DOMESTIC CONTENT OF EXPORTS AND THE VERTICAL SPECIALIZATION: AN ANALYSIS FOR TURKISH EXPORT, 1995-2011

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF SOCIAL SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

CEREN GÜNDOĞDU

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
THE DEPARTMENT OF ECONOMICS

SEPTEMBER 2015

Approval of the Graduate School of Social Sciences

Prof. Dr. Meliha Altunışık
Director

I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Science

Prof. Dr. Nadir Öcal
Head of Department

This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Science

Assoc. Prof. Dr. D. Şirin Saracoğlu
Supervisor

Examining Committee Members

Assoc. Prof. Dr. Elif Akbostancı Özkazanç (METU, ECON) _____

Assoc. Prof. Dr. D. Şirin Saracoğlu (METU, ECON) _____

Assist. Prof. Dr. Seda Ekmen Özçelik (Yıldırım B. U, ITB) _____

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name, Last name: Ceren GÜNDOĞDU

Signature :

ABSTRACT

DOMESTIC CONTENT OF EXPORTS AND THE VERTICAL SPECIALIZATION: AN ANALYSIS FOR TURKISH EXPORT, 1995-2011

Gündoğdu, Ceren

M.S., Department of Economics

Supervisor: Assoc. Prof. Dr. D. Şirin SARACOGLU

September 2015, 90 pages

This thesis examines trends in domestic value added and vertical specialization of Turkish exports between the years 1995 and 2011. The World Input Output Database (WIOD) is used for calculation of domestic and foreign value added in Turkish exports by utilizing MATLAB programming. Furthermore, countries' contributions to Turkish vertical specialization are calculated. The findings show that the vertical specialization of Turkey has risen in relevant period and hence it can be said that the integration into Global Value Chains (GVCs) has increased. Turkey has vertically specialized on mainly high-tech sectors. Moreover, Germany, China, Italy and France play important roles in foreign value added of Turkish exports. This study contributes the literature by being the first study to use the WIOD for the analysis of vertical specialization and domestic value added in Turkish exports between the years 1995 – 2011.

Keywords: Domestic value added in exports, vertical specialization, global value chains, WIOD

ÖZ

İHRACATTA YERLİ KATMA DEĞER VE DİKEY UZMANLAŞMA:

TÜRKİYE İÇİN BİR ANALİZ, 1995-2011

Gündoğdu, Ceren

Yüksek Lisans, İktisat Bölümü

Tez Yöneticisi: Doçent Dr. D. Şirin SARACOGLU

Eylül 2015, 90 sayfa

Bu çalışma, Türkiye ihracatının yerli katma değerinin ve dikey uzmanlaşma düzeyinin 1995 ve 2011 yılları arasındaki eğilimlerini incelemektedir. Dünya Girdi Çıktı Veritabanı'ndan (WIOD) faydalanılan bu çalışmada, Türkiye'nin dikey uzmanlaşması ve ihracatındaki yerli katma değerin hesaplanmasında MATLAB programı kullanılmıştır. Ülkelerin Türkiye'nin ihracatındaki yabancı katma değer içerisindeki payları hesaplanmıştır. Analiz sonuçlarına göre, Türkiye'nin dikey uzmanlaşma düzeyi bahse konu dönemde yükselmiş olup, Küresel Değer Zincirlerine entegrasyonu da artış göstermiştir. Türkiye'nin dikey uzmanlaşmasının özellikle yüksek teknoloji ürünlerinde arttığı çalışmanın önemli sonuçlarındandır. Ayrıca, Almanya, Çin, İtalya ve Fransa'nın Türkiye'nin ihracatındaki yabancı katma değer içerisinde önemli paya sahip olduğu sonucu elde edilmiştir. Bu çalışma, Türkiye ihracatının yerli katma değerinin ve dikey uzmanlaşma düzeyinin WIOD kullanılarak hesaplandığı ilk çalışma olarak literatüre katkı sağlamaktadır.

Anahtar Kelimeler: İhracatta yerli katma değer, Dikey uzmanlaşma, Küresel Değer Zincirleri, Dünya Girdi Çıktı Veritabanı

To my husband

ACKNOWLEDGEMENT

Firstly, I would like to express my gratitude and deep appreciation to my thesis supervisor Assoc. Prof. Dr. D. Şirin Saracoğlu for her continuous motivation, support and immense knowledge throughout this study. I would also like to thank to the examining committee members Assoc. Prof. Dr. Elif Akbostancı Özkazanç and Seda Ekmen Özçelik for their valuable comments and suggestions.

I owe my deepest gratitude to my colleagues, especially Aysun Tekin and Başak Bahtiyar for their support and motivation throughout this thesis by sharing every steps of the process.

I also owe special thanks to Mert Yakut for his endless guidance and support by sharing all academic experiences with me throughout my studies in Graduate School.

I would like to thank to my sister-in-law Elçin Gündoğdu Aktürk, she has always listened to my problems and advised me new routes as being not only a psychologist but also a sister.

I would like to thank my dearest friend Gülnur Baybaş for her encouragements, relaxing attitudes and making me always pleased during the thesis process.

I am also grateful for my precious husband, Erhan Gündoğdu for his guidance, motivations and endless love. Without his both technical and spiritual supports, this thesis could not be completed.

Finally, I owe my deepest gratefulness to my dad Erol Sarıtoprak, my mom Emine Sarıtoprak, my brother Emre Kadir Sarıtoprak and my sister-in-law Selin Sarıtoprak for their endless motivations and tolerance. They always support me whenever I needed. Especially, my mom always encourages me to realize my dreams and she teaches me that it is never too late to do things which make me feel better.

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CHAPTER 1

INTRODUCTION

Globalization has been an important issue in economics and politics since the middle of the 20th century. When the economic aspect of globalization is considered, it has a strong relation with international trade that makes it possible to exchange economic factors such as capital and labor, as well as goods and services across countries. In this regard, the trade volume in the world has increased. To illustrate, the share of trade in world's GDP has increased from 28 percent to 50 percent between 1975 and 2013 (The World Bank Database).

With the end of the Uruguay Rounds held between 1986-1995 and hence the establishment of World Trade Organization (WTO) in 1995, reduction in tariff barriers and improvements in transportation and communication technologies made capital, labor and goods more global. These developments have led to changes in the production processes, and hence altered the nature of international trade. The concept of Global Value Chains (GVC) has arisen as a new matter in international trade. A global value chain of a final product is defined as the value added of all activities that are directly and indirectly needed to produce it (Timmer, et al. 2014).

Through the transitions in international trade, the measurements of trade export performance and international competitiveness began to change. According to Beltramello *et al.* (2012), export performance cannot measure the participation of a country into GVCs these exports have both domestic and foreign contents. Therefore, the source of value added in exports should be distinguished. Vertical specialization i.e. foreign content in a country's exports has been developed for this purpose. By the pioneering work of Hummels, Ishii, and Yi (HIY hereafter) (2001), a large body of

literature has emerged which measures countries' integration into GVCs by using national input-output tables.

It is argued that the fragmentation of production processes across the world has led to a reduction in export performance and employment generation of countries involved in international trade (Chen, Cheng, Fung and Lau, 2004; Cappariello, 2012). Moreover, the discussion of how much domestic value added is created by countries involved in international trade has also become popular. In particular, China's rapid exports have been examined in terms of domestic value added content and employment generation. In that sense, there is a good number of studies that try to measure domestic value added in exports (For example Cappariello 2012; Chen, et al. 2004; Koopman, Wang and Wei 2012).

In today's economic system, international trade can be regarded as a leading component of the economy in order to maintain economic growth for many countries. The integration of countries in international trade used to be measured by export and import shares of countries in total world trade when the conventional trade indicators were taken into consideration. In that sense, Turkey, as an emerging economy, has attracted attention with the increasing growth rate of exports (The annual growth rate of exports between 1980 and 2012 is equal to 13 percent (WTO Database)). Turkey's role in world trade with regards to export and import volumes has increased since 1980s when the focus of policy shifted from import substitution to export oriented growth and the implications of current account liberalization began to emerge[1]. Furthermore, the volume of intermediate imported goods has increased sharply between 1995 and 2011 (from 26 billion to 148 billion $), while the other goods such as consumption and capital has increased slightly. In other words, it can be said that the main source of the growth in imports is intermediate goods import. Moreover, with the transition of nature of foreign trade, participation of countries in international trade

[1] The share of Turkish exports in total world trade was 0.14 percent and 0.82 percent in 1980 and 2012, respectively (WTO Database).

and also GVCs started to be measured by vertical specialization. Therefore, the integration of Turkey to GVCs has become an important issue that needs to be investigated in the context of new phenomena emerging in the international trade literature.

In light of these facts, there are some questions those should be answered in order to evaluate the position of Turkey in international trade. First question is that with the substantial increase in her trade volume, where Turkey is located in GVCs? Second, what can be said about Turkey's participation into GVCs in recent years? Third, how can Turkey gain the benefits of being a part of this chain? Therefore, finding reasonable answers for these questions is the main motivation for this study.

The objective of this study is to conduct an analysis of domestic value added content in Turkish exports and the integration of Turkey into GVCs via vertical specialization based on 14 sub-sectors of manufacturing exports. Furthermore, measurement of individual countries' contributions to Turkish vertical specialization will be a new perspective of the analysis of participation to GVCs. This study calculates the most updated values for domestic and foreign value added in Turkish exports by using World Input Output Database (WIOD). Moreover, this thesis will be the first in the literature to use the WIOD for the analysis of vertical specialization and domestic value added in Turkish exports between the years 1995 – 2011.

In order to measure vertical specialization of Turkey, the method introduced by HIY (2001) has been applied. Since the methodology for measurements of domestic value added in exports is closely related with the vertical specialization, the same method has been implemented for both. Moreover, the direct and indirect shares of domestic and foreign value added are calculated. Contributions to foreign value added in Turkish exports made by countries are examined by using WIOD. In this study, the WIOD is utilized since it provides a time series of input output tables between the years 1995 and 2011, while the most updated input output table released by Turkish Statistical Office (TURKSTAT) belongs to 2002. Moreover, the WIOT, an item of

WIOD, is an input-output table that includes 40 countries and Rest of World (RoW). All calculations are performed by using MATLAB®.

The results of the analysis show that the global economic crisis that began in 2008 has been influential on both domestic value added content of Turkish Exports and vertical specialization of Turkey. Overall, domestic value added in Turkish exports has decreased from 86.1 percent to 77.7 percent between the years 1995 and 2011, while vertical specialization i.e. imported content in exports has increased from 13.9 percent to 22.3 percent for the same period. When the manufacturing sectors are taken into consideration it can be said that the imported content in Turkish exports are consists of mainly high-tech sectors such as Transport, Electrical and Optical Equipment. Moreover, the main contributor countries to Turkish vertical specialization are listed as China, Germany, France, Italy.

In Chapter 2, the meaning and the participation determinants of GVCs are presented at first. Methodological framework for measurement of vertical specialization and hence domestic content in exports are briefly explained. Finally, country experiences in measuring vertical specialization and domestic value added in exports are given.

Chapter 3 provides information about construction of the WIOD, and countries and sectors included in the WIOD. The methodology for measurement of vertical specialization and domestic value added contents, direct and indirect shares, and countries' contributions to Turkish vertical specialization are explained.

The results and findings of analysis are given in Chapter 4. Domestic content of Turkish exports and vertical specialization patterns between the years 1995 and 2011 on a sectoral basis are presented. Then, countries' shares in vertical specialization of Turkey will be analyzed in detail.

Finally, the concluding remarks are summarized in Chapter 5.

CHAPTER 2

LITERATURE REVIEW

With the rise of globalization, the structure of international trade has been prompted to change. The main reason of this change can be the fragmentation of the production processes. Lower tariff barriers and also much easier movement of capital, labor and goods and services have stimulated the spread of production stages across the countries: firms design the products in their home country, and assemble them in other countries where the cost of factors of production is lower. As a result of this fragmentation of the production stages, a new phenomenon called "Global Value Chains (GVCs)" has emerged. A global value chain contains the entire production activities that firms hold in their home countries or abroad in order to produce final goods (OECD 2013).

By means of GVCs, the value added created by production of a country belongs to different countries since different stages of the production process can be located in any country in the world. Since firms divide their production processes in order to minimize the cost of production factors, a complexity in measuring the value added by each country arises. In that context, the "vertical specialization (VS)" term has come up. The VS share of a country, i.e. foreign content in countries' export is considered to be an indicator of integration into the GVCs. Moreover, the domestic value added in exports reflects the value added created by using domestically produced intermediate goods, and the job opportunities created due to export activities. In that sense, Turkey's vertical specialization and the domestic content of Turkish exports are investigated in this study.

In this Chapter, firstly, the concept of GVCs is introduced, and the participation issues into GVCs are presented, then the methodologies for calculation of vertical

specialization and domestic content of export are reviewed in Section 2.2. In Section 2.3, country experiences in vertical specialization and measurement of domestic value added content in export are given, the studies are classified with respect to country groups.

2.1 Global Value Chains and Trends in International Trade

The GVC has created more competition and dependence across countries. Countries have become more dependent to each other's demand, capital and production despite of the competition between them for attracting investment and job opportunities. With the increasing outsourcing practices, i.e. the practice to subcontract non-core activities to independent suppliers, competition between companies has changed from being horizontal to vertical (World Bank 2014). The horizontal competition refers to firms' competition for the same sector for the same customer-base, while the vertical one means that firms in the same value chain compete to perform specialized tasks in the manufacturing processes. Hence, firms choose different combinations of intra-company production (production at home), offshoring (production in abroad) and outsourcing strategies in order to improve their production performance. These different strategies implemented by companies have led to the spread the production processes across the world.

There is a well-known example to illustrate the fragmentation of the production process implemented by the Apple Company. The iPod, an innovative product released to the market by Apple, is designed in the U.S., assembled in China by the manufacturers from Taiwan, and the key components are embodied by Japanese, Korean and American suppliers (Linden, Kraemer and Dedrick 2009). In that sense, monitoring which country has the most value added this production process helps to understand the indicators to measure the international trade competitiveness.

In order to develop a reasonable and effective policy path for international trade, the factors associated with the participation in GVC should be identified. The conventional measurement and the one which considers GVCs for international trade

competitiveness come up with different results. For instance, when the bundle of intermediate exported goods is taken as a measure of trade competitiveness, it is argued that emerging markets contribute in more low-tech industries to the world's trade. However, based on the analysis of export performance in terms of GVC, it is shown that emerging economies also have gained large shares of the world's exports in high and medium-high technology industries (Kowalski, et al. 2015). Moreover, emerging markets have gained a considerable amount of export shares in final as well as in intermediate goods.

Measuring countries' international trade competitiveness along with the participation into GVCs has long been an important issue and the increase in the globalization of trade and the geographic distributions of the production stages makes the measurement even more complex. The conventional way for the measurement of the international competitiveness has been the export and import shares of the countries in the world trade. When the GVCs are considered, the specialization of the countries with respect to different production activities need to be analyzed thoroughly in order to get a more accurate measurement of trade competitiveness (Beltramello, De Backer and Moussiegt 2012).

The specialization in the production activities can be explained by the position in the production chain, such as upstream or downstream phases. The countries upstream produce the raw materials or the knowledge (e.g. research, design) involved at the beginning of the production process, while the countries downstream assemble the processed products or specialize in customer services (World Bank 2014). In general, upstream activities refer to the production of the intermediate inputs while downstream activities imply assembling of products at final stage. The position of a country in the production chain determines the benefit of participating in GVCs. For instance, although that benefit depends on the subject of the industry, research and development activities tend to create more value added than assembly (OECD 2013). When emerging markets are considered, they have been able to integrate rapidly into the global operations and enter new export markets thanks to GVCs, but this does not

mean that these emerging markets necessarily are able to upgrade their position in world trade in the later stages of the production (Beltramello, De Backer and Moussiegt 2012).

The determinants for the participation of countries in GVCs have varied by the structure of the countries' production systems. The type of linkages in GVCs, such as backward and forward linkages, has been effective for the improvement in the international trade competitiveness (Kowalski, et al. 2015). In general, the backward linkage of a sector reflects the sector's dependence on local inputs that occur within the production process of the economy. A strong backward linkage suggests a weak sectoral independence (Song, Liu and Langston 2006). When it is considered in the perspective of foreign trade, definition of the backward linkage into GVCs is that foreign intermediate good contents in the country's export i.e. the dependence of export on import. In other words, backward linkages into GVCs show how much imported intermediate goods are used in the production of the output that is exported (Banga 2014).

On the other hand, forward linkage of a sector shows the dependence of the remaining sectors in the economy on this sector's supplies (Song, Liu and Langston 2006). When the GVCs are considered, forward linkage has the same pattern by reflecting a country's exported intermediate goods used in other countries' export, i.e. other countries depend on the country's exports to continue their production processes. To illustrate, Turkey exports silk (as an intermediate good) to UK and a textile firm produces shirts by using silk imported from Turkey. After that process, textile firm operating in UK exports shirts to Germany. In that case, while Turkey has forward contribution to the GVC, UK has backward contribution.

According to Kowalski *et al*. (ibid), the types of the contribution in GVC, i.e. backward or forward, have different effects according to the dominant determinants on the integration into the GVCs. These factors are divided into two groups as non-policy (or structural) and policy factors. The former refers to the policies which do not easily influence the integration into GVC in at least short or medium term, while the latter

have an obvious effect via the investment and openness in trade. The non-policy or structural policies can be listed as market size, remoteness to the markets, level of development and degree of industrialization. Regional trade agreements and tariffs; openness to inward Foreign Direct Investment (FDI); other policies of interest; logistic performance border related procedures and infrastructure; education and training, intellectual property rights protection and research and development, and the quality of institutions and other policies related to GVC participation are policies that have effect on integration into GVC (Kowalski, et al. 2015).

Kowalski *et al.* (ibid.) examines the integration into GVCs by the developing countries especially in Asia, Africa and Middle East regions, and makes some policy suggestions to increase their participation in the GVCs. The main outcome of the study is that regardless of whether countries participate in GVCs with backward or forward linkages, they will get the benefit from being a part of the production chain. Moreover, the authors have disagreed with the idea that the sophistication i.e. having high domestic value added is the most effective way for upgrading an economy. They claim that the volume of the activity might matter as much as the domestic value added share.

Although Banga (2014) has agreed with Kowalski *et al.* in terms of the definition of backward and forward linkages, she diverges from them in terms of benefits of being a part of GVCs. She claims that the net value added gains might measure the benefit of participation into GVCs by finding the difference between forward and backward linkages (Banga 2014). The analysis shows that countries like Japan, U.S. and UK have participated in GVCs through more forward linkages than backward linkages. On the other hand, backward linkages (i.e. foreign value in other countries' exports) are more dominant compared to forward linkages in case of China, South Korea, India, Malaysia, the Philippines, Thailand and Vietnam. Therefore, it can be said that developed countries create higher domestic value added in other countries' exports compared to foreign value added in own exports, while the case for developing countries is the opposite. When the sectoral distribution of value added in exports is investigated, it can be said that the benefits of the participation into GVCs can be

gained via activities which involve more of marketing, managing and R&D. For instance, services share in the value added of exports is larger than that in other sectors for developed countries. However, the manufacturing sector still plays an important role in the value added contribution in export in developed countries.

In brief, the measurement of trade competiveness along with GVCs is a major factor for GVCs analysis. Through conducting an analysis by applying a reasonable measurement, it is easier to determine policies related to integration in GVCs. Countries' position in production chains and backward or forward linkages with GVCs play a crucial role for the participation in the GVCs.

2.2 Methodology of Vertical Specialization and Domestic Content in Export

Vertical specialization was first stated as the subdividing the production process among individual establishments (Balassa 1967). He gave the automobile industry of U.S. as an example of a vertically specialized sector. Different components and accessories produced in separate firms have been gathered together to manufacture the final output. Krugman also mentioned the vertical specialization by emphasizing the importance of rise in the world trade after Second World War and he expressed the vertical specialization as "slicing up the value added chain" (Krugman 1995).

However, the recently known concept of "vertical specialization" i.e. countries' specialized production stages of a good's production sequence, introduced by Hummels, Ishii and Yi in 2001, measures basically the import content in export of a country that has sequential production stages in different countries. In other words, vertical specialization (VS) can be expressed as the foreign content in export or the foreign value added of export. HIY defines a certain concept about the occurrence of the VS and make some assumptions which are listed as;

- A good is produced in two or more sequential stages,
- Two or more countries provide value-added during the production of the good,

- At least one country must use imported inputs at any stage of the production process, and some of the resulting output must be exported.

HIY also point out that VS has both import and export sides. On the import side, the VS is a subset of only intermediate goods while export side involves both the intermediate and final goods. Moreover, HIY have a key assumption that the imported intermediate goods used for the domestic production and the exports have the same intensity.

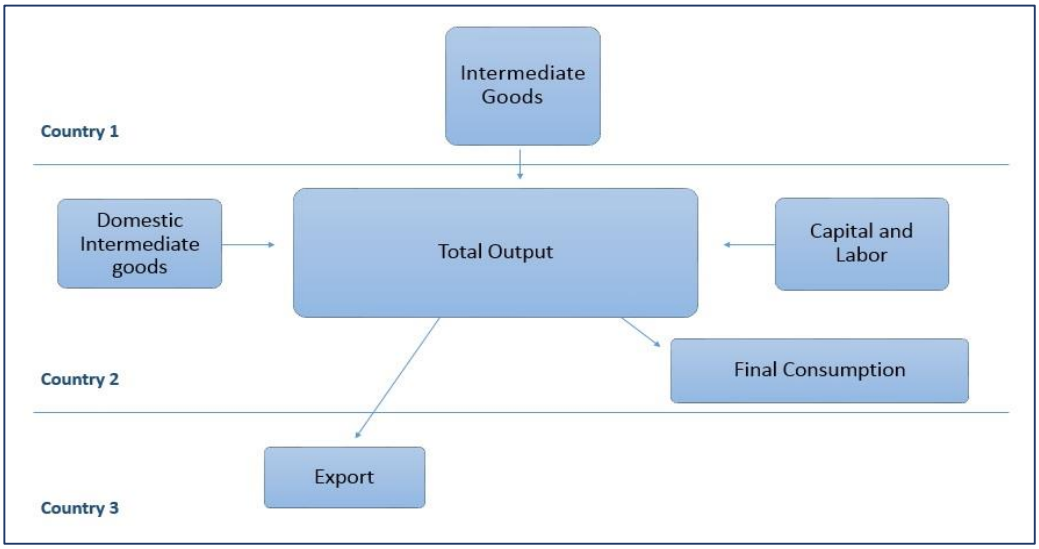

Figure 1: Vertical Specialization Process

Source: (Hummels, Ishii and Yi 2001)

Figure 1 shows the production stages across the countries. Country 2 produces output by using the intermediate goods both by those imported from Country 1 and also those domestically produced. In that production process, it is assumed that the capital and labor are provided by Country 2. The total output that Country 2 produced can be exported to other countries or used for domestic purposes. Figure 1 explains the VS and trade flow behavior along with GVCs.

While VS points out the integration into GVCs, the domestic value added or domestic content in export demonstrates how much domestically produced intermediate goods the country uses in exporting. The term of "Domestic Value Added in export

(DVAX)" stands for the real domestic value added induced by a country. At this point, it is essential to emphasize that the other factors of the production rather than inputs, such as capital, land and labor are not taken into account in the context of domestic value added in export (Cappariello 2012). For instance, the value added created by employing a foreign engineer or using foreign invested machine has not been separated from the domestic value added content in exports. Therefore, it can be said that the domestic value added concept cannot distinguish the production factors except for the intermediate inputs from the foreign sources.

In Figure 1, Country 2's VS, i.e. foreign content in export can be measured by the methodology suggested by HIY (2001). HIY method has shed light on the measurement of both VS and domestic value added. This methodology is quite clear and insightful. Simply, the national input-output tables are utilized to calculate imported content in the exported final goods. The domestic content in export can be calculated by two ways; first, one can be computed by using direct value added content of trade while the second's starting point is HIY method for VS (Cappariello 2012).

As was mentioned, the domestic value added in export, i.e. the domestic content of export literature is closely related to the VS measurement. There has been a number of studies about the domestic content in export. The most remarkable studies are conducted by Chen, Cheng, Fung, & Lau (2004); Koopman, Wang, and Wei (2012 and 2014); Johnson and Noguera (2012) and Cappariello (2012). Before explaining the prominent studies, it is important to understand the HIY method for measurement of VS and hence domestic value added since almost all of the literature builds on it.

HIY (2001) defines the VS of the country *k* in sector *i* in equation (1);

$$VS_{ki} = \left(\frac{imported\ intermediates}{gross\ output}\right) * exports = \left(\frac{exports}{gross\ output}\right) * imported\ intermediates \quad (1)$$

The VS share of total exports of country *k* is expressed in equation (2);

$$VS\ share\ of\ total\ exports = \frac{VSX_k}{X_k} = \frac{\sum_i VSX_{ki}}{\sum_i X_{ki}} \qquad (2)$$

where *X* denotes exports; $k\ and\ i$ are country and sector indices respectively.

Hummels *et al* (2001) also show in Equation (3) that the overall VS share of country k is an export-weighted average of the sector *i*'s VS export share ($\frac{VSX_i}{X_i}$):

$$VS\ share\ of\ total\ exports\ of\ country\ k = \frac{VSX}{X_k} = \sum_i \left(\frac{X_{ki}}{X_k}\right)\left(\frac{VSX_{ki}}{X_{ik}}\right) \qquad (3)$$

In Table 1, a representative input-output table is presented. The input-output tables reflect the distribution of the intermediate and final goods to produce the total output at sectoral base, and also involve all the components of total output in both use and supply aspects. They also provide a classification of intermediate goods and a chance to compare sectoral variations. By using the input-output tables (separated into the domestic and imported intermediates) the idea in equation 3 is transformed into a matrix form.

Table 1 : A Representative Input - Output Table

			Intermediate Use	Final Use		Gross Output
				Non-export (C+I+G)	Export	
		Dim	1.….N	1	1	1
Intermediate Inputs	Domestically Produced	1...N	D	F^D	X	Y
	Imported	1...N	M	F^M	-	Y^M
Value Added		1	V			
Gross Output		1	Y'			

$$D = \begin{bmatrix} D_{11} & \cdots & D_{1n} \\ \vdots & \ddots & \vdots \\ D_{n1} & \cdots & D_{nn} \end{bmatrix}, \quad M = \begin{bmatrix} M_{11} & \cdots & M_{1n} \\ \vdots & \ddots & \vdots \\ M_{n1} & \cdots & M_{nn} \end{bmatrix}, \quad F^D = \begin{bmatrix} F_{11}^D \\ \vdots \\ F_{n1}^D \end{bmatrix},$$

$$F^M = \begin{bmatrix} F_{11}^M \\ \vdots \\ F_{n1}^M \end{bmatrix}, \quad X = \begin{bmatrix} X_{11} \\ \vdots \\ X_{n1} \end{bmatrix}, \quad Y = \begin{bmatrix} Y_{11} \\ \vdots \\ Y_{n1} \end{bmatrix}, \quad Y^M = \begin{bmatrix} Y_{11}^M \\ \vdots \\ Y_{n1}^M \end{bmatrix}, \quad V = [V_{11} \quad \dots \quad V_{1n}]$$

D and M are square matrices of the domestically produced intermediate goods and imported intermediate goods, respectively. F^D is the vector of final domestic demand in the country, while F^M is the vector of demand of imported final goods. Moreover, X and Y denote the vector of exports and gross outputs, respectively. V is a vector of value added created in each sector regarding all production factors such as capital, land and labor inputs. D_{ij}, the element of matrix D, denotes the value of goods produced in sector j by using the domestically produced inputs sector i, while M_{ij} denotes the value of goods produced in sector j by using the imported inputs in sector i as an element of matrix M. V_j , the element of vector V and Y_i ,the element of vector Y , denote the value added in sector j and gross output value of sector i, respectively. F_i^D and F_i^M, the

elements of vectors F^D and F^M, indicate the final demand of sector i for domestically produced and imported goods, respectively. The element of X vector X_i is the exports of sector i. Finally, Y_i^M the element of the vector Y^Mshows the total imports of sector i.

The matrix formulation for the VS share of total exports (the same idea with Equation (3)) is given below:

$$VS\ share\ of\ total\ exports\ of\ country\ k = \frac{VSX_k}{X_k} = \frac{uA^M[I - A^D]^{-1}X}{X_k} \quad (4)$$

where u is a $1 \times n$ vector of 1's, A^M is $n \times n$ imported input coefficient matrix (i.e. the ratio that the value of imported intermediate goods used from sector i to produce goods for sector j to total output produced in sector j $\equiv \frac{M_{ij}}{Y_j}$), A^D is an n×n domestic input coefficient matrix (i.e. the ratio that the value of domestically produced intermediate goods in sector i to produce goods for sector j to total output produced in sector j, $A^D \equiv \frac{D_{ij}}{Y_j}$), X is an n×1 vector of exports. $[I - A^D]^{-1}$ is the well-known Leontief matrix that captures the imported input embodied in the domestic output after the second stage of the production process for the goods that are exported (Hummels, Ishii and Yi 2001). Another definition for the Leontief matrix is a matrix of the coefficients for the total domestic output requirement (Koopman, Wang and Wei 2012).

An important contribution to the domestic value added literature has been made by Koopman, Wang, & Wei (KWW hereafter) (2012). The main objective of this study is to calculate the domestic content in exports of China by distinguishing the processing trade from ordinary trade. Processing trade is not taken into account in the scope of HIY methodology and it violates HIY's assumption that the imported intermediate goods used for domestic production and exports are in the same intensity.

KWW developed a methodology to construct a new Input-Output table that separates the processing trade via the trade statistics of the countries based on HIY method. At the beginning of the study, they mention the ordinary domestic value added methodology. Although the focus point of KWW's study is not the domestic value added in export in the context of ordinary trade, the deductions and methodology are quite useful to measure the domestic content in export.

Equation (5) means that the additional domestic value added generated by one additional unit of final demand of the domestic products.

$$Domestic\ Value\ Added\ Coefficient = A_V[I - A^D]^{-1} \quad (5)$$

where A_V is an 1×n vector with the value added coefficients (i.e. the ratio that V_j is the value added created by the sector j to total output produced in sector j ≡ $\frac{V_j}{Y_j}$).

KWW define VS via domestic value added methodology such as foreign value added share (FVA);

$$Foreign\ Value\ Added\ Coefficient = u - A_V[I - A^D]^{-1} = uA^M[I - A^D]^{-1} \quad (6)$$

Moreover, KWW claim that the summation of coefficient part of the Equation (4) ($uA^M[I - A^D]^{-1}$) which describes the VS share in export and the domestic content of export (Equation (5)) is equal to unity.

As it is stated in Equation (5), the concept of the domestic content in export can be clearly explained with the general value added approach. The total value added created in a country or an industry is the output value of that sector minus the value of intermediate goods used to produce the final goods. The total value added has information about both domestically produced and imported intermediate goods. Overall direct value added of export can be estimated by the general value added formula if HIY's assumption that the imported intermediate goods used for the domestic demands and the exports have the same intensity holds (Cappariello 2012). The Equation (7) gives the direct value added content of exports for a country.

$$VAX = \sum_i X_i \left(1 - \sum_j a_{ji}\right) = \sum_i [X_i va_i] \qquad (7)$$

where a_{ji} denotes the coefficients for exports and domestic sales and va_i is the ratio of direct value added content of sector i.

Cappariello (2012) states that the direct value added content trade has become an insufficient measure because it captures only the value added generated by the exports of each manufacturing sector in its own sector. Moreover, she claims that the domestic value added concept covers the value added content in all inputs including goods and services.

Since the total value added cannot capture the value added created between sectors, a more comprehensive measurement is needed. The formula of domestic value added content in exports which includes the value added generated by not only within sectors but also between sectors introduced by Cappariello given below (2012);

$$DVAX = \sum_i X_i \left[va_i + \sum_j va_i \, a_{ji}^D + \sum_j \sum_k va_k \, a_{kj}^D a_{ji}^D + \sum_j \sum_k \sum_s va_s a_{sk}^D a_{kj}^D a_{ji}^D + \cdots \right] \quad (8)$$

where $i, j, k, s \; etc.$ denotes the successive sectors.

$$DVAX = \sum_i X_i \left[1 - \left(a_i^M + \sum_j a_j^M \, a_{ji}^D + \sum_j \sum_k a_k^M \, a_{kj}^D a_{ji}^D + \sum_j \sum_k \sum_s a_s^M a_{sk}^D a_{kj}^D a_{ji}^D + \cdots \right) \right] \quad (9)$$

Similar to KWW, she claims that the unity minus domestic value added content in exports is equivalent to the foreign value added content in export, e.g. VS share in export. Therefore, equation (8) and (9) give the same result of that domestic value added content in export. The matrix notations are the same with KWW method.

Another substantial study that measures the domestic value added procedure has been conducted by Johnson and Noguera in 2012. In their study, they firstly track the value of primary factors (labor, land, capital etc.) that are embodied in the trade of the intermediate and final goods. Moreover, they follow the HIY methodology by making modification to investigate bilateral relations between the source and destination countries. They tried to find the value of intermediate good that is exported to destination country where this good is absorbed to produce final good. Therefore,

Johnson and Noguera (2012) have used the input-output data for the source and destination countries simultaneously. Like other studies, they calculate the value added exports and value added to export ratio (VAX ratio) which is the ratio of value added produced in source country and absorbed in destination country to gross export of source country as a measure of the value added content of trade.

To sum up, it is important to emphasize that the most remarkable and pioneer study of the VS literature has been done by HIY. The follow - up studies developed the methodology by modifying assumptions made by HIY. Moreover, the domestic content of export has become to be researched more. The value of domestic content of export can be measured via not only general value added approach but also VS approach. In this study, HIY's VS approach are adopted in order to calculate the value of VS and domestic content in exports of Turkey.

2.3 Country Experiences in Measuring Vertical Specialization and Domestic Content of Export

Since vertical specialization and domestic value added in exports have been rather recent topics, there are a limited number of studies that investigate the new measure of international trade in the literature. In this part of Chapter 2, studies which measure vertical specialization and domestic value added content in exports of countries and country groups are examined. Across country and sector analysis are provided firstly, and measurement experiences with processing trade such as in the case of China and Mexico will follow. Finally, the results of various studies related to Turkey's vertical specialization and domestic value added in Turkish exports are given.

2.3.1 Across Countries and Sectors Analyses

Firstly, the empirical results of the study conducted by HIY are discussed. They use input-output tables provided from the OECD database and the national accounts of each country in order to calculate the vertical specialization ratios for 10 OECD countries (Australia, Canada, Denmark, France, Germany, Japan, Italy, the Netherlands, United Kingdom and United States) and Ireland, South Korea, Taiwan

and Mexico. The important result of the analysis is that the vertical specialization (VS) share of exports of these 14 countries which make up the more than three-fifths of world trade was 16.5 percent in 1970 and it has risen to 21 percent by 1990. The growth of VS is much higher than overall export between the years 1970-1990. Moreover, they investigate whether there is a relation between VS and GDP growth by using OECD database (only for OECD countries). A negative correlation coefficient (-0.65) implies that developed countries have smaller VS shares.

The authors weighted VSs based on export shares of each country in initial year and final year (respectively 1970 and 1990) to measure aggregated VS for 14 OECD countries, which have 63 percent share of world trade in 1990. The aggregated VS has been found as 0.165 and 0.211 respectively in 1970 and 1990. There is a 28 percent of growth over 20 years. By using initial year's export shares, VS is found 0.204 in order to address the source of growth. It implies that the 28 percent of growth consists of 86 percent of the increase in VS shares of countries and 14 percent of increase in export share of the high VS share countries. In other words, HIY claims that the main source of VS growth is the increase in the overall 14-country VS shares. In addition, the authors examined the contribution of VS in growth of export to GDP ratios for both each country and the aggregate level. Finally, they find that contributions of VS shares of all countries except for Australia, Germany, Japan, US are at least 30 percent to growth of export shares in GDP.

HIY also examined the nature of vertical specialization by decomposing the growth of vertical specialization over time, across sectors and countries. They separate the growth of contribution of change in sectoral VS intensity (i.e. the VS sector share of sector exports) and sector share of total exports for nine OECD countries between the years 1970 and 1990. The similar methodology has been applied to obtain cross-country differences by creating representative country values, taking simple average of sector vertical intensity and sector composition over all countries. The main finding of this analysis is that sector VS intensity plays a major role in overall VS share variation over time and across countries. Moreover, HIY (2001) state that chemicals

and machinery sectors account for most of the VS share growth over time in most countries.

It is stated in the methodology review part that Johnson and Noguera (2012) analyzed the value added content in export via VAX ratio across countries and sectors. One of the substantial findings of this study is that in the sector of Agriculture, Natural Resources, and Services, VAX ratios are higher than those in Manufacturing. The reason behind this result might be the use of the non-manufacturing inputs in production of manufacturing goods. Another important result of the study is that the VAX ratios vary substantially across partners for individual countries at the bilateral level. The contribution type into GVCs i.e. backward - forward and multilateral production shares are stated as main reasons for this diversification. Therefore, in light of these adjustments, countries' gross export shares and value added content of trade become dissimilar. For instance, US trade deficit with China is less (around 30-40 percent) when it is calculates by the new value added than when the gross exports are taken into consideration.

The variation in bilateral value added to export ratio can be explained by production sharing, i.e. countries location in the production activities, not by composition of goods exported to different destinations (Johnson and Noguera 2012). Moreover, what happens after exporting of the goods and the type of the goods are effective factors in variety in bilateral value added to export ratio. In other words, whether the goods exported are a final good and absorbed in that destination, or goods are intermediate inputs and redirected to other country or home country create difference in bilateral VAX ratio.

In light of remarkable studies focused on foreign and domestic value added content of export, a unified methodology has been constructed by KWW in order to trace value added by country and measure vertical specialization in international trade (Koopman, Wang and Wei 2014).

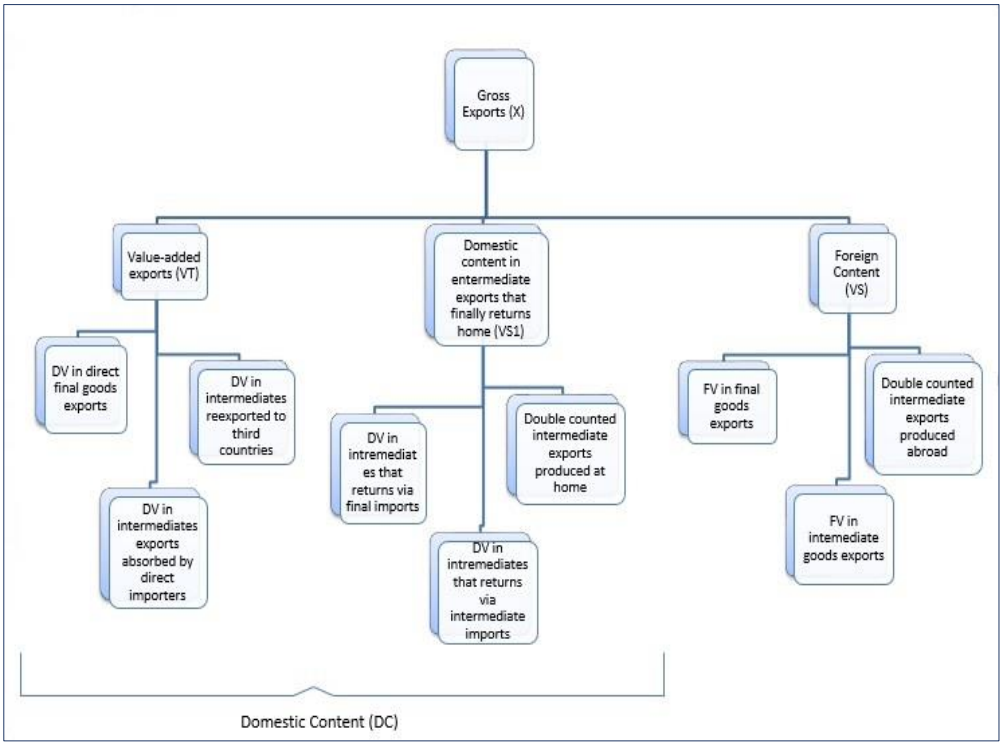

Figure 2: The unified domestic content concepts proposed by KWW[2]

Gross exports have been separated into three components which are value added exports (VT), domestic content in intermediate exports that finally returns to home (VS1) and foreign content (VS) as it is shown in Figure 2. The first component which is value added exports is divided into three such as domestic value added in direct final goods exports, intermediate exports absorbed by direct importers and intermediate re-exported to third countries. Domestic value added in intermediates that returns via final and intermediate imports, and double counted intermediate exports produced at home form the second component which is intermediates that produced domestically return finally home. Similarly, foreign content of exports are formed by foreign value in final and intermediate goods exports and double counted intermediate exports produced abroad. KWW have made comparisons with the previous concepts revealed in the literature such as VAX, VS and VS1 introduced by Johnson & Noguera (2012), HIY

[2] Source: Koopman, Wang, & Wei, 2014

(2001) and Daudin, Rifflart, and Schweisguth (2011). KWW introduced a new domestic content (DC) measure by involving domestic content in intermediate exports that finally returns home.

As a result of across country analysis based on domestic content measurement proposed by KWW, the difference between emerging markets and developed countries draws attention (Koopman, Wang and Wei 2014). The VAX ratio and DC are very close to each other for emerging markets, while the gap between these two measurements for developed countries is quite wide. This implies that the production activities of country groups are diversified such as upstream and downstream activities (Koopman, Wang and Wei 2014). In other words, high-income economies' exports are specialized in relatively more upstream activities and some of the value added generated by this type of countries involved in intermediate goods return to home as a part of other countries' export to the advanced economies.

Cappariello (2012) conducted a study which focuses on domestic value added content of exports for Italy, France and Germany. The input- output tables are taken from Eurostat and ISTAT databases and contain information on domestically produced and imported inputs. The direct value added and domestic value added content are computed for these countries for the years 2000 and 2007. As was stated in the methodology part, direct value added covers only the value added in exports generated by manufacturing sector only in its own sector, i.e. it does not take the other sectors into the account. The domestic value added term implies the value added created by manufacturing exports in all of the economy. Therefore, the empirical results show that the domestic value added in exports for all three countries are almost twice the direct value added content.

Domestic value added content in manufacturing export and vertical specialization share are similar for Italy and France. In 2000, domestic value added content in manufacturing exports of Italy and France are 67.4 percent and 66.4 percent respectively, while the numbers have decreased to 61.7 percent and 64 percent by 2007. However, both vertical specialization and domestic value added are different for

Germany. The domestic value added content in manufacturing export has fallen from 70.1 to 65.5 between the years 2000-2007, while import content in manufacturing export has increased from 29.9 to 34.5. The rates of change differ for these countries. It can be said that a similar result to KWW was obtained. Germany's high domestic value added content points to a higher degree of fragmentation of production chains. Therefore, the upstream activities of Germany in the production stages are observed more than those of Italy and France.

The smooth transition to other parts of the world can be done by expressing the experience of Malaysia in vertical specialization. Loke and Tham (2014) investigate the vertical specialization and backward linkages to show that the contribution of manufacturing sector in GVCs is more than services. Malaysian government gave higher importance to services sector rather than manufacturing in the Tenth Malaysia Plan. The authors try to reveal that the manufacturing sector is as powerful as the services sector for economic development when the participation into GVCs is considered (Loke and Tham 2014). Therefore, the importance of manufacturing is highlighted via vertical specialization and backward linkages. The importance of industries sectors is determined by combining these two measurements. However, it is essential to recall that the definition of backward linkages is different from the one explained in the first part of Chapter 2. In that case, backward linkages imply the linkages of the sector with other sectors. The result of the analysis shows that the VS share of Malaysia is high (45 percent) compared to other countries in 2005. The authors claim that industries with strong VS share and backward linkages should play an active role in economic growth. Based on this analysis, it can be said that the manufacturing sectors such as diary production, soft drinks, publishing, concrete and other non-metallic mineral products, iron and steel products, casting of metals, other fabricated metal products, general purpose machinery and motor vehicles have relatively high VS shares as well as strong backward linkages, although the services sectors are considered as an engine for economic growth. Therefore, it can be emphasized that vertical specialization and domestic value added measurement are crucial when it comes to determining economic policies. In other words, policies

constructed without considering the new international trade measurement might not be successful.

2.3.2 DVAX and VS Experiences with the Case of Processing Trade

Another crucial issue about the vertical specialization, in particular domestic value added in export is the existence of the processing trade. Processing trade is the trade form in which raw materials are imported, assembling them to produce final goods at home, and then exporting to abroad. It seems very similar to the production chain across countries defined in the first part of the Chapter 2. Nevertheless, the difference of the processing trade is that the processing trade activities are done by the regulations enacted for this type of trade activity. Therefore, within this context, the imported intermediate goods are used in only production for exports, not for domestic purposes. The most popular country operating processing trade is China, and then Mexico.

The huge growth of Chinese foreign trade since the 2000s has attracted attention in the international trade literature and policy makers from various countries. In the context of GVCs, the domestic value added of Chinese exports and vertical specialization of China have been investigated by many researchers. The important but missing point is the existence of processing trade. If the processing trade is ignored and the methodology applied without a modification for processing trade, the domestic content of exports is overestimated. The methodology introduced by KWW in 2012 is a benchmark when the processing trade is taken into account for the measurement of domestic content of exports (Koopman, Wang and Wei 2012). They separate the intermediate goods part of the input-output table into two as ordinary and processing trade by using the processing trade data released by General Administration of Customs of China. The weighted sum of domestic value added in exports generated by processing and non-processing trade show the total domestic content of Chinese export. Therefore, the domestic content of Chinese manufacturing export estimated as 60.6 percent when the separated input-output table for 2007 is used. The HIY method which does not take the processing trade into account finds that the domestic value

added of manufacturing export is 71.3 percent for the same period. Since the contribution in domestic value added of processing trade is less than ordinary trade, the total domestic value added in export is lower when the processing trade is taken into account. When it is investigated on sectoral basis, among the 57 manufacturing industries, 25 of them have more than 75 percent of the domestic value added share in export in 2007. Besides the traditional export items of China and labor intensive industries like furniture, textiles and apparel; industries requiring capital and skills such as motor vehicle, industrial machinery and rolling steel have domestic value added in exports more than 75 percent in the same period.

Another study which compares the vertical specialization of China by using separated and usual input- output tables for the year 2002 (Dean, Fung and Wang 2008). The authors find that vertical specialization computed using the separated input output table (46 percent) is higher than the non-separated one (25.4 percent). One of the reasons of this wide gap is that foreign value added in processing export is higher than ordinary export by definition. Consistent with KWW, the weighted sum of the processing and ordinary trade has been calculated to find overall foreign value added in Chinese export. Therefore, the other reason is that processing trade has a high share in total trade. Dean *et al.* (2008) also mention that both approach i.e. separated and non-separated input- output tables have the similar result in vertical specialization on sectoral basis. Electronic computers; office equipment; telecommunications equipment; computer peripheral equipment; electronic elements and devices; radio/TV/other communications equipment and plastic products are the most vertically specialized industries of China in 2002 by using both approaches. Moreover, a strong positive correlation between separated estimates of foreign content in export and the share of the processing trade of these sectors has been identified.

As was stated before, Mexico has a similar trade pattern with China. The processing trade has been encouraged by the government via Maquiladora which is manufacturing operations in free trade zones and other programs promoting export such as PITEX and IMMEX. Therefore, De La Cruz, Koopman, Wang, and Wei

(2011) has conducted a study which measures domestic value added in Mexican exports by considering these promotion programs and hence processing trade. In this study, the domestic value added of export created in Mexico is calculated as 34 percent in 2003. Moreover, 80 percent of Mexico's manufacturing exports has less than 50 percent of domestic value added in their export. The industries have low domestic value added in their exports can be listed as computer and electronic product; transportation equipment; electrical equipment; textile and furniture (Cruz, et al. 2011). Since the domestic content of export is equal to one minus foreign content of export, it can be said that the industries have low domestic content in exports are similar to results of Dean *et al.* (2008) study for China.

2.3.3 Literature Measuring DVAX and VS of Turkey

In the literature, there are a few studies focused on vertical specialization and domestic content in export of Turkey. Some reports prepared by international organizations, articles which examine the vertical specialization and working papers focused on domestic value added in export are stated in this part of the Chapter.

First, the results of a very recent study which investigates the vertical specialization of Middle East countries such as Jordan, Lebanon, Egypt and Turkey are provided (Muhtesab and Daoud 2015). Since the most updated input-output table of Turkey released by Turkish Statistical Office (TURKSTAT) belongs to 2002, the authors could analyze the VS share of Turkey only for the years 1998 and 2002. In the study, Muhtesab and Daoud (2015) have followed the HIY method for the measurement of VS share. The overall VS share in Turkish exports for the years 1998 and 2002 are found as 32.8 and 26.7 percent, respectively. A slight decrease in Turkish overall VS shares in exports between two years can be observed. As a comparative result, Egypt and Lebanon[3] have higher VS shares in their exports than Turkey, 40.3 and 61 percent

[3] Since the available data for Jordan are in the years 2006 and 2010, results of the analysis about Jordan cannot be compared with Turkish data.

in 2002, respectively. When the VS shares are examined in regard to broad categories of economic activities, the manufacturing activities with the highest VS share has attracted attention for all countries in the analysis. While manufacturing sectors have the highest imported content share in exports followed by agriculture, mining and services sectors have almost the same VS share (Muhtesab and Daoud 2015). In 2002, the VS shares of Turkish manufacturing, agriculture, services and mining exports are 32.5, 17.1, 9.1 and 8.4 percent, respectively. Moreover, manufacturing activities are examined with respect to sub-industries in the article. The manufacturing industries which have higher VS share in 2002 than 1998 are mostly in the classification of high or medium high technology industries[4] such as chemicals, machinery, electrical-optical and transport equipment although the overall VS share of Turkish exports is lower for relevant years. The authors also recorded that the highest increases in VS shares of four countries have occurred in high and medium high technology exports.

In the opposite side of the vertical specialization, the domestic value added content of Turkish exports, has been examined in another recent study. Mıhcı, Akkoyunlu-Wigley and Dalgıç (2015) investigate the employment generation potential and the domestic value added generated by Turkish exports for the period 1995-2008 based on the data released in Trade in Value Added Database released by OECD-WTO. Consistent with Muhtesab and Daoud (2015), the authors state that the domestic value added share of gross exports recorded a striking decrease between the years 1995 and 2008. On sectoral basis, the share of imported intermediate goods in production of exports has increased in all sectors except for agriculture, food products and textiles in the related period (Mıhcı, Akkoyunlu-Wigley and Dalgıç 2015).

As was stated in the first part of this chapter, the international organizations keep track of the forementioned phenomenon in international trade. Organization of Economic Cooperation and Development (OECD), the World Bank, World Trade Organization

[4] OECD technology classification for manufacturing sectors (OECD,2011).

(WTO) and the International Monetary Fund (IMF) have released reports, discussion papers or other documents about the issue at different times. In addition, Trade in Value Added (TIVA) database has been constructed with the collaboration of OECD and WTO. TIVA database contains leading indicators of international trade and value added fields such as domestic value added and foreign value added in total output/foreign final demand, etc. Another database is the World Input-Output Database which started as a project in 2009 was funded by European Commission. The analyses of this study are conducted based on the WIOD and the details about the database will be given in Chapter 3.

According to the Turkey Country Report (2013, May) on the topic of participation in GVCs released by OECD, the share of domestic value added created for the final demand for goods and services are 79 percent, while the share of foreign value added i.e. VS share is equal to 21 percent in 2009. In addition, it is stated in the report that the backward participation into GVCs (the foreign intermediates in Turkish exports) is slightly higher than forward participation (the share of Turkish imports in other countries exports).

To sum up, it is important to emphasize that the literature on vertical specialization of countries and domestic content in export is relatively new. The measurement for these structures began with HIY's article, and the literature has developed only recently. Especially for Turkish case, there are a small number of studies measuring the domestic and foreign content in exports. Therefore, this study will contribute to the literature by providing measurement of domestic content in Turkish exports and vertical specialization of Turkey among 14 manufacturing sectors for the years between 1995 and 2011.

CHAPTER 3

METHODOLOGY AND THE CONCEPTUAL FRAMEWORK

As argued in the previous section, domestic and foreign contents of Turkish exports have been investigated in several studies, yet for limited years since the most updated input-output table was released by TURKSTAT for the year 2002. There are other sources to obtain input-output tables, such as OECD Structural Analysis (STAN) Database Input-Output Tables, WTO - OECD TIVA Database, Global Trade Analysis Project (GTAP) Database, and The World Input-Output Database (WIOD). In this study, the WIOD is chosen as a source for input-output table due to a set of advantages that make the analysis more comprehensive. The important advantages of using the WIOD are the availability of input-output tables for the period 1995- 2011 providing the value of transactions among 35 industries in 40 countries plus the Rest of World (RoW). This study will be the first in the literature to use the WIOD for the analysis of vertical specialization and domestic value added in Turkish exports between the years 1995-2011. Moreover, by using world input-output table that includes 40 countries plus RoW, countries' share in Turkish foreign value added of exports will be measured and analyzed.

In this chapter, firstly the characteristics of the WIOD are presented. Secondly, the methodology for measuring the domestic content of Turkish export and vertical specialization of Turkey in the period of 1995-2011 is shown. In this context, the method for the measurement of direct and indirect value added created by imported and domestically produced intermediate goods by years is expressed. Finally, the measurement of countries' shares in the foreign content of Turkish exports is given.

3.1 Characteristics of the WIOD

The The WIOD was a project that ran from 2009 to 2012 and funded by the European Commission. The aim of the project was to harmonize the standards of trade data between countries to generate more reasonable policies (Dietzenbacher, et al. 2013). To realize that goal, four types of databases were prepared in the scope of the WIOD. Firstly, in the scope of the WIOD, the national input-output tables were constructed based on officially published input-output tables which were merged with national accounts data and international trade statistics for 40 countries. These tables are composed of a set of harmonized supply and use tables, along with data on international trade in goods and services. These two sets of data have been integrated into sets of inter-country (world) input-output tables namely the World Input Output Table (WIOT). The WIOT, an item of the WIOD, provides annual time series of world input-output tables for 35 industries (based on ISIC Rev. 3 classification) and it includes 40 countries plus RoW from 1995 to 2011. The industry classification and the countries are given in Table A.1 (see Appendix). Moreover, the socio-economic and environmental accounts tables are also available in the WIOD. The former one contains the industry-level data on employment, capital stocks, gross output and value added at current/constant prices while the latter includes industry energy use, CO2 emissions and emissions to air, respectively (World Input Output Database 2015) .

In Table 2, a representative WIOT is presented in order to visualize the WIOT concept. The WIOT contains 40 countries' transactions among 35 industries for the years between 1995 and 2011 as mentioned before. The table represents the WIOT for a certain year.

Table 2 : A Representative WIOT for a certain year[5]

			Intermediate Use by Countries (Use by country-industries)										Final Use by Countries				Total Use
			Country 1			....	Country 40			Rest of World			Country 1	....	Country 40	Rest of World	
			Ind 1	....	Ind 35		Ind 1	....	Ind 35	Ind 1	....	Ind 35					
Intermediate Inputs from countries (Supply from country-industries)	Country 1	Ind 1															
		....															
		Ind 35															
	....																
	Country 40	Ind 1															
		....															
		Ind 35															
	Rest of World	Ind 1															
		....															
		Ind 35															
Total Intermediate Consumption																	
Value Added by Labor and Capital																	
Gross Output																	

In this study, the WIOT and the National Input-Output Table of Turkey obtained from the WIOD is used for the analysis. In order to make the WIOT more understandable, its construction method is explained briefly. As was mentioned before, the WIOT is generated from publicly available statistics from national statistical institutes and international organizations. National supply and use tables are used to build the blocks of the WIOT. Therefore, time series of national supply and use tables have been derived and these tables are linked across countries by utilizing bilateral international trade statistics to create international supply and use tables. Finally, these tables are subsequently used for construction of WIOTs as a time series (Timmer, et al. 2015) . However, the benchmarks of the countries' supply and use tables are not in the same year, so they are not designed for comparisons over time. Since the national trade statistics have been revised more often than supply and use tables, the constructors of

[5] Source: Timmer, Dietzenbacher, Los, Stehrer, & De Vries, 2015

the WIOTs have imputed the unknown product shares by utilizing the national trade data with applying the SUT-RAS[6] method (Dietzenbacher, et al. 2013).

The National Input-Output Tables are consistent with the WIOT in terms of the classifications the industries and the content of the general element of supply and use tables. Similar to the WIOT, time series of the National Input-Output Tables are driven by the SUT-RAS method.

3.2 Measuring the Domestic Content of Turkish Export and Vertical Specialization of Turkey

The focus of this study is measuring the vertical specialization of Turkey and the domestic content of Turkish exports. The overall assessments are done by the light of six indicators namely domestic value added of exports, direct and indirect content of the domestic value added; vertical specialization i.e. imported content of exports, direct and direct content of the imported content of exports. The calculations of these indicators are performed by using MATLAB® for all the years between 1995 and 2011.

3.2.1 Vertical Specialization Concept

As was mentioned in Chapter 2, the well-known methodology for the measurement of vertical specialization has been introduced by HIY (Hummels, Ishii and Yi 2001). In this study, HIY method is followed in measuring the extent of vertical specialization.

[6] SUT-RAS method developed by Temurshoev and Timmer (2011) in order to estimate supply and use tables (SUTs) simultaneously. This methos is very close to original (G) RAS method which is used for the projections of input-output tables. The difference of SUT-RAS from (G)RAS is the process of updating SUTs which is independent in G(RAS) method, while dependent in the case of SUT-RAS. With applying SUT-RAS the estimates of supply and use tables derived by biproportional adjustments of the original ones.

The vertical specialization shares vector for all 35 sectors of a country is given in equation (10);

$$VS = uA^M[I - A^D]^{-1} \quad (10)$$

where VS is a 1×35 vector that denotes the foreign content of the 35 industries. A^D is a 35×35 square matrix which denotes the share of the domestically produced intermediate goods. The Leontief matrix ($[I - A^D]^{-1}$) is a 35×35 square matrix that reflects the coefficients for the total domestic output requirement; while A^M is a 35×35 square matrix that shows the share of imported intermediate goods, u is a 1×35 vector of ones. Therefore the uA^M is the column sum of the share of imported intermediate goods, i.e. it shows the sectoral share of the imported intermediate goods in the total output. Recall that the imported intermediate goods used for the domestic productions and the exports have the same intensity in the HIY method. So, equation (10) is the coefficient for foreign value added. Since one of the aims of this study is to measure the foreign value added in Turkish export i.e. the vertical specialization of Turkey, the VS coefficients multiplied by exports of subjected year. Finally, **the value of foreign content** in Turkish export is found by the equation (11).

$$VSX = uA^M[I - A^D]^{-1}X \quad (11)$$

where X is a 1×35 vector of exports, while VSX is the value of the foreign content of exports.

The overall VS share in export is equal to the ratio of the value of the foreign content of exports to total export value of the subjected year (Equation (12)).

$$Overall\ VS\ share\ in\ export = \frac{VSX}{X_k} = \frac{uA^M[I-A^D]^{-1}X}{X_k} \quad (12)$$

3.2.1.1 Direct Imported Content

The vertical specialization i.e. foreign value added coefficients contain both direct and indirect contents of the imported intermediate goods. Direct imported content of exports means that imported intermediate goods are directly used in exports of a sector. Direct imported content coefficients are obtained from the column sum of the matrix A^M.

3.2.1.2 Indirect Imported Content

Indirect imported content refers to the imported intermediate goods used for domestic intermediate goods production. In other words, the indirect imported content covers the imported intermediate goods used to produce domestic intermediate goods. The indirect imported content coefficient is equal to the difference between vertical specialization shares and the direct imported content coefficients.

3.2.2 Domestic Value Added Concept

The general methodology for measurement of domestic value added content of exports was given in Chapter 2. The close relations between vertical specialization i.e. foreign content and domestic value added in exports were expressed in detail. Mathematically, the sum of foreign and domestic content of exports should be equal to total exports. Therefore, domestic value added coefficients are equal to unity minus vertical specialization shares of a country as shown in equation 13.

$$DVA = u - uA^M[I - A^D]^{-1} \quad (13)$$

Where u is a 1×35 vector of ones, the uA^M is the column sum of the share of imported intermediate goods, ($[I - A^D]^{-1}$) is a 35×35 square Leontief matrix and DVA is a 1×35 vector that denotes the domestic value added coefficients for each sector.

In order to obtain domestic value added in Turkish exports, the equation 14 is applied for all years in the database.

$$DVAX = (u - uA^M[I - A^D]^{-1})X \quad (14)$$

Consistent with VS methodology, the overall DVA share in export is calculated by the equation 15.

$$Overall\ DVA\ share\ in\ export = \frac{DVAX}{X_k} = \frac{(u - uA^M[I - A^D]^{-1})X}{X_k} \quad (15)$$

3.2.2.1 Direct Domestic Content

Similar to foreign value added case, domestic value added includes direct and indirect contents. Direct domestic content is the column sum of the A^D matrix. By intuition, the direct domestic value added means the value of intermediate good produced at home country and directly used for production in that country.

3.2.2.2 Indirect Domestic Content

The indirect domestic content refers to imported intermediate good originally produced at home country than exported to other countries. In other words, domestically produced intermediate goods exported to other country where these intermediate good used in producing another intermediate good. The final intermediate good produced in other country turns back to home country via import. The indirect domestic content coefficient is equal to the difference between domestic value added shares and the direct domestic content coefficients.

3.3 Countries' Shares in Foreign Value Added of Turkish Export

The VS share of a country's exports denotes the imported content of this country's exports as mentioned above. The one of focuses of this study is to measure countries' value added in Turkish export. By the means of WIOT, measurement of the each

country's contribution to Turkish export become possible. The structure of the WIOT was expressed in the previous part is containing 40 countries plus RoW for 35 industries. Therefore, the WIOT is a $(35 * 41) \times (35 * 41)$ matrix for the intermediate goods used in the world as it can be seen in the Table 3. Moreover, it contains "total intermediate consumption", "value added by labor and capital" and "gross output" rows for each country and each industry.

Firstly, "Countries vs Turkey" matrix (Turkey in the supply part (rows) was excluded) was constructed in order to obtain the Turkey's use from other countries intermediate goods. The "Countries vs Turkey", presented in Table 3, is a $(35 * 40) \times (35)$ matrix that denotes the values of the intermediate goods provided from abroad used to produce Turkish gross output.

Table 3 : A Representative "Countries vs Turkey" Matrix

			Intermediate Use		
			TURKEY		
			Ind 1	....	Ind 35
Intermediate Inputs from countries (Supply from country-industries)	Country 1	Ind 1			
		....			
		Ind 35			
	....				
	Country 39	Ind 1			
		....			
		Ind 35			
	Rest of World	Ind 1			
		....			
		Ind 35			
Total Intermediate Consumption					
Value Added by Labor and Capital					
Gross Output					

Secondly, the "Countries vs Turkey" matrix was separated into 40 parts by countries. In that way, it is easier to observe the use of the intermediate goods from each countries in the gross output. Therefore, there were 40 square matrices with the dimension of 35×35. By using these matrices, the coefficient matrices for each of them was

obtained. Recall that the total imported intermediates coefficient matrix, A^M, is the ratio which the value of imported intermediate goods used from sector i to produce goods for sector j to total output produced in sector j ≡ $\frac{M_{ij}}{Y_j}$. In this case, the ratio of the value of imported intermediate goods from each country used from sector i to produce goods for sector j to total output produced in sector j $= A_c^M \equiv \frac{M_{ij}^c}{Y_j}$ where c denotes the countries from 1 to 40. The coefficient matrix of the total imported intermediate goods is equal to the sum of the coefficient matrices from each country (Equation 16)

$$A^M = A_1^M + A_2^M + A_3^M + \cdots + A_{40}^M \tag{16}$$

Recall that the Equation 10 and 11 denote the vertical specialization shares of a country for each industry and the value of foreign content i.e. vertical specialization in export, respectively. The sum of the VS shares of each country in Turkish export should be equal to total VS shares in Turkish export for each industry. The equality is presented below (Equation 17). In the same vein, the total value of foreign content of Turkish export is equal to the sum of the content of each countries in Turkish exports as shown in Equation 18.

$$\begin{aligned} VS &= uA^M[I - A^D]^{-1} \\ &= uA_1^M[I - A^D]^{-1} + uA_2^M[I - A^D]^{-1} + \cdots + uA_{40}^M[I - A^D]^{-1} \end{aligned} \tag{17}$$

$$VSX = uA^M[I - A^D]^{-1}$$
$$= uA_1^M[I - A^D]^{-1}X + uA_2^M[I - A^D]^{-1}X + \cdots + uA_{40}^M[I - A^D]^{-1}X \quad (18)$$

Finally, in the equation 19, it is shown that the overall VS share in Turkish exports is equal to the sum of the countries value added shares in Turkey's exports.

$$\frac{VSX}{X_k} = \frac{uA^M[I - A^D]^{-1}X}{X_k}$$
$$= \frac{uA_1^M[I - A^D]^{-1}X}{X_k} + \frac{uA_2^M[I - A^D]^{-1}X}{X_k} + \cdots + \frac{uA_{40}^M[I - A^D]^{-1}X}{X_k} \quad (19)$$

CHAPTER 4

FINDINGS AND RESULTS OF THE ANALYSIS

The findings and results of the abovementioned methodology are presented in this chapter. As is known, the WIOD is utilized in order to analyze the domestic content of export and the vertical specialization shares for the Turkish case between the years 1995 and 2011. Moreover, other countries' value added in Turkish exports are analyzed. All of the analyses are performed by using MATLAB®.

It should be emphasized that the input-output tables involve trade flows of both goods and services. In general, official foreign trade statistics reflect only commodity trade. Therefore, differences could emerge between the shares and total numbers of export values which are calculated based on input-output tables and trade statistics. For example, shares of sectors in total exports are not exactly the same with official trade statistics, since the WIOD is utilized in this study.

The manufacturing sectors are the focus of this study in order to analyze the recent developments in foreign trade. One of the reasons is that most of the intermediate goods are utilized by the manufacturing sector. The other reason is that although the share of services sectors in total exports has begun to rise in recent years, the manufacturing sector still makes up a substantial part of Turkish exports as a structural feature of Turkish foreign trade. As was stated before, the WIOD provides 35 sectors including goods and services based on ISIC Rev 3 classification, 14 of which are manufacturing sectors listed in Table A.2. (see Appendix).

In this chapter, firstly the overall results of the analysis of vertical specialization and domestic value added in exports are presented. Secondly, trends in vertical specialization and domestic value added coefficients of manufacturing sectors are

examined in detail. Finally, findings of countries' contributions to foreign value added created by Turkish exports are demonstrated.

4.1 Analysis of Vertical Specialization and Domestic Content in Turkish Exports

In this part of the chapter, firstly an overall assessment on domestic and foreign contents of Turkish exports is presented, secondly manufacturing sectors are examined separately in terms of vertical specialization and domestic value added.

4.1.1 Domestic and Foreign Contents in Total Exports

Domestic content in exports shows the value added created by using domestically produced intermediate goods and other factors of the production processes such as land, capital and labor. Recall that the value added generated by foreign capital and labor cannot be distinguished by using abovementioned methodology. Moreover, a symmetry between domestic and foreign content (i.e. vertical specialization) in exports was expressed in Chapter 3. Hence, the patterns observed in both domestic content in exports and vertical specialization are given together below.

Based on results of the analysis, domestic value added (DVAX) in Turkish exports has decreased by 9.8 percent between the years 1995 and 2011 (Figure 3). In 1995, domestic value added share in total exports was 86.1 percent, while this share fell to 77.7 percent in 2011.

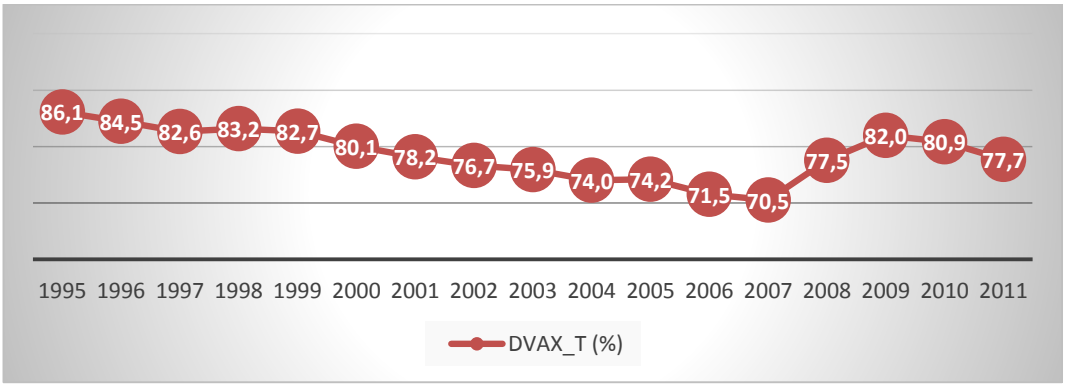

Figure 3: Domestic Value Added Share in Total Export (%), Turkey

As expected, a reverse trend is observed in vertical specialization (VSX) (Figure 4). After reaching a peak in 2007, a sharp decrease can be seen in foreign content of total Turkish exports. The average share of vertical specialization of Turkey is 21.3 percent through 17 years between 1995 and 2011. Although the integration to GVCs has been interrupted in 2007, there is nevertheless an 8.4 percent points increase between the years 1995 and 2011.

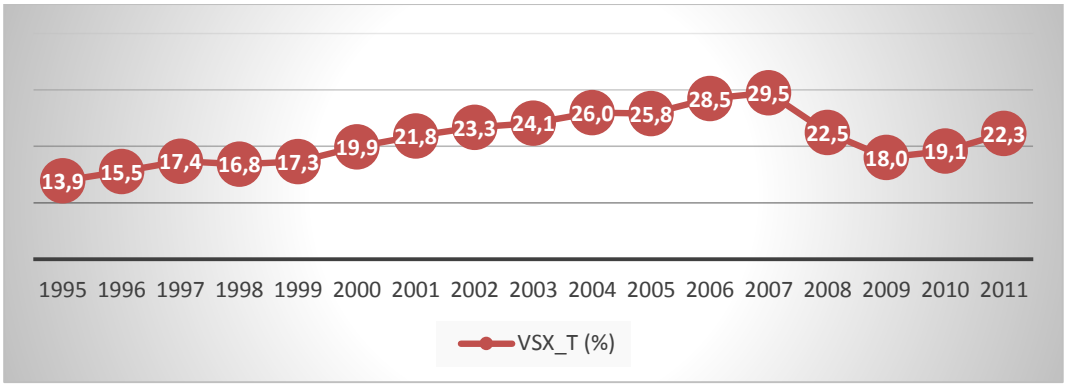

Figure 4 : Vertical Specialization Share of Turkish Exports (%)

Fluctuations which occurred after 2007 attract attention in Figure 3 and 4. The continuous decrease (increase) has a hold between 1995 and 2007, when the lowest (highest) share of domestic (foreign) value added in total export is observed in 2007. Two consecutive years (2008 and 2009), the DVAX (VSX) share has risen (fallen), then a slight downward (upward) trend can been observed.

These fluctuations could be related to the share of intermediate goods in total imports (recall that we cannot distinguish between foreign intermediate goods and foreign factors of production in exports). The correlation coefficient between the share of intermediate goods in imports and DVAX (VSX) is -0.96 (0.96) between the years 2006 and 2011. This correlation coefficient points out a strong negative (positive) relation between intermediate goods import and the domestic (foreign) content of exports. However, when all years in database are taken into account, it is found that

there is not a significant relationship between fore mentioned ratios[7]. Therefore, it can be inferred that global economic crisis in 2008 might have led to a decrease in imported intermediate goods of Turkey. In fact, the share of intermediate goods in total imports was 83.6 percent in 2007, it has decreased to 61.2 and 55.4 percent in 2008 and 2009, respectively (WIOD). The other reason of the fluctuation can be the change in the composition of exports by sectors during the period of global economic crisis. The exports share of sectors which use more imported intermediate goods in their production such as Machinery, and Transport, Electrical and Optical Equipment experienced a sharp decrease in 2008, while a sharp increase was observed in Textile Products in the same year (Figure 5).

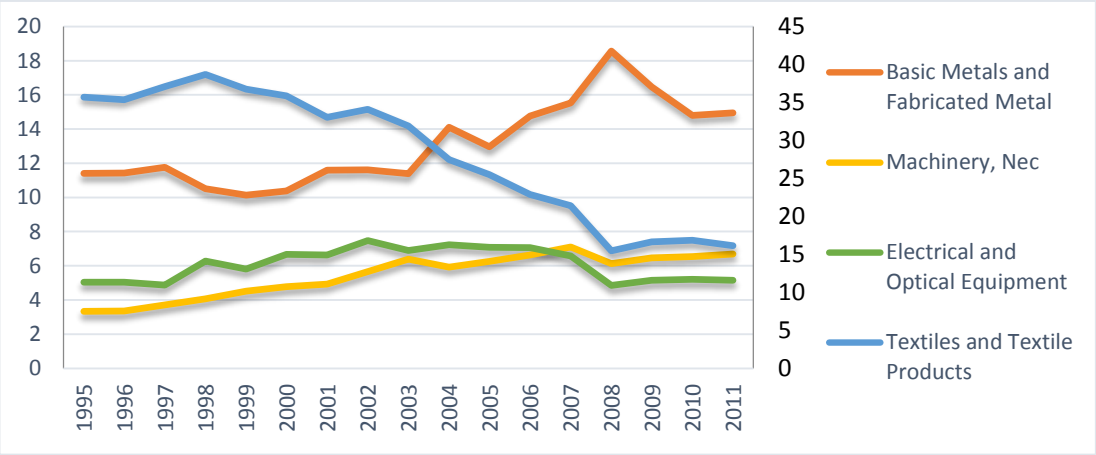

Figure 5 : The Shares of Exports by Sectors (%)

** Secondary (right) axis shows intermediate goods in total imports of Textile Products*

In Chapter 3, the meanings of direct and indirect shares in domestic and foreign content of exports were explained. Domestic (foreign) content of exports involves both direct and indirect domestic (imported) intermediate goods. In figure 6, it can be seen that there is a steady increase in direct share in domestic content of exports between 1996 and 2002. For this period, in average 50 points of domestic content share in exports

[7] The correlation coefficient between the intermediate imports share and the domestic content share in exports is -0,11 (0,11 for VSX) for the years between 1995 and 2011.

comes from intermediate goods completely produced at home. Although a fall in direct share in domestic content of exports is observed, a striking increase, which is a similar trend with total domestic content of export, has occurred in between 2007 and 2009 (Figure 6).

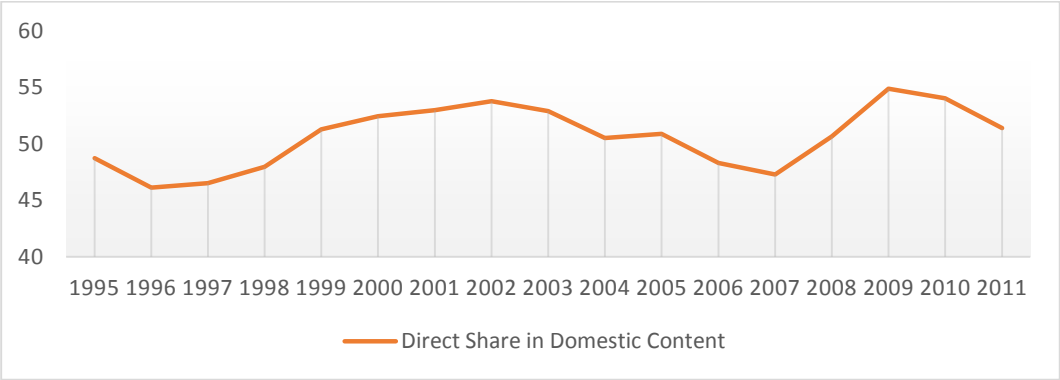

Figure 6 : Direct Share in Domestic Content of Exports

As was stated before, the indirect shares in domestic content of exports mean that the share of goods which are produced at home and exported as an intermediate goods to abroad, then turn back to home country as an intermediate good again, to use production of exports. Therefore, it can be said that the intermediate goods, subject of indirect domestic content in exports, reach at least third stage of production processes. For example, raw cotton (intermediate good), which is produced in Turkey, is exported to Bangladesh in order to produce yarn (intermediate good). If Turkey imports this yarn from Bangladesh to produce texture (intermediate good) and exports this texture to abroad, then the domestic value added created by producing raw cotton can be considered as indirect domestic content of exports. While a downward trend is observed in indirect share of domestic content between the years 1996 and 2002, it remains stable until 2011 (Figure 7). For the entire period of database, the overall contribution of indirect component to total domestic value added is about 23 points.

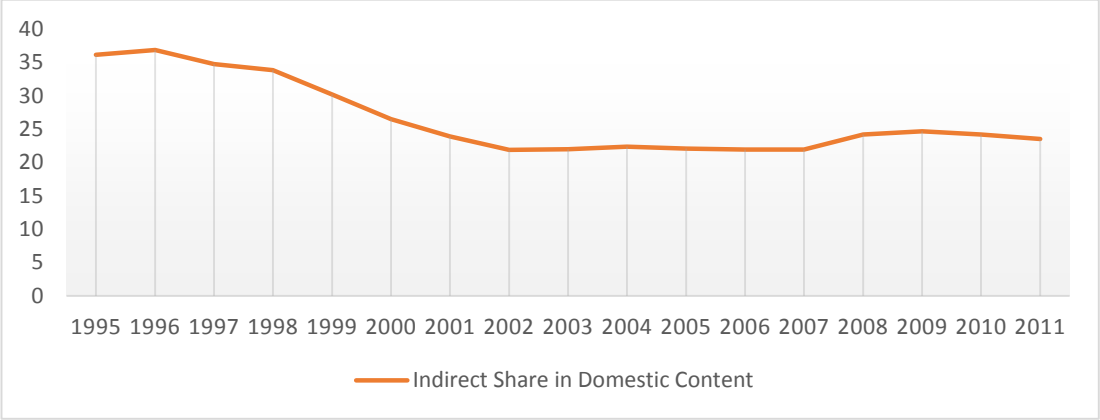

Figure 7 : Indirect Share in Domestic Content of Exports

Direct component in foreign content represents the imported intermediate goods directly used for exports, while indirect component of foreign content refers to the imported intermediate goods used in domestically producing intermediate goods. In other words, the trend in indirect component of foreign value added reflects the tendency of imported intermediate goods usage in domestically produced intermediate goods. The Figure 8 and 9 show trends in direct and indirect shares of foreign value added in total exports. The sharp decrease that is observed in total foreign value added after 2007 is also seen in both direct and indirect share of foreign content in exports.

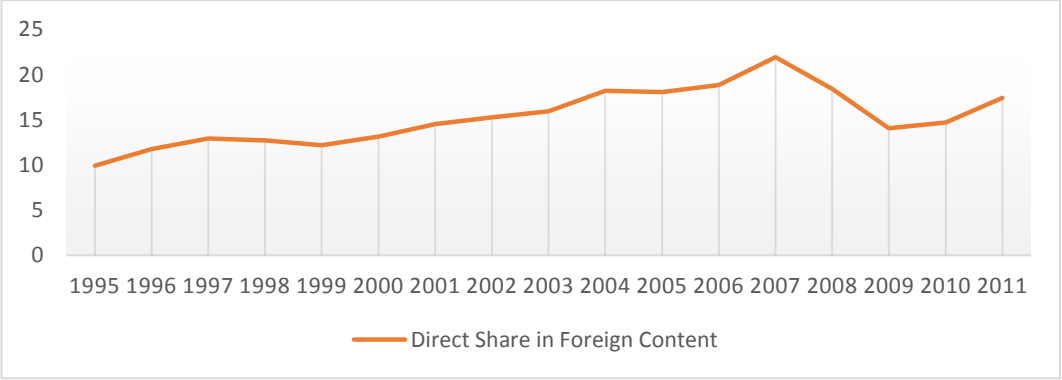

Figure 8 : Direct Share in Foreign Content of Exports (%)

As expected, the substantial part of the foreign content comes from direct components such as 6.1 points the average of 17 years, while 15.2 percent is generated directly.

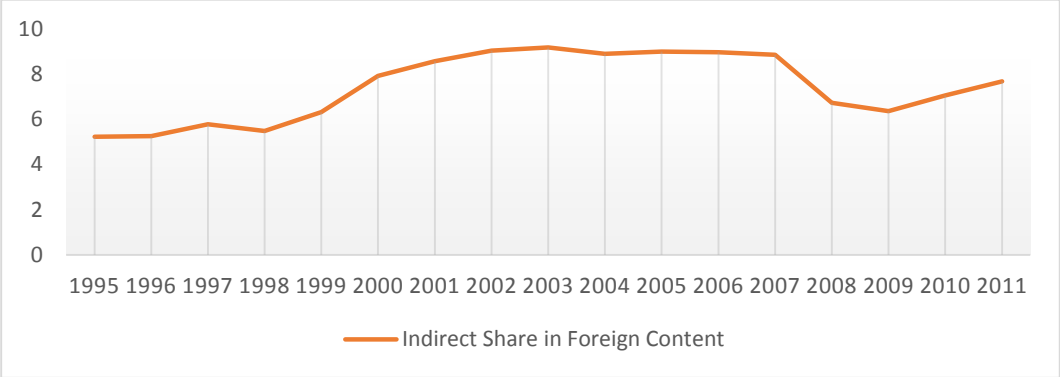

Figure 9 : Indirect Share in Foreign Content of Exports (%)

4.1.2 Domestic and Foreign Contents in Exports by Manufacturing Sectors

As was emphasized, the manufacturing industry is the focus of this study since it has an important role in Turkish exports. Based on WIOD, The share of manufacturing sectors in total export is 86.9 and 81.6 percent in 1995 and 2011, respectively.

The pattern of domestic value added and vertical specialization are very similar for total exports and manufacturing sector exports as it can be seen in Figure 10 and 11.

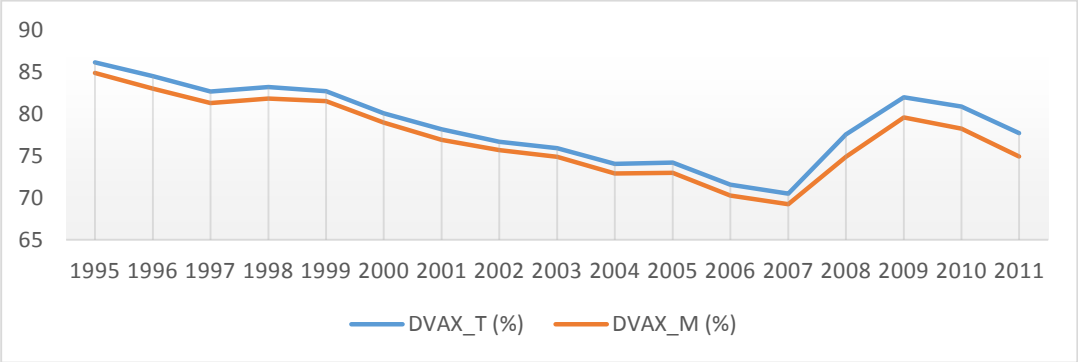

Figure 10 : Domestic Value Added Share in Manufacturing Exports and Total Export (%)

Domestic value added shares in manufacturing sectors are less than that of total exports for the relevant period (Figure 10). The shares of services and agriculture, forestry and fishery sectors in export follow manufacturing sectors' share. Since these sectors are more labor-intensive sectors and require less imported intermediate goods than manufacturing, the domestic value added in total exports are higher than that of the manufacturing sector.

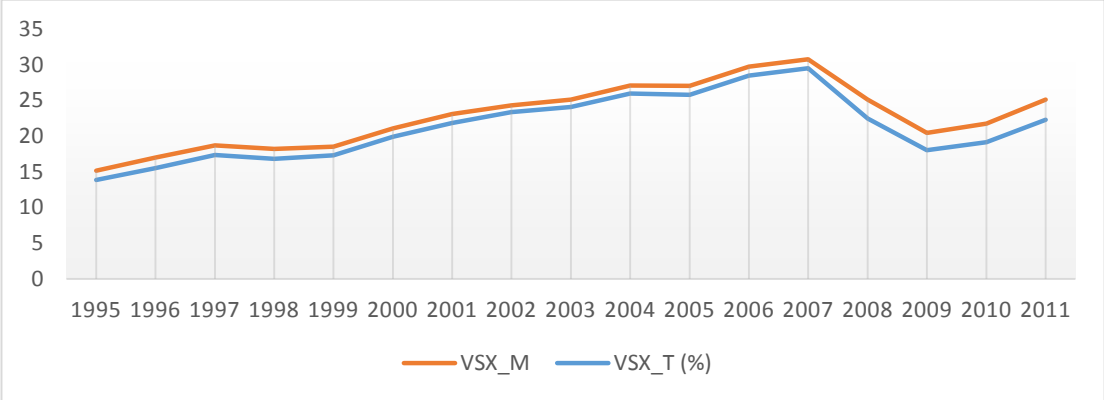

Figure 11 : Foreign Value Added Share in Manufacturing and Total Export (%)

On the other hand, vertical specialization share in manufacturing exports is higher than that in total exports (Figure 11). As was stated, the manufacturing sector is relatively more capital-intensive than agriculture and services and requires more intermediate goods in order to continue production. Since the share of imported intermediate goods in manufacturing is more than half (55.7 percent in average) of all intermediate goods used in manufacturing for the years between 1995 and 2011, the higher VSX share in this sector is not a surprising result.

Based on technology classification of OECD (2011), manufacturing sectors are divided into four groups such as low, medium low, medium high and high level of technology (See Table B.1 for classification details). OECD divides medium high and high level technology of sectors by using three and four digits. However, the WIOD provides only two digits of ISIC codes. Therefore, sectors included the medium high and high technology levels are aggregated in this study. Hence, there are three technology levels such as low (low-tech), medium low (med-low-tech) and high and high medium (high-tech) in the next part of the Chapter.

The below graph show the change in domestic value added in manufacturing sectors based on technology classification. It can be said that domestic value added content in low-tech sectors is the highest for all years in the database. When the med-low-tech sectors are considered, a downward trend is observed in domestic value added of exports until 2007, a sharp increase was seen in between 2007 and 2009. Although an

upward trend has been attracted attention of domestic value added of high tech sectors' exports after 2007, it has declined during 17 years between1995 and 2011.

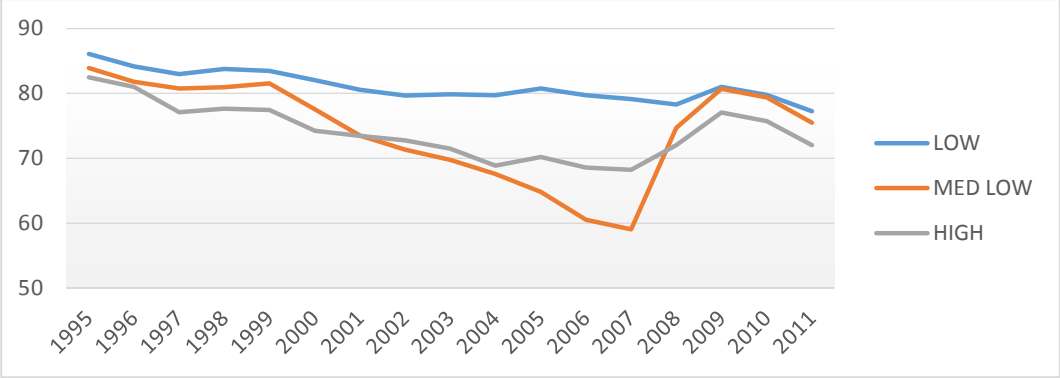

Figure 12 : Domestic Value Added Share in Turkish Exports by technology classifications (%)

When the VS shares of sectors based on technology levels are considered, the interpretations will be very similar to domestic value added in exports since they are symmetric indicators. In short, it can be said that the vertical specialization rates of high-tech sectors are higher than low-tech sectors (Figure 13). This is an expected result since high-tech sectors such as Transport, Electrical and Optical Equipment need more imported intermediates. As seen in Figure 13, the low-tech sectors' vertical specialization shares are the lowest, since the low-tech sectors are more labor-intensive and require again low-tech intermediate goods which can be produced in Turkey.

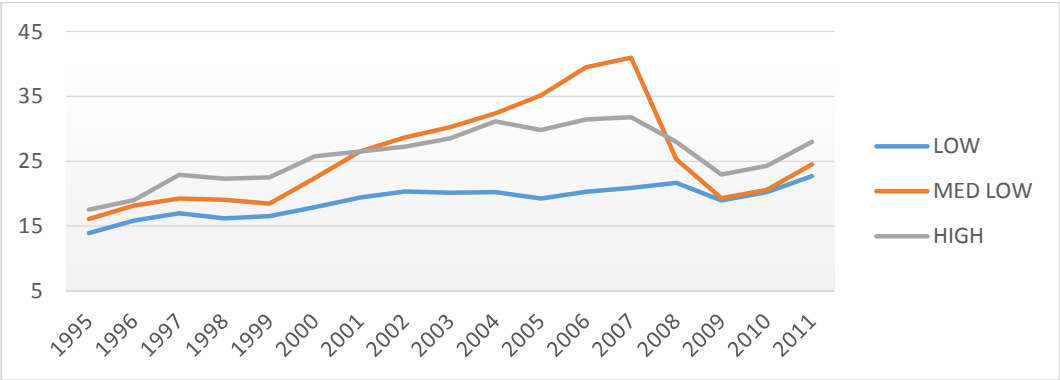

Figure 13 : Vertical Specialization Shares in Exports by technology classifications (%)

Consistent with domestic (foreign) value added in manufacturing and total exports, fluctuations after 2007 i.e. the period of global economic crisis were observed in both

Figure 12 and 13. It can be inferred that global economic crisis has been influential on the structure of Turkish Exports in terms of dependence on imported goods. Dependence on import of both exports and production reduced the competitive power of Turkey (Yükseler 2011). Since domestic value added in med-low-tech and high-tech sectors' exports has increased between the years 2007 and 2009, foreign value added i.e. imported content in exports of these sectors decreased in the period of global economic crisis.

Except for Leather and Footwear, the domestic value added coefficients of other low-tech sectors have shown a downward trend between the years 1995 and 2011. On the contrary, the vertical specialization shares have increased for the sectors Other Manufacturing and Recycling; Textile Products; Wood Products; Food, Beverages and Tobacco; and Paper, Printing and Publishing in relevant period.

Although the domestic content coefficient of all low-tech sectors have a recovery after 2007, the fall in domestic content share in textile exports has continued. In other words, the domestic value added coefficients of textiles follow a continuous downward trend by decreasing to 75 percent from 85 percent for the relevant period. Moreover, a striking increase of intermediate goods share in total import of textiles has attracted attention in 2008 (Figure 14).

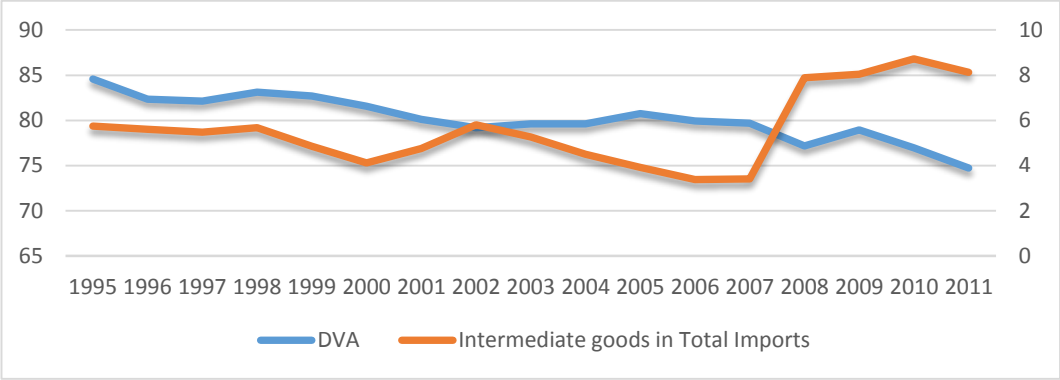

Figure 14 : Trends in Domestic Value Added Coefficients and Share of Intermediate Goods in Total Imports of Textile Products

**Secondary (right) axis shows share of intermediate goods in total imports of Textile Products*

When the med-low-tech sectors are investigated; although Plastics, Other Non-Metallic Mineral and Basic and Fabricated Metal sectors have had a downward trend until 2007, a sharp increase between 2007 and 2009 and a slight decrease by 2011 are observed (Figure 15). In other words, the imported content in med-low-tech sectors' exports has decreased after 2007.

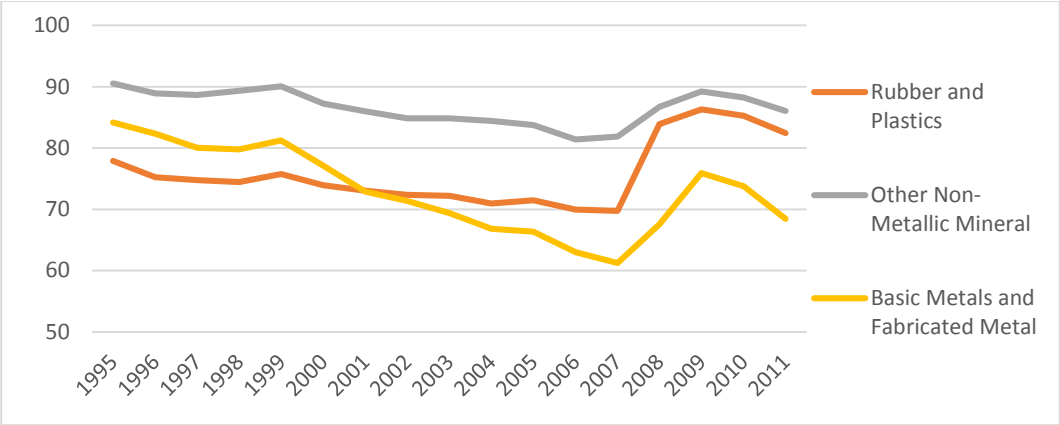

Figure 15 : Domestic Value Added Trends in Medium Low Technology Sectors (%)

In overall, the high-tech sectors (except for chemicals) have upward trend in vertical specialization between the years 1995 and 2011. In figure 16, it is seen that the imported good content in exports of high-tech sectors has been affected by the global economic crisis occurred during 2007 and 2009. As seen in Figure 16, the least effected sector is the transportation equipment. Unlike other high-tech sectors, the vertical specialization (i.e. foreign value added) coefficients of transport equipment exports continue to rise in 2008. Although a fall was observed in 2009, it is less than that of other high-tech sectors.

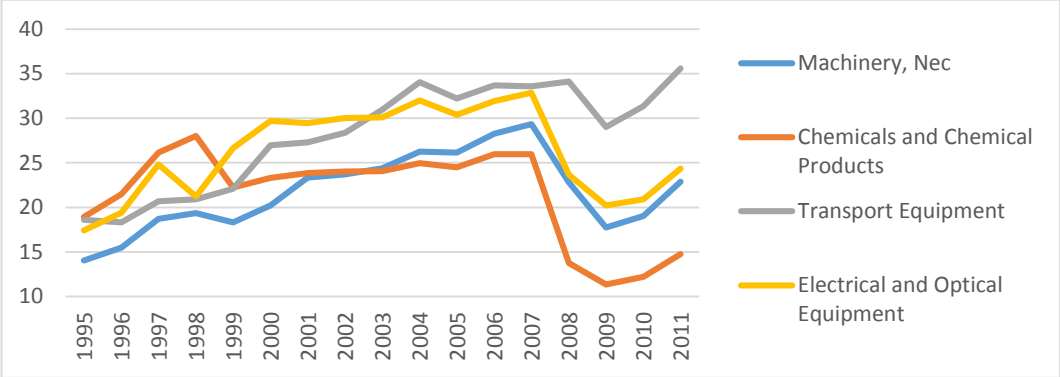

Figure 16: Trends of Vertical Specialization in High Technology Sectors (%)

Moreover, among high-tech sectors, the vertical specialization in transportation equipment exports have the highest growth rate as 3.9 percent between the years 1995 and 2011. Export share of transportation equipment has also increased in the relevant period (Figure 17).

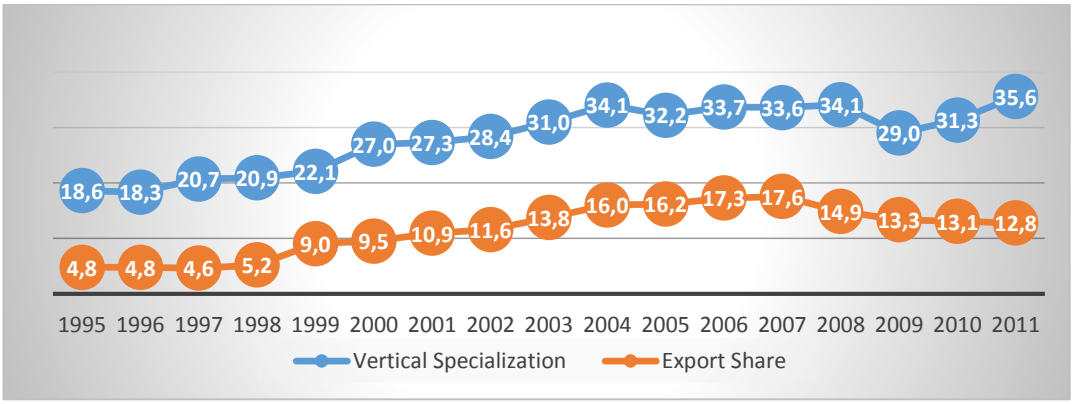

Figure 17 : Trends in Vertical Specialization and Export Share of Transportation Equipment (%)

To sum up, the domestic (foreign) content in exports has decreased (increased) in 10 out of 14 sectors from 1995 to 2011. Overall, vertical specialization shares in manufacturing exports has increased by 10 points from 15.1 to 25.1 percent in relevant period. The analysis based on technology level of sectors shows that vertical specialization of med-low-tech and high-tech exports are equal to each other when the average of 17 years is considered (26 percent). As expected, high-tech sectors have higher VSX since they need more imported intermediate products (production of intermediate goods used in high-tech sectors require more technological developments

and R&D activities). Likewise, the med-low-tech sectors such as Basic and Fabricated Metals and Coke, Refined Petroleum and Nuclear Fuels use considerable amounts of imported intermediate goods. Although the dependence on imported intermediates of exports of high-tech sectors seemed like fall with rise of global economic crisis (between 2007 and 2009), it is a temporary tendency, it has started to climb after 2009.

On the other hand, the distributions of DVAX and VSX are examined based on technology level, it can be said that the growth rate of vertical specialization shares of high-tech sectors in VSX is the highest, followed by med-low-tech sectors. The share of high-tech and med-low-tech sectors in VSX has increased with 2.6 and 1.9 annual growth rate through 17 years, while low-tech's share has decreased (See Figure C.1 and C.2 in Appendix). The participation into GVCs via backward linkages (i.e. imported content in exports) has been mainly the high-tech sectors. As expected, the trends observed in the sectoral compositions of DVAX and VSX are closely related to export shares of these technology categories. As a result, it can be said that Turkey's vertical specialization mainly concentrates on high-tech sectors. Therefore, this result is consistent with the results of the study conducted by Kowalski, *et al*. (2015) that the emerging economies have gained a large shares in high-tech sectors along the GVCs.

Although Turkey has specialized in downstream activities in production processes i.e. low value added segments of the GVCs, it has a strong potential to upgrade its situation along the chain (World Bank 2014). In light of these findings, it can be said that Turkey has vertically specialized in high-tech sectors and present in downstream activities in production processes.

4.2 Countries' Shares in Vertical Specialization of Turkish Exports

Methodology for the measurement of countries' contributions to foreign value added content in Turkish exports was presented in Chapter 3. Results of the analysis are given in this part of the chapter.

In Table 4, the RoW[8] and eight countries which have important roles in foreign value added generated by Turkish manufacturing exports are presented.

[8] RoW refers to the countries excluded 27 European Union countries and 13 major other countries.

Table 4 : Top Eight Countries and RoW, which contribute most to Vertical Specialization of Turkey,1995-2011[9]

Countries	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	*2011**
RoW	18,3	19,5	17,1	16,2	17,2	23,1	27,2	28,4	29,7	29,8	34,3	37,1	34,5	28,8	18,6	19,1	*19,4*
CHN	5,9	3,4	3,3	3,6	3,1	3,2	2,6	3,0	3,7	4,0	4,4	4,8	5,4	8,5	10,9	13,0	*13,2*
DEU	15,7	16,6	16,4	15,8	16,0	13,6	12,8	12,9	12,6	12,4	10,5	10,1	9,1	11,0	12,1	11,2	*11,0*
ITA	10,6	11,5	10,9	10,5	9,4	9,5	10,2	9,0	8,6	6,8	5,8	5,2	4,9	6,5	7,5	7,1	*6,7*
ESP	2,0	2,5	2,9	2,7	3,1	3,2	3,0	3,0	2,6	3,6	3,2	3,0	2,7	4,2	5,0	5,1	*5,5*
RUS	8,5	6,7	4,4	5,7	7,1	5,1	6,7	5,9	5,5	7,8	9,7	9,7	14,0	5,6	5,1	4,9	*5,2*
FRA	6,0	6,3	7,3	7,2	8,8	7,3	5,8	6,2	6,4	6,1	4,8	4,5	4,0	5,4	6,5	5,1	*4,8*
GBR	4,4	4,9	5,3	5,2	5,1	4,9	4,8	4,7	5,8	4,0	3,2	2,7	2,3	3,7	3,9	4,4	*4,4*
USA	4,4	3,9	5,3	4,4	3,8	3,6	4,2	2,7	2,2	1,9	1,8	1,6	1,7	1,6	2,1	1,8	*2,2*

**Table is sorted based on 2011 shares.*

[9] *The shaded cells refer to the top five countries and RoW, which contribute most to VS of Turkey in each year.*

The contribution of RoW to foreign value added in Turkish manufacturing sectors has always been the highest between the years between 1995 and 2011. Although the RoW's contribution to vertical specialization of Turkey is the highest among all countries through 17 years, and it has increased until 2005, then a sharp decrease has been observed between 2006 and 2009 (Figure 18).

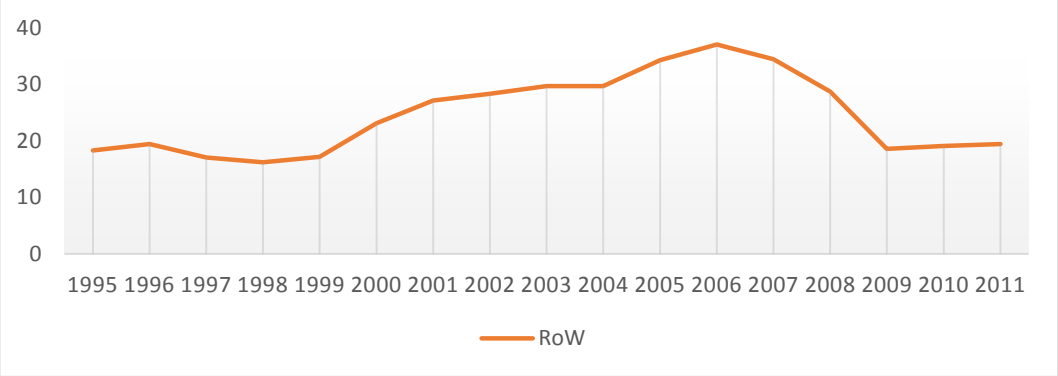

Figure 18 : Trends in Row's Contribution to Turkish Vertical Specialization (%)

The important part of the value added in Turkish exports generated by the RoW in the sectors Basic Metals and Fabricated Metal, Machinery and Other Manufacturing and Recycling in 2011. However, in 1995 vertical specialization share of Coke, Refined Petroleum and Nuclear Fuel sectors is the highest among the sectors contributed by RoW. As a matter of fact, the value added created by RoW in Coke, Refined Petroleum and Nuclear Fuel exports of Turkey has a fluctuating trend similar to the vertical specialization of that sector during the 17 years (Figure 19). Therefore, it can be said that the RoW's contribution to vertical specialization in Coke, Refined Petroleum and Nuclear Fuel exports has a substantial effect on total vertical specialization of that sectors.

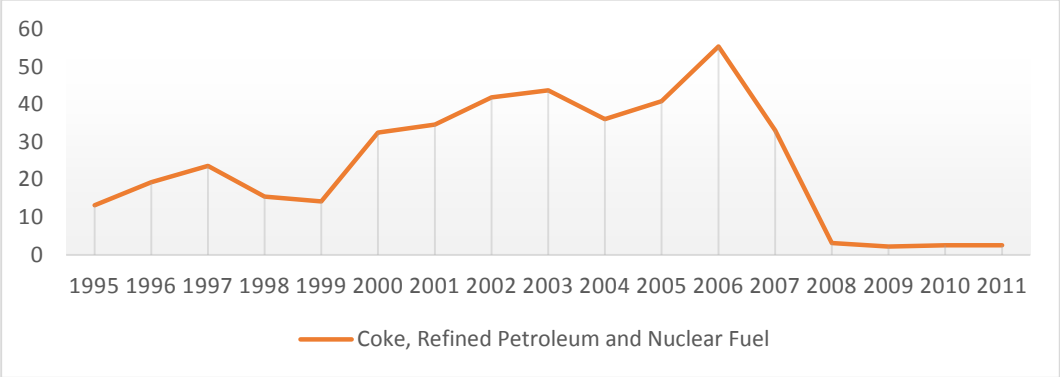

Figure 19 : The contribution of RoW to foreign value added share in Coke, Refined Petroleum and Nuclear Fuel exports of Turkey (%)

While the share of RoW in foreign value added embedded in Turkish exports has begun to fall after 2006, China's contribution has increased. As it can be seen in Figure 20, a continuous upward trend has been observed after 2001, especially between 2007 and 2010, a sharp rise is attracted attention. Moreover, it can be said that the share of RoW's in foreign value added in Turkish export has turned into China's contribution.

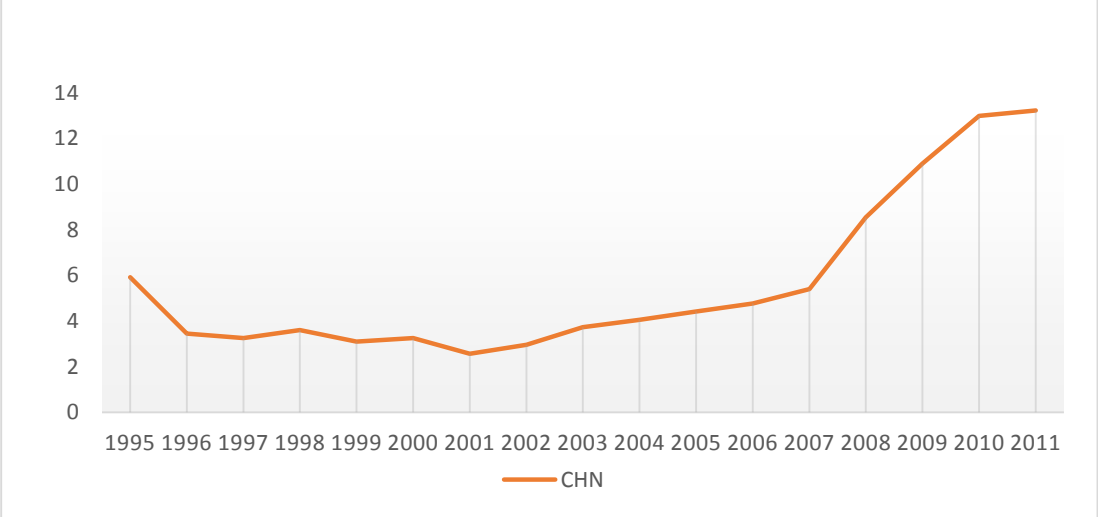

Figure 20 : Trends in China's Contribution to Turkish Vertical Specialization (%)

When the role of China in vertical specialization on sectoral basis is examined, it can be said that Textile sectors, which is included in low-tech category, has had an important role in import of China for all years. In particular, the contribution of China to vertical specialization share in Textile exports increased sharply from 2007 to 2011 (Figure 21). As was mentioned, these years correspond to the global economic crisis

period. Therefore, it can be said that the contribution of China to foreign value added in Textile exports of Turkey has begun to increase in the period of global economic crisis.

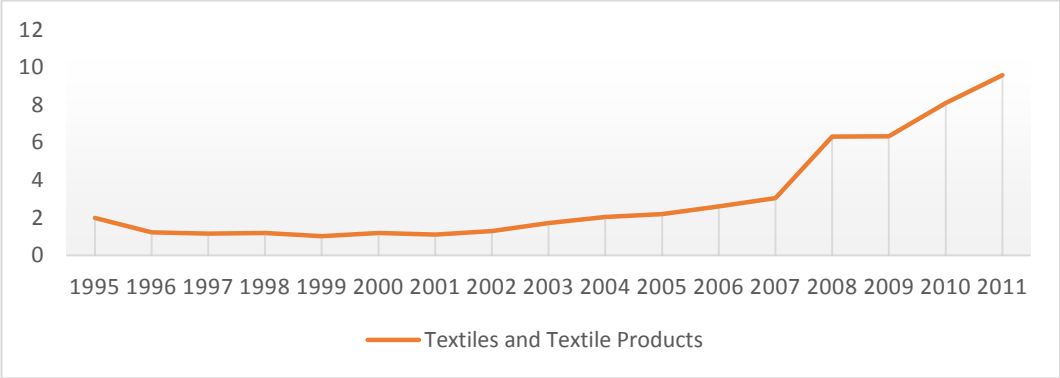

Figure 21 : The contribution of China to foreign value added share in Textile exports of Turkey (%)

The composition of sectors to which China contributes to vertical specialization has changed over time. The Figure 22 , 23 and 24 shows the contribution of China to vertical specialization of the sectors; Electrical and Optical Equipment (included in high-tech level), Transport Equipment (included in high-tech level) and Other Manufacturing and Recycling (included in low tech), respectively.

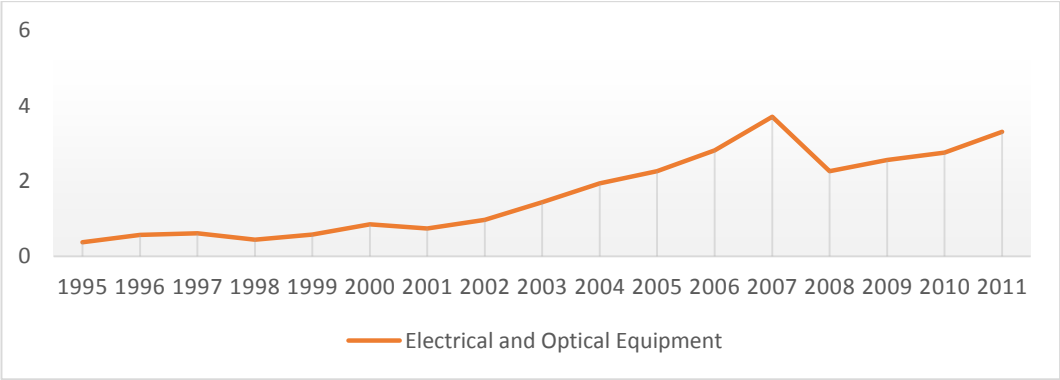

Figure 22 : The contribution of China to foreign value added share in Electrical and Optical Equipment exports of Turkey (%)

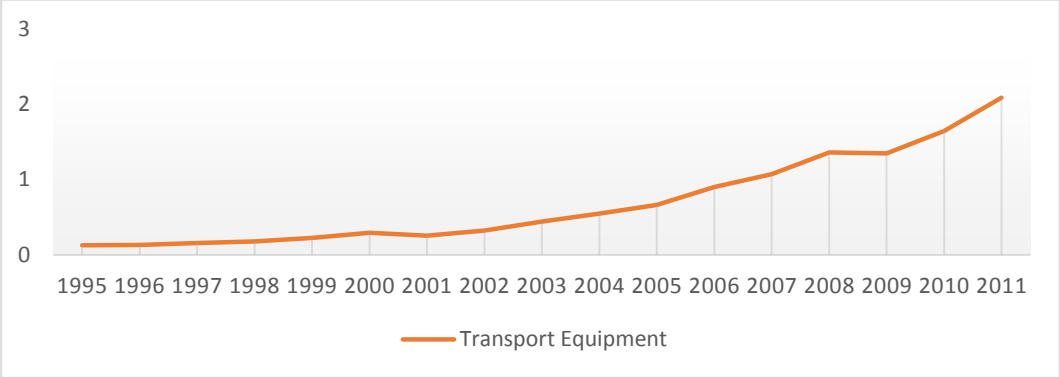

Figure 23 : The contribution of China to foreign value added share in Transport Equipment exports of Turkey (%)

As high-tech sectors, the contribution of China to share of vertical specialization in Transport and Electrical-Optical Equipment has increased over time except for a fluctuation in Electrical-Optical Equipment in 2007-2008. In other words, Turkey's imported intermediate goods in these sectors from China have increased. On the other hand; one of low-tech sectors, which is Other Manufacturing such as furniture, toys, musical instruments etc. and Recycling, has a similar pattern with the abovementioned high-tech sectors by having upward trend in contribution of China to vertical specialization (Figure 24).

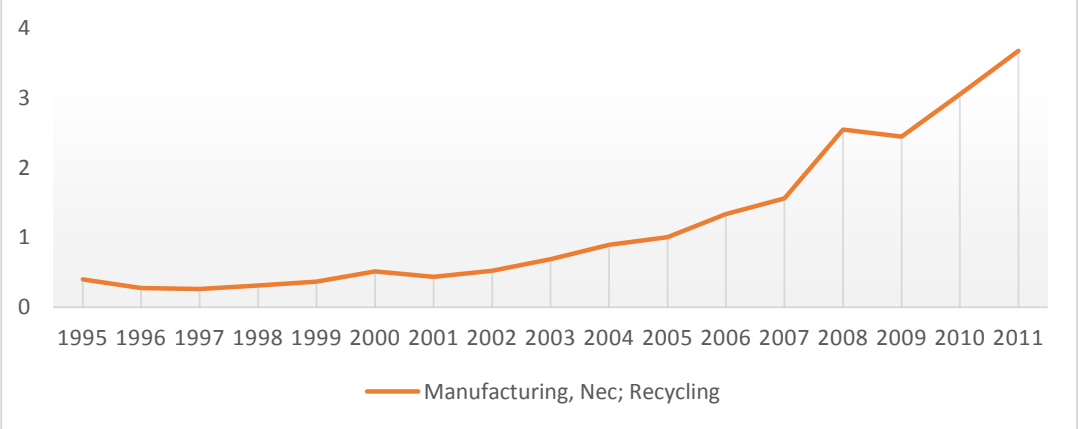

Figure 24 : The contribution of China to value added share in Other Manufacturing and Recycling exports of Turkey (%)

The contribution of Germany to imported content in Turkish exports was higher in 1995 than in 2011. A continuous downward trend in the share of foreign value added of Germany can be observed between the years 1999 and 2006. In the period of global

economic crisis, the increase in the contribution of Germany to vertical specialization of Turkey's exports is remarkable.

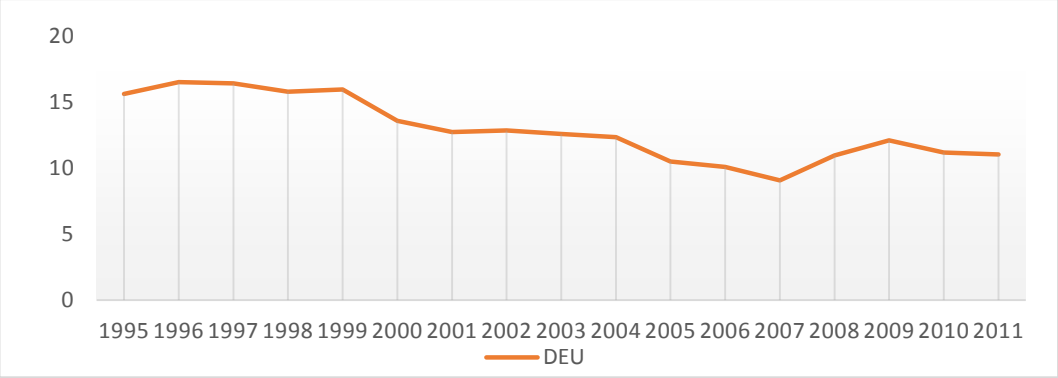

Figure 25 : Trends in Germany's Contribution to Vertical Specialization of Turkey (%)

When the contribution of Germany to vertical specialization of Turkish exports is investigated on sectoral basis, findings show that the contribution of Germany to share of vertical specialization in Transport Equipment is the highest among all other sectors.

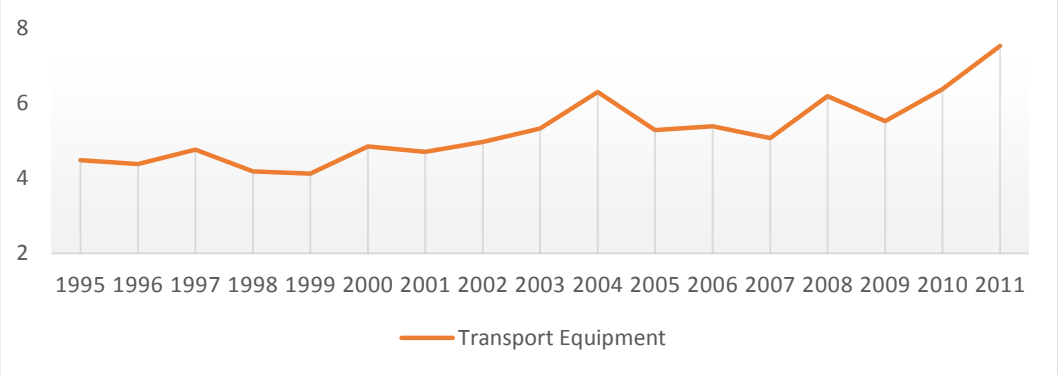

Figure 26 : The contribution of Germany to foreign value added share in Transport Equipment exports of Turkey (%)

As seen in Figure 26, Germany's contribution to foreign value added share in Transport equipment exports has an upward trend between the years 1995 and 2011. Moreover, the contribution of Germany to the share of vertical specialization in Electrical and Optical Equipment was higher in 1995 than in 2011. As was mentioned, these two sectors are included in high-tech category. Importing high tech products from the countries which have a high R&D expenditure and share of high tech

production in their manufacturing sectors like Germany can be beneficial to importer country in terms of technology transfers and spillover effects.

Although the contributions of Italy and France to foreign value added have decreased in the relevant period, they nevertheless have an important position in the imported content of Turkish exports (Figure 27 and 28). Similar with Germany, the contribution of these countries to the share of vertical specialization in Transport Equipment is the highest among all other sectors.

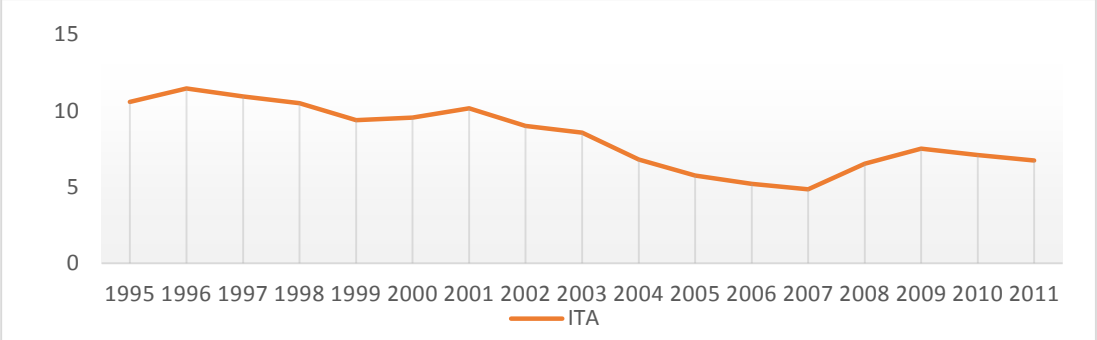

Figure 27 : Trends in Italy's Contribution to Turkish Vertical Specialization

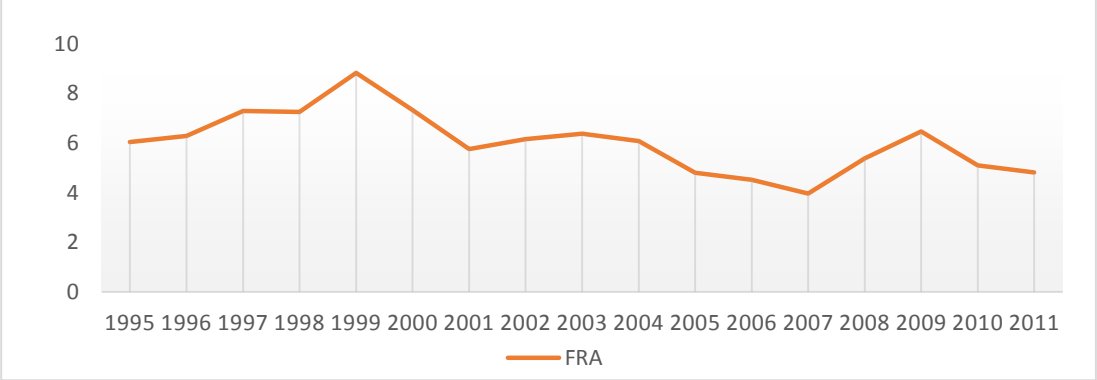

Figure 28 : Trends in France's Contribution to Turkish Vertical Specialization (%)

Countries contributions to foreign value added in Turkish exports were analyzed in this part of the chapter. The main contributor countries to vertical specialization of Turkey are listed as China, Germany, France, Italy and the RoW.

As was mentioned in Chapter 2, although domestic value added in Chinese exports has increased, Chinese foreign trade mainly focuses on processing trade (Koopman, Wang

and Wei 2012). Since processing trade means assembling imported intermediate goods and exporting them, the value added and technology transfers of this type of trade is not high. Moreover, the expenditure on R&D activities and the share of high tech production are lower in China compared to Germany and France[10]. Therefore, a high contribution of countries like Germany and France to vertical specialization is beneficial for technology transfers and improves knowhow. Although the vertical specialization (i.e. imported content in export) shows the measure for backward linkages into GVCs, trade partners produced goods in at high level of technology could led to enhance the benefits from GVCs.

[10] The share of R&D expenditure in GDP is 1.8, 2.9 and 2.2 for China, Germany and France, respectively(The World Bank Database).

CHAPTER 5

CONCLUSION

In this thesis, domestic and foreign value added contents in Turkish exports are examined between the years 1995 and 2011. Direct and indirect components of domestic and foreign value added in export are calculated, some inferences are derived. In addition, the sectoral tendencies of vertical specialization and domestic value added shares are investigated with respect to 14 manufacturing sectors. The analyses based on technological classification of manufacturing sectors are conducted for these measurements. Moreover, the contribution of each country to foreign content in Turkish exports was calculated by utilizing the WIOD. Although shares of 40 countries are calculated, the countries which have important roles on Turkish Exports are selected to analyzed in terms of sectors.

In order to calculate vertical specialization the HIY's method is followed. Since, the summation of vertical specialization shares and domestic content in exports are equal to unity for each sectors, domestic value added in exports are also calculated by the same methodology with vertical specialization. Moreover, countries' shares in foreign value added of exports are distinguished, and the contributions of each country on sectoral basis are obtained for all years in database.

Based on our analysis, an upward trend is observed in vertical specialization of Turkey (increased from 13.9 percent to 22.3 percent) through the 17 years between 1995 and 2011, while domestic value added content in exports has decreased from 86.1 percent to 77.7 percent. One can say that the participation of Turkey into GVCs has increased by only considering the vertical specialization rate. However, the sectors and the countries which contribute to Turkish vertical specialization should be examined broadly in order to determine the benefits of being a part of GVGs. To this end, firstly, vertical specialization and domestic value added shares are examined on a sectoral

basis. The manufacturing sectors are investigated in detail since the majority of Turkish exports consist of manufacturing sectors. Manufacturing sectors were classified based on OECD's technology levels and were analyzed with respect to this classification. Secondly, the countries' shares in foreign value added of Turkish exports are calculated and the highest contributing countries are selected for analyzing on a sectoral basis.

As it is examined in various studies, global economic crisis which emerged in 2008 had a negative effect on Turkish foreign trade performance (Bayrak and Kanca 2013; Aras 2010; Mercan 2014; World Bank 2014). The results of the analysis performed in this thesis agree with this opinion in terms of participation into GVCs. It can be said that fluctuations in trends of domestic and foreign contents in Turkish exports are present in almost all sectors in the global crisis period. Moreover, the fluctuations that occurred in vertical specialization in med-low-tech sectors is the highest, while the trend in vertical specializations of low-tech remains steady in the period of global economic crisis. When the trend in contributions of countries to vertical specialization are examined in the crisis period, contributions of France, Germany and Italy have slightly increased after 2007, while a striking rise is observed in China's contribution to Turkish vertical specialization.

As was mentioned, Banga (2014) states the direction of linkages into GVCs determine the benefit from being a part of this system, while Kowalski *et al* (2015) claim that regardless of whether countries participate in GVCs via backward and forward linkages, they will get the benefits from being a part of this chains. In this study, it is agreed with Kowalski *et al* (ibid.) and believed that the technology level of imported intermediate goods and the countries where the goods are imported from might affect the benefits from this system.

According to results of the analysis that measures the backward contributions to GVCs, the highest contribution to Turkish vertical specialization is made by high-tech sectors such as Transport, Electrical and Optical Equipment. Although it is considered that foreign direct investments (FDIs) have a substantial effect on technology transfers (World Bank 2014), vertical specializations of countries might also have an important

role on developing technologies. At this point, which sectors are vertically specialized might have an effect on the degree and nature of technology transfers from abroad. Higher vertical specialization in high-tech sectors could lead to a higher level of technology transfers from abroad and subsequent spillover effect. By importing products an intermediate goods for high tech exports, the benefits obtained from participating into GVCs are relatively more to importing intermediate goods for low-tech exports. This transfer of knowledge could be a positive side of increasing vertical specialization share. However, it should not be ignored that if the imported intermediate goods are mainly low-tech and med-low-tech goods, it is similar to assembling rather than technology transfers like Chinese in processing trade.

Similarly, the types of countries' contributions to vertical specialization is important to see benefits from GVCs. The results show that the main contributor countries to Turkish vertical specialization are listed as China, Germany, France, Italy and the RoW. Germany, France and Italy have relatively higher R&D expenditures and high-tech shares in total manufacturing exports than China. Therefore, it can be said that the technology-intensive and developed countries might help to improve technology in production of goods. According to results of the analysis, the contribution of China to Turkish vertical specialization has increased in recent years. Since the Chinese exports mainly consist of low-tech products, this increase might not be beneficial for Turkey to upgrade its position in GVCs.

In short, it can be said that the technology levels of the intermediate goods and types of countries which contribute to vertical specializations determine the benefits of being a part of GVCs in addition to type of linkages. This thesis concludes that Turkey's participation into GVCs has increased based on mainly high-tech sectors between the years 1995 and 2011. Moreover, Germany, China, Italy and France play important roles in foreign value added of Turkish Exports.

Although the results of analysis show that the participation of Turkey into GVCs has increased over the relevant period, Turkey still needs to upgrade its position in GVCs in terms of the production activity stages i.e. upstream and downstream activities. Turkey tends to operate the production activities mainly in downstream segments

(World Bank 2014). In order to change the production stages from downstream to upstream, Turkey needs to improve the technology level in production and increase the expenditure on R&D activities. Therefore, the high-tech production and exports of Turkey will be increased. In fact, the results show that Turkey has vertically specialized mainly on high-tech sectors, however, the contribution of low-tech and med-low-tech countries to vertical specialization has increased. In that sense, Turkey should improve trade relations with the high-tech countries to benefit from their knowhow and technologies.

The limitations of this study can be related with the database used in the analysis, the WIOD. As was mentioned, the most updated input output table released by TURKSTAT is belong to 2002. Input-output tables of Turkey available in the WIOD are projected by using appropriate methods to construct a time series until 2011. Although projections are consistent with the trade data, there might be some years that the estimations cannot fit the actual values. Moreover, since the national input output tables do not provide the employment and foreign direct investments data for value added, this study cannot cover the measurements for FDI flow in terms of GVCs and employment generated by means of exports.

This study can be extended by measuring the forward linkages of Turkish foreign trade into GVCs. Recall that forward linkages of Turkey refer to Turkey's intermediate exports which are used other countries exports. By using the WIOD, Turkish contribution to other countries' vertical specialization can be calculated and the results are compared to backward linkages. Moreover, bilateral contributions of countries to vertical specializations of each other can be calculated and an index can be constructed. Hence, the benefits from being a part of GVCs can be measured at bilateral level.

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APPENDICES

A. INDUSTRIES AND COUNTRIES INCLUDED IN THE WIOD

Table A.1. Industries in the WIOD

ISIC Rev.3 Code	Industry Name
AtB	Agriculture, Hunting, Forestry and Fishing
C	Mining and Quarrying
15t16	Food, Beverages and Tobacco
17t18	Textiles and Textile Products
19	Leather, Leather and Footwear
20	Wood and Products of Wood and Cork
21t22	Pulp, Paper, Paper , Printing and Publishing
23	Coke, Refined Petroleum and Nuclear Fuel
24	Chemicals and Chemical Products
25	Rubber and Plastics
26	Other Non-Metallic Mineral
27t28	Basic Metals and Fabricated Metal
29	Machinery, Nec
30t33	Electrical and Optical Equipment
34t35	Transport Equipment
36t37	Manufacturing, Nec; Recycling
E	Electricity, Gas and Water Supply
F	Construction
50	Sale, Maintenance and Repair of Motor Vehicles and Motorcycles; Retail Sale of Fuel
51	Wholesale Trade and Commission Trade, Except of Motor Vehicles and Motorcycles
52	Retail Trade, Except of Motor Vehicles and Motorcycles; Repair of Household Goods
H	Hotels and Restaurants
60	Inland Transport
61	Water Transport
62	Air Transport
63	Other Supporting and Auxiliary Transport Activities; Activities of Travel Agencies
64	Post and Telecommunications
J	Financial Intermediation
70	Real Estate Activities
71t74	Renting of M&Eq and Other Business Activities
L	Public Admin and Defence; Compulsory Social Security

Table A.1 (cont'd) ISIC Rev.3 Code	Industry Name
N	Health and Social Work
O	Other Community, Social and Personal Services
P	Private Households with Employed Persons

Source: WIOD

Table A.2. Manufacturing Sectors in the WIOD

ISIC Rev.3 Code	Industry Name
15t16	Food, Beverages and Tobacco
17t18	Textiles and Textile Products
19	Leather, Leather and Footwear
20	Wood and Products of Wood and Cork
21t22	Pulp, Paper, Paper , Printing and Publishing
23	Coke, Refined Petroleum and Nuclear Fuel
24	Chemicals and Chemical Products
25	Rubber and Plastics
26	Other Non-Metallic Mineral
27t28	Basic Metals and Fabricated Metal
29	Machinery, Nec
30t33	Electrical and Optical Equipment
34t35	Transport Equipment
36t37	Manufacturing, Nec; Recycling

Source: WIOD

Table A.3. Countries in the WIOD

Countries Included in the WIOD			
Australia	Estonia	Japan	Romania
Austria	Finland	Korea	Russia
Belgium	France	Latvia	Slovak Republic
Brazil	Germany	Lithuania	Slovenia
Bulgaria	Greece	Luxemburg	Spain
Canada	Hungary	Malta	Sweden
China	India	Mexico	Taiwan
Cyprus	Indonesia	Netherlands	Turkey
Czech Republic	Ireland	Poland	United Kingdom
Denmark	Italy	Portugal	USA

Source: WIOD

B. OECD CLASSIFICATION OF MANUFACTURING SECTORS

Table B.1. Classification of Manufacturing Industries Based on Technology

ISIC Codes	Sectors	Tech. Class	Notes
15t16	Food, Beverages and Tobacco	Low	
17t18	Textiles and Textile Products	Low	
19	Leather, Leather and Footwear	Low	
20	Wood and Products of Wood and Cork	Low	
21t22	Pulp, Paper, Paper , Printing and Publishing	Low	
36t37	Manufacturing, Nec; Recycling	Low	
23	Coke, Refined Petroleum and Nuclear Fuel	Med_low	
25	Rubber and Plastics	Med_low	
26	Other Non-Metallic Mineral	Med_low	
27t28	Basic Metals and Fabricated Metal	Med_low	
29	Machinery, Nec	Med_high	
24	Chemicals and Chemical Products	Med_high+High	2423 high, exc. 2423 med-high
34t35	Transport Equipment	Med_high+High	34+352+359 Med-high, 353 high
30t33	Electrical and Optical Equipment	High+Med_high	30+32+33 High, 31 Med-high

Source: OECD

C. THE SHARES OF TECHNOLOGY CATEGORIES IN DOMESTIC AND FOREIGN VALUE ADDED IN EXPORTS

Figure C.1. The shares of technology categories in Domestic Value Added in Exports, 1995 - 2011

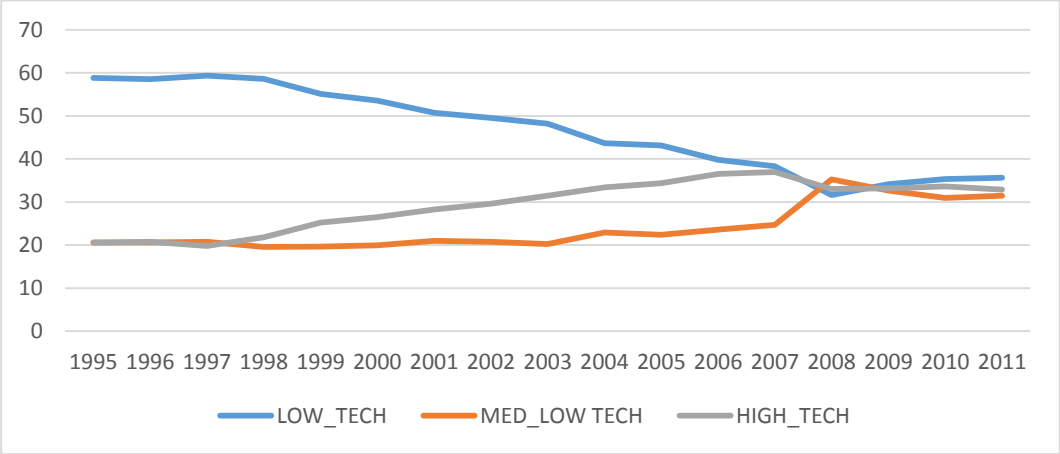
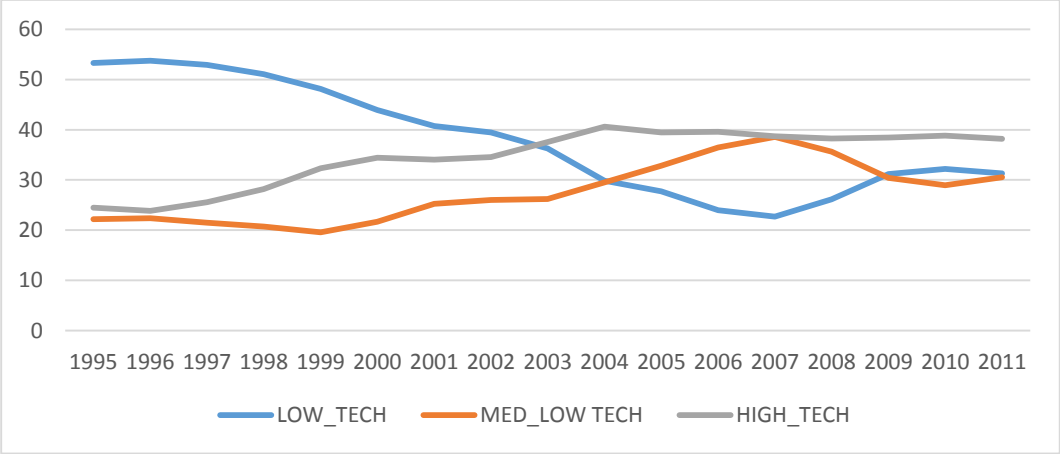


Figure C.2. The shares of technology categories in Foreign Value Added in Exports, 1995 - 2011



D. TIME SERIES OF MEASUREMENTS FOR MANUFACTURING SECTORS (DVA AND VS SHARES)

Table D.1. DVA Shares of Manufacturing Sectors between the years 1995 and 2011 (%)

	Sectors	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
15t16	*Food, Beverages and Tobacco*	90,9	90,0	86,0	87,2	87,6	86,2	85,4	86,1	85,6	86,1	87,0	86,0	85,0	84,6	87,3	88,7	85,4
17t18	*Textiles and Textile Products*	84,6	82,3	82,1	83,1	82,7	81,6	80,1	79,2	79,6	79,6	80,7	79,9	79,7	77,2	78,9	77,0	74,7
19	*Leather, Leather and Footwear*	82,1	79,9	79,9	80,6	81,9	79,9	78,6	79,7	80,8	81,4	82,5	81,2	81,1	84,9	87,3	86,8	84,1
20	*Wood and Products of Wood and Cork*	90,8	89,4	87,4	85,9	81,9	78,5	78,1	77,2	76,7	75,0	74,6	72,5	72,7	85,7	88,0	86,9	84,3
21t22	*Pulp, Paper, Paper , Printing and Publishing*	88,4	87,2	85,9	85,8	85,0	82,1	81,0	79,6	79,5	78,8	78,9	77,0	77,3	88,1	89,7	88,9	87,1
23	*Coke, Refined Petroleum and Nuclear Fuel*	73,9	69,0	72,2	79,3	70,4	57,4	44,4	38,8	38,5	38,5	31,8	25,1	26,7	89,0	91,1	90,1	88,0
24	*Chemicals and Chemical Products*	81,1	78,5	73,9	72,0	77,8	76,7	76,2	76,0	75,9	75,0	75,5	74,0	74,0	86,3	88,6	87,8	85,2
25	*Rubber and Plastics*	77,9	75,2	74,8	74,5	75,7	73,9	73,1	72,4	72,2	70,9	71,5	69,9	69,7	83,9	86,3	85,3	82,5
26	*Other Non-Metallic Mineral*	90,5	88,9	88,7	89,4	90,1	87,2	86,0	84,9	84,9	84,4	83,8	81,4	81,8	86,7	89,2	88,2	86,0
27t28	*Basic Metals and Fabricated Metal*	84,2	82,3	80,0	79,8	81,2	77,1	72,9	71,4	69,4	66,8	66,3	63,0	61,2	67,6	75,9	73,7	68,5
29	*Machinery, Nec*	86,0	84,5	81,3	80,6	81,7	79,8	76,6	76,3	75,6	73,8	73,8	71,7	70,7	77,2	82,2	81,0	77,1
30t33	*Electrical and Optical Equipment*	82,6	80,6	75,2	78,8	73,3	70,3	70,5	70,0	69,9	68,0	69,6	68,1	67,2	76,3	79,8	79,1	75,7
34t35	*Transport Equipment*	81,4	81,7	79,3	79,1	77,9	73,0	72,7	71,6	69,0	65,9	67,8	66,3	66,4	65,9	71,0	68,7	64,4
36t37	*Manufacturing, Nec; Recycling*	88,9	87,3	84,7	84,1	82,6	78,9	74,9	73,2	71,5	69,6	69,7	67,5	66,1	70,2	76,5	74,4	69,9

Table D.2. VS (Foreign Value Added) Shares of Manufacturing Sectors between the years 1995 and 2011 (%)

	Sectors	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
15t16	*Food, Beverages and Tobacco*	9,1	10,0	14,0	12,8	12,4	13,8	14,6	13,9	14,4	13,9	13,0	14,0	15,0	15,4	12,7	11,3	14,6
17t18	*Textiles and Textile Products*	15,4	17,7	17,9	16,9	17,3	18,4	19,9	20,8	20,4	20,4	19,3	20,1	20,3	22,8	21,1	23,0	25,3
19	*Leather, Leather and Footwear*	17,9	20,1	20,1	19,4	18,1	20,1	21,4	20,3	19,2	18,6	17,5	18,8	18,9	15,1	12,7	13,2	15,9
20	*Wood and Products of Wood and Cork*	9,2	10,6	12,6	14,1	18,1	21,5	21,9	22,8	23,3	25,0	25,4	27,5	27,3	14,3	12,0	13,1	15,7
21t22	*Pulp, Paper, Paper , Printing and Publishing*	11,6	12,8	14,1	14,2	15,0	17,9	19,0	20,4	20,5	21,2	21,1	23,0	22,7	11,9	10,3	11,1	12,9
23	*Coke, Refined Petroleum and Nuclear Fuel*	26,1	31,0	27,8	20,7	29,6	42,6	55,6	61,2	61,5	61,5	68,2	74,9	73,3	11,0	8,9	9,9	12,0
24	*Chemicals and Chemical Products*	18,9	21,5	26,1	28,0	22,2	23,3	23,8	24,0	24,1	25,0	24,5	26,0	26,0	13,7	11,4	12,2	14,8
25	*Rubber and Plastics*	22,1	24,8	25,2	25,5	24,3	26,1	26,9	27,6	27,8	29,1	28,5	30,1	30,3	16,1	13,7	14,7	17,5
26	*Other Non-Metallic Mineral*	9,5	11,1	11,3	10,6	9,9	12,8	14,0	15,1	15,1	15,6	16,2	18,6	18,2	13,3	10,8	11,8	14,0
27t28	*Basic Metals and Fabricated Metal*	15,8	17,7	20,0	20,2	18,8	22,9	27,1	28,6	30,6	33,2	33,7	37,0	38,8	32,4	24,1	26,3	31,5
29	*Machinery, Nec*	14,0	15,5	18,7	19,4	18,3	20,2	23,4	23,7	24,4	26,2	26,2	28,3	29,3	22,8	17,8	19,0	22,9
30t33	*Electrical and Optical Equipment*	17,4	19,4	24,8	21,2	26,7	29,7	29,5	30,0	30,1	32,0	30,4	31,9	32,8	23,7	20,2	20,9	24,3
34t35	*Transport Equipment*	18,6	18,3	20,7	20,9	22,1	27,0	27,3	28,4	31,0	34,1	32,2	33,7	33,6	34,1	29,0	31,3	35,6
36t37	*Manufacturing, Nec; Recycling*	11,1	12,7	15,3	15,9	17,4	21,1	25,1	26,8	28,5	30,4	30,3	32,5	33,9	29,8	23,5	25,6	30,1

E. THE MOST IMPORTANT CONTRIBUTOR COUNTRIES TO TURKISH VERTICAL SPECIALIZATION BY MANUFACTURING SECTORS

Table E.1. Contribution of RoW to Foreign Value Added of Turkish Exports

	Sectors	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
27t28	*Basic Metals and Fabricated Metal*	4,48	5,06	5,06	4,96	4,83	6,97	11	12,2	13,3	15,3	16,8	17,5	18,5	14,7	7,25	8,52	10,4
36t37	*Manufacturing, Nec; Recycling*	2,37	2,77	3,03	3,31	3,76	5,44	8,58	9,64	10,6	12	13	13,3	14,4	10,3	5,18	6,14	7,37
29	*Machinery, Nec*	2,17	2,48	2,38	2,6	2,88	4,38	6,46	7,41	8,05	9,16	10,2	10,4	11,2	8,47	4,24	5,04	6,14
15t16	*Food, Beverages and Tobacco*	2,71	3,18	3,87	3,61	3,36	4,54	4,93	4,35	5,03	4,92	4,75	5,38	5,47	6,44	4,48	3,89	4,88
19	*Leather, Leather and Footwear*	4,52	4,99	3,55	3,2	4,42	6,54	6,97	6,25	6,18	5,6	5,71	6,62	6,71	5,26	3,76	3,99	4,62
30t33	*Electrical and Optical Equipment*	2,01	2,24	2,18	2,36	2,55	4,07	5,15	6,02	6,32	6,95	7,76	8,19	8,24	6,04	3,49	3,9	4,39
34t35	*Transport Equipment*	1,64	1,89	1,86	1,91	2,15	3,21	5,19	5,7	6,06	6,51	7,64	8,15	8,81	6,79	3,67	3,81	4,23
25	*Rubber and Plastics*	4	4,85	3,73	4,22	4,75	6,33	7,05	7,11	7,38	7,56	8,11	8,8	8,91	3,52	2,41	2,91	3,19
24	*Chemicals and Chemical Products*	4,03	5,09	5,2	5,91	4,86	6,31	6,72	6,58	6,79	6,81	7,29	8,17	7,94	3,52	2,43	2,77	3,04
20	*Wood and Products of Wood and Cork*	2,13	2,59	3,51	4,3	5,11	7,26	7,44	8,19	8,57	9,17	9,44	11,1	9,82	3,2	2,17	2,64	2,87
23	*Coke, Refined Petroleum and Nuclear Fuel*	13,2	19,3	23,7	15,5	14,2	32,5	34,6	41,9	43,7	36,1	40,8	55,4	33,1	3,15	2,24	2,59	2,53
26	*Other Non-Metallic Mineral*	2,82	3,8	4,12	3,19	2,55	4,53	5,04	5,26	5,68	5,28	6	7,92	6,52	3,31	2,06	2,4	2,27
21t22	*Pulp, Paper, Paper , Printing and Publishing*	1,99	2,27	2,23	2,15	2,46	3,84	4,4	4,93	5,16	4,97	5,57	7,05	5,95	1,91	1,32	1,58	1,69
17t18	*Textiles and Textile Products*	1,93	2,27	2,03	1,78	2,42	3,71	4,1	4,17	4,39	4,06	4,24	4,99	4,53	2,03	1,33	1,42	1,44

Table E.2. Contribution of China to Foreign Value Added of Turkish Exports

	Sectors	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
17t18	*Textiles and Textile Products*	1,99	1,22	1,16	1,20	1,04	1,20	1,11	1,30	1,72	2,06	2,21	2,61	3,05	6,31	6,33	8,10	9,59
36t37	*Manufacturing, Nec; Recycling*	0,40	0,27	0,26	0,31	0,37	0,51	0,44	0,52	0,69	0,90	1,00	1,34	1,56	2,55	2,45	3,05	3,68
30t33	*Electrical and Optical Equipment*	0,37	0,57	0,61	0,44	0,58	0,85	0,73	0,97	1,43	1,94	2,26	2,82	3,71	2,26	2,56	2,75	3,31
34t35	*Transport Equipment*	0,13	0,13	0,16	0,18	0,22	0,29	0,26	0,32	0,44	0,55	0,67	0,90	1,07	1,36	1,35	1,65	2,09
25	*Rubber and Plastics*	0,21	0,20	0,35	0,35	0,30	0,35	0,36	0,47	0,64	0,79	0,96	1,29	1,60	1,04	1,02	1,34	1,83
19	*Leather, Leather and Footwear*	0,30	0,20	0,35	0,40	0,24	0,25	0,23	0,29	0,38	0,47	0,55	0,71	0,83	1,06	1,06	1,40	1,75
29	*Machinery, Nec*	0,09	0,09	0,17	0,21	0,26	0,35	0,27	0,33	0,46	0,62	0,73	0,97	1,26	1,12	1,12	1,28	1,57
26	*Other Non-Metallic Mineral*	0,05	0,05	0,10	0,11	0,10	0,13	0,15	0,24	0,37	0,51	0,60	0,67	0,65	0,87	0,89	1,17	1,57
27t28	*Basic Metals and Fabricated Metal*	0,07	0,08	0,14	0,22	0,25	0,35	0,24	0,28	0,40	0,56	0,65	0,82	1,00	1,13	0,94	1,22	1,46
24	*Chemicals and Chemical Products*	0,08	0,11	0,28	0,30	0,23	0,26	0,29	0,38	0,50	0,61	0,77	1,04	1,30	0,77	0,74	0,99	1,34
20	*Wood and Products of Wood and Cork*	0,05	0,05	0,07	0,07	0,15	0,19	0,22	0,30	0,41	0,57	0,77	1,10	1,22	0,90	0,79	1,01	1,31
21t22	*Pulp, Paper, Paper , Printing and Publishing*	0,06	0,07	0,11	0,11	0,12	0,16	0,17	0,24	0,32	0,40	0,49	0,66	0,80	0,73	0,73	0,96	1,26
15t16	*Food, Beverages and Tobacco*	0,08	0,06	0,10	0,09	0,10	0,13	0,11	0,15	0,21	0,27	0,35	0,42	0,47	0,47	0,46	0,58	0,75
23	*Coke, Refined Petroleum and Nuclear Fuel*	0,01	0,01	0,01	0,02	0,06	0,08	0,08	0,09	0,07	0,09	0,07	0,05	0,07	0,40	0,43	0,57	0,72

Table E.3. Contribution of Germany to Foreign Value Added of Turkish Exports

	Sectors	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
34t35	*Transport Equipment*	4,48	4,37	4,76	4,18	4,11	4,84	4,69	4,96	5,32	6,29	5,28	5,38	5,06	6,18	5,52	6,37	7,51
30t33	*Electrical and Optical Equipment*	4,57	4,86	6,13	3,58	4,37	4,52	4,71	5,12	4,71	4,65	3,87	3,79	3,71	2,89	2,68	2,49	2,91
36t37	*Manufacturing, Nec; Recycling*	1,60	2,09	2,49	2,41	2,79	3,11	2,98	3,35	3,36	3,20	2,80	2,94	2,74	2,73	2,50	2,37	2,70
27t28	*Basic Metals and Fabricated Metal*	2,15	2,54	2,84	2,63	2,61	2,93	2,48	2,89	2,95	2,78	2,40	2,52	2,29	2,21	2,04	2,01	2,43
29	*Machinery, Nec*	3,20	3,49	4,03	3,71	3,43	3,37	3,50	3,52	3,49	3,34	2,98	3,26	2,99	2,28	2,14	1,98	2,37
25	*Rubber and Plastics*	3,91	4,48	4,61	4,62	4,19	3,76	3,99	3,99	4,13	4,28	3,83	4,19	3,81	2,15	1,90	1,73	1,97
20	*Wood and Products of Wood and Cork*	1,32	1,66	1,75	1,69	2,42	2,47	2,80	2,78	2,91	2,90	2,68	2,65	2,59	1,88	1,64	1,58	1,80
17t18	*Textiles and Textile Products*	2,26	2,99	3,05	2,89	2,97	2,44	2,60	2,62	2,49	2,38	2,04	2,13	1,94	2,03	1,94	1,56	1,53
21t22	*Pulp, Paper, Paper , Printing and Publishing*	1,72	2,23	2,40	2,41	2,56	2,65	3,00	3,19	3,12	3,28	2,90	2,99	2,76	1,72	1,59	1,44	1,59
26	*Other Non-Metallic Mineral*	1,11	1,25	1,26	1,25	1,24	1,26	1,46	1,65	1,64	1,64	1,42	1,47	1,36	1,63	1,36	1,27	1,47
24	*Chemicals and Chemical Products*	2,95	3,43	4,12	4,44	3,52	3,03	3,24	3,24	3,38	3,51	3,11	3,37	3,05	1,58	1,36	1,21	1,39
19	*Leather, Leather and Footwear*	1,43	1,63	2,47	2,59	2,24	1,89	1,99	1,98	1,97	1,98	1,78	1,90	1,80	1,23	1,18	0,98	1,15
15t16	*Food, Beverages and Tobacco*	1,04	1,08	1,06	1,08	1,26	1,23	1,28	1,33	1,38	1,26	1,11	1,20	1,18	1,01	1,05	0,74	0,94
23	*Coke, Refined Petroleum and Nuclear Fuel*	0,25	0,17	0,15	0,17	0,57	0,51	0,43	0,40	0,39	0,40	0,24	0,16	0,18	1,02	0,88	0,71	0,81

Table E.4. Contribution of Italy to Foreign Value Added of Turkish Exports

	Sectors	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
34t35	*Transport Equipment*	3,32	2,70	2,54	2,39	2,31	3,28	4,12	3,66	3,91	2,34	1,96	2,06	1,93	2,16	2,02	2,22	2,43
17t18	*Textiles and Textile Products*	1,71	2,43	2,41	2,26	2,10	2,16	2,50	2,49	2,33	2,25	1,92	1,78	1,69	2,74	2,46	2,16	2,18
36t37	*Manufacturing, Nec; Recycling*	1,16	1,49	1,58	1,52	1,39	1,83	1,96	1,85	1,85	1,73	1,52	1,56	1,54	1,91	1,83	1,83	2,04
27t28	*Basic Metals and Fabricated Metal*	1,43	1,49	1,58	1,47	1,15	1,51	1,54	1,36	1,44	1,38	1,18	1,27	1,27	1,30	1,33	1,47	1,73
29	*Machinery, Nec*	1,76	2,03	2,21	2,03	1,64	1,95	1,96	1,76	1,76	1,77	1,60	1,69	1,71	1,29	1,25	1,31	1,53
30t33	*Electrical and Optical Equipment*	2,00	2,36	3,14	2,03	2,21	2,45	3,83	2,64	2,26	2,18	1,67	1,67	1,59	1,42	1,31	1,41	1,52
19	*Leather, Leather and Footwear*	4,50	5,37	4,15	3,46	2,41	2,96	3,60	3,12	2,64	2,46	2,00	2,21	1,90	1,57	1,28	1,20	1,50
25	*Rubber and Plastics*	2,15	2,44	2,55	2,30	1,91	2,20	2,26	2,28	2,10	1,97	1,88	1,86	1,72	1,13	1,00	0,99	1,18
26	*Other Non-Metallic Mineral*	0,68	0,76	0,80	0,80	0,71	0,97	0,90	0,93	0,91	0,87	0,80	0,79	0,76	0,97	0,82	0,87	1,11
23	*Coke, Refined Petroleum and Nuclear Fuel*	0,13	0,08	0,09	0,10	0,37	0,74	0,35	0,26	0,30	0,29	0,21	0,14	0,66	0,73	0,59	0,70	1,06
20	*Wood and Products of Wood and Cork*	0,86	0,96	1,03	0,99	1,11	1,71	1,48	1,52	1,43	1,27	1,23	1,15	1,14	0,92	0,74	0,77	0,96
24	*Chemicals and Chemical Products*	1,62	1,87	2,39	2,25	1,63	1,86	1,83	1,89	1,72	1,62	1,54	1,52	1,39	0,86	0,73	0,74	0,92
21t22	*Pulp, Paper, Paper , Printing and Publishing*	0,79	0,97	1,14	1,02	0,96	1,28	1,33	1,47	1,46	1,36	1,28	1,23	1,15	0,85	0,75	0,76	0,89
15t16	*Food, Beverages and Tobacco*	0,53	0,55	0,64	0,64	0,59	0,70	0,70	0,67	0,67	0,63	0,60	0,63	0,59	0,59	0,49	0,47	0,57

Table E.5. Contribution of France to Foreign Value Added of Turkish Exports

	Sectors	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
34t35	*Transport Equipment*	1,70	1,54	1,96	1,94	3,79	4,12	3,23	3,13	3,72	3,84	2,86	2,86	2,44	3,12	3,18	2,76	2,84
30t33	*Electrical and Optical Equipment*	1,27	1,49	2,06	1,71	2,43	2,24	2,01	2,42	2,27	2,06	1,60	1,63	1,61	1,40	1,37	1,11	1,36
27t28	*Basic Metals and Fabricated Metal*	0,95	1,19	1,66	1,42	1,35	1,23	0,93	1,16	1,35	1,24	1,08	1,09	1,07	1,18	1,26	1,18	1,32
36t37	*Manufacturing, Nec; Recycling*	0,66	0,79	1,22	1,13	1,33	1,29	1,12	1,32	1,45	1,39	1,21	1,21	1,14	1,22	1,24	1,12	1,24
29	*Machinery, Nec*	1,17	1,37	1,77	1,67	1,73	1,43	1,18	1,58	1,61	1,52	1,22	1,30	1,22	1,11	1,16	1,03	1,14
25	*Rubber and Plastics*	1,26	1,72	2,00	2,05	1,96	1,73	1,51	1,65	1,63	1,72	1,52	1,60	1,45	0,99	0,98	0,77	0,89
26	*Other Non-Metallic Mineral*	0,43	0,53	0,61	0,66	0,74	0,71	0,57	0,74	0,72	0,73	0,57	0,59	0,53	0,80	0,78	0,62	0,75
24	*Chemicals and Chemical Products*	0,97	1,35	1,78	1,94	1,65	1,44	1,20	1,33	1,32	1,38	1,20	1,26	1,14	0,73	0,73	0,56	0,66
17t18	*Textiles and Textile Products*	0,89	1,04	1,23	1,24	1,36	1,17	1,06	1,18	1,07	1,02	0,83	0,84	0,73	0,79	0,73	0,54	0,60
20	*Wood and Products of Wood and Cork*	0,47	0,52	0,60	0,62	1,01	1,06	0,92	0,99	1,00	1,05	0,93	0,91	0,82	0,67	0,64	0,51	0,59
21t22	*Pulp, Paper, Paper , Printing and Publishing*	0,60	0,81	0,95	1,01	1,04	1,06	0,95	1,18	1,10	1,08	0,88	0,90	0,84	0,68	0,62	0,50	0,59
19	*Leather, Leather and Footwear*	1,38	1,52	1,33	1,31	1,30	1,06	0,92	1,06	1,01	0,97	0,75	0,71	0,67	0,60	0,60	0,44	0,53
15t16	*Food, Beverages and Tobacco*	0,53	0,55	0,84	0,62	0,75	0,67	0,54	0,62	0,64	0,60	0,49	0,51	0,49	0,50	0,50	0,34	0,49
23	*Coke, Refined Petroleum and Nuclear Fuel*	0,09	0,07	0,07	0,09	0,55	0,48	0,18	0,21	0,20	0,21	0,11	0,07	0,09	0,68	0,55	0,38	0,48

F. TURKISH SUMMARY

20. yüzyılın ortalarında ortaya çıkan küreselleşme kavramı hem ekonomi hem de siyasi politikaların uygulanmasında önemli bir role sahiptir. Küreselleşmenin iktisadi yönü ele alındığında, uluslarası ticaret gerek sermaye ve emek gibi üretim faktörleri, gerekse mal ve hizmet ticareti ile yakından ilişkilidir. Son yıllarda küreselleşmenin hız kazanması ile dünya ticaret hacminin artmakta olduğu bilinmektedir. Dünya Bankası verilerine göre, dünya gayrisafi yurtiçi hasılasının (GSYH) içinde ticaretin payı 1975 yılında yüzde 28 iken, bu oran 2013 yılında yüzde 50'ye ulaşmıştır (Dünya Bankası Veritabanı).

1995 yılında Uruguay Turunun sonuçlanması ve nihayetinde Dünya Ticaret Örgütü (DTÖ)'nün kurulması ile azalan tarife engelleri ve teknolojinin gelişmesi ile artan lojistik ve iletişim imkanları sermaye, emek ve mal piyasasının küreselleşmesinde etkin roller oynamışlardır. Bu gelişmeler üretim süreçlerinin ve böylece uluslararası ticaretin doğasında değişimlere sebep olmuştur. Bu kapsamda, Küresel Değer Zincirleri (KDZ) yeni bir kavram olarak ortaya çıkmıştır. Üretim süreçlerinin dünya üzerinde farklı lokasyonlara dağılması ve böylece KDZ'lerin ortaya çıkışı ile üretimde yaratılan katma değerin hesaplanması zor ve karışık bir işlem haline gelmiştir. Üretim maliyetlerini en az düzeye indirgemek isteyen firmalar sermaye ve emeğin dolaşımının daha serbest olduğu günümüz koşullarında üretim süreçlerinin her bir safhasının farklı ülkelerde tamamlamaya başlamış, bu durum bahse konu malın üretiminde yaratılan katma değerin hangi ülkenin ticaretine katkı yaptığının tespit edilmesini zorlaştırmıştır. Bu kapsamda, ülkelerin dikey uzmanlaşmaları KDZ'lere entegrasyonlarının bir göstergesi olarak kabul edilmektedir.

Bahsedildiği üzere, günümüz ekonomik sisteminde dış ticaret potansiyeli çoğu ülke için önemli bir büyüme kaynağı olarak görülmektedir. Ülkelerin uluslararsı ticarete katılımları genel olarak ihracat ve ithalat performansları ile ölçülmektedir. Bu kapsamda, 2000'li yıllarda kayda değer bir yükselişin gözlendiği Türkiye ekonomisi dikkat çekmektedir. 1980 – 2012 yılları arasında Türkiye'nin ihracat hacmi yılık ortalama yüzde 13 oranında büyüme göstermiştir. Bu yıllar arasında görülen

büyümede en önemli etken ithal ikameci politikaların yerini ihracat odaklı büyüme politikaları almış olmasıdır. Bunun yanı sıra 1980'li yıllarda libarelleşmeye ve dışa açılmaya başlayan Türkiye ekonomisinde dış ticaretin gelişmesi beklenen bir sonuçtur. Ayrıca, 1995 yılında 26 milyar dolar olan Türkiye'nin aramalı ithalatı 2011 yılında 148 milyar dolara ulaşırken, tüketim ve aramalı ithalatı daha yumuşak bir yükseliş göstermiştir. Bir diğer deyişle, Türkiye'nin ithalat büyümesinin ana kaynağı aramalı ithalatıdır.

Bu çalışma, KDZ'lerin ortaya çıkışı ve üretim süreçlerinin değişmesinin beraberinde getirdiği uluslarası ticaretin doğasında yaşanan değişimin Türkiye perspektifinden ele alınmasını amaçlamıştır. Esas olarak, Türkiye ekonomisinin yapısının incelenmesinin sebebi ise son yıllarda artan dış ticareti ile dikkat çeken bir ülke olması ve Türkiye dış ticaretinin dikey uzmanlaşma ve ihracatta yerli katma değer açısından değerlendirildiği çalışmaların literatürde yetersiz sayıda olmasıdır. KDZ'lerin yaygınlaşması ve uluslararsı ticarette yaşanan bu dönüşümün kapsamında Türkiye'nin uluslararası platformdaki pozisyonu araştırılmaya değer bir konu olarak görülmüştür. Bu noktada, Türkiye'nin önemli derece artan dış ticaret hacmi ile KDZ'lerin hangi segmentinde yer aldığı, son yıllarda KDZ'lere katılımının nasıl bir eğilim izlediği ve son olarak KDZ'lerin içerisinde yer almanın Türkiye'ye neler kazandıracağı sorularına makul düzeyde cevaplar bulunması bu çalışmanın yürütülmesinde önemli etkenlerdir.

Çalışmada, Türkiye'nin ihracatındaki yerli katma değerin ve ülkenin dikey uzmalaşma düzeyinin ölçülmesi amaçlanmıştır. Çalışma 14 adet imalat sanayi sektörü üzerine yoğunlaşmış olup, bu sektörlerin ihracatındaki yerli ve yabancı katma değerler elde edilmiştir. Buna ek olarak, Dünya Girdi Çıktı Veritabanı (WIOD) kullanılarak aramalı ithalatı yapılan ülkelerin Türkiye'nin ihracatındaki yabancı katma değer içerisindeki payları hesaplanmıştır. Bahse konu veritabanı 1995 ve 2011 yılları arasındaki tüm yılları içeren girdi çıktı tablolarını sağladığı için kullanımı tercih edilmiş ve böylece Türkiye ihracatına ilişkin en güncel yerli ve yabancı katma değerler hesaplanmıştır. Bu perspektifte, bu çalışmanın WIOD'u Türkiye ekonomisi için kullanan ve ihracatta en güncel yerli katma değer ve dikey uzmanlaşma oranlarını analiz eden çalışma olduğu söylenebilir.

Türkiye'nin dikey uzmanlaşmasını hesaplamak için Hummels, Ishii ve Yi (HIY) tarafından 2001 yılında literatüre kazandırılan yöntem kullanılmıştır. İhracatta yerli katma değer hesaplaması için kullanılan yöntem ile dikey uzmanlaşma hesaplama yöntemi birbirine oldukça benzer olduğu için aynı yöntem her iki hesaplamada da kullanılmıştır. Ülkelerin, Türkiye'nin ihracatındaki yabancı katma değer içerisindeki paylarının hesaplanmasında Dünya Girdi Çıktı Tablosu (WIOT)'ndan yararlanılmıştır. 1995 ve 2011 yılları arasında Türkiye'nin ihractındaki yerli ve yabancı katma değer ile diğer ülkelerin Türkiye'nin ihracatındaki yabancı katma değer içerisindeki paylarını yansıtan göstergeler 14 adet imalat sanayi sektörü için ayrı ayrı hesaplanmıştır. Analizdeki tüm hesaplamalarda MATLAB programı kullanılmıştır.

Çalışmada öncelikle KDZ'lerine ve dikey uzmanlaşma kavramına ilişkin literatür taraması yapılmıştır. Literatür taramasının ardından benimsenen yöntem ayrıntılı şekilde anlatılmış olup, çalışmada yararlanılan veriler tanıtılarak veritabanının özelliklerine değinilmiştir. Bir sonraki aşamada, analizin sonuçları anlatılmıştır.

2014 yılında Dünya Bankası tarafından Türkiye için hazırlanan Yüksek Gelire Geçişte Dış Ticaretin Rolü Raporunda, KDZ'lerin ülkeler arasındaki rekabeti ve bağımlılığı arttırdığı ifade edilmiştir. Rapora göre, ülkeler birbirilerinin üretim ve sermayelerine daha çok ihtiyaç duymakta olup, aynı zamanda birbirlerinde oluşan istihdam ve yatırım imkanları için rekabet etmek durumundadırlar. Şirketlerin dış kaynak kullanımını yani şirket ana faaliyetleri dışındaki faaliyetler için aracı firmalar ile çalışmalarını arttırmaları firmalar arasındaki rekabetin yatay rekabetçilikten dikey uzmanlaşmaya dönüşmesine yol açmıştır (Dünya Bankası 2014). Böylece, şirketler hem üretim maliyetlerini düşürmek hem de üretim süreçlerini hızlandırmak amacıyla her bir üretim evresini farklı ülkelerde gerçekleştirmektedirler.

Uluslararası ticaretin doğasındaki bu dönüşüm, uluslararası rekabetçiliğin ve ülke performanslarının ölçülmesi hususlarında da değişimlerin ortaya çıkmasına yol açmıştır. Geleneksel dış ticaret göstergelerine göre, ülkelerin ihracat performansları uluslararası rekabetin ölçülmesinde kullanılmaktadır. Beltramello vd. (2012), bir ülkenin ihracatının, hem yerli hem de yabancı katma değeri içermesi sebebiyle tamamen o ülkenin rekabetçiliğinin ölçme konusunda yeterli bir ölçüt olmadığını

belirtmektedir. Ülkelerin uluslararası ticarette gösterdikleri performansın daha doğru ölçülebilmesi için, ihracatta yaratılan katma değerin kaynağının tespit edilmesi (diğer bir deyişle yerli ve yabancı katma değerin ayrıştırılması) gerekmektedir. Bu noktada, ülkelerin dikey uzmanlaşmalarının (ihracatın ithalat içeriği) ölçülmesi için HIY (2001) bir yöntem geliştirmiş olup, konuya ilişkin pek çok çalışma bu yöntemi izlemiştir.

KDZ'lere ilişkin en çok bilinen örnek Apple – iPod üretim sürecidir. Apple tarafından üretilen iPod 'un tasarımı ABD'de, ürün montajı ise Tayvanlı üreticiler tarafından Çin'de gerçekleştirilmiştir. Ürünün önemli aksam ve parçaları ise Japonyalı, Koreli ve Amerikalı tedarikçiler tarafından sağlanmıştır (Linden, Kraemer ve Dedrick 2009). Bahse konu ürünün üretim sürecinde hangi ülkenin en fazla katma değere sahip olduğunun hesaplanması daha önce belirtildiği gibi karmaşık bir konudur. Bu sebeple, dikey uzmanlaşma oranı, iPod örneğindeki gibi dünyanın pek çok yerine yayılmış olan üretim zincirlerinde ülkelerin rekabetçiliğini ölçen bir gösterge niteliği taşımaktadır.

Diğer taraftan, ülkelerin KDZ'lere entegresyonu yine dikey uzmanlaşma düzeyleri ile saptanmakta olup, uluslararası rekabetçiliğin ölçülmesi sağlanmaktadır (Beltramello, De Backer ve Moussiegt 2012). Kowalski vd. göre, ülkelerin KDZ'lere entegrasyonunu etkileyen faktörler o ülkenin üretim yapısı ile yakından ilişkilidir (Kowalski, ve diğerleri 2015). Bu kapsamda, ülkelerin KDZ'lerle katılımları ileri ve geri bağlantılarına göre ölçülebilir. Sektörel bazda geri bağlantı, her sektörün kendi üretimini gerçekleştirmek için diğer sektörlerden ve kendisinden ara girdi kullanmak zorunda olması olarak tanımlanırken, sektörel bazda ileri bağlantı her sektörün çıktısının diğer sektörlerde ara girdi olarak kullanılması olarak ifade edilir. Sektörler arası bağımlılığın derecesini, herhangi bir sektörün diğer sektörlerden aldığı ve onlara verdiği girdilerin toplam sektör üretimindeki yeri gösterir (Song, Liu ve Langston 2006). KDZ kapsamında ise geri bağlantı, ülkenin diğer ülkelerden ithal ettiği ve kendi ihracatında kullandığı aramalı payını yansıtırken, ileri bağlantı ülkenin ihraç ettiği aramalının diğer ülkelerin ihracatındaki kullanımını ifade eder. Bir diğer deyişle, ülkelerin dikey uzmanlaşma düzeyleri, KDZ'ne geri bağlantılarını göstermektedir.

Kowalski (2015), KDZ'ye bağlantı türünün (ileri ya da geri bağlantı), ülkelerin KDZ'ne katılımlarından elde edecekleri faydayı etkilediği ancak birebir bağlantılı

olmadığını belirtmektedir. Kowalski'ye göre KDZ'ye bağlantı yönü fark etmeksizin, ülkelerin KDZ katılımları onlara fayda sağlayacaktır. Diğer taraftan, Banga (2014) ülkelerin KDZ'ye katılarak elde edecekleri faydanın net katma değer kazancı ile ölçülmesi gerektiğini belirtmektedir (Banga 2014). Net katma değer kazancı ileri bağlantı değerinin geri bağlantı değerinden çıkarılması ile elde edilmektedir. Banga'nın ortaya koyduğu analizin sonuçlarına göre, Japonya, ABD ve Birleşik Krallık'ın KDZ'ye ileri bağlantısı daha yüksektir. Çin, Güney Kore, Hindistan, Malezya, Filipinler gibi ülkeler de ise geri bağlantı düzeyi, ileri bağlantı düzeyinden daha yüksektir.

Dikey uzmanlaşma kavramı ilk olarak Balassa tarafından 1967 yılında ortaya çıkarılmış olsa da, dikey uzmanlaşmanın uluslararası ticaretle bağlantısını ilk olarak ortaya çıkaran ve hesaplama yöntemi geliştiren çalışma 2001 yılında HIY tarafından yapılmıştır (Balassa 1967; Hummels, Ishii and Yi 2001). HIY uluslararsı ticarette dikey uzmanlaşmayı hesaplarken aşağıda listelenen varsayımları yapmıştır:

- Mallar birbirine bağlı, ardışık aşamalarda üretilmelidir. Yani bir üretim zinciri söz konusu olmalıdır.
- İki veya daha fazla ülke malın üretiminin bir ya da birkaç aşamasında bir uzmanlaşmalı, katma değer sağlamalıdır.
- En az bir ülke üretim süreci aşamasında ithal girdi kullanmalı ve elde edilen çıktının bir kısmı ihraç edilmelidir.

Bunun yanı sıra, HIY tarafından yapılan bir diğer önemli varsayım da ithal aramalı kullanımının iç talep ve ihracatta aynı ağırlığa sahip olmasıdır. HIY, dikey uzmanlaşma düzeyini ulusal girdi çıktı tablolarından faydalanarak hesaplamaktadır.

İhracatta yerli katma değer oranının hesaplanma yöntemi, dikey uzmanlaşma ile aynıdır. İhracatta yerli katma değer kavramı ihraç edilen bir ürünün üretim aşamasında kullanılan yerli aramallarını, bahse konu üretimde yaratılan istihdamı ve diğer üretim faktörlerini içerir. Bu noktada, ihracatta yerli katma değerin yabancı katma değerden sadece aramalı kullanımı bazında ayrıştırılabildiği vurgulanmalıdır. Bir diğer deyişle, yerli katma değer, ithal aramalı kullanımı dışındaki diğer üretim faktörlerini yerli ya

da yabancı ayırtetmeksizin içermektedir. Örneğin, ihraç edilecek bir malın üretiminde yabancı sermaye kullanımı ya da yabancı mühendislerin çalışması da ihracatta yerli katma değerinin içerisinde yer alacaktır.

Belirtildiği üzere, KDZ'ler ve dış ticarette dikey uzmanlaşma yeni araştırılan konulardır. Bu sebeple, konuya ilişkin literatür oldukça kısıtlıdır. Literatüre önemli katkılar sağlayan çalışmalar başta HIY(2001) olmak üzere, Koopman, Wang ve Wei (2012 ve 2014), Chen, Cheng, Fung ve Lau (2004), Johnson ve Noguera (2012) ve Cappariello (2012) olarak sıralanabilir. Türkiye için yapılan çalışmalar incelendiğinde ise en güncel çalışma olarak, 2015 yılında Muhtesab ve Dauod tarafından yapılan ve Ürdün, Lübnan, Mısır ve Türkiye için dikey uzmanlaşma düzeylerinin HIY yöntemi ile hesaplandığı çalışma ortaya çıkmaktadır. Çalışmada, Türkiye'nin 1998 ve 2002 yıllarına ait dikey uzmanlaşma düzeyleri hesaplanmıştır (Türkiye için Türkiye İstatistik Kurumu (TÜİK) tarafından yayınlanan en güncel girdi çıktı tablosu 2002 yılına aittir). Yapılan analizin sonucunda Türkiye'nin dikey uzmanlaşma düzeyi diğer ülkelerden daha düşük olarak ortaya çıkmıştır. Buna ek olarak, tüm ülkeler için dikey uzmanlaşma oranının en yüksek olduğu sektörler imalat sanayi sektörleridir (Muhtesab ve Daoud 2015). OECD tarafından 2013 yılında yayınlanan Türkiye Ülke Raporu'na göre ise, 2009 yılında Türkiye'nin ihracatında yaratılan yerli ve yabancı katma değerler sırasıyla yüzde 79 ve 21 olarak kaydedilmiştir. Ayrıca raporda, Türkiye'nin KDZ'lerine geri bağlantısının ileri bağlantısından daha yüksek olduğuna da yer verilmiştir. Özetle, Türkiye için de KDZ'leri ve dikey uzmanlaşma konularına ilişkin çalışma sayısı yetersiz düzeydedir. Bu tez, Türkiye'nin ihracatında yerli ve yabancı güncel katma değerin hesaplanması ile uluslararası ticaret literatürüne katkı sağlamayı amaçlamaktadır.

Bahsedildiği üzere, Dünya Girdi Çıktı Veritabanı (WIOD) çalışmanın ana veri kaynağı olarak kullanılmıştır. Analizler için anılan veritabanının seçilmesinn en önemli sebebi, veritabanında ulusal girdi çıktı tablolarının zaman serisi halinde yer almasıdır. Buna ek olarak, tüm dünya için oluşturulmuş toplu girdi çıktı tablosu (WIOT), ülkelerin ikili düzeyde ticari ilişkilerinin sektörler bazında analiz edilmesine olanak sağlamaktadır. WIOD, 40 ülke ve dünyanın geri kalanını kapsayan, 35 sektörü içeren

girdi çıktı tablolarını 1995 - 2011 yılları için sunmaktadır. Böylece, Türkiye için en güncel girdi çıktı tabloları bu veri tabanında mevcuttur. 17 yıllık zaman serileri oluşturulurken, mevcut olan güncel verilerden beslenen bir modelleme ile projeksiyon yapılmıştır (Timmer ve diğerleri 2015).

Çalışmada yapılan analiz esas olarak iki bölüme ayrılmıştır. Öncelikle, 1995 ve 2011 yılları arasında Türkiye'nin hem toplam hem de imlalat sanayi[11] sektörlerindeki ihracatında yerli katma değer ve dikey uzmanlaşma oranları hesaplanmıştır. İmalat sanayi sektörleri, OECD'nin teknoloji sınıflaması çerçevesinde yüksek teknoloji, orta yüksek teknoloji, orta düşük teknoloji ve düşük teknoloji kategorilerine göre sınıflandırılmıştır. Hem ihracattaki yerli katma değer, hem de dikey uzmanlaşma oranları bu sınıflamaya göre değerlendirilmiştir. İkinci olarak ise, ülkelerin Türkiye'nin ihracatındaki yabancı katma değer içerisindeki payları hesaplanarak, Türkiye'nin ihracatındaki en fazla ithal katkıyı sağlayan ülkeler tespit edilmiş ve bu ülkeler sektörler bazında analiz edilmiştir.

Analiz sonuçlarına göre, 1995 ve 2011 yılları arasında Türkiye'nin dikey uzmanlaşmasının yani ihracat içerisinde ithalat oranının artan bir eğilim ile yüzde 13,9'dan yüzde 22,3'e yükseldiği söylenebilir. Dikey uzmanlaşma oranının simetrik göstergesi olan ihracattaki yerli katma değer oranı ise ters bir eğilim izleyerek, 1995 ve 2011 yıllarında sırasıyla, yüzde 86,1 ve yüzde 77,7 olarak gerçekleşmiştir. Belirtildiği üzere, Türkiye'nin dikey uzmanlaşma oranındaki artışa bağlı olarak KDZ'lere entegrasyonunun da arttığı söylenebilir. Ancak, dikey uzmanlaşmanın hangi sektörlerde yoğunlaştığı ve ihracattaki ithal katma değerin esas olarak hangi ülkeler tarafından sağlandığı Türkiye'nin KDZ'lere entegrasyonu ile elde edeceği getirilerin belirlenmesinde önemli rol oynar (Kowalski 2015). Bu sebeple, OECD teknoloji sınıflamasına göre Türkiye'nin imalat sanayi ihracatında hangi teknoloji düzeylerinde daha fazla dikey uzmanlaşma oranına sahip olduğu araştırılmıştır. Buna göre, 1995 ve 2011 yılları arasında, Türkiye ihracatında ithal girdi yani dikey uzmanlaşma oranı

[11] 2011 yılında imalat sanayi ihracatının Türkiye'nin toplam ihracat içerisindeki payı yüzde 81,6'dır (WIOD).

düşük teknoloji grupları için en düşük olarak ortaya çıkmıştır. Diğer taraftan, yüksek ve orta yüksek teknoloji sektörlerinin ihracatında ithal girdi kullanımı düşük teknoloji grubuna dahil sektörlerden daha fazladır ve son yıllarda artan bir eğilim gözlenmektedir. Bir diğer deyişle, Türkiye'nin ihracatında ithal girdi kullanımının en fazla olduğu sektörler, Motorlu Taşıtlar, Elektrikli ve Makine Ekipmanları gibi yüksek teknoloji grubuna dahil sektörler olduğu tespit edilmiştir. Yüksek ve orta yüksek teknoloji grubundaki ürünlerin üretiminde yine yüksek teknoloji grubuna dahil aramalı kullanımı daha fazla olması ve Türkiye'de yüksek teknoloji aramalı üretiminin düşük düzeyde gerçekleşmesinden dolayı, bu sonuç makul ve beklenen bir sonuçtur.

İhracattaki ithal girdi kullanım payının yani dikey uzmanlaşmanın yüksek teknoloji ürün gruplarında daha yüksek seviyede olması iki şekilde yorumlanabilir. Birincisi, dikey uzmanlaşmanın yüksek teknoloji ürünlerinde yoğunlaşması, teknoloji transferleri olanağını arttırmaktadır. İkincisi, belirtildiği üzere, yüksek teknoloji grubuna dahil ara malı ithalatının en temel sebebi Türkiye'nin iç piyasaında yüksek teknoloji aramalı ürünlerinin üretilemiyor oluşundan kaynaklanabilir. Bu durum, ihracat üreticilerini ithalata yöneltmektedir. Bu üretim yetersizliğinin en önemli sebebi Türkiye'de teknolojinin yüksek teknoloji aramalı ürünlerini üretebilecek düzeyde gelişememiş olmasıdır.

Benzer biçimde, ihracatttaki yabancı katma değere katkıda bulunan ülkelerin teknoloji açısından gelişmişlik düzeyleri Türkiye'nin KDZ'lere entegrayonundan elde edeceği getirileri etkileyeceği düşünülmektedir. Analiz sonuçlarına göre, Türkiye'nin ihracatındaki yabancı katma değere en çok katkıda bulunan ülkeler Çin, Almanya, Fransa ve İtalya olarak ortaya çıkmaktadır. Almanya, Fransa ve İtalya gibi Ar-Ge harcamaları ve imalat sanayi üretimleri içerisinde yüksek teknoloji sektörlerinin payının görece yüksek olduğu ülkelerden aramalı ithalatı yapmak Türkiye'nin KDZ'lerden edindiği faydayı arttırmaktadır. Bir diğer deyişle, ekonomik gelişmişlik düzeyi yüksek ve teknoloji-yoğun üretim yapan ülkelerden ithalat yapmak Türkiye'nin ekonomisinde teknolojinin gelişmesine yardımcı olabilir. Diğer taraftan, 2006 yılından itibaren Türkiye'nin ihracatında Çin'den ithal edilen aramalı kullanımının payının ivmeli bir artış göstermesi dikkat çekmektedir. Çin'den en çok ithalat yapılan sektör

ise düşük teknoloji grubuna dahil olan Tekstil ve Konfeksiyon sektörüdür. Çin'den yapılmakta olan düşük teknolojili aramalı ithalatının, Türkiye'nin KDZ'ler içerisindeki yerini yükseltmesi açısından faydalı olmayacağı öngörülmektedir.

2008 yılında ortaya çıkan küresel ekonomik kriz pek çok çalışmada da belirtildiği gibi Türkiye'nin dış ticaret seyrini derinden etkilemiştir (Bayrak ve Kanca 2013; Aras 2010; Mercan 2014; Dünya Bankası 2014). KDZ'ler perspektifinden Türkiye'nin dış ticaretini inceleyen bu çalışmada yapılan analiz sonuçları da, bu görüşü desteklemektedir. Hemen hemen tüm sektörlerin ihracatındaki yerli ve yabancı katma değerin, küresel kriz döneminde dalgalı bir eğilim izlediği söylenebilir. Dikkat çekici bir unsur olarak, küresel kriz döneminde Türkiye'nin dikey uzmanlaşmasında ortaya çıkan dalgalanmaların orta yüksek teknoloji grubuna dahil olan sektörlerde yüksek, düşük teknoloji gruplarında ise daha düşük düzeyde dalgalanmalar gözlenmektedir. Aynı şekilde, Türkiye imalat sanayi ihracatındaki ithal katma değere en yüksek katkı sağlayan ülkelerin eğiliminin de küresel krizden etkilendiği görülmektedir. Örneğin, Fransa, Almanya ve İtalya'nın Türkiye imalat sanayi ihracatının ihtiva ettiği yabancı içeriğine olan katkıları 2007 yılından sonra nispeten daha yavaş bir artış gösterirken, Çin'in Türkiye'nin imalat sanayi ihracatına katkısının aynı dönemde keskin bir şekilde arttığı sonucuna ulaşılmıştır.

Özetle, KDZ'lere bağlantı yönüne (ileri ya da geri) ek olarak, ithal edilen aramalının ve ithalat yapılan ülkelerin teknolojik gelişmişlik düzeyleri ülkelerin KDZ'ye entegrasyonları sonucunda elde edecekleri faydayı belirlemektedir. Bu çalışmanın sonucuna göre, Türkiye'nin ihracatındaki ithal girdi oranı yüksek teknoloji ürünlerinde daha fazla olarak ortaya çıkmıştır. Buna ek olarak, Türkiye imalat sanayi ihracatında kullanılan yerli olmayan aramalların daha çok Almanya, Çin, İtalya ve Fransa gibi ülkelerden ithal edildiği sonucuna ulaşılmıştır.

Analiz sonuçlarına göre, Türkiye'nin dikey uzmanlaşma oranı 1995 ve 2011 yılları arasında artan bir eğilim seyretmiş olmasına rağmen, KDZ'ler içerisindeki pozisyonununun yükseltilmesi gerekmektedir. Türkiye halihazırda üretim süreçlerinin düşük segmentlerinde yer almaktadır. Bir diğer deyişle, yüksek teknoloji, AR-GE, markalaşma ve pazarlama teknikleri ile daha yüksek katma değer yaratılan üretim

süreçlerine dahil değildir (Dünya Bankası 2014). Türkiye'nin pozisyonunu yükseltip, üretim ve ihracatta yüksek üretim segmentine geçebilmesi için, Ar-Ge haracamalarını arttırması, kalifiye çalışanlarla daha yüksek teknoloji içeren ve böylece yüksek katma değerli ürünler üretmesinin gerekli olduğu düşünülmektedir.

Çalışmanın kısıtları, analiz için kullanılan veritabanı ile ilişkilidir. Belirtildiği üzere TÜİK tarafından yayınlanan Türkiye için en güncel girdi çıktı tablosu 2002 yılına aittir. Özellikle son on yılda Türkiye dış ticaretinin önemli bir dönüşüm sürecinden geçirdiği göz önünde bulundurulduğunda 2002 yılına ait veriler ile analiz yapılmasının sağlıklı sonuçlar vermeyeceği değerlendirilmektedir. Bu sebeple, 1995 ve 2011 yılları arasındaki 17 yıl için ayrı ayrı girdi çıktı tablosu içeren WIOD veritabanının kullanımı tercih edilmiştir. Anılan zaman serisi RAS projeksiyon yöntemi ile oluşturulmuş, en güncel üretim ve ticaret verileri ile eğitilmiş olsa da, kullanılan veritabanının projeksiyon ile elde edildiği göz ardı edilmemelidir. Diğer taraftan, WIOD tarafından sağlanan girdi çıktı tabloları istihdam ve doğrudan yabancı yatırım istatistiklerini ihtiva etmediği için, sadece aramalı düzeyinde ihracatın yabancı katma değer oranı hesaplanmıştır.

Bahsedildiği üzere bu çalışma Türkiye'nin KDZ'lere sadece geri bağlanma yönü ile katılımını irdelemiştir. Bir diğer deyişle, bu çalışmada, Türkiye'nin ihracatındaki ithal girdi payı perspektifinden KDZ'lere entagrasyonu araştırılmıştır. Bundan sonra yapılacak çalışmalarda, Türkiye'nin KDZ'lere ileri bağlanma yönünde katılımı incelenebilir. Böylece, ülkeler arasında ikili düzeyde katma değer endeksleri oluşturulabilir ve bu endeksler KDZ'lere katılım perspektifinden yorumlanabilir. Bunun yanı sıra, bu çalışmaya dahil edilemeyen yabancı istihdam ve doğrudan yabancı yatırımlar, bundan sonra yapılacak olan ihracatın yabancı katma değerine ilişkin çalışmalarda kullanılabilir.

G. TEZ FOTOKOPİSİ İZİN FORMU

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