles	94	Furniture; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings; lamps and lighting fittings, not elsewhere specified or included; illuminated signs, illuminated nameplates and the like; prefabricated buildings.	6 668 961	3 048 046	0.63	49 479	1 613 342	0.06	13 887	1550292	0.02
		95	Toys, games and sports requisites; parts and accessories thereof	0	66 912	0.00	588 507	215 684	0.54	316 396	1103316	0.45
		96	Miscellaneous manufactured articles	0	75 763	0.00	5 627	46 207	0.22	0	60797	0.00

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

In this section, INT dominated over IIT. Since 2006, IIT continuously decreased its share on total trade within chapter 94 from 62 percent to 2 percent in 2006. Fluctuated development on trade shares from the intra- and inter-industry specialization was reported in chapter 95. In 2006, there was measured net INT of net INT, which decreased to 46 percent of INT in 2011 and increased to 55 percent of INT in 2011. Net INT was measured in 2006 and 2016 for the commodity chapter 96. In 2011, IIT share within this chapter increased by 22 percent with 78 percent predominance of INT.

2.2.21. Bilateral Trade with Commodities of Section XXI

Artworks, collectors' pieces, and antiques are commodities traded occasionally. In bilateral trade between Malaysia and Slovakia, the commodities of chapter HS 2 code 97 represented a matter of Malaysia´s exports only in 2016 as net one-way trade.

Tab. 46 Bilateral trade with commodities of section XXI

Harmonized System				2006			2011			2016		
Section	Name of section	HS 2 code	Name of chapter	Export	Import	GL index	Export	Import	GL index	Export	Import	GL index
Section XXI	Works of art, collectors ´pieces and antiques	97	Works of art, collectors' pieces and antiques	0	0	-	0	0	-	0	900	0.00
		98	-	-	-	-	-	-	-	-	-	-
		99	-	-	-	-	-	-	-	-	-	-

Source: Statistical Office of the Slovak Republic and author's calculations (2018)

2.3. Intra-industry Trade Analysis of Vehicles Motor cars and other motor vehicles; principally designed for the transport of persons (other than those of heading no. 8702), including station wagons and racing cars

In this subchapter, the author analyses the bilateral trade between South Korea and Slovakia with vehicles defined as motor cars, other motor cars that were principally designed to transport people including racing cars and station wagons. The data conducted for this analysis were provided by the Statistical Office of the European Union – Eurostat. All the data value data are provided in exact values in Euro and amounts of commodities are provided in tons.

In 2006, Slovakia´s export represented more than 24 million €. That year, Slovakia reported positive trade balance in trading commodities included in HS 2 code 8703. The GL index reported the value of 0.82. The trade took place 82 percent IIT and 18 percent INT. IIT took place as VIIT by most 68 percent. In 2011, the situation changed and South Korea´s export exceeded Slovakia´s export of commodities included in chapter 8703. That year, the

GL index was measured at the value of 0.58. IIT represented 58 percent while INT represented 42 percent of the total trade of this commodity chapter. The value of decomposed IIT indicated a higher presence of VIIT by 54 percent based on the unit value calculations. In 2016, South Korea´s trade positive balance remained its position due to exceeding South Korea´s export over Slovakia´s exports. The GL index of 2016 reported the value of 0.58. Total trade composition of this commodity group remained stable also by 58 percent of IIT and 42 percent of INT. VIIT increased its value compared to 2011. VIIT increased its share on IIT by the measured result by 3 points compared to the previous model year.

Tab. 47Intra-industry trade analysis of HS 2 code 8703

YEAR	HS 4 CODE	EXPORT		IMPORT		GL INDEX	UNIT VALUE EXPORT	UNIT VALUE IMPORT	UVM/UVM	RESULT
		VALUE	AMOUNT	VALUE	AMOUNT					
2006	8703	24 032 259	30 095	16 845 136	14 240	0.82	799	1183	0.68	VIIT
2011	8703	8 072 677	12 670	19 740 986	16 782	0.58	637	1176	0.54	VIIT
2016	8703	18 086 411	24 048	44 383 806	33 605	0.58	752	1321	0.57	VIIT

Source: Eurostat and author's calculations (2018)

From the analysis, it is obvious that the relationship in commodities of HS4 8703 between South Korea and Slovakia is based on vertical intra-industry exchange. Based on the assumptions of Greenaway, Hine, and Milner (1994), vertical intra-industry trade takes place when commodities of trade partners participating in trade vary in quality. South Korea´s exports reported higher unit values of products included in the chapter. These calculations confirm the theory that higher quality products are exported from a more capital intensive economy. The higher quality of South Korean cars is the result of a long tradition in the automotive industry and capital intensity to innovate production processes.

3. Analysis of Conduced Trade Results based on Trade Decomposition

3.1. Case study of South Korea

South Korea is one of the fastest growing economies of the OECD member economies. In 2016, it was the eleventh greatest economy in the world and the fourth in the Asian region. South Korea´s economy is high export orientated with a status of the fifth global exporter. From 2006 to 2016, South Korea´s top 10 export commodity chapters of HS 2 were 85, 87, 84, 89, 39, 90, 27, 72, 29 and 73. (Korean International Trade Association 2018)The overall export composition did not change over the past decade. Over the past fifty years, South Korea became the global number one producer in the electronic industry of memory chips and mobile phones, the second global boat, and ship producer, the fifth largest producer of automobiles and the sixth largest producer of steel in the world. The world-known South Korea´s brand and firms in electronics represented by companies like Samsung and LG. In the automotive segment, the worldwide leaders are Hyundai and Kia Motors. The economy of South Korea is highly dependent on importing raw materials due to its geographical and natural prepositions.

The economic predispositions of the national economy influence the steps in foreign trade policy formation. As it was already mentioned, South Korea has a high export orientation due to its limited market. The international trade strategy is to get into foreign markets through bilateral and multilateral free trade agreements with the focus of large developed economies. Due to its national raw material limitations, South Korea develops relations with member states of OPEC and developing countries orienting in mining strategic natural resources, growing crops, and producing goods with low processing rate. South Korea belongs on the list of top global investors in foreign countries, which has been the result of its limited and expensive labor force.

The most important trade partners of South Korea are China, ASEAN, the EU, Japan, and the USA. ASEAN members are also the destinations of foreign investments of South Korea.

Many of the mentioned facts above outline the relationship between the Slovak Republic and South Korea. The Slovak Republic is the fourth most important export destination within the EU region. South Korea represents the second largest import origin of the Asian region and the fourth global exporter. From the perspective of Slovakia, South Korea does not seem to be a key partner of external relation. Slovakia´s exports are intended for European destinations mainly, the EU market. Individual contracts or foreign direct investments primarily determine the external trade relations with South Korea. South Korea is the twenty-ninth global export destination of Slovakia and the third Asian export destination. (Observatory of Economic Complexity 2018) During the past decade, bilateral trade between Slovakia and South Korea more than doubled as the result of an increase in exports and imports. South Korea´s exports significantly surpassed Slovakia´s exports resulting in prevailing Slovakia´s negative trade balance, which is the result of foreign investments with Korean origin mostly in technologies, electronics and automotive segments and facilitation of established Korean firm on the territory of Slovakia of mentioned segments.

The trade dynamics slowed down in recent years. Mainly, South Korea´s exports decreased since reached maximum in 2013. The declining trend continued during the observed years of 2014, 2015 and 2016. (Statistical Office of the Slovak Republic 2017) On the other hand, Slovakia´s exports to South Korea gradually increased during the observed period. The only significant drop in Slovakia's exports happened in 2009 as the result of the global financial crisis.

Graph 1 Bilateral trade development between South Korea and the Slovak Republic in millions of Euros
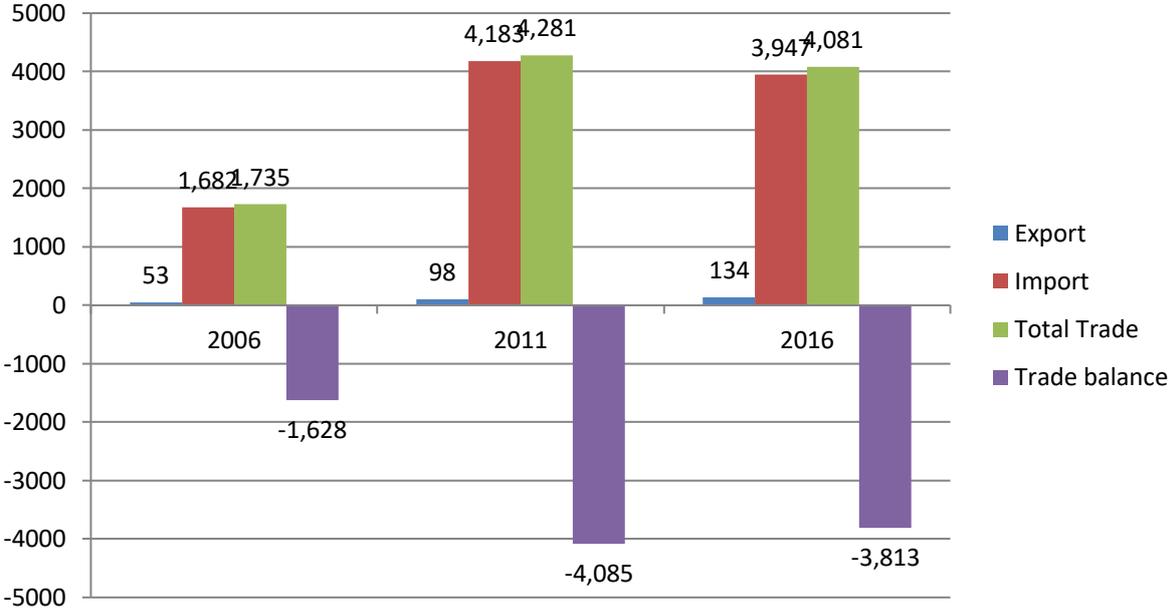
Source: Statistical Office of the Slovak Republic and author's calculations (2018)

From the graph, above, it is clear that South Korea´s exports prevail over Slovakia´s exports. During the examined period Slovakia achieved a negative trade balance with increasing tendency from 2006 to 2011. In 2016, the negative trade balance has decreased due to increasing Slovakia´s exports to South Korea and reduced imports from South Korea. Total trade had rapidly increased during the examined decade by more than 135 percent. Slovakia´s exports maintained a continuous increasing trend in each of the examined years. In 2016, South Korea´s exports experienced a drop that resulted in the decline of the total annual bilateral trade. Decreasing trend in South Korea´s exports to Slovakia has resulted from various factors. The first factor is that Korean firms producing in Slovakia replaced material imports needed in production processes by local Slovak substitutes. The second factor is the declining Korea´s export performance and plummeting value of Korea´s exports. In 2016, Korea´s export value dropped by 18.5 percent, which was the highest since the global recession. (Quartz Media, Inc. 2016) Slovakia became the fourth largest European export market for Korean commodities. South Korea is one of the most significant investors in Slovakia. The high negative trade balance is also affected by the fact that Korean firms located in Slovakia are supplied by technology and production equipment from the domestic country to a certain extent. Korea is the 7th largest foreign direct investor in Slovakia by establishing the automotive and electronic production plants of Kia Motors and Samsung Electronics in Slovakia. Besides these significant conglomerates, more than 100 other Korean firms have their subsidiaries in Slovakia. Based on the sectoral segmentation of Korean firms operating in Slovakia, the dominant sector is industrial production such as electrical machinery and equipment and parts thereof, automotive industry and manufacture of accessories of motor vehicles and parts thereof. (Ministry of Foreign and European Affairs of the Slovak Republic 2018)

The commodity structure of bilateral trade between South Korea and Slovakia varied during the observed years. Almost each of 96 examined commodities of HS 2 engaged at least

in one-way trade; however, the majority of trade commodities represented less than 1 percent share on total trade. Stably traded products in bilateral trade between Slovakia and South Korea during the past decade belonged to the commodity chapters 84, 85, 87 and 90. In the recent five-year period, new products of commodity chapters 72, and 73 arose. Slovakia´s top export commodities to South Korea were vehicles included in chapter 87 (36.08 percent), electronics of chapter 85 (17.51 percent), machinery and mechanic appliances of chapter 84 (16.90 percent), rubber and rubber articles (9.48 percent), organic chemicals (5.08 percent), items included in chapter 90 (4.61 percent), articles of steel and iron (3.30 percent) and plastics and plastic articles (1.74 percent). South Korea´s exports consisted mainly of machinery and mechanical appliances included in chapter 84 (57.05 percent), electrical machinery and equipment of chapter 85 (17.35 percent), optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; parts and accessories thereof included in chapter 90 (11.59 percent), vehicles covered in chapter 87 (7.92 percent), plastic and plastic articles (1.29 percent) and iron and steel (1.12 percent).

In the previous chapter, the bilateral trade analysis of Slovakia and South Korea was presented from intra- and inter-industry perspective in years 2006, 2011 and 2016. All commodities were segmented according to the 2-digit aggregation of Harmonized system for each of the examined years. In this subchapter, the summary of commodity chapters involved in an intra-industry trade is provided. In the bilateral trade between Slovakia and South Korea significantly dominated inter-industry specialization. By looking at the trade development, the trade pattern persisted visibly inter-industry with some examples of intra-industry specialization. During the observed years, the share of IIT on total trade proved decreasing tendency, however, the variation of traded commodities incremented.

In 2006, the total reported number of commodities, which were subject of intra-industry exchange to some extent, was 29 out of all trade commodity chapters. That year, 76 defined commodity chapters entered at least one-way exchange. IIT trade represented 6.14 percent of the total annual trade. Annual bilateral commodity exchange between Slovakia and South Korea was performed at 93.86 percent inter-industry level.

Tab. 48 List of commodity chapters that entered intra-industry trade between Slovakia and South Korea in 2006

Commodity chapter of Harmonized System		GL index
62	Articles of apparel and clothing accessories, not knitted or crocheted	0.7
81	Other base metals; cermets; articles thereof	0.69
73	Articles of iron or steel	0.58
29	Organic chemicals	0.56
95	Toys, games and sports requisites; parts and accessories thereof	0.55
38	Miscellaneous chemical products	0.53
70	Glass and glassware	0.53
22	Beverages, spirits and vinegar	0.48
44	Wood and articles of wood; wood charcoal	0.45
92	Musical instruments; parts and accessories of such articles	0.38
87	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	0.36
25	Salt; sulfur; earths and stone; plastering materials, lime and cement	0.27
91	Clocks and watches and parts thereof	0.17
51	Wool, fine or coarse animal hair; horsehair yarn and woven fabric*	0.16
54	Man-made filaments	0.12
71	Natural or cultured pearls, precious or semi-precious stones, precious metals, metals clad with precious metal and articles thereof; imitation, jewelry; coin	0.08
84	Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	0.08
48	Paper and paperboard; articles of paper pulp, of paper or of paperboard	0.07
63	Other made up textile articles; sets; worn clothing and worn textile articles; rags	0.07
34	Soap, organic surface-active agents, washing preparations, lubricating preparations, artificial waxes, prepared waxes, polishing or scouring preparations, candles and similar articles, modeling pastes, "dental waxes" and dental preparations with a basis of plaster	0.03

94	Furniture; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings; lamps and lighting fittings, not elsewhere specified or included; illuminated signs, illuminated nameplates and the like; prefabricated buildings.	0.03
83	Miscellaneous articles of base metal	0.02
85	Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles	0.02
21	Miscellaneous edible preparations	0.01
49	Printed books, newspapers, pictures and other products of the printing industry; manuscripts, typescripts and plans	0.01
61	Articles of apparel and clothing accessories, knitted or crocheted	0.01
65	Headgear and parts thereof	0.01
72	Iron and steel	0.01
90	Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; parts and accessories thereof	0.01

Source: Author´s calculations

In 2011, the total number of traded commodity chapters increased to 81 of which 35 commodity chapters indicated a certain extent of IIT. However, the share of IIT decreased by 1.53 percent of the total annual bilateral trade compared to 2006.

Tab. 49 List of commodity chapters that entered intra-industry trade between Slovakia and South Korea in 2011

Commodity chapter of Harmonized System		GL index
49	Printed books, newspapers, pictures and other products of the printing industry; manuscripts, typescripts and plans	0.86
60	Knitted or crocheted fabrics	0.68
29	Organic chemicals	0.67
35	Albuminoidal substances; modified starches; glues; enzymes	0.66
94	Furniture; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings; lamps and lighting fittings, not elsewhere specified or included; illuminated signs, illuminated nameplates and the like; prefabricated buildings.	0.62
69	Ceramic products	0.5
91	Clocks and watches and parts thereof	0.37
93	Arms and ammunition; parts and accessories thereof	0.34
48	Paper and paperboard; articles of paper pulp, of paper or of paperboard	0.33
95	Toys, games and sports requisites; parts and accessories thereof	0.31
64	Footwear, gaiters and the like; parts of such articles	0.23
68	Articles of stone, plaster, cement, asbestos, mica or similar materials	0.23
21	Miscellaneous edible preparations	0.21
40	Rubber and articles thereof	0.16
38	Miscellaneous chemical products	0.14
87	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	0.11
92	Musical instruments; parts and accessories of such articles	0.11
37	Photographic or cinematographic goods	0.09
44	Wood and articles of wood; wood charcoal	0.09
96	Miscellaneous manufactured articles	0.08
56	Wadding, felt and nonwovens; special yarns; twine, cordage, ropes and cables and articles thereof	0.06
76	Aluminum and articles thereof	0.05
33	Essential oils and resinoids; perfumery, cosmetic or toilet preparations	0.04
39	Plastics and articles thereof	0.04
62	Articles of apparel and clothing accessories, not knitted or crocheted	0.04
70	Glass and glassware	0.04
85	Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles	0.04
63	Other made up textile articles; sets; worn clothing and worn textile articles; rags	0.03
73	Articles of iron or steel	0.03
84	Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	0.03
22	Beverages, spirits and vinegar	0.02
30	Pharmaceutical products	0.02
72	Iron and steel	0.01
90	Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; parts and accessories thereof	0.01

Source: Author´s calculations

The decreasing trend in IIT also continued in 2016. The share of IIT on total trade was represented by 2.1 percent. The measured INT on total trade increased to 97.9 percent. The

total number of commodity chapters that involved in bilateral trade was 81 out of 40 indicated a certain extent of IIT.

Tab. 50 List of commodity chapters that entered intra-industry trade between Slovakia and South Korea in 2016

	Commodity chapter of Harmonized System	GL index
68	Articles of stone, plaster, cement, asbestos, mica or similar materials	0.91
91	Clocks and watches and parts thereof	0.65
48	Paper and paperboard; articles of paper pulp, of paper or of paperboard	0.64
95	Toys, games and sports requisites; parts and accessories thereof	0.63
22	Beverages, spirits and vinegar	0.58
40	Rubber and articles thereof	0.56
61	Articles of apparel and clothing accessories, knitted or crocheted	0.54
64	Footwear, gaiters and the like; parts of such articles	0.52
69	Ceramic products	0.52
70	Glass and glassware	0.49
25	Salt; sulfur; earths and stone; plastering materials, lime and cement	0.46
29	Organic chemicals	0.46
19	Preparations of cereals, flour, starch or milk; pastry cooks' products*	0.45
44	Wood and articles of wood; wood charcoal	0.39
62	Articles of apparel and clothing accessories, not knitted or crocheted	0.38
20	Preparations of vegetables, fruit, nuts or other parts of plants.	0.26
21	Miscellaneous edible preparations	0.25
56	Wadding, felt and nonwovens; special yarns; twine, cordage, ropes and cables and articles thereof	0.25
33	Essential oils and resinoids; perfumery, cosmetic or toilet preparations	0.13
87	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	0.12
43	Fur skins and artificial fur; manufactures thereof	0.11
54	Man-made filaments	0.11
73	Articles of iron or steel	0.10
82	Tools, implements, cutlery, spoons and forks, of base metal; parts thereof of base metal	0.10
27	Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes	0.08
49	Printed books, newspapers, pictures and other products of the printing industry; manuscripts, typescripts and plans	0.08
39	Plastics and articles thereof	0.07
65	Headgear and parts thereof	0.07
83	Miscellaneous articles of base metal	0.07
76	Aluminum and articles thereof	0.06
63	Other made up textile articles; sets; worn clothing and worn textile articles; rags	0.04
71	Natural or cultured pearls, precious or semi-precious stones, precious metals, metals clad with precious metal and articles thereof; imitation, jewelry; coin	0.04
42	Articles of leather; saddler and harness; travel goods, handbags and similar containers; articles of animal gut (other than silk-worm gut).	0.02
57	Carpets and other textile floor coverings	0.02
85	Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles	0.02
90	Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; parts and accessories thereof	0.02
94	Furniture; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings; lamps and lighting fittings, not elsewhere specified or included; illuminated signs, illuminated nameplates and the like; prefabricated buildings.	0.02
28	Inorganic chemicals; organic or inorganic compounds of precious metals, of rare-earth metals, of radioactive elements or of isotopes*	0.01
31	Fertilizers	0.01
74	Copper and articles thereof	0.01
84	Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	0.01

Source: Author´s calculations

In the table below, the summary of commodity chapters that indicated a certain extent of IIT in each of the presented years is shown. These commodity chapters were chosen as the most relevant and reliable samples to demonstrate the IIT development. The other commodity chapters that are not listed below did not indicate the presence of IIT either in one of the examined years. From table 51, it is visible that commodity chapters that indicated certain levels of IIT are exclusively composed of manufactured commodities. Individual commodity chapters are ranked according to the highest measured GL index. The greater extent of IIT was present in commodity chapters with negligible importance on total trade. However, in

commodity chapters, such are 84, 85, 87 and 90 with the highest shares of total trade indicated low with fluctuated or decreasing the tendency of IIT.

Tab. 51 Summary of commodity chapters indicating stably IIT in bilateral trade between Slovakia and South Korea during the observed years

Commodity chapter of Harmonized System		GL index	GL index	GL index
95	Toys, games and sports requisites; parts and accessories thereof	0.55	0.31	0.63
91	Clocks and watches and parts thereof	0.17	0.37	0.65
62	Articles of apparel and clothing accessories, not knitted or crocheted	0.7	0.04	0.38
22	Beverages, spirits and vinegar	0.48	0.02	0.58
70	Glass and glassware	0.53	0.04	0.49
48	Paper and paperboard; articles of paper pulp, of paper or of paperboard	0.07	0.33	0.64
49	Printed books, newspapers, pictures and other products of the printing industry; manuscripts, typescripts and plans	0.01	0.86	0.08
44	Wood and articles of wood; wood charcoal	0.45	0.09	0.39
73	Articles of iron or steel	0.58	0.03	0.1
94	Furniture; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings; lamps and lighting fittings, not elsewhere specified or included; illuminated signs, illuminated nameplates and the like; prefabricated buildings.	0.03	0.62	0.02
87	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	0.36	0.11	0.12
21	Miscellaneous edible preparations	0.01	0.21	0.25
63	Other made up textile articles; sets; worn clothing and worn textile articles; rags	0.07	0.03	.04
84	Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	0.08	0.03	0.01
85	Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles	0.02	0.04	0.02
90	Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; parts and accessories thereof	0.01	0.01	0.02

Source: Author´s calculations

During the observed ten-year period of the development of bilateral trade between Slovakia and South Korea was found that IIT is an unstable phenomenon that occurred within a particular commodity chapter. The analyzed data prove and strongly indicate the dominance of INT among traded commodities. Even though there was detected the presence of two-way trade, the great imbalance on total trade resulted in persisting and increasing its importance INT.

3.2. Case study of Malaysia

Malaysia is the third largest economy in the region of Southeast Asia, and it is listed as the thirty-fifth largest economy in the world. Malaysia´s economy belongs to a group of middle-income countries with a relatively opened market with a high dependency on foreign markets. Export represents about 80 percent of Malaysia's GDP and GDP growth is to a large extent determined by foreign direct investment. Malaysia´s economic environment is favorable to the accumulation of foreign direct investments because of a stable political situation, cheap labor force, and low energy inputs which is due to the availability of natural resources such as petroleum and natural gas. Natural resource mining represents about 40 percent of government budget revenues. (Slovak Investment and Trade Development Agency 2018)

Government plays an essential role in economic life. Malaysia is in the process of transformation from an industry-oriented economy, with low added values, to a knowledge-oriented economy, with higher added values; with an increasing share of innovations and services on the GDP. Currently, services represent about 56 percent of GDP, industry share on GDP is 37 percent, and agrarian sector represents 7 percent of Malaysia's GDP. (Ministry of Foreign and European Affairs of the Slovak Republic 2018) One of the most significant problems of Malaysia in becoming one of the high-income countries is the low-quality education system and low labor productivity, which is one of the administrative tasks to improve the infrastructure of human resources. Generally, Malaysia specializes in the export

of electronics, petroleum, and natural gas, rubber, textiles, wood and palm oil. The top import commodities are electronics, machinery, chemicals and transport and optical equipment. Malaysia´s top trade partners are China, Singapore, Japan, and the EU. Currently, the new objects of interest are developing countries with high economic growth rates such India, countries of Latin America and Middle Asia but also China and transition economies such Russia in the sphere of foreign trade relations.

Malaysia represents the twenty-second global and the seventh Asian import origin destination. From the perspective of Slovakia´s exports, Malaysia is the forty-seventh global and the fourteenth Asian export destination of Slovakia. (Observatory of Economic Complexity 2018) The high distance, possibilities for regional markets and negligible investment opportunities (understand in the relation between Malaysia and Slovakia) resulted in high discrepancies in trade. Slovakia is a small economy, highly oriented on exports that are indented to satisfy the needs of European customers. Malaysia, however, is an optimal destination to export Slovakia's output of modern technologies from biotechnology and nanotechnology fields, mining industry, transport infrastructure, automotive industry, information technology, food processing industry, chemical industry, machinery and mechanics and medical, measuring optical appliances.

Graph2 Bilateral trade development between Malaysia and the Slovak Republic in millions of Euros
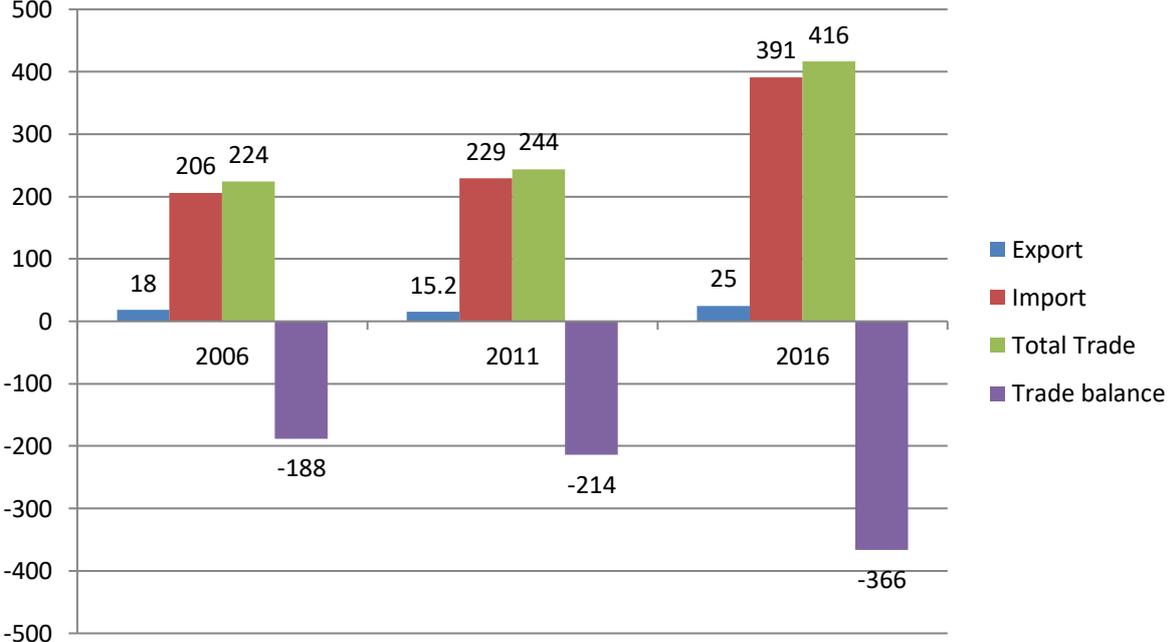
Source: Statistical Office of the Slovak Republic (2018)

Bilateral trade between Malaysia and Slovakia grew continuously since 2006. Slovakia achieved negative trade balance in each of the examined years. Malaysia´s exports majorly overpass Slovakia´s reciprocal exports. The year 2011 was not favorable for Slovakia´s exports to Malaysia. The reasons could be various, such as substitution of exports by domestic production with the aim to boost the national economy after the crisis or substitution of Slovakia´s exports due to the appreciation of Euro currency compared to other foreign currencies. From the long-run perspective, Slovakia achieved negative trade balance in bilateral trade with Malaysia during the past decade. Slovakia´s imports from Malaysia rapidly increased in 2014 and maintained increased volume. In 2016, the enormous increase

of total trade was reported. The reason for such a rapid increase in trade cooperation was also the fact that in 2015, Malaysia and Slovakia signed the *Double taxation agreement that leads towards intensifying bilateral trade and investment cooperation*.

The commodity structure of bilateral trade between Slovakia and Malaysia did not undergo stable development like as compared to Slovakia and South Korea´s commodity structure over the past decade. The bilateral trade with South Korea and Slovakia seemed mature enough to indicate a specific stable trade pattern in trading commodities. However, the bilateral trade between Malaysia and Slovakia experienced dynamic development in major traded commodities. The primary traded commodities between Malaysia and Slovakia belong to chapters 85, 40, 84, 39, 90, 38, 87 and 94. All other commodities represented less than 1 percent of total trade if were traded at all.

Over the past decade, the main Slovakia´s export items were electronics included in commodity chapter 85 (28.83 percent), machinery and mechanical appliances included in chapter 84 (20.60 percent), vehicles included in chapter 87 (13.42 percent), furniture included in chapter 94 (11.18 percent), rubber and rubber articles (10.81 percent), optical appliances of chapter 90 (4.71 percent), glass and glassware (3.11 percent) and plastic and plastic articles (1.90). Slovakia´s imports with Malaysian origin were electronics of chapter 85 (61.01 percent), rubber and rubber article of chapter 40 (19.23 percent), machinery and mechanical appliances included in chapter 84 (8.58 percent), plastics and plastic articles of chapter 39 (2.34 percent), chemicals of chapter 38 (2.27 percent) and optical appliances included in chapter 90 (2.08 percent). During the past five-year period, Slovakia's newly exported commodities arose, such as toys, games and sports requirements (1.5 percent) and pharmaceutical products (1.35 percent).

The foreign trade analysis provided in the previous chapter of bilateral trade between Malaysia and Slovakia of all defined commodity chapters of Harmonized system revealed high persisting overpass of inter-industry specialization with a potential of growing IIT.

In the case of bilateral trade between Malaysia and Slovakia, the trade pattern persisted visibly inter-industry. However, there was IIT measured in certain commodities to some extent. The specific commodity chapters based on a 2-digit aggregation of Harmonized system are listed in following tables by observed years. During the observed years, the share of IIT on total trade proved increasing tendency and also the variation of traded commodities incremented.

In 2006, the total reported number of commodity chapter reporting IIT was 14. In 45 commodity chapter was measured net INT. IIT trade represented 15.89 percent of total annual trade.

Tab. 52 List of commodity chapters that entered intra-industry trade between Malaysia and Slovakia in 2006

	Commodity chapter of Harmonized System	GL index
87	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	0.94
92	Musical instruments; parts and accessories of such articles	0.87
48	Paper and paperboard; articles of paper pulp, of paper or of paperboard	0.77
94	Furniture; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings; lamps and lighting fittings, not elsewhere specified or included; illuminated signs, illuminated nameplates and the like; prefabricated buildings.	0.63
90	Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; parts and accessories thereof	0.52
56	Wadding, felt and nonwovens; special yarns; twine, cordage, ropes and cables and articles thereof	0.19
44	Wood and articles of wood; wood charcoal	0.17
39	Plastics and articles thereof	0.16
85	Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles	0.13
73	Articles of iron or steel	0.07
76	Aluminum and articles thereof	0.06

84	Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	0.05
61	Articles of apparel and clothing accessories, knitted or crocheted	0.03
83	Miscellaneous articles of base metal	0.01

Source: Author´s calculations

In the year 2011, the trade decomposition revealed an increase in the number of commodities where the IIT was present at some level. The total number of commodity chapters where the intra-industry specialization took place between Slovakia and Malaysia was 29. The share of IIT on total annual trade decreased by 3.63 percent compared to 2006. IIT represented 14.07 percent of the total annual trade value. 38 commodity chapters entered a net one-way trade.

Tab. 53 List of commodity chapters that entered intra-industry trade between Malaysia and Slovakia in 2011

Commodity chapter of Harmonized System	GL index
70 Glass and glassware	0,95
42 Articles of leather; saddler and harness; travel goods, handbags and similar containers; articles of animal gut (other than silk-worm gut).	0.94
49 Printed books, newspapers, pictures and other products of the printing industry; manuscripts, typescripts and plans	0.88
84 Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	0.62
95 Toys, games and sports requisites; parts and accessories thereof	0.54
87 Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	0.51
63 Other made up textile articles; sets; worn clothing and worn textile articles; rags	0.49
23 Residues and waste from the food industries; prepared animal fodder	0.42
64 Footwear, gaiters and the like; parts of such articles	0.34
72 Iron and steel	0.32
21 Miscellaneous edible preparations	0.31
96 Miscellaneous manufactured articles	0.22
22 Beverages, spirits and vinegar	0.15
85 Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles	0.13
90 Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; parts and accessories thereof	0.12
44 Wood and articles of wood; wood charcoal	0.07
62 Articles of apparel and clothing accessories, not knitted or crocheted	0.07
92 Musical instruments; parts and accessories of such articles	0.06
94 Furniture; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings; lamps and lighting fittings, not elsewhere specified or included; illuminated signs, illuminated nameplates and the like; prefabricated buildings.	0.06
39 Plastics and articles thereof	0.05
82 Tools, implements, cutlery, spoons and forks, of base metal; parts thereof of base metal	0.05
85 Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles	0.05
30 Pharmaceutical products	0.02
35 Albuminoidal substances; modified starches; glues; enzymes	0.02
73 Articles of iron or steel	0.02
27 Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes	0.01
34 Soap, organic surface-active agents, washing preparations, lubricating preparations, artificial waxes, prepared waxes, polishing or scouring preparations, candles and similar articles, modeling pastes, "dental waxes" and dental preparations with a basis of plaster	0.01
76 Aluminum and articles thereof	0.01

Source: Author´s calculations

In 2016, the number of commodity chapters where IIT was detected decreased, even though the number of total traded commodity chapters increased compared to 2011. IIT represented 14.04 percent of total annual trade. The total number of commodity chapters with the presence IIT was 28, and 41 commodities were exchanged at net inter-industry level.

Tab. 54 List of commodity chapters that entered intra-industry trade between Malaysia and Slovakia in 2016

Commodity chapter of Harmonized System	GL index
70 Glass and glassware	0.95
56 Wadding, felt and nonwovens; special yarns; twine, cordage, ropes and cables and articles thereof	092
92 Musical instruments; parts and accessories of such articles	0.87
34 Soap, organic surface-active agents, washing preparations, lubricating preparations, artificial waxes, prepared waxes, polishing or scouring preparations, candles and similar articles, modeling pastes, "dental waxes" and dental preparations with a basis of plaster	0.84
87 Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	0.76
42 Articles of leather; saddler and harness; travel goods, handbags and similar containers; articles of animal gut (other than silk-worm gut).	0.75
84 Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	0.63
44 Wood and articles of wood; wood charcoal	0.47
95 Toys, games and sports requisites; parts and accessories thereof	0.45
64 Footwear, gaiters and the like; parts of such articles	0.35
40 Rubber and articles thereof	0.33
90 Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; parts and accessories thereof	0.32
65 Headgear and parts thereof	0.26
48 Paper and paperboard; articles of paper pulp, of paper or of paperboard	0.18
25 Salt; sulfur; earths and stone; plastering materials, lime and cement	0.16
28 Inorganic chemicals; organic or inorganic compounds of precious metals, of rare-earth metals, of radioactive elements or of isotopes	0.16
39 Plastics and articles thereof	0.14
74 Copper and articles thereof	0.14
29 Organic chemicals	0.09
49 Printed books, newspapers, pictures and other products of the printing industry; manuscripts, typescripts and plans	0.07
85 Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles	0.06
63 Other made up textile articles; sets; worn clothing and worn textile articles; rags	0.05
73 Articles of iron or steel	0.04
62 Articles of apparel and clothing accessories, not knitted or crocheted	0.02
76 Aluminum and articles thereof	0.02
94 Furniture; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings; lamps and lighting fittings, not elsewhere specified or included; illuminated signs, illuminated nameplates and the like; prefabricated buildings.	0.02
69 Ceramic products	0.01
82 Tools, implements, cutlery, spoons and forks, of base metal; parts thereof of base metal	0.01

Source: Author´s calculations

The table below provides a summary of commodity chapters that indicated a certain extent of IIT in each of the presented years is provided. These commodity chapters were chosen as the most reliable samples to demonstrate the IIT development as it was in the case of South Korea. The other commodity chapters that are not listed below did not indicate the presence of IIT either in one of the examined years. It is evident that commodity chapters that indicated certain levels of IIT are exclusively composed of manufactured commodities. Individual commodity chapters are ranked according to the highest measured GL index. In case of bilateral trade between Malaysia and Slovakia, the commodity chapters with the high importance of total trade during the selected years indicated mostly fluctuated development such as chapters 87, 39, 90 and 85. The commodity chapter 84 experienced the positive development of IIT as it is visible in table 55. The commodity chapter 94 reported a 63 percent share of IIT in 2006, which decreased continually to 94 percent of INT in 2016.

From the analysis of the bilateral trade between Malaysia and Slovakia, it is significant that the trade persists mostly on an inter-industry level.

Tab. 55 Summary of commodity chapters indicating stably IIT in bilateral trade between Malaysia and Slovakia during the observed years

Commodity chapter of Harmonized System	GL index	GL index	GL index
87 Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	0.94	0.51	0.76

92	Musical instruments; parts and accessories of such articles	0.87	0.06	0.87
84	Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	0.05	0.62	0.63
90	Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; parts and accessories thereof	0.52	0.12	0.32
44	Wood and articles of wood; wood charcoal	0.17	0.07	0.47
94	Furniture; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings; lamps and lighting fittings, not elsewhere specified or included; illuminated signs, illuminated nameplates and the like; prefabricated buildings.	0.63	0.06	0.02
39	Plastics and articles thereof	0.16	0.05	0.14
85	Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles	0.13	0.05	0.06
73	Articles of iron or steel	0.07	0.02	0.04
76	Aluminum and articles thereof	0.06	0.01	0.02

Source: Author´s calculations

3.3. Discussion

3.3.1. Correlation of Trade Pattern Changes with the Different Levels of Economic Development

As it was previously mentioned, international trade consists of intra-industry and inter-industry trade based on the structure of mutually exchanged commodities. The theoretical explanation of inter-industry trade defined INT like the exchange of primary commodities for commodities of secondary production and this type of trade usually dominates between developed and developing economies or countries with different factor endowments. On the other hand, intra-industry trade is defined as a two-way trade of differentiated goods. The intra-industry trade of differentiated products is the result of the presence of scale economies, imperfect completion and customer preferences.

In the analysis of bilateral trade of Slovakia with its two Asian partners, the trade pattern was examined over the past decade. In both cases of bilateral trade, INT significantly dominated over IIT. The reasons for low IIT share on the total trade may be various. As Linder (1961) stated in his theory on international trade that household income closely related with consumer preferences and countries with similar per capita income tended to have similarities also in demand structure due to consumer preferences. Besides the income level, Linder (1961) stated that cultural similarities, geographical distance, and tariffs influence the trade intensity. Balassa (1979) noticed that the extent of IIT closely related to economic development stage and trade obstacles such as tariffs. Wolter and Loertscher (1980) also introduced determinants, which have an impact on IIT between countries. The country-specific determinants of IIT were the economic development stage, market size, and distance and tariff barriers.

During the past decade, IIT was stably observed in manufactured commodities with a low share on total trade in each of the examined years. The trade pattern did not change rapidly over the past decade. However, the importance of IIT on total trade decreased during the observed period in both cases. The bilateral trade between Slovakia and South Korea reported a greater variance of traded HS 2 commodity chapters compared to the bilateral trade between Slovakia and Malaysia. The variance of HS 2 chapters that participated in IIT was higher in trade between Slovakia and South Korea. In both cases, the variance of commodities increased during the past decade. However, stable continuity in the variance was not reported. The intra-industry trade seems to be a statistical phenomenon in both of the observed cases than a stable result of continual trade development. The bilateral trade between Slovakia and South Korea consists mostly of commodities changed on the inter-industry level. The IIT share on total trade decreased during the past decade. The commodity chapters that indicated the highest share on total trade (HS 2 chapters: 84, 85, 87, 90) in each of selected years reported higher inter-industry exchange with decreasing share of intra-industry exchange. In the case of bilateral trade between Malaysia and Slovakia, the primary traded commodities

indicated the dominance of INT. Intra-industry trade was stable reported in commodity chapters of 85, 87 and 94. However, from the ten-year period, the IIT share decreased. Intra-industry trade share on total trade between Slovakia and Malaysia was higher in all reported years compared to bilateral trade between Slovakia and South Korea.

Graph 3 Comparison of INT and IIT development among examined bilateral trade partners
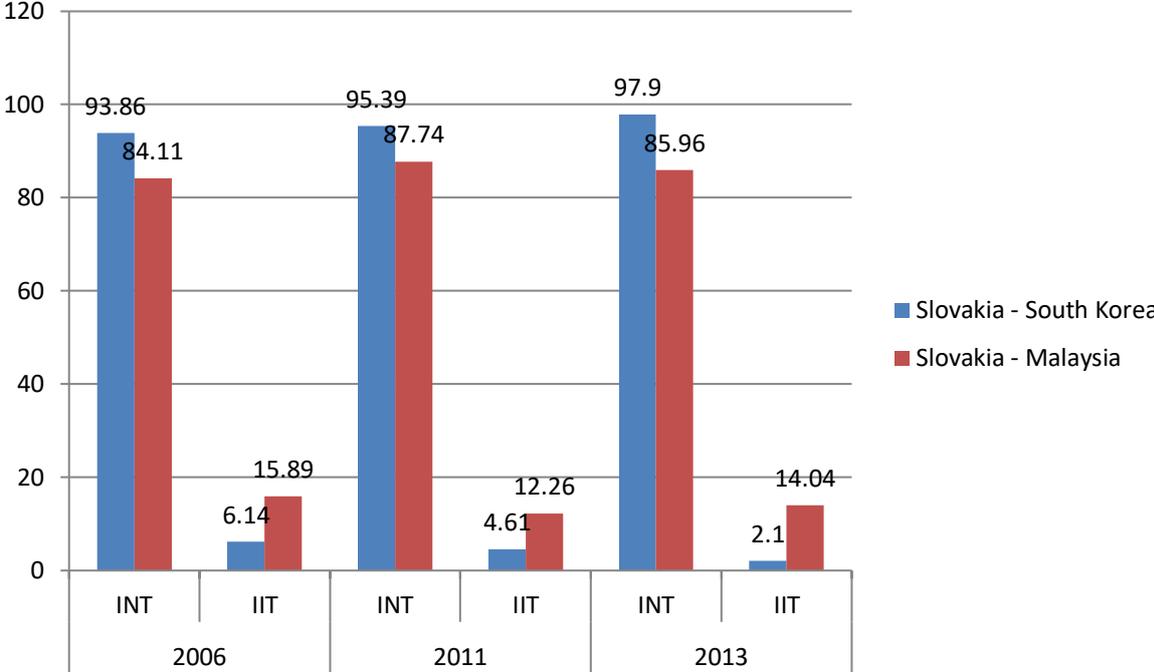
Source: Author´s calculations (2018)

The reasons for increasing INT among countries may be high discrepancies in factors that initiate the structure of commodities of mutual trade. One such factor is definitely the trade balance. Slovakia continually achieved negative trade balance in respect to both trade partners. Slovakia is not a traditional trade partner of South Korea and Malaysia. Slovakia mainly orients on exports on the EU market. The main trade partner of Slovakia is Germany (since 1998) due to investment activities, followed by Czechia, Poland, and other European countries. Before 1989, the main trade partners were countries of the Council for Mutual Economic Assistance. The traditional export markets are countries of Visegrad four. Import countries that dominate in the trade with Slovakia are Germany, Czechia, Poland, China Austria, and South Korea. In the trade with Asian countries, Slovakia has achieved negative trade balance in the long-run period.

Slovakia can be characterized as a small open economy (the EU fourth most open economy) with the relatively limited domestic market, limited resources and agricultural potential with high dependence on foreign markets. Slovakia´s export is primary luxurious goods such electronics and automobiles further optical instruments and apparatus, electrical equipment (pumps, fans, compressors, boilers, and TV receivers and communication sets) and base metals (iron and steel). Slovakia´s economy is highly sensitive to the development on external markets of these goods due to its high dependency. The imported commodities are machinery and mechanical appliances and electrical equipment (personal computers and mobile phones), natural resources (gas and oil) and vehicles (automobiles and parts thereof). Slovakia´s advantages in terms of foreign trade are its European central location, low labor costs associated with relatively high labor productivity, availability of highly qualified

experts, low operation costs, developing infrastructure, the high potential of innovations in R&D and attractive investment environment with the potential to grow. Foreign trade policies of the Slovak Republic are highly oriented in export and increasing competitiveness of Slovak firms on the international platform and to create conditions for foreign investments.

Low presence of IIT between trading partners indicated that the economies differ from each other. As it was previously mentioned, one of the determinants of IIT on the demand side is the per capita income that strongly relates to consumer preferences. Per capita income also relates to the economic development stage of a country. Countries with high-income levels are usually characterized as capital-intensive economies. Capital intensive economies use the resources in innovation and technological progress and produce commodities with higher added values and diversified their production. Countries with similar income levels tend to share similar consumer preferences that in the initial stage forms the intra-industrial commodity structure of traded commodities at it as previously mentioned. Slovakia in its bilateral trade with Malaysia and South Korea achieved low levels of IIT; one of the reasons could be the discrepancies in per capita income. According to the World Bank, South Korea and Slovakia belong on the list of high-income economies while Malaysia is still ranked as an upper middle-income country. (The World Bank Group 2018)

Graph 4 Per capita gross national income (GNI) in current prices of USD
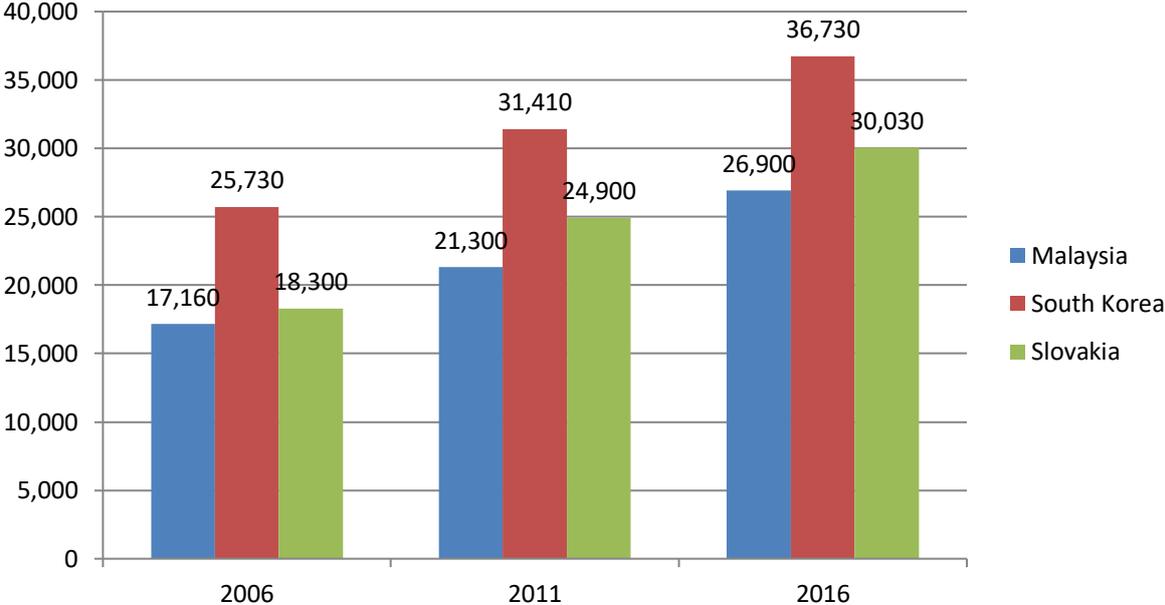
Source: The World Bank Group (2018)

Comparing per capita income levels of the single countries, the differentials are higher between Slovakia and South Korea than comparing Slovakia and Malaysia. In 2006, the differential in per capita income levels was the smallest between Slovakia and Malaysia of all of the compared years. That exact year, IIT was the highest reported among observed countries. The per capita income level differentials increased during the past decade in the case of bilateral trade between Malaysia and Slovakia that could negatively affect the IIT development, which decreased in 2011 and 2016 compared to 2006. However, in 2016 the differential of per capita income levels decreased and the extent of IIT on total trade reported an increase. Slovakia and South Korea reported a high difference in per capita income levels, during each of the reported years. The high per capita income level differences could signalize a small extent of IIT in bilateral exchange, which was the result of the analysis.

Another fact that may affect the trade composition is the market size. Wolter and Loertscher proved that market size is an important determinant of IIT. The bigger the market size among trade countries is, the higher the potential of scale economies arises since economies of scale are available to any product that is produced at large volume. Simultaneously, there is presented the demand for voluminous differentiated foreign goods. (Wolter, and Loertscher 1980, 283)

Graph 5 Gross domestic product (GDP) in current prices of million USD
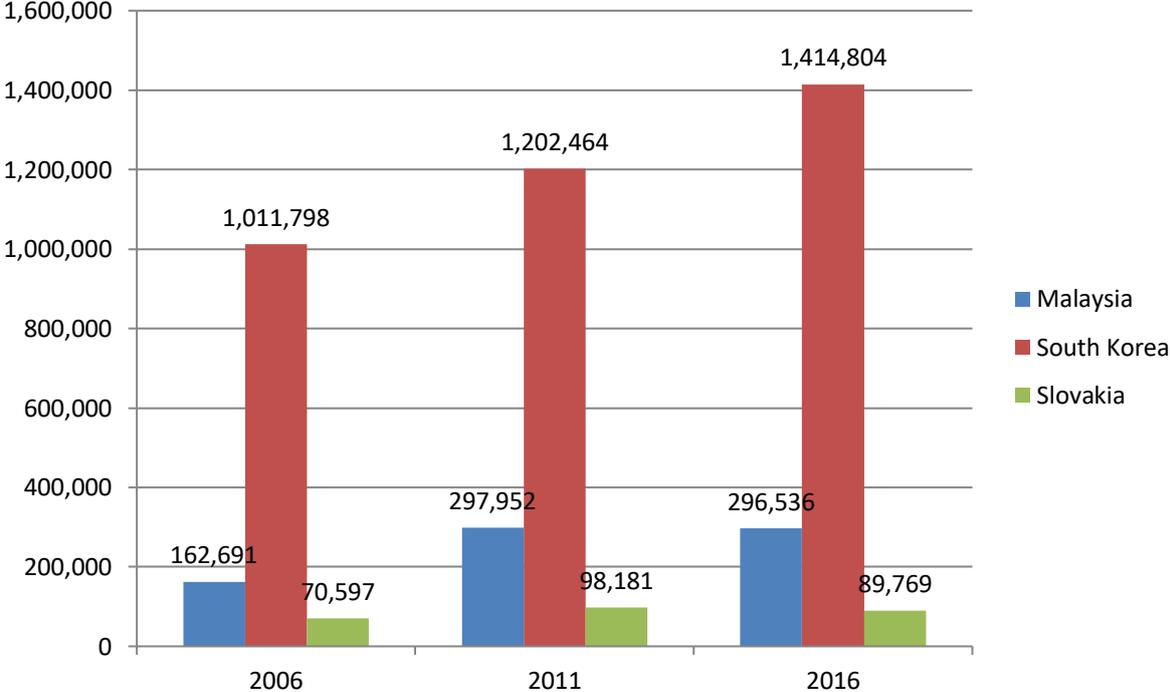
Source: The World Bank Group (2018)

From the table, above, it is evident that the market sizes compared per national GDP reports differ. Slovakia reported the lowest GDP in all of the reported years. The reason is that Slovakia is a small country by the area and population compared to its Asian trade partners. However, comparing per capita GDP, Slovakia achieved higher productivity than Malaysia in all of the examined years. Both of the market size indicators such as GDP and per capita GDP show that the differences in market sizes among Slovakia´s trade partners are appreciable, which resulted in low IIT.

Graph 6 Per capita gross domestic product (GDP) in current prices of USD
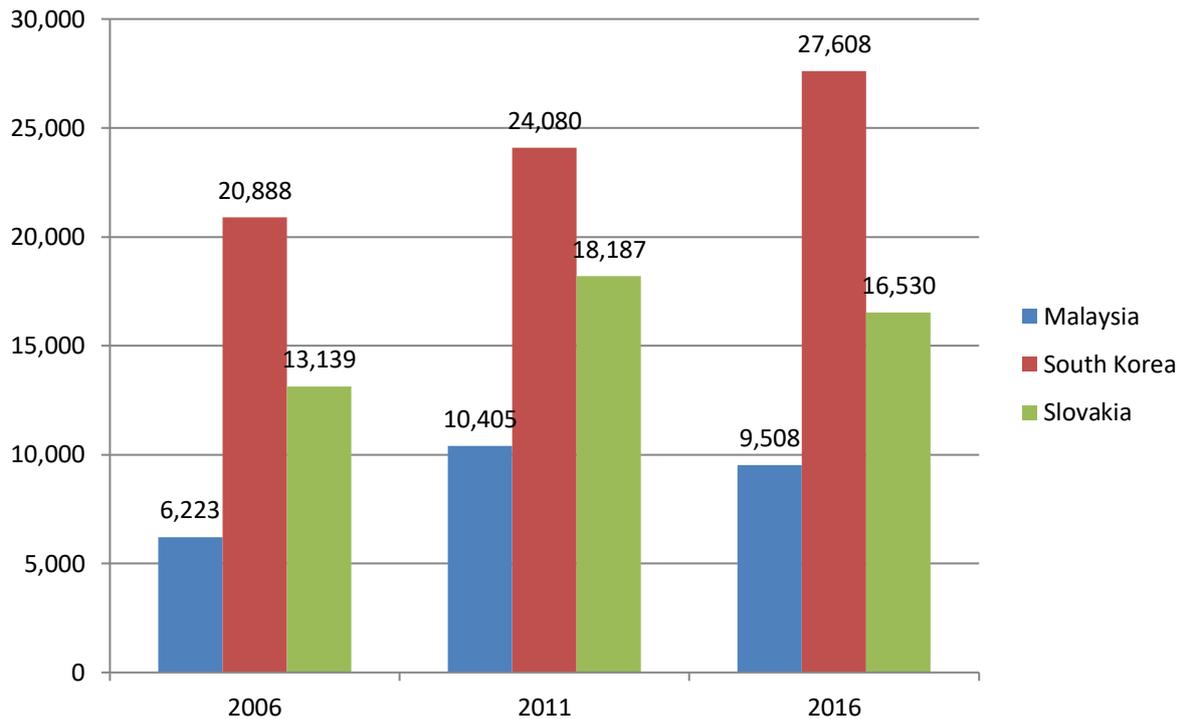
Source: The World Bank Group (2018)

Further indicators that affect the extent of foreign trade exchange are the trade barriers. The age of globalization and internationalization is characterized by lowering the trade barrier among trade partners in order to accelerate mutual commodity exchange. In presented cases, the trade liberalization to a certain extent occurred between Slovakia and its Asian trade partners during the observed period. Slovakia and Malaysia concluded various contracts that strengthen mutual cooperation in international relations. In terms of mutual economic cooperation, the countries accepted two contracts. The first concluded contract was on *Agreement between the government of the Slovak Republic and the government of Malaysia for the promotion and protection of investments* in 2007 and in 2015, the *Agreement between the government of Malaysia and the government of Slovak Republic for the avoidance of double taxation and the prevention of fiscal evasion with respect to taxes on income*. In 2001, the *Convention between the Republic of Korea and the Slovak Republic for the avoidance of double taxation and the prevention of fiscal evasion with respect to taxes on income* was signed and in 2005, the *Agreement between the government of the Republic of Korea and the government of the Slovak Republic for the promotion and reciprocal protection of investments* was signed. However, Slovakia and South Korea enhanced their mutual economic relations by accepting the *EU-South Korea free trade agreement* in 2011. Since 2011, all of the EU member states (including Slovakia) followed the principles conclude in the agreement that led towards the elimination of all tariff and non-tariff trade barriers among the EU and South Korea in order to promote trade exchange due to practicing Common Commercial Policy. Before the contract ratification, both economic entities held that FTA would continuously contribute to value increment of mutual trade.

In this perspective, it seems that the trade agreements promoted the development of bilateral trade in both analyzed cases, which was reflected in total trade increase during the observed years; however, the correlation of IIT was not noticed.

Another important factor that certainly correlates with the trade composition from the perspective of intra- and inter-industry trade is the transaction cost that relates to the distance

between countries. In the previous studies on IIT, it was proved that countries with closer location tend to reach higher extents of IIT. High transaction costs are more economically accepted in cases of commodities that cannot be easily substituted. The economic subjects are rational and look for the most effective and efficient way to exchange commodities. Transaction costs are often reflected in products prices that can overprice the product that leads to a decrease in consumer preferences.

Slovakia is located on the European continent while Malaysia and South Korea are located on the Asian continent. The bee-line between Slovakia exceeds 5 600 miles and the bee-line between Slovakia and South Korea exceeds 4 400 miles. (Distance From To 2018)

Another factor affecting the development of IIT and thus also the consumer preferences is the cultural and language aspect. Slovakia and its Asian trade partners do not share a mutual history, neither ethnicity nor language. The deepening of mutual relation is the result of globalization and the increasing importance of mutual economic relations.

In the case of bilateral trade between Slovakia and its Asian partners, the economic development stage did not play a significant role while analyzing the trade from INT and IIT perspective. However, it was noticeable at a certain extent. The analysis revealed that Slovakia and its Asian trade partners report higher levels of INT rather than IIT. The definition of an economic stage is wide and there exist more important factors that affect trade composition. South Korea reported a higher variance of commodities that became part of two-way exchange and had an increasing tendency compared to Malaysia during the presented period. However, the variance of commodities was not stable. Neither was the variance of two-way traded commodities between Slovakia and Malaysia, which was less compared to South Korea. The economic development signalizes so-called sophistication of commodities that can be differentiated. This was actually presented in a small extent within the trade between Slovakia and South Korea since more industries continually achieved and reported IIT (see tables 50 and 54).

3.3.2. Correlation of Trade Pattern Changes with Different Degrees of Trade Liberalization

The previously conducted researches on intra-industry trade confirmed the correlation between trade liberalization and IIT. The first economist who noticed the positive relationship between reduction of trade obstacles and enhancing IIT among EEC was Balassa (1966). Grubel (1967) noticed that after the *Treaty of Rome* came into effect, intra-industry specialization among EEC member states grew compared to the respondent period before the contract was accepted. Balassa (1979) observed the development of trade patterns in LAFTA, CACM, and EEC and reported that reduction of trade obstacles by the establishment of the common market increased the extent of IIT among members per particular economic group.

In the presented analysis of bilateral trade between Slovakia and its Asian trade partners, the correlation of trade pattern changes with the different degree of trade liberalization was not reported. Other factors determining IIT outweighed the importance of trade liberalization factor. First of all, the countries reported high trade imbalance during the observed period. The imbalance was significant almost in each commodity chapter. Besides that, factor such as economic development and market size reported high differences which contradict favorable conditions for increment in IIT. Also, cultural and geographical factors play against the increment of IIT.

There had not been confirmed the relationship between the higher degree of trade liberalization and intra-industry specialization. The reasons may be various. Both Balassa and Grubel reported a positive impact of deepening and strengthening trade relations between countries that formed common markets. Those countries shared cultural, historic and language

similarities close geographical location and similar levels of economic development. In order to prove Balassa´s statement, it could be more relevant for either analyzing EU- South Korea FTA on the level of the bilateral trade between the EU as a whole or to analyze the bilateral trade between South Korea and bigger European economies like Germany or France. In these cases, the IIT determinants could indicate rather similarities than differences.

3.3.3. The Potential Emergence of a Threat for Enterprises of Slovakia in the Automotive Sector

In the subchapter 2.3, the deeper analysis of car producing industry between Slovakia and South Korea was provided. The analysis revealed that the trade of vehicles defined as motor cars, other motor cars that were principally designed to transport people including racing cars and station wagons with the presence of IIT is mainly based on a vertical level of exchange. The result confirms the theory of Greenaway, Hine, and Milner, which said that an economy with higher capital intensity specialized in the production of higher quality commodities. Also, Falvey held that a country with higher income level specialized in the production of higher quality products. (Falvey 1981, 11) South Korea reported higher per capita income compared to Slovakia during the observed period.

Cars segment belongs to one of the most traded commodity chapters between Slovakia and South Korea. South Korea is the fourth global car producer in the world and highly contributed to the development of Slovakia´s automotive industry. However, in this part, the relationship in the car industry between Slovakia and South Korea and potential threats will be analyzed. The automotive industry is one of the fastest growing industries in Slovakia and represents more than 20 percent of Slovakia´s exports. Slovakia is a small open economy highly dependent on external economic development. Automotive industry contributes the most to total Slovakia´s exports and South Korea as the leading power of the industry can represent a significant threat.

The car industry was not the traditional industry of Slovakia. Traditionally, before 1989, Slovakia was an agrarian and heavy industry oriented country with a focus on military production and more sophisticated industrial production was located in Czechia, the northern part of Czechoslovakia. The Automobile industry was located in Czechia. Two of the Czechoslovak largest automobile factories were based in Koprivice and Mlada Boleslav. Tatra Koprivice manufactured passenger cars and utility vehicles and in Mlada Boleslav, Skoda plant produced passenger motor vehicles. Since the entire automobile industry was located in the Czech Republic, the majority of foreign investment inflows went to these regions. At that time, The Slovak Republic took the role of auxiliary production. In Trnava, the auxiliary plant of Tatra Koprovice was located since 1967 and in Bratislava; the automobile plant of Skoda Mlada Boleslav was established in 1971. (Ilkovic 2007, 41-43) After the Velvet revolution and demerge of Czechoslovakia, Slovakia had to answer a difficult question and identified its position in the world. In the last 25 years, Slovakia transformed from an agrarian-oriented country into a leader of car industry across Central Europe by creating a favorable environment for foreign automobile firms that by foreign direct investments established its subsidiary companies such Volkswagen Slovakia (1991), Groupe PSA Slovakia (2003) and Kia Motors Slovakia (2004). Both PSA and Kia started its production in 2006. Another reinforcement of Slovak car industry was the establishment of Jaguar Land Rover Slovakia in 2015 with the estimated start of production in 2018. Car subsidiaries established strong networks with domestic suppliers who sold to domestic and foreign assemblers. Besides political and economic stability, Slovakia also offered cheap however well-qualified human capital, strategic location, and governmental invectives in order to promote investments. The automotive industry is the decisive industry and the

driving force of the development of Slovakia´s economy. The automotive sector of Slovakia represents 44 percent of the country´s total industrial production and 35 percent of total Slovakia´s industrial export. (HNonline.sk 2018) Car industry represents 13 percent of entire Slovakia´s economic performance. The automotive sector contributes significantly to lower the unemployment rate by fulfilling 250 thousand jobs directly and non-directly connected to the industry. 129 thousand employees are directly employed by VW, PSA, Kia, and their Tier 1 suppliers (Fraurecia-PSA, Mobis-Kia, and Delphy-VW). (Bukov; Slovak Investment and Development Agency 2017) During the past decade, Slovakia became the world´s leader in car production per capita.

South Korea´s automobile industry started right after WWII. The government decided to protect and boost domestic car industry by accepting the Automobile Industry Protection Law during the first five-year plan of economic development in 1962. The law had three provisions such as import prohibition of completed cars, tax exemption for assemblers, and input components of cars were exempted from import tariffs. Besides that, the government also removed the ceiling of total car registration in order to increase motorization of Koreans. The nascent automotive industry was helped by Japan by importing kits for Korean production. Later in the 1970´s, the government also promoted the development of associated industries such as the chemical industry under the principles of import substitution. Local production increased by 70 percent during the first decade. During the 1960´s the production was only sold on the domestic market exclusively. The first exports of 70´s were supplied on the markets of Latin America and the Middle East by less than 20 percent of production. The automotive industry blossomed until the second Oil crisis in 1979 when the domestic demanded plunged which resulted in low capacity utilization and the firms faced bankruptcy. (Green 1992, 13-14) The rescue step was to find another market demanding diversified output of automotive sector that would be big enough to pump benefits of efficient production such as scale economies, which was Northern America. However, South Korea faced another problem if it wanted to supply the US market. South Korea´s production processes and technology lagged behind the US competitive standards. South Korea´s government removed inefficient firms and established cooperation with Japan in order to gather engineering and technology know-how. These governmental decisions helped South Korea to restore its car industry recession and build strong supply chains of Korea´s motor vehicles on the US market. After the turbulent development of the automotive sector, the country became one of the global leaders not only on the side of producers but also investors in the segment, which gives it the opportunity to produce cars cheaper and closer to the demand markets. Currently, the top car manufacturers registered in Korea Automobile Manufacturers Association of South Korea are Kia (1944), Ssangyong Motor (1954), Hyundai (1967), Renault Samsung Motors (2000), GM Korea (2002).

Graph 7 Top 10 Slovakia´s export destinations of commodities included in HS4 8703
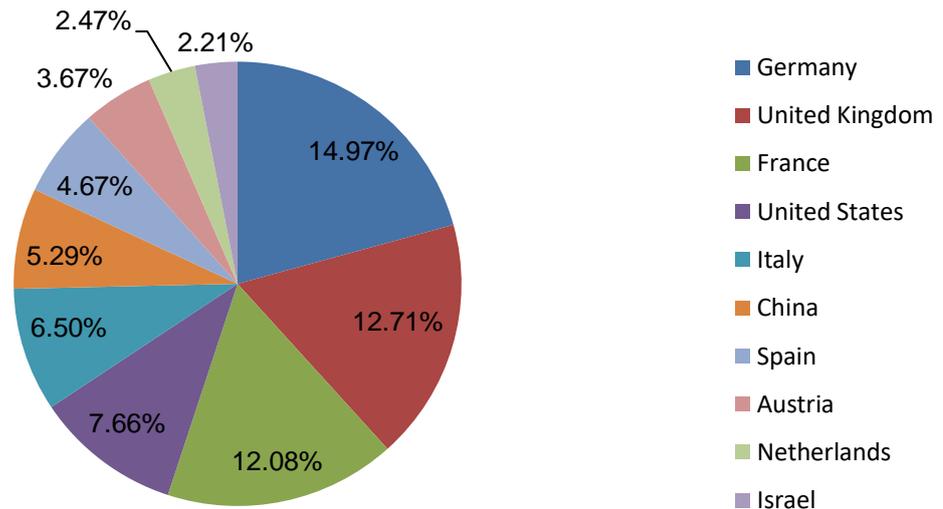
In order to analyze potential threats of South Korea´s car producing industry, the export interests of both countries are shown in the further graphs for both countries.

The EU is the leading export market of Slovakia´s vehicle production. In 2016, the total exports of HS 4 8703 were supplied on the EU market by 71.20 percent. Since the EU market significantly dominates over the external trade partners a closer report at the individual member state market is important to be demonstrated. Slovakia´s car sector biggest demand markets originating from the EU are Germany (14.97 percent), followed by the United Kingdom (12.71 percent), and France (12.08 percent). The market of the US represented 7.66 percent in 2016 followed by Italy (6.50 percent), China (5.29 percent), Spain (4.67 percent), Austria (3.67 percent), Netherlands (2.47 percent) and Israel (2.21 percent).

Graph 8 Top 10 South Korea´s export destinations of commodities included in HS4 8703
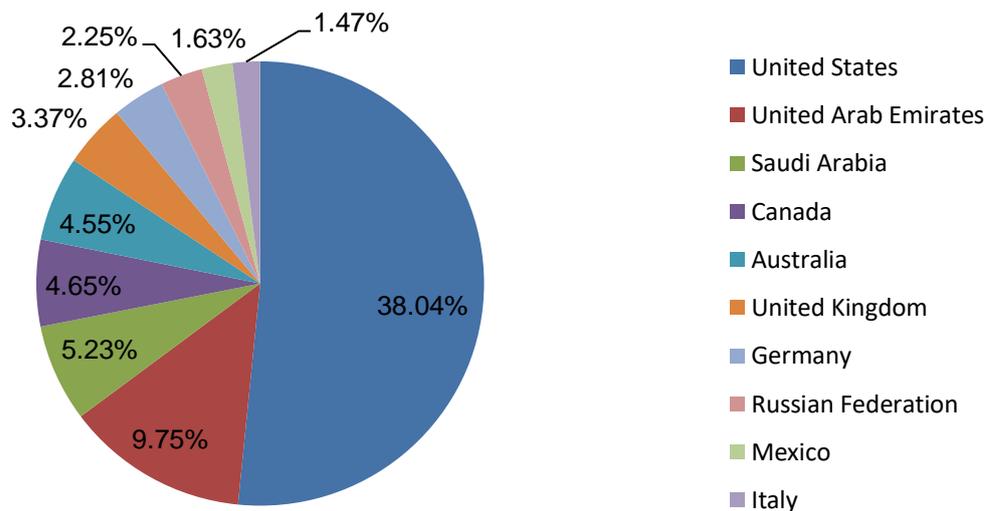
In the 1980´s, the automobile industry was one of the sources of Korea´s economic growth with their high share of exports. In the early 2000´s, the EU was one of the largest import markets of Korean cars, however, sales started to decline, in the EU due to the strength of the Korean Won (Song 2007, 230). Currently, the top 10 import markets of motor vehicles with South Korea´s origin are the US by holding the highest import share of 38.04 percent, followed by the United Arab Emirates (9.75 percent), Saudi Arabia (5.23 percent), Canada (4.65 percent) and Australia (4.55 percent). South Korea exports motor cars of the commodity chapter 8703 on the EU market; nevertheless, the country established its own subsidiaries on the continent. The leading EU import market of South Korea´s cars is the United Kingdom and Germany followed by Italy with 1.47 percent of the export share.

By looking at the analysis of the subchapter 2.3 and the territorial export structure of South Korea and Slovakia, the relationship between countries is not competitive. The analysis revealed that the countries trade cars at the higher extent of vertical intra-industrial specialization. Vertical intra-industry trade is often explained by traditional economic trade theories where countries rather exchange different commodities than diversified. In this mean, the difference represents the quality, which is significantly higher in South Korea´s exports. In case that the countries would omit mutual trade in these commodities the production could be more expensive and not efficient for both. The export markets are determined by the country's position and do not overlap in crucial export destinations. Slovakia´s car producers do not seem to be jeopardized by South Korea´s car producers mainly due to a cooperative relationship in the form of FDI that helped build strong automotive sector and different object of interest markets in terms of exports. Therefore, the general threats of automobile sector seem to arise from the internal country's economic orientation since the most enhanced economic sector is determined by FDI. The biggest threat would be that the investors would look for more suitable locations of production due to increasing wages in the segment, lacking qualified workforce or more interesting governmental incentives offered by other countries. In 2004, Korea´s automobile titan decided to establish its subsidiary on Slovakia´s market. NMS like Slovakia represented great location due to a qualified workforce, strategic central European location, built infrastructure, low tax burden and compared to other western and central European countries also lower minimum wage and besides all this non-tariff enter to the EU market. Slovakia´s government also applied investment-friendly policy order to promote FDI and offered tax holidays to foreign investors. Korean FDI had a positive impact on Slovakia´s economic growth and economic welfare of the country by lowering the unemployment rate, optimal utilization of human capital, income distribution, making Slovakia´s industrial production more competitive, opening up new export markets, and providing backward and forward linkage and access to international quality goods and services. (Song 2007, 231)

FDI of automobile sector was an integral part of Slovakia´s economic development and the country continues to be highly dependent on them. The greatest threat would be if the Korean Kia decided to relocate its production due to more favorable conditions offered by other European countries.

4. Conclusion

The composition of international trade has changed over the past seven decades. Before WWII, the traditional theories held that countries with large factor endowments differences engage in mutual trade. The international trade was determined by the comparative advantages. Any country could achieve comparative advantage if traded goods that consisting of a production factor that was intensive within the domestic market and imported those commodities that were produced of those factors that the domestic country lacked. According to a previous, valid at the time, Heckscher-Ohlin theorem the trade was beneficial for any economy ii the commodity exchange was done on the inter-industry level when the traded output is the result of different industries.

After WWII, the trade composition among countries started to change. The trade among countries with similar factor endowment started to grow and moreover the commodities that were exchanged internationally belonged to the same industries. The newly observed economic trend was first noticed by Verdoorn (1960). Verdoorn examined trade among counties of Benelux and noticed that the countries sharing similarities in factor endowments traded mostly products belonging to the same commodity group. Later Balassa (1966) confirmed the phenomenon and named it intra-industry trade, a trade between countries consisting of goods manufactured within the same industries. The first researches analyzing the phenomenon of intra-industry trade were mostly conducted between close economies within the European region such as Benelux and the newly established EEC. Later, IIT was confirmed in other regions (Latin and Central America) mainly among countries that achieved higher levels of trade liberalization or formed common markets and exhibited similarities in economic development level. Verdoorn, Balassa and also Grubel (1967) conducted their first researches on the new phenomenon, the simultaneous trade of products produced within the same industry and traded between countries of similar economic status, were not based on one and single theoretical model rather hypothetical questions. The first theoretical approach was formed by Grubel and Lloyd in 1971. Grubel and Lloyd defined the underpinnings of IIT such as monopolistic competition and scale economies. The traditional trade assumptions such as perfect competition and constant returns of scale became invalid while analyzing global trade. Economies of scale were the sign of efficient production and demand started to form the commodity structure of a country. Back then, the national commodity structure had been mostly determined by the supply side, which was consistent with the traditional trade theories. Later, Krugman summarized that IIT was the result of the presence of economies of scale, product differentiation under the conditions of either monopolistic or oligopolistic competition. Further, economists started to analyze IIT as such. Greenway, Hine, and Milner (1994) uncovered the demand aspect of IIT. The fact was that consumers determined the commodity structure of national trade by the desire of diversified commodities. That was one of the determinants for importing and exporting differentiated commodities. Traded products differentiated either in characteristics, but the same quality (horizontal intra-industry trade) or different quality, but the same characteristics (vertical intra-industry trade).

The main subject of this master thesis has been primarily to analyze the foreign trade between the Slovak Republic and two of its Asian trading partners (South Korea and Malaysia) from the perspective of intra-industry and inter-industry trade in all 21 commodity sections of Harmonizes System at its 2-digit commodity aggregation (HS 2) in the years of 2006, 2011 and 2016. The further goal has been to find out whether different stages of trade liberalization have impacted the extent of IIT among bilateral trade between examined countries. The last but not least aim has been to identify the relationship among Slovakia´s

and South Korean car producing industry and evaluate if South Korea represents significant Slovakia´s competitor in this sector.

In both cases of bilateral trade, INT significantly dominated over IIT during the examined period. In both cases, the variation of commodity chapters indicating certain levels of IIT increased during the observed years. However, the dominant commodity chapters of total trade reported a downturn trend in IIT in both analyzed bilateral trades. There was no proof that a stable development of IIT and the trade pattern remained mostly INT. The trade liberalization has not impacted IIT. There have been identified various reasons that contributed to a higher level of inter-industry specialization among examined countries. First of all, Slovakia and its Asian trade partners have never been traditional commodity exchange partners. The bilateral trade in both cases has been long-term imbalanced. In both cases, Slovakia has reported the negative trade balance for decades. Based on the divergence in income levels, the differences in consumer preferences may be assumed per Linder´s theory (1961). According to Linder, countries with similar per capita income tended to have similarities also in demand structure due to consumer preferences and vice versa. The market sizes among bilateral trade partners reported also great incompatibility. The similarity in the market size is one of the country´s determinants of IIT per Wolter and Loertscher (1980). Besides these facts, the geographical location and cultural differences also negatively affected the trade composition of the bilateral trade partners from the perspective of IIT.

In these trade analyses, there has not been confirmed Balassa´s statement that countries that achieved a higher level of trade liberalization tended to indicate a higher level of IIT among manufactured goods. In the case of bilateral trade between Slovakia and South Korea, this stamen was not confirmed. First of all, the countries did not indicate similarity in any of the examined IIT determinants. In order to confirm Balassa´s statement, it could be more relevant to either analyze EU-South Korea FTA on the level of the bilateral trade between the EU as a whole or to analyze the bilateral trade between South Korea and bigger European economy with greater IIT determinants similarities.

In the introductory part, the importance of the automotive industry was shown among countries of Slovakia and South Korea. The car production is a significant contributor to the economic performance in both countries. The revealed relationship between these two countries has seemed more cooperative than competitive. Slovakia´s car industry has been determined by FDI since it has not been its traditional economic sector and South Korea is one of the major investors of the industry in Slovakia. The analysis of decomposition of IIT has revealed that South Korea and Slovakia have traded cars of different qualities. South Korea´s exports have reported higher unit values of products, which is significant for countries with higher capital intensity. Further, the export markets have not overlapped in crucial export destinations. Therefore, the general threat of automobile sector has not seemed to arise from the South Korean side rather Slovakia´s domestic market. The biggest threat has seemed to remain the internal economic, social and political situation of the country. In order, not to jeopardize the car sector, Slovakia has to maintain an investment-friendly environment to prevent outflow of FDI.

Appendix I

List of Abbreviations

BOTH	Border trade dummy
CACM	Central American Common Market
CCPC	Potential candidates
CESEE	Central, Eastern, and South-Eastern European countries
CUGR	Cultural group dummy
CUUN	Custom union dummy
DIST	Transport cost variable
EEC	European Economic Community
EFTA	European Free Trade Association
EU	European Union
FDI	Foreign direct investments
FTA	Free trade agreement
GDP	Gross domestic product
GL index	Grubel Lloyd index
GNI	Gross national income
HIIT	Horizontal intra-industry trade
H-O-T	Heckscher-Ohlin theorem
HS	Harmonized Commodity Description and Coding System (Harmonized System)
IIT	Intra-industry trade
INT	Inter-industry trade
KAMA	Korea Automobile Manufacturers Association
LAFTA	Latin America Free Trade Association
NMS	New member states (of the European Union)
NX	Net export
OECD	Organization for Economic Co-operation and Development
OICA	Organization of Motor Vehicles Manufacturers
PCIA	Average of per capita income
PCID	Difference in per capita income
PRDI	Product differentiation dummy
SARIO	Slovak Investment and Trade Development Agency
TRCO	Transaction cost indicator
UK	United Kingdom
UN	United Nations
US	United States (America)
USA	United States of America
UV	Unit Value
VIIT	Vertical intra-industry trade

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