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### ANALYSIS OF THE FOREIGN TRADE ALIGNMENT OF TURKEY AND SOUTH KOREA WITH THE HELP OF TRADE COMPLEMENTARITY INDEX <sup>1</sup>

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#### ABSTRACT

Turkey and South Korea are two of the leading countries in emerging economies, following the BRICS economies (Brazil, Russia, India, China, South Africa). These two countries increase their share and competitiveness in the world economy with their increasing exports and national incomes. In this perspective, both countries are rapidly evolving as a major competitor against both developing and developed countries. In this study, it is aimed to measure the mutual harmony between the export supply and import demand of the two countries. In other words, the study aimed to determine whether South Korea and Turkey can be good foreign trade partners on a product basis by using the Trade Complementarity Index. For example, if the product pattern in South Korea's exports is consistent with the product pattern in Turkey's imports, it can be stated that Turkey is an important trading partner for South Korea. According to the results, South Korea is not a good partner in Turkey's exports as an importer. As an importer, Turkey is a better partner in South Korea's exports. In other words, the product pattern in Turkey's imports is more consistent with the product pattern in South Korea's exports.

**Keywords:** Foreign Trade, Trade Complementarity Index, Turkey, South Korea

#### 1. INTRODUCTION

Today, the fact that countries want to take a greater share of global value-added forces them to increase their international competitiveness. In this context, countries need to increase their export revenues by spreading their exports to wider markets in order to increase their competitiveness. If the export profile of one country aligns with the import profile of other countries, that country increases its competitiveness in global markets.

<sup>1</sup> This article was prepared during the writing phase of Postgraduate Huri Gul Aybudak's thesis titled "International Competition Analysis of Turkey and South Korea on Value Added Basis" under Assoc. Prof. Dr. Birol Erkan consultancy.

Turkey and South Korea are two countries that want to increase their competitiveness against both developed and developing countries. Both countries, with their strong production and foreign trade structure, are a major threat to both emerging economies and developed economies. In this perspective, the course of convergence between the product pattern in exports of the two countries and the product pattern in imports by years was analyzed in this study. It is thought that the results of the analysis may better reveal the similarities between the foreign trade profile of the two countries.

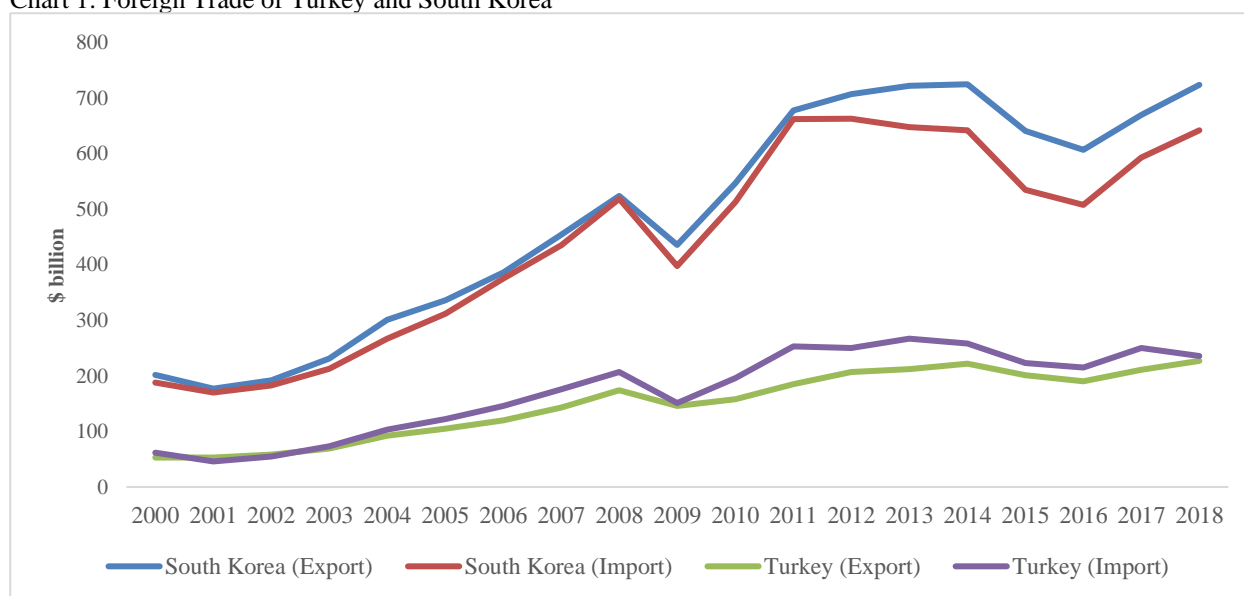
Table 1. Exports and Imports of South Korea and Turkey (\$ billion )

Years	South Korea Export	Turkey Export	South Korea Import	Turkey Import
2000	202	53	188	62
2001	177	53	170	46
2002	192	58	183	55
2003	231	69	213	73
2004	301	92	267	103
2005	336	105	312	122
2006	386	120	375	146
2007	454	143	435	176
2008	524	174	519	207
2009	436	146	398	151
2010	547	158	513	196
2011	678	185	662	253
2012	707	207	663	250
2013	722	212	648	267
2014	725	222	642	258
2015	641	201	535	223
2016	607	190	508	215
2017	670	211	593	250
2018	724	227	642	236

Source: It is arranged by us using the data obtained from [www.data.worldbank.org](http://www.data.worldbank.org)

When the export values of Turkey and South Korea between 2000 and 2018 are examined with the data obtained from the World Bank, it is seen that South Korea's exports are 3-4 times that of Turkey in general (<https://data.worldbank.org/>, 2019). South Korea's imports are also considerably higher than that of Turkey. However, South Korea has been steadily producing a foreign trade surplus. Turkey, on the contrary, has a stable foreign trade deficit (Table 1, Chart 1).

Chart 1. Foreign Trade of Turkey and South Korea



Source: It is arranged by us using the data obtained from [www.data.worldbank.org](http://www.data.worldbank.org)

## 2. TRADE COMPLEMENTARITY INDEX

The Trade Complementarity Index (TCI) first appeared at the suggestion of Kojima Kiyoshi and was made functional by Peter Drysdale in 1967 (Shuai & Wang, 2011). Michaely's work has also contributed to the development of the TCI.

The TCI is used to measure compliance and complementarity in foreign trade of countries with each other. The TCI is an important indicator of the foreign trade of countries, as it can measure the harmony between exports and imports in terms of domestic and international trade volumes. Findings about countries that are compatible with the TCI in foreign trade and thus complement each other are obtained. It is expected that the measure of harmonisation of the complementarity of the countries involved in complementarity will increase the gain from trade agreements (Saygılı & Terzioğlu, 2008).

As a result of examining the export and import data of the two countries on the basis of product or product group, the TCI is used to measure the harmony of the foreign trade of the countries with each other (Linnemann & Beers, 1988). In addition, the TCI enables the analysis of product or product groups on the basis of factor density (Norak & Kakinaka, 2007). The TCI also provides information on the course of possible trade agreements between a country's commercial partner and the two countries due to their concentration of exports and imports (Şimşek, Şimşek, & Zhanaltay, 2017).

The TCI is an indicator of competence in the export supply of another country so that one country's import demand is met. In this context, the height of the TCI score reveals that the two countries are each other's natural trading partners (Ibrahim & Shehu, 2016).

The main idea of the TCI is to measure the degree to which the import structure of one country is compatible with the export structure of the other country. As the TCI rate increases, it can be interpreted that the import and export patterns of the two countries align. In this case, it would be rational and profitable for the two countries to trade more with each other (Hoang, 2018).

The trade complementarity index is formulated as follows (Ibrahim & Shehu, 2016):

$$TCI_{ij} = 100 |1 - \sum(|X_{ik} - M_{jk}|)/2|$$

The formula deals with the complementarity of the relationship between exports of country i and imports of country j. In the formula "M<sub>jk</sub>" shows the ratio of imports of product k in country j to total imports of country. "X<sub>ik</sub>" indicates the ratio of exports of product k of the country i to total exports of the country.

In terms of countries, the most important return of TCI is the economic gains achieved in regional and foreign trade. The TCI score will be 100 when the compliance in the foreign trade of the countries that are trading partners with each other is fully realized. Under normal conditions, index results are between 0 and 100. Close to 100 index results indicate that the countries' foreign trade is compatible with each other and their performance in complementarity is good. If the index value is equal to 0, it is understood that there is no complementarity between countries. In other words, one country produces and exports the product of another country does not import (Saygılı & Terzioğlu, 2008).

## 3. LITERATURE EXAMPLES ON TRADE COMPLEMENTARITY INDEX

In the study conducted by Saygılı and Terzioğlu (2008) for the period 1985-2004, the alignment of the foreign trade of Turkey and the new EU countries with the EU was analyzed using the TCI. As a result of the study, it was found that the new EU countries performed more harmoniously compared to Turkey (Saygılı & Terzioğlu, 2008).

Chandran (2010) analyzed the alignment of trade structures of India and ASEAN countries with the help of the TCI in his study for the period 1990-2007. As a result of the study, ASEAN countries have achieved trade alignment with India in some product groups due to their different levels of economic development and competitiveness (Chandran, 2010).

Shuai and Wang (2011) also analyzed the agricultural trade of China and the United States using the TCI in their study for the years 1997-2011. According to the analysis results, China and the United States' trade alignment has tended to strengthen after China's accession to the WTO. However, the two countries have also achieved harmony in agricultural foreign trade (Shuai & Wang, 2011).

Çeştepe (2012) also analyzed Turkey's trade partnership with selected Middle Eastern countries using the TCI in his study on the period 1999-2009. According to the analysis results, Turkey's foreign trade volume has increased over the years with these countries. Furthermore, Turkey's foreign trade with the said countries has a high complementarity in processed goods. Apart from one or two product groups, Turkey's competitiveness against these countries is low (Çeştepe, 2012).

Ibrahim and Shehu (2016) analyzed the foreign trade alignment of Nigeria and India using TCI in their study of the years 2000-2014. According to the analysis results, there is a partial match between Nigeria's export supply and India's import demand. However, in order for Nigeria to increase and diversify its exports, it needs to assess opportunities in Indian markets (Ibrahim & Shehu, 2016).

In the study conducted by Çelen and Demirel (2017), the alignment of Turkey's foreign trade structure with 73 different countries between 2011 and 2015 was analyzed using the TCI. Turkey's exports complement each other at a high level with imports from Kuwait, Saudi Arabia, Uzbekistan, Qatar and Austria. However, Turkey's exports have a low level of complementarity with imports from Singapore, Malta, Greece, India and Japan (Çelen & Demirel, 2018).

Hoang (2018) analyzed the complementarity of ASEAN countries in the global agricultural market using the TCI. According to the analysis for the period 1997-2015, ASEAN countries have weak complementarity in meeting regional import demands in the field of agricultural exports (Hoang, 2018).

Keskingöz (2018) analyzed the complementarity of the Organization of Islamic Cooperation in Turkey's foreign trade after the 2008 global crisis using the TCI. Keskingöz emphasized that Turkey's trade relations with the Customs Union tend to decrease, on the contrary, its trade relations with the member states of the Organization of Islamic Cooperation tend to increase. Considering the increasing trade relations of the Member States of the Organization of Islamic Cooperation with Turkey, it has been stated that this market has the potential to be an alternative to the Customs Union (Keskingöz, 2017).

In this study, trade complementarity related to Turkey and South Korea was measured. It is thought that the study could contribute to the literature with this difference.

#### **4. ANALYSIS OF TURKEY AND SOUTH KOREA'S BILATERAL TRADE COMPLEMENTARITY INDEX**

The study primarily measured the proportion of Turkey's export supply complemented by South Korea's import demand. Later, the state of completion of South Korea's export supply with Turkey's import demand was analyzed. The SITC (Standard International Trade classification) used in revenge for the export competitiveness of countries has been used (Erkan & Bozduvan, 2018). According to this classification, the TCI analyses were conducted according to export and import values of 2 digit product groups (67 units) of countries using data obtained from the World Bank (<https://wits.worldbank.org/>, 2019). Analyses were carried out for the period 2000-2018.

#### 4.1. Complementarity Analysis of Turkey's Export Supply by South Korea's Import Demand

The level of completion of Turkey's export supply by South Korea's import demand was analyzed with the help of the TCI. The results of the analysis are shown in Table 2 and Chart 2.

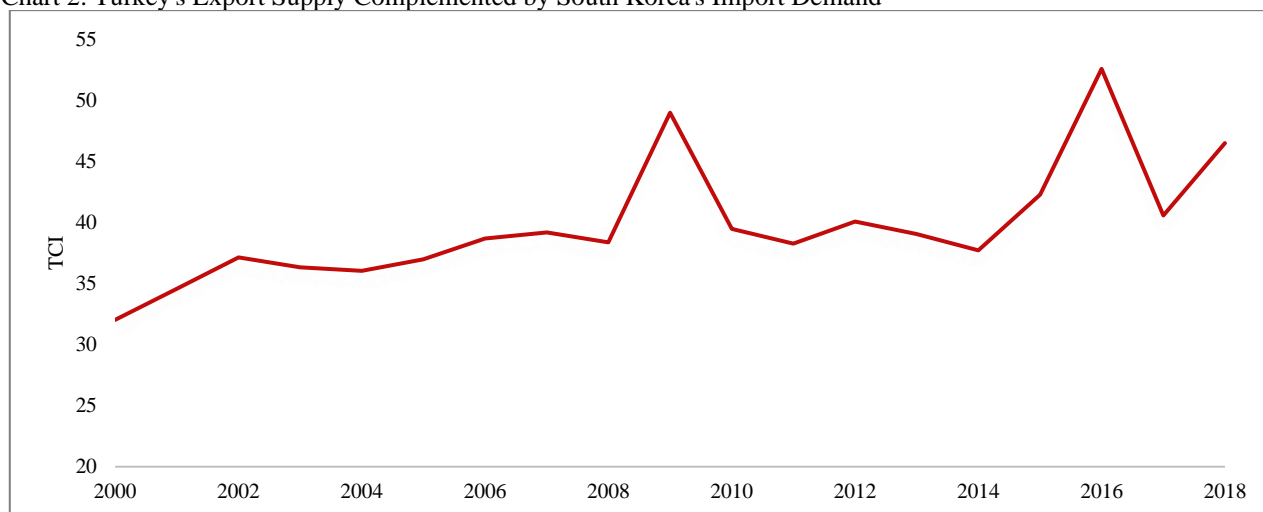
Table 2. Turkey's Export Supply Complemented by South Korea's Import Demand

	2000-2009	2010-2018	min	max	2000-2018 average
TCI	37,84	41,85	32,03	52,59	39,74

Source: It is arranged by us using the data obtained from <https://wits.worldbank.org/>

The TCI value, which was 37.84 between 2000-2009, was measured as 41.85 in 2010-2018. The average value is 39.74. The TCI score reached its highest level with 52.59 in 2016. According to this, the level of completion of Turkey's exports by South Korea is not sufficient. In other words, the level of Turkey's export supply in alignment with South Korea's import demand is insufficient. However, the TCI scores have been increasing over the years (Table 2, Chart 2).

Chart 2. Turkey's Export Supply Complemented by South Korea's Import Demand



Source: It is arranged by us using the data obtained from <https://wits.worldbank.org/>

The level of Turkey's export supply on a product group basis is not sufficient to be met by South Korea's import demand. The main reason for this situation is that South Korea's import demand consists mainly of raw material-intensive product groups. Turkey's comparative advantages are mostly in labor and capital intensive product groups. This shows that Turkey does not have a comparative competitive advantage in the export of raw material intensive products. In other words, South Korea's predominantly raw material-intensive product demand cannot be met by Turkey.

#### 4.2. Complementarity Analysis of South Korea's Export Supply by Turkey's Import Demand

The level of completion of South Korea's export supply by Turkey's import demand was analyzed with the help of the TCI. The results of the analysis are shown in Table 3 and Chart 3.

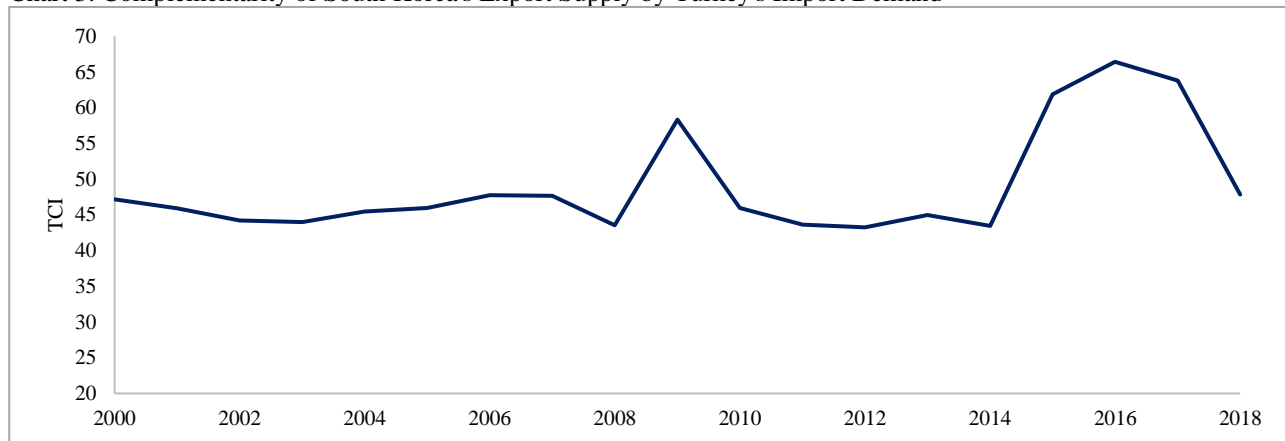
Table 3. Complementarity of South Korea's Export Supply by Turkey's Import Demand

	2000-2009	2010-2018	min	max	2000-2018 average
TCI	47,01	51,25	43,25	66,43	49,02

Source: It is arranged by us using the data obtained from <https://wits.worldbank.org/>

The alignment of South Korea's export supply with Turkey's import demand (average 49.02) is higher than the alignment of Turkey's export supply with South Korea's import demand (average 39.74). South Korea's exports are relatively adequately met by Turkey's import demand. In other words, the product group requests in Turkey's imports are relatively consistent with the product group supply in South Korea's exports (Table 3).

Chart 3. Complementarity of South Korea's Export Supply by Turkey's Import Demand



Source: It is arranged by us using the data obtained from <https://wits.worldbank.org/>

The TCI value of 47.01 between 2000-2009 was measured as 51.25 in 2010-2018. The average value is 49.02. The TCI score reached its highest level in 2016 with 66.43. South Korea's TCI score was also the highest reached in 2016. This indicates that the volume of foreign trade between the two countries reached its highest level in 2016.

If South Korea's exports are taken into account, Turkey is a good importer for South Korea. South Korea's exports meet a significant proportion of Turkey's expectations in terms of imports. The most important reason for this is that South Korea's comparative advantages (the product or product groups it exports) are technology-based. Turkey, on the other hand, does not have a relatively comparative advantage in the export of technological products. Therefore, Turkey's imports are mainly based on R & D and technology-based product groups. This is why South Korea is an important trading partner for Turkey.

## 5. CONCLUSION

In today's world economy, where the level of global competition is increasing and competitiveness is becoming increasingly difficult, it has become necessary for countries to change their foreign trade strategies. Because countries that do not change their export profile on a product or market basis and do not diversify, the chances of competing with other countries on a global scale have decreased. The higher the production and export profile of a country, the higher the external competitiveness of the country. In this perspective, the study investigated the harmony of the foreign trade profiles of Turkey and South Korea, the pioneers of emerging economies in terms of their economic size. In this context, the trade complementarity index was used to analyze the product group alignment between the export supply of a country and the import demand of its partner country.

According to the trade complementarity Index scores of Turkey and South Korea, South Korea is not a good partner for Turkey as an importer. On the contrary, Turkey is a better partner for South Korea as an importer. In other words, the complementarity of Turkey's export supply in the context of South Korea's import demand is lower compared to the complementarity of South Korea's exports in the context of Turkey's import demand. The most important reason for this situation can be explained as follows: South Korea has no comparative advantage in exporting its raw material-intensive product group. In this case, it is obvious that South Korea will be the first of the relatively raw material product groups in the portfolio of import demand. Comparative advantages in Turkey's exports are not based on raw material intensive products. Therefore, the level of cohesion (complementarity) between Turkey's export supply and South Korea's import demand is lower. The alignment between South Korea's export supply and Turkey's import demand is higher. This is because South Korea mainly exports relatively high-tech intensive products with added value.

Turkey's imports consist mainly of these product groups. That's why Turkey's imports complement South Korea's exports more.

Today, countries need to analyze the profiles of the import demands of other countries in order to increase their global competitiveness. In this context, especially developing countries need to create export supply from strategic products with high value added and income flexibility of demand. Thus, the contribution of foreign trade to national income and national prosperity may be higher.

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