MEHMET AKİF ERSOY ÜNİVERSİTESİ
İKTİSADİ VE İDARİ BİLİMLER FAKÜLTESİ DERGİSİ
Mehmet Akif Ersoy University
Journal of Economics and Administrative Sciences Faculty

ISSN: 2149-1658
Cilt: 8 Sayı: 3 s.1476-1498
Volume: 8 Issue: 3 p.1476-1498
Kasım 2021 November

BEING STRONGER IN NEW GLOBAL SUPPLY CHAIN AFTER THE PANDEMIC: SEEKING TO INCREASE FOREIGN TRADE VOLUME AND EMPLOYMENT SIMULTANEOUSLY IN TURKEY ECONOMY

PANDEMİ SONRASI YENİ KÜRESEL TEDARİK ZİNCİRİNDE GÜÇLENEN HALKA OLMAK: TÜRKİYE EKONOMİSİNDE DIŞ TİCARET HACMİNİ VE İSTİHDAMI EŞANLI ARTIRMA ARAYIŞI

İlkay GÜLER[1], Yunus Emre AYDINBAŞ[2]

1. Öğr. Gör. Dr., Ankara Hacı Bayram Veli Üniversitesi Tapu Kadastro Yüksekokulu, Emlak ve Emlak Yönetimi Bölümü, ilkay.guler@hbv.edu.tr, https://orcid.org/0000-0003-1289-6652
2. Öğr. Gör., Ankara Hacı Bayram Veli Üniversitesi Tapu Kadastro Yüksekokulu, Emlak ve Emlak Yönetimi Bölümü, yunus.aydinbas@hbv.edu.tr, https://orcid.org/0000-0001-5760-9966

Makale Türü	Article Type
Araştırma Makalesi	Research Article

Başvuru Tarihi	Application Date
12.01.2021	01.12.2021

Yayına Kabul Tarihi	Admission Date
28.05.2021	05.28.2021

DOI
https://doi.org/10.30798/makuiibf.859593

Abstract

This study is intended to discuss turning a broken global supply chain into an opportunity by Turkey in post-COVID-19 period and the possibility to be an alternative to China in the sectors in which Turkey is more advantageous and solution seeking to repair the employment structure which has been damaged in pandemic process. Partial direct backward linkages coefficients of both countries were calculated and Leontief similarity test and Spearman correlation test were applied to the obtained coefficients, and the results of both tests were evaluated together. As a result of the analysis, sectors having the advantage of Turkey's foreign trade is as follows: “manufacture of food products”, “manufacture of textiles”, "manufacture of other non-metalic mineral products", "construction" “manufacture of articles of straw and plaiting materials” and “manufacture of computer, electronic and optical products, manufacture of electrical equipment”. The activities of the first 4 of these sectors are among the 6 activities which were published by TOBB and they were most affected by the Covid-19 outbreak and closed down.electronic and optical products, manufacture of electrical equipment”.

Keywords: Economic Development, Economic Growth, Global Supply Chain, Post-COVID-19, Employment.

Öz

Bu çalışmada COVID-19 sonrası dönemde Türkiye’nin, kırılan küresel tedarik zincirini fırsata çevirebilmesi, dış ticarette avantajlı olduğu sektörlerde Çin’e alternatif olabilme imkânı, pandemi sürecinde yara alan istihdam yapısını onarabilecek çözüm arayışları tartışılmaktadır. Her iki ülkenin kısmî doğrudan geri bağlantı katsayıları hesaplanarak, elde edilen katsayılara Leontief benzerlik testi ile Spearman korelasyon testi uygulanmış, her iki testin sonuçları birlikte değerlendirilmiştir. Analiz neticesinde, Türkiye’nin dış ticaret avantajına sahip olan sektörler şu şekildedir; “gıda ürünleri”, “tekstil”, "diğer metalik olmayan mineral ürünler","inşaat", “saz, saman ve benzeri malzemelerden örülerek yapılan eşyalar”, ve “bilgisayar, elektronik ve optik ürünlerin imalatı, elektrikli teçhizat”dır. Bu sektörlerden ilk dördünün faaliyetleri TOBB tarafından yayımlanan, COVID-19 salgını döneminde en çok işletmenin kapandığı altı 6 faaliyet kolu içerisinde yer almaktadır.

Anahtar Kelimeler: Ekonomik Kalkınma, Ekonomik Büyüme, Küresel Tedarik Zinciri, COVID-19 Sonrası, İstihdam.

GENİŞLETİLMİŞ ÖZET

Çalışmanın Amacı

COVID-19 sürecinde kırılan tedarik zincirleri uzak pazarlardan yapılan tedariklere dair yeni riskleri belirginleştirmiş, ekonomilerin bölgesel tedarik ağlarına dair arayışları gündeme gelmiştir. Bu gündem Türkiye'nin bölgesel ve küresel ticaretteki pazar payını artırması yönünde potansiyel fırsatlar içermektedir. Bu çalışmada Türkiye'nin sadece yurtiçinde üretilen girdileri kullanmak koşulu ile üretim avantajına sahip olduğu sektörleri saptayarak Çin'e alternatif olabileceği ürün gamını belirginleştirmek ve söz konusu sektörlerin potansiyel istihdam kapasitelerine dikkat çekmek amaçlanmaktadır.

Araştırma Soruları

Çin'de ve Türkiye'de hangi sektörler hiç ithal girdi kullanmadan üretim yapabilme imkânına sahiptir? Yeni normalde Türkiye'de Çin'e alternatif, pazar payını artırma potansiyeli taşıyan sektörler hangileridir? Pazar payını artırma potansiyeline sahip sektörlerin istihdama olası etkileri nelerdir?

Literatür Araştırması

"Mutlak Üstünlükler Teorisi", "Karşılaştırmalı Üstünlükler Teorisi", "Faktör Donanımı Modeli", "Açıklanmış Karşılaştırmalı Üstünlükler Teorisi" dış ticarette kabul gören teoriler olmuştur. Ancak bu teorilerin birçoğunun, COVID-19 salgın sürecinde meydana gelen ve nispeten ön görülemeyen olağan dışı şartlarda gerçekleşen, tedarik zincirinin kırılması durumunda ortaya çıkması muhtemel değişimleri açıklamakta yetersiz kaldığı iddia edilebilir. Bu nedenle çalışmada, küresel ticarette değişmesi muhtemel alışkanlıklar karşısında, yurtiçi girdi kullanmak koşuluyla, sektörlerin diğer sektörlerden temin ettiği girdilerin, oransal benzerliğinin belirlenmesi için 120 tane makale tek tek incelenmiştir. Küresel tedarik zincirinde birbirinin ikamesi olabilecek ülke/sektör gruplarının belirlenmesinde girdi-çıktı analizi kullanan 51 çalışma odağa alınmıştır.

Yöntem

Çalışmada, WIOD tarafından en son yayımlanan girdi-çıktı tablosu kullanılmaktadır. Bu çerçevede kullanılan veriler öncelikle toplulaştırılarak Çin ve Türkiye'nin veri sayısı eşitlenmiştir. Verilere girdi-çıktı analizi uygulanarak doğrudan geri bağlantı katsayıları elde edilmiştir. Katsayılara Leontief Benzeşme analizi, Shapiro Wilk testi ve Spearman Korelasyon hesaplaması uygulanmıştır.

Sonuç ve Değerlendirme

Türkiye'nin, Çin'e alternatif olarak yurtiçi girdi ile ihracat potansiyeline sahip olduğu sektörler; "gıda ürünleri", "tekstil", "diğer metalik olmayan mineral ürünler", "inşaat", "mobilya hariç; saz, saman ve benzeri malzemelerden örülerek yapılan eşyalar", "bilgisayar, elektronik ve optik ürünlerin imalatı, elektrikli teçhizat" sektörleridir. Bu sektörlerden ilk dördünün faaliyeti, işsizlikle mücadelede odağa alınması gereken sektörler olarak tespit edilmiştir. Söz konusu sektörlerde üretimin arttırılması ile ekonomik büyüme ve ekonomik kalkınma potansiyeli artacaktır. Elde edilen bulgular, teşviklerle desteklenmesi gereken sektörleri belirleme sürecinde politika yapıcılara, yatırımcılara, sektör temsilcilerine ve bu konuda çalışan araştırmacılara yardımcı olacaktır.

1. INTRODUCTION

COVID-19 caused millions of people to become ill and the deaths of hundreds of thousands of people and also global disruptions occurred in supply chains. The slowdown in China, which has simply become the "factory of the world" and where production is concentrated, has adversely affected the production processes of many economies. In the post-epidemic period, economies that want to secure their raw material and intermediate goods supplies can be expected to change their supply policies and seek alternative suppliers, especially from their close regions. While the global supply chain was at the forefront before the COVID-19 epidemic, it is among the possibilities that the concepts of self-sufficiency and regional foreign trade partnership will come to the fore in the period after the epidemic, if this expectation is realized. Turning the changes in the international supply chain into an opportunity for Turkey to increase foreign trade volume and employment depends on the development of the right strategies.

Many international supply models that were active until the COVID-19 epidemic started to be questioned with the breaking of the global supply chain. Turning the changes in the international supply chain into an opportunity for Turkey to increase foreign trade volume and employment depends on the development of the right strategies. The input-output model that enables the comparison of the production structure of economies will be utilized to highlight the sectors in Turkey which can be an alternative to China and to provide data. Looking for solutions for Turkey's economy to overcome this multi-dimensional global crisis with little damage constitutes the main motivation of the study. For this purpose, the changing balances with COVID-19 are examined in terms of global trade and employment in the first part of the study, the studies comparing the sectors of the country on the basis of input-output analysis are examined in the second part, the consolidation principles used in the analysis carried out are explained, the theoretical basis of the analysis is created, the analysis is applied and the obtained results are described in detail in the third part. The fourth section includes conclusion and evaluation.

2. THE CHANGING BALANCES WITH COVID-19

Leontief (1974) stated that the world economy can be seen as a system of interconnected processes like the economy of a single country, and that each process produces certain outputs, sectors are interdependent and the output of any sector is an input of another.

The developments in COVID-19 process suggest that Turkey has a strong potential to turn the global crisis into opportunity and it has the infrastructure to support this production potential. The loss of market share in the international trade of China may even emerge new opportunities for Turkey (Güler, 2020a). In this context, to accurately identify opportunities and develop effective strategies, it is necessary to determine in which of the sectors Turkey has the production advantage over China.

The US President's cessation of payments to the World Health Organization and announcing that someone will be held "responsible" for all the happenings after the health crisis can be seen as a sign that the US will become more aggressive in the ongoing trade war and will increase its sanctions on China in proportion to its effect. The perception of the "Chinese virus" created by taking advantage of the spread of the COVID-19 virus from China may be one of the reasons why China's "belt and road initiative", which is an alternative globalization effort, has been halted in recent years. In such an environment, "Made in Turkey" may be preferred instead of "Made in China" in certain markets and / or in certain products (Ulutaş, 2020).

The global value chain occurs when companies operating at an international level distribute their production processes among supplier businesses located abroad (Gereffi, Humphrey and Sturgeon, 2005; Güler,2020b). Therefore, it can be stated that it is very difficult to protect any country in the global value chain from the economic negativities caused by the COVID-19 epidemic. The breaking of the global value chain with the COVID-19 epidemic has led the USA, Japan and the European Union countries to search for new production organization and mobility. These searches may come to the fore as moving the production facilities of manufacturing companies in China (India and ASEAN countries) or searching for other partners instead of China, which is the focus of this study (Bermingham, Leng and Magnier, 2020). Considering that the process in question is still fresh and ongoing, only one publication in the literature has been found out, which has the same focus as our study, but has not been analyzed. Gao and Ren (2020) discussed the necessity of creating a flexible and diverse value chain, stating that Australia and New Zealand produced respirators in the COVID-19 epidemic, but they were dependent on China for many products, including this production. It is not wrong to say that Turkey will be one of the most powerful countries with the potential to become relatively effective in post covid-19 world trade using the advantage of continuous production, reliable supply, rapid logistics and geographical location (Güler and Küçükkiremitçi, 2020).

The COVID-19 outbreak caused the breaking of the global trade chain and it also caused an increase in unemployment all over the world. To reduce the negative effects of the COVID-19 outbreak on the labor market in Turkey, Social Protection Shield Program was launched by the Ministry of Family and Social Policies. Within the scope of this application, short term Working Allowance and Termination Ban, cash wage support (unemployment benefit), unemployment insurance allowance, social support program PHASE I, PHASE II, PHASE III (Family Assistance) and alleviation of unemployment insurance requirements are included (Republic of Turkey Ministry of Family and Social Policies, 2020). Among these measures, termination ban is effective as long as the workplace where the worker works is active. Other measures are passive labor market policies implemented to protect the life quality of unemployed individuals and provide income security. It is not possible to implement active labor market policies that aim to create new employment opportunities and increase direct or indirect employment through vocational training activities under pandemic conditions (Özaydın and

Öztürk,2020; Öçal and Korkmaz,2020). Analyzing the statistics published by The Union of Chambers and Commodity Exchanges of Turkey –TOBB- since March 2020 when the first patient diagnosed with coronavirus disease (COVID-19), It is observed that 23,234 companies have been closed, and considering that these closed companies are joint stock companies, limited companies and cooperatives, it turns out that many employees are unemployed (TOBB, November 2020). In this context, the determination of the sectors in Turkey that could be an alternative to China in new normal period will be a guideline for foreign trade and to create new areas of employment.

1.2. Literature

Absolute Advantages Theory (Smith, 1776), "Comparative Advantages Theory" (Ricardo, 1817), "Factor Endowment Model" (Dornbusch, Fischer and Samuelson, 1980), "The Theory of Revealed Comparative Advantages" (Balassa, 1965) have been the accepted theories in foreign trade. However, it can be argued that they are inadequate to explain the possible changes in the supply chain that occurred during the COVID-19 epidemic process and under relatively unforeseen and unusual circumstances. For this reason, in the study, input-output analysis was used to determine the proportional similarity of inputs obtained by sectors from other sectors, provided that domestic input is used against the habits that are likely to change in global trade (Leontief, 1946; Viet, 1980, pp.160-162). The basis of input-output analysis is based on "Economic Table" of Quesnay and "General Equilibrium Model" of Walras (Quesnay, 1758; Walras, 1954). Leontief, the Nobel Prize-winning economist, was the first to create the input-output table and model, and he calculated the inter-sectoral relations in the USA (Leontief, 1936). Many economists have contributed to this model over time. Rasmussen constructed the Leontief inverse matrix, calculated and normalized the total correlation coefficients. Chenery and Watanabe (1958) created the technology matrix and calculated the key sectors with direct backward linkage and direct forward linkage coefficients. Rasmussen identified sectors with high total backward and total forward linkages as key sectors, while Chenery and Watanabe identified sectors with a direct backward and direct forward linkage above average as key sectors (Chenery and Watanabe, 1958; Rasmussen, 1956). Hazari reinterpreted Rasmussen's power of dispersion index and sensitivity of dispersion index, calculated the coefficients of variation and considered activities above the average as a key sector (Hazari, 1970).

In the literature review, studies using input-output analysis have been focused on identifying country / sector groups that can be substitutes for each other in the global supply chain. Chenery and Watanabe (1958) determined the similarity of production structures of countries by means of partial direct backward coefficients.

In this context, they grouped Italy-Japan, Japan-USA, Norway-USA, Norway-Japan, Italy-USA, Norway-Italy countries in pairs and concluded that the country pair with the closest input rates used in production is Italy-Japan. Hummels, Ishii and Yi (2001) analyzed the use of imported inputs in

the export sectors of Australia, Canada, Denmark, France, Germany, Japan, the Netherlands, the United Kingdom, the United States, Ireland, Korea, Mexico, Taiwan and determined that approximately one third of the total exports were realized by using import inputs and that they depend on imports in exports. However, it was not calculated which sectors produce using domestic inputs, so it was not determined which countries could be an alternative to each other. Daudin, Schweisguth and Rifflart (2011) determined which sectors of a country produce for other countries. In that study, within the framework of the comparative advantage theory and regardless of the possibility of breaking the global trade chain, the study was based on the principle of purchasing a product in a country where it is produced at the cheapest price. Johnson and Noguera (2012) calculated the added value created in the export sectors of Europe, East Asia, North America, all USA and China by input-output analysis. In the study, the gross export rates of countries with each other were determined using the imported input-output table. Banga (2013) analyzed the global value chain of all countries using imported input-output table data, and reached the conclusion that OECD countries have a share of 67% in the global value chain, while BRICS countries have a share of 25%. Timmer et al., (2013) examined the effects of cross-border segregation of production. Based on the global value chain revenues of 27 European Union countries, they revealed the sectors in which they had comparative advantage. By using input-output analysis, Kohl (2019) determined the global supply chain of the countries involved in China's belt road project and from which sectors they receive the inputs from each other. Caliò et al., (2020) analyzed the contribution of inputs from all sectors of the European Union to global value chains Hewings and Wang (2020) investigated whether it would be profitable or harmful for US-based companies to shift their production from China to the USA due to the increase in customs tariff, which is part of the trade wars. The subject was evaluated on the basis of factor incomes and customs tariff applied in two countries. While it was determined that the cost that would occur in the mobilization of businesses from China to the USA was much higher than the current applied tariff, it was seen that the cost was at a level close to the tariff when the same situation was examined for Mexico. Therefore, it was concluded that if there was a mobilization, it would be more economically feasible to move to countries where labor is relatively cheap. Giammetti et al., (2020) examined the effects of the slowdown in production due to COVID-19 in Italy with input-output analysis. However, in this study, only the effect of the parts in the global supply chain on the production activities in Italy was discussed. In the literature, the studies examining the global supply chain of countries by using input-output tables are drawing attention. Studies on the global supply chain are limited due to the COVID-19 epidemic and global trade wars which continue their effects with different intensities. It can be expected that this period will be subject to more analysis as the crisis comes to an end and its effects become clear. However, today, there is no study that creates a scenario about countries that can be alternative to each other in certain sectors, especially if the global supply chain is broken. In this study carried out with the aim of completing this gap in the literature, a scenario is developed in the possibility that the countries importing from China may shift their

preferences from China to Turkey for any reason. Within the framework of this scenario, it is analyzed in which products Turkey can be an alternative to China. Production potentials of Turkey and China are compared using only domestic input-output tables, without using any imported inputs. In this framework, it is aimed that the analysis will make an original contribution to the literature.

3. ANALYSIS

3.1. Purpose of Analysis, Scope and Limitations of the Data

In today's global supply chain, the production output of one country is used as the production input of another country (Borin and Mancini, 2019; Los and Timmer, 2018). Due to epidemics, trade wars, regional instability, the international flow of goods and services are disrupted and there may be problems in procuring imported inputs needed for manufacturing. Although China has not lost its place as to be "factory of the world", it is predictable that the supply habits will change in the world with the COVID-19 epidemic process and the new normalization. As a small contribution to Turkey to enter this new process containing many changes, the main motivation of this study is to determine the sectors in which Turkey's economy has a production advantage in foreign trade over China. In some studies, in the literature, countries and sectors are analyzed comparatively, and imported and domestic inputs are used together in the analysis. This study is different from similar studies in the literature because it includes analyzes on the assumption that imported input cannot be obtained. In the analysis, both Turkey's and China's national input-output tables are used. It takes many years to create input-output tables. However, they are used to create production projections all over the world in the input-output analysis applied through the tables based on the assumption that the ratios such as input, capital, technology are constant. When examining Turkey's GDP figures on dollar basis for 2014, it seems to be higher than that of 2020 GDP in dollars. For this reason, the fact that the production volume in 2014 is higher than the production volume in the following years encourages us to use the 2014 input-output table. The domestic input-output table and imported input-output table of 43 countries are prepared separately in the WIOD database. By combining these two tables, the input-output table of the countries is obtained. If the aim is to analyze the production carried out with domestic input without using any imported input, the domestic input-output table is taken as the basis in the analysis, and the import is added to this table as a separate line and / or a column (Dietzenbacher and Los, 2000; Korum,1963, pp.9-13; TURKSTAT, 2020; Timmer et al., 2015; WIOD, 2016).

Since the production structures of the countries differ, certain sectors are not included in some country's economies, and these sectors are shown with zero value in the input-output table (Leontief, 1986a, pp.40-42; 1986b, pp.19-40). When conducting comparative analysis between two countries, the sectors with zero value in the same sectors in both countries should be excluded from the analysis. However, if a sector with zero value in one country is active in the other country subject to comparative analysis, sector consolidation should be done. For this reason, when starting the analysis, the zero-value

sectors are first separated in both countries, provided that they are the same sectors. The separated sectors are *"repair and installation of machinery and equipment, broadcasting activities", "Motion picture, video and television program production, sound recording and music publishing activities; programming and broadcasting activities", "architectural and engineering activities; technical testing and analysis, advertising and market research", "activities of households as employers", "undifferentiated goods- and services-producing activities of households for own use",* and *"activities of extraterritorial organizations and bodies".* After this separation, sector consolidation was made (Leontief, 1949; Eurostat, 2020). While performing the consolidation process, even if only the column (the inputs provided by the industry from other sectors) or only the line (using the output of the sector as input by other sectors) has a zero value, the relevant sectors are deleted not to cause any malfunction in the calculation. These sectors are *" basic pharmaceutical products and pharmaceutical preparations", "manufacture of chemicals and chemical products", "postal and courier activities, warehousing and support activities for transportation", "real estate activities, architectural and engineering activities, technical test and analysis", "legal and accounting activities", "activities of head offices", " management consultancy activities", "water collection, treatment and supply, sewerage, waste collection, treatment and disposal activities, material recovery, remediation activities and other waste management services", "crop and animal production, hunting and related service activities", "forestry and logging", "fishing and aquaculture", "manufacture of paper and paper products", "printing and reproduction of recorded media", "manufacture of computer, electronic and optical products", "manufacture of electrical equipment", "public administration and defense, compulsory social security" and "education".*

After the regulations, input coefficients matrix in 37x37 size were obtained separately for both Chinese and Turkey.

$$\begin{bmatrix} a11 & \cdots & a137 \\ \vdots & \ddots & \vdots \\ a371 & \cdots & a3737 \end{bmatrix}$$

3.2. Analysis Method

The method applied in the study is based on input-output analysis. The inputs used by a sector from itself and all other sectors with input-output analysis provide the opportunity to reach information such as at what rates these inputs are obtained from which sectors, the share of the sectors in the economy, the multiplier effect of the sector's production in the economy, the acquisition of information showing the ratio of inputs obtained through imports in production, determination of the sectors to be encouraged, examining the effects of economic policies, forecasting the economic activities of the future periods for regional, national and even world economies, seeing the links of the added value chain provided to the economy, determining the dependency levels of the sectors and determining in which sectors the production structure of the two countries is similar (Viet, 1980). In summary, input-output

analysis is a mathematical general equilibrium model that quantitatively examines the interrelationship between all production and consumption units across the economy (Aydoğuş, 2010; Leontief, 1946). In our study, the input coefficient matrix (technology matrix) is calculated first.

The input coefficients matrix consists of input coefficients expressing the amount of intermediate input required by each sector to obtain a unit of output (Leontief, 1985). The formula used for calculation is shown in equation (1).

$$a_{iJ} = \frac{x_{iJ}}{X_i} \quad (i=1\ldots\ldots\ldots\ldots n;j=1\ldots\ldots\ldots\ldots\ldots\ldots n) \tag{1}$$

The notations of the formula are as follows; aij (coefficients in the matrix of input coefficients) indicate the production of sector i, which sector j uses to produce a unit (Leontief, 1985).

The direct backward linkage coefficients of the sectors can be reached with the separate column sums of the coefficients belonging to each sector obtained with the input coefficients matrix. The direct backward linkage coefficient refers to the output that a sector uses from other sectors. The high coefficients in question mean that more intermediate goods are demanded from other sectors as a result of an increase in the production of the relevant sector, thus increasing the production of the sectors that give input to the relevant sector (Chenery and Watanabe, 1958; Öney, 1980). Coefficients in the input coefficients matrix are greater than 0 and less than 1. When the difference of direct backward linkage coefficients of each sector is taken from 1 separately, the difference shows the added value created by the relevant sector. In this sense, the matrix shows an open model feature.

The total backward linkage coefficient shows the total production increase created by one-unit final increase in demand. The direct backward linkage coefficient shows the shares of inputs used from other sectors in the realization of current production. The analysis is intended to determine and compare input rates of production carried out by the existing capacity in Turkey and China, so direct backward linkage coefficients are used in the analysis.

To this end, Leontief similarity analysis brought to the literature by Chenery and Watanabe is applied to direct backward linkage coefficients of China and Turkey (Bezdek, 1984; Leontief, 1951). The formula used for this analysis is shown in equation (2).

$$\gamma_j^{\alpha\beta} = \frac{\sum \left| aij^{\alpha} - aij^{\beta} \right|}{\frac{1}{2}\sum \left(a_{ij}^{\alpha} + a_{ij}^{\beta} \right)} \tag{2}$$

The notations in the formula are as follows; aijα: Turkey's direct input coefficients, aijβ: China's direct input coefficients, γjαβ: absolute column criteria (relative index of exchange between the two countries). Chenery and Watanabe (1958) suggested that as the coefficients obtained from the Leontief similarity test decrease, the similarity between countries will increase, but they do not suggest a

threshold value. Therefore, to eliminate the mentioned weakness and to use the correct statistical technique, it is necessary to test whether the variables are suitable for normal distribution. For this purpose, Shapiro-Wilk test is applied.

Necessary hypotheses:

H_0: The sample came from a normal distribution

H_1: The sample did not come from normal distribution

The formula used for the Shapiro-Wilk test application is shown in equation (3).

$$W = \frac{\left(\sum_{i=1}^{n} a_i x_{(i)}\right)^2}{\sum_{i=1}^{n}(x_i - x)^2} \quad (3)$$

The notations in the formula are as follows; W = Shapiro Wilk test coefficient, xi = x1, xy2,…. Xyn: direct backward linkage coefficients from small to large, a = direct backward linkage coefficient of the relevant sector (Altunkaynak and Gamgam, 2012).

In the literature, if variables do not conform to normal distribution as a result of Shapiro-Wilk test, it is recommended to calculate Spearman Correlation coefficient (Altunkaynak and Gamgam, 2012). The formula used for calculating the Spearman correlation coefficient is shown in equation (4):

$$r_s = 1 - \frac{6\sum_{1}^{n}(d_k^2)}{n(n^2 - 1)} \quad (4)$$

The notations in the formula are as follows; rs: Spearman correlation coefficient, n: number of sectors, dk: represents the differences between the rankings of the sectors of Turkey and China (Farlie, 1960). As a result of the analysis listed so far, it is possible to determine the sectors with similar rates of inputs used in production between the two countries.

3.3. Analysis Results

Partial direct backward linkage coefficients obtained from input coefficients matrix of China and Turkey are presented in Table 1 (Leontief, 1986b).

Table 1. Direct Backward

Sector Names	TURKEY		CHINA	
	Rank	**DGB**	**Rank**	**DGB**
Manufacture of coke and refined petroleum products	1	0,7490	1	0,8303
Manufacture of food products, beverages and tobacco products	2	0,7285	12	0,7652
Manufacture of textiles, wearing apparel and leather products	3	0,6740	9	0,7933
Electricity, gas, steam and air conditioning supply	4	0,6660	10	0,7772
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	5	0,6596	15	0,7578
Manufacture of furniture; other manufacturing	6	0,6157	24	0,5876
Air transport	7	0,5983	18	0,7023
Manufacture of paper and paper products, printing and reproduction of recorded media	9	0,5961	16	0,7496

Manufacture of motor vehicles, trailers and semi-trailers	10	0,5919	4	0,8085
Manufacture of computer, electronic and optical products, manufacture of electrical equipment	11	0,5829	3	0,8100
Manufacture of basic metals	12	0,5773	2	0,8241
Manufacture of rubber and plastic products	13	0,5645	6	0,7975
"Manufacture of chemicals and chemical products", "manufacture of basic pharmaceutical products and pharmaceutical preparations"	14	0,5639	5	0,8038
Manufacture of other non-metallic mineral products	15	0,5615	17	0,7306
"Warehousing and support activities for transportation"," postal and courier activities"	16	0,5174	25	0,5826
Accommodation and food service activities	17	0,5038	22	0,6192
Manufacture of fabricated metal products, except machinery and equipment	18	0,5034	7	0,7965
Construction	19	0,4495	14	0,7598
"Insurance, reinsurance and pension funding, except compulsory social security", "activities auxiliary to financial services and insurance activities"	20	0,4457	21	0,6245
Manufacture of machinery and equipment n.e.c.	21	0,4445	13	0,7642
Other service activities	22	0,4344	30	0,5235
Human health and social work activities	23	0,4266	19	0,6515
Telecommunications	24	0,4094	36	0,3547
Administrative and support other transport equipment service activities	25	0,3785	29	0,5287
Manufacture of other transport equipment	26	0,3782	11	0,7756
"Wholesale and retail trade and repair of motor vehicles and motorcycles", "wholesale trade, except of motor vehicles and motorcycles", "retail trade, except of motor vehicles and motorcycles"	27	0,3684	34	0,3902
Scientific research and development	28	0,3680	27	0,5489
Land transport and transport via pipelines	29	0,3577	32	0,4753
Financial service activities, except insurance and pension funding	30	0,3401	37	0,2472
Water transport	31	0,3397	26	0,5763
Mining and quarrying	32	0,3169	31	0,5145
Computer programming, consultancy and related activities; information service activities	32	0,3099	23	0,5911
Other professional, scientific and technical activities; veterinary activities	33	0,2891	28	0,5307
"Public administration and defence; compulsory social security", "education"	34	0,2832	32	0,4320
"Crop and animal production, hunting and related service activities", "forestry and logging", "fishing and aquaculture"	35	0,2702	33	0,4021
"Water collection, treatment and supply", "sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services"	36	0,1837	20	0,6373
"Real estate activities", "legal and accounting activities; activities of head offices; management consultancy activities", "architectural and engineering activities; technical testing and analysis"	37	0,1255	35	0,3820

Resource: WIOD was calculated by the authors using 2016 data

As can be observed in Table 1, the backward linkage coefficients of both countries in the same sectors differ. Therefore, the Leontief similarity analysis results applied to calculate the similarity of the structure of production in China and Turkey are presented in Table 2.

Table 2. Leontief Similarity Results

Sector Names	**Coefficients**
Manufacture of food products, beverages and tobacco products	6,3183
Manufacture of textiles, wearing apparel and leather products	7,4285
"Manufacture of computer, electronic and optical products", "manufacture of electrical equipment"	7,4286
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	7,7276
Accommodation and food service activities	8,1307
"Wholesale and retail trade and repair of motor vehicles and motorcycles", "wholesale trade, except of motor vehicles and motorcycles", "retail trade, except of motor vehicles and motorcycles"	8,1755
Manufacture of furniture; other manufacturing	8,3773
Manufacture of machinery and equipment n.e.c.	8,5611
Manufacture of other non-metallic mineral products	8,7039
"Public administration and defence; compulsory social security", "education"	8,7067

Human health and social work activities	8,7660
Manufacture of motor vehicles, trailers and semi-trailers	8,7878
Manufacture of fabricated metal products, except machinery and equipment	8,8223
"Manufacture of chemicals and chemical products", "manufacture of basic pharmaceutical products and pharmaceutical preparations"	8,8664
"Manufacture of paper and paper products", "printing and reproduction of recorded media"	8,8908
Construction	9,0089
Scientific research and development	9,0359
"Insurance, reinsurance and pension funding, except compulsory social security", "activities auxiliary to financial services and insurance activities"	9,0921
Financial service activities, except insurance and pension funding	9,1439
"Crop and animal production, hunting and related service activities", "forestry and logging", "fishing and aquaculture"	9,2023
Manufacture of other transport equipment	9,2386
Manufacture of rubber and plastic products	9,2964
Telecommunications	9,3782
Mining and quarrying	9,4342
Manufacture of basic metals	9,8668
Electricity, gas, steam and air conditioning supply	9,8780
Other service activities	10,0209
Other professional, scientific and technical activities; veterinary activities	10,0735
Manufacture of coke and refined petroleum products	10,2702
Computer programming, consultancy and related activities; information service activities	10,9206
Water transport	11,2777
Administrative and support service activities	11,4837
Land transport and transport via pipelines	11,7668
Air transport	12,3806
"Warehousing and support activities for transportation"," postal and courier activities"	12,7115
"Water collection, treatment and supply", "sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services"	12,8426
"Real estate activities", "legal and accounting activities; activities of head offices; management consultancy activities", "architectural and engineering activities; technical testing and analysis"	12,8624

Source: WIOD was calculated by the authors using 2016 data

Since the calculation performed in Table 2 is based on the principle that the calculated coefficient will decrease as the similarity between the sectors of the two countries increases, the coefficients are listed in ascending order. Since neither Chenery and Watanabe nor Leontief suggest a threshold value for this analysis, this weakness must be overcome. The results obtained from the Shapiro Wilk test applied to determine whether the variables conform to normal distribution to use the correct statistical technique are presented in Table 3 (Shapiro and Wilk, 1965).

Table 3. Shapiro Wilk Test Results of Turkey and China

Sector Names	**Turkey Coefficients**	**China Coefficients**
"Crop and animal production, hunting and related service activities", "forestry and logging", "fishing and aquaculture"	0,369	0,397
Mining and quarrying	0,607	0,640
Manufacture of food products, beverages and tobacco products	0,345	0,303
Manufacture of textiles, wearing apparel and leather products	0,253	0,267
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	0,544	0,270
"Manufacture of paper and paper products", "printing and reproduction of recorded media"	0,472	0,338
Manufacture of coke and refined petroleum products	0,330	0,220
"Manufacture of chemicals and chemical products", "manufacture of basic pharmaceutical products and pharmaceutical preparations"	0,600	0,382
Manufacture of rubber and plastic products	0,548	0,369
Manufacture of other non-metallic mineral products	0,555	0,559
Manufacture of basic metals	0,525	0,376
Manufacture of fabricated metal products, except machinery and equipment	0,482	0,396
"Manufacture of computer, electronic and optical products", "manufacture of electrical equipment"	0,455	0,308

Manufacture of machinery and equipment n.e.c.	0,469	0,510
Manufacture of motor vehicles, trailers and semi-trailers	0,441	0,279
Manufacture of other transport equipment	0,581	0,466
Manufacture of furniture; other manufacturing	0,541	0,591
Electricity, gas, steam and air conditioning supply	0,200	0,337
"Water collection, treatment and supply", "sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services"	0,572	0,657
Construction	0,575	0,548
"Wholesale and retail trade and repair of motor vehicles and motorcycles", "wholesale trade, except of motor vehicles and motorcycles", "retail trade, except of motor vehicles and motorcycles"	0,672	0,351
Land transport and transport via pipelines	0,461	0,593
Water transport	0,501	0,541
Air transport	0,524	0,454
"Warehousing and support activities for transportation", "postal and courier activities"	0,361	0,724
Accommodation and food service activities	0,539	0,290
Telecommunications	0,471	0,420
Computer programming, consultancy and related activities; information service activities	0,440	0,582
Financial service activities, except insurance and pension funding	0,563	0,359
"Insurance, reinsurance and pension funding, except compulsory social security", "activities auxiliary to financial services and insurance activities"	0,518	0,465
"Real estate activities", "legal and accounting activities; activities of head offices; management consultancy activities", "architectural and engineering activities; technical testing and analysis"	0,620	0,735
Scientific research and development	0,791	0,692
Other professional, scientific and technical activities; veterinary activities	0,626	0,573
Administrative and support service activities	0,365	0,799
"Public administration and defence; compulsory social security", "education"	0,767	0,840
Human health and social work activities	0,773	0,283
Other service activities	0,431	0,784

Source: WIOD was calculated by the authors with the MATLAB program and the SPSS 23 software using the 2016 data

When Table 3 is examined, it is determined that none of the variables are suitable for normal distribution. All p-values were calculated as $\alpha = 0.05$. Comparing the means of the variable may be inaccurate since the distribution of variables does not have a symmetrical structure, so the medians should be compared. The findings obtained as a result of the Spearman correlation coefficient calculation performed to determine the direction and degree of the linear relationship between variables that do not have normal distribution are presented in Table 4 (Gibbons, 1993, pp.3-6).

Table 4. Spearman Correlation Coefficients of Turkey and China

Sector Names	**Spearman Correlation**	**p value**
"Crop and animal production, hunting and related service activities", "forestry and logging", "fishing and aquaculture"***	0,613	0,000
Mining and quarrying ***	0,512	0,001
Manufacture of food products, beverages and tobacco products****	0,773	0,000
Manufacture of textiles, wearing apparel and leather products****	0,731	0,000
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials****	0,725	0,000
"Manufacture of paper and paper products", "printing and reproduction of recorded media"***	0,658	0,000
Manufacture of coke and refined petroleum products***	0,531	0,001
"Manufacture of chemicals and chemical products", "manufacture of basic pharmaceutical products and pharmaceutical preparations"***	0,693	0,000
Manufacture of rubber and plastic products***	0,646	0,000
Manufacture of other non-metallic mineral products****	0,707	0,000
Manufacture of basic metals***	0,613	0,000
Manufacture of fabricated metal products, except machinery and equipment****	0,663	0,000
"Manufacture of computer, electronic and optical products", "manufacture of electrical equipment"****	0,718	0,000
Manufacture of machinery and equipment n.e.c.***	0,611	0,000

Manufacture of motor vehicles, trailers and semi-trailers***	0,689	0,000
Manufacture of other transport equipment***	0,663	0,000
Manufacture of furniture; other manufacturing***	0,693	0,000
Electricity, gas, steam and air conditioning supply***	0,699	0,000
"Water collection, treatment and supply", "sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services"***	0,578	0,000
Construction****	0,726	0,000
"Wholesale and retail trade and repair of motor vehicles and motorcycles", "wholesale trade, except of motor vehicles and motorcycles", "retail trade, except of motor vehicles and motorcycles"***	0,636	0,000
Land transport and transport via pipelines**	0,376	0,023
Water transport***	0,576	0,000
Air transport***	0,635	0,000
"Warehousing and support activities for transportation", "postal and courier activities"**	0,396	0,016
Accommodation and food service activities***	0,680	0,000
Telecommunications***	0,680	0,000
Computer programming, consultancy and related activities; information service activities***	0,459	0,005
Financial service activities, except insurance and pension funding ****	0,719	0,000
"Insurance, reinsurance and pension funding, except compulsory social security", "activities auxiliary to financial services and insurance activities"***	0,639	0,000
"Real estate activities", "legal and accounting activities; activities of head offices; management consultancy activities", "architectural and engineering activities; technical testing and analysis" *	0,252	0,132
Scientific research and development **	0,365	0,027
Other professional, scientific and technical activities; veterinary activities ***	0,530	0,001
Administrative and support service activities*	0,295	0,077
"Public administration and defence; compulsory social security", "education"***	0,495	0,002
Human health and social work activities***	0,467	0,004
Other service activities *	0,220	0,190

* No statistically significant relationship **Weak relationship in the same direction *** Moderate relationship in the same direction **** Strong relationship in the same direction

Source: WIOD was calculated by the authors with the MATLAB program and the SPSS 23 software using the 2016 data

Table 4 shows the sectors in which Turkey has an advantage in the event that the countries importing from China changes their supply habits. Under the aforementioned assumption, the sectors in which Turkey has an advantage are *"manufacture of textiles, wearing apparel and leather products", "manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials", " Manufacture of other non-metallic mineral products ", "Manufacture of computer, electronic and optical products + Electrical equipment" and "construction''*.

These sectors are also the sectors whose coefficient is getting smaller, that is, the production structure is similar to each other according to Leontief similarity analysis results. Among the sectors with similar production structures, the construction sector has a distinct feature. Because, although the production of the construction sector is not subject to export, foreigners' purchase of houses and workplaces provides foreign currency inflow to the economy[2]. In this respect, it can be said that the construction sector has strategic importance for countries with current account deficit. Since the construction sector itself is not subject to export, it may be more useful to examine the impact of partial direct backward linkage on the sectors subject to export and providing the most input to this sector. For this reason, table 5 shows the sectors[13] from which the construction industry receives the most input.

Table 5. Partial Direct Backward Linkage Impact of the Construction Sector

Sector Code	Coefficients
"Wholesale and retail trade and repair of motor vehicles and motorcycles", "wholesale trade, except of motor vehicles and motorcycles", "retail trade, except of motor vehicles and motorcycles"	0,0914
Manufacture of other non-metallic mineral products	0,0860
Land transport and transport via pipelines	0,0481
Manufacture of fabricated metal products, except machinery and equipment	0,0243
Other professional, scientific and technical activities; veterinary activities	0,0232
Administrative and support service activities	0,0213
Financial service activities, except insurance and pension funding	0,0180
Construction	0,0169
Manufacture of basic metals	0,0152
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	0,0144
"Water collection, treatment and supply", "sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services"	0,0121
Manufacture of coke and refined petroleum products	0,0120

Source: It was created by the authors using the results obtained in the study

Table 5 includes the sectors that provide the most input to the construction industry. These sectors are the sectors which are classified as medium and high levels of opportunity for Turkey's exports. According to this classification; these sectors offer a medium level of opportunity: *"Wholesale and retail trade and repair of motor vehicles and motorcycles + Wholesale trade, except of motor vehicles and motorcycles+ Retail trade, except of motor vehicles and motorcycles", "Manufacture of fabricated metal products except machinery and equipment", "manufacture of base metal'', "Manufacture of coke and refined petroleum products ".* The sectors similar to China regarding Turkey's domestic intermediate input usage rates and an alternative to China in the global supply chain in this respect are *"Manufacture of other non-metallic mineral products", "Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials". Construction* sector can also be listed since it produces input for itself. The results obtained from all the analyzes applied in the study are consolidated and shown in Table 6.

Table 6. The Sectors With a potential to Take Place in Turkey's Global Supply Chain After COVID-19

Sectors showing high production similarity with China
• Manufacture of food products, beverages and tobacco products • Manufacture of textiles, wearing apparel and leather products • Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials • Manufacture of other non-metallic mineral products • Manufacture of computer, electronic and optical products + Electrical equipment • Construction

Source: It was created by the authors using the results obtained in the study

Table 6 shows the sectors showing similarities in terms of domestic intermediate input usage rates in China and Turkey. A dual classification was applied as the sectors showing high and medium similarity according to the proportional weight of intermediate inputs obtained from other sectors within production. In studies on imported input use, the date of domestic input-output and imported input-output table are collected and import dependency ratios of all sectors within the total production are calculated. However, in this study, the production carried out by domestic intermediate inputs of Turkey

using only domestic input-output tables is analyzed. Using this method, the production potential of Turkey without imported intermediate inputs was tried to be determined and featured. Today, as in every sector, imported input is used in addition to the domestic input in the sectors determined as a result of the analysis. Among the reasons for this preference, the advantages of reaching a higher quality, cheaper and technology-intensive intermediate input can be expressed. The most important element that should not be ignored here is that the basic assumption of the analysis accepts technology as constant. Therefore, in the sectors in which each of the sectors in Table 6 is similar to China, the proportional similarity of domestic inputs only used in production with assumption of constant technology is subject to comparison.

"Supplementary Decision to Import Regime Decision" was published in the Official Gazette dated May 11, 2020 and it was decided to apply additional customs tax to more than 800 products (Official Gazette of the Republic of Turkey, 2020). In this context the sectors with a high level of opportunities for Turkey's exports have a different significance. Because the sectors in question show that we have the capacity to realize the same production of China in our country without using any imported inputs. The negative effects of countervailing duty will not affect Turkey as a result of providing incentives and support to these sectors and increasing production. Especially if the countries to which China exports are in search of another market, Turkey is strong enough meet the demands for both domestic production and imports from other countries. When the sectors to apply countervailing duty are examined specific to all sectors with a high level of opportunity for Turkey's exports, they will have to pay countervailing duty in the manufacture of the sectors apart from "*manufacture of food products, beverages and tobacco products*" if imported inputs are used. Especially in this challenging period, supporting; "*manufacture of textiles, wearing apparel and leather products", "manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials", "manufacture of other non-metallic mineral products", "manufacture of computer, electronic and optical products, manufacture of electrical equipment", "construction"* sectors with incentives, which have the potential to produce without using any imported inputs, is of great importance for the protection of our economy.

3.4. The Potential of Sectors That May Be Alternative to China to Increase Their Employment Capacity

Warning about the devastating effects of the epidemic that caused a humanitarian and economic crisis, which is rare in the world, The World Health Organization (WHO) declared a pandemic on March 11, 2020, deciding that the disease turned into a global epidemic. With the COVID-19 epidemic, the daily functioning that stopped completely or slowed down in some sectors caused serious damage in the global economy due to the high rate of spread of the epidemic. The measures, which could be considered to be extraordinary by some experts, have been taken by international organizations, states and

individuals; and even quarantine and curfews have been imposed in many parts of the world. Within the scope of the aforementioned developments, distance education was started in schools in our country and restrictions were imposed on going out for certain risk groups (Özaydın,2014). Many workplaces have been closed due to insufficiency of demand or due to the restrictions imposed by public authorities to protect the health of the public such as reducing physical contact and interactions as much as possible by maintaining social distance in common areas.

To overcome the damage to labor market caused by the epidemic with minimum loss in Turkey, some passive labor market policies have been implemented. Active labor market policies could not be implemented under pandemic conditions, and the increase in closed workplaces day by day caused an increase in unemployment (Özaydın,2013). Workplaces that were closed down occurred at a higher rate, especially in some sectors. The current situation is presented statistically by TOBB Information Retrieval Division compiling established / closed companies published in Turkey Trade Registry Gazette. Table 7 shows the number of closed companies in Turkey from March 2020 when the first COVID-19 case was found out.

Table 7. Distribution of Companies Closed Between March 2020 and November 2020 by Sectors

Sector codes	**Sector names**	**Number of Closed companies**
G	Wholesale and retail trade and repair of motor vehicles and motorcycles	8618
F	Construction	3342
C	Manufacture	2663
H	Transport and storage	1902
I	Accomodation and food service activities	1529
M	Other professional, scientific and technical activities	1287
J	Information and communication	637
N	Administrative and support service activities	627
L	real estate activities	573
Q	Human health and social work activities	343
P	Education	342
S	Other service activities	334
D	Electricity, gas, steam and air conditioning supply	259
A	Agriculture, forestry and fishing	234
K	Finance And Insurance Activities	200
R	Culture, Art, Entertainment, Leisure and Sport	183
B	Mining and quarrying	68
E	Water collection; Sewerage; waste collection, treatment and disposal activities	52
O	Public administration and defence; compulsory social security	32
U	Activities of International Organizations and Their Representatives	5
T	Activities of households as employers; undifferentiated goods-and services- producing activities of households for own use	4

Source: Edited by the authors using TOBB 2020 data

Analysing Table 7 including the sectors ranked from high to low according to the number of closed businesses, it is seen that it is similar with Table 6 showing the sectors in Turkey which have a high potential to take place in global supply chain. However, some sectors are considered under the heading of other sectors, as the sector consolidation is carried out while the data made by TOBB is created. For example, the manufacturing sector, which is in the third place in the table, is associated

with many sectors in Table 6. However, in order to see the connection between them clearly, it is necessary to separate the sector activities. For this purpose, the number of enterprises closed between March 2020 and November 2020 is shown in Table 8 according to the activity types of joint stock companies, limited companies, real person commercial enterprises.

Table 8. Top 10 Activity Types Closed Between March 2020 and November 2020

Activity names	**Number of Closed companies**
Construction of residential and non-residential buildings	2417
Retail trade with food, beverage or tobacco predominantly in non-specialized stores	1650
Restaurants and mobile food service activities	1102
Other passenger transport by land transport not classified elsewhere	1060
Real estate agencies and leasing or operating their own or rented real estate	594
Retail trade of clothing and wholesale trade of clothing and footwear in specialized stores	526
Wholesale trade in non-specialized stores	348
Freight transport by road	342
Retail trade via mail or internet	266
Engineering	224

Source: Edited by the authors using TOBB 2020 data

It is seen that most of the sectors in Turkey with a high potential to take a place in global supply chain at a high level after COVID-19 have a similarity with the fields of activity in Table 8 that have been closed down most during the pandemic. While the "construction sector" in Table 6 includes "Construction of residential and non-residential buildings" listed first inTable 8, "Real estate agencies and leasing or operating their own or rented real estate" in the fourth has a high level of direct forward linkage (Güler, 2019). Manufacture of other non-metallic mineral products in Table 6 and Construction of residential and non-residential buildings in Table 8 have a high level of direct backward linkage coefficient (Güler,2019). While "Manufacture of food products, beverages and tobacco products" sector in Table 6 includes "Retail trade with food, beverage or tobacco predominantly in non-specialized stores" sector listed second in Table 8, ‘'Restaurants and mobile food service activities" in the third place has a high level of direct forward linkage effect. "Manufacture of textiles, wearing apparel and leather products" sector in Table 6 includes " Retail trade of clothing and wholesale trade of clothing and footwear in specialized stores" in Table 8.

4. EVALUATION AND CONCLUSION

The balances in the global supply chain are predicted to change in the following years. The fact that The USA blames China for the spread of the COVID-19 virus to the world and imposed additional tariffs on China's products can be interpreted as the steps to weaken China's reputation in the global supply chain. The possibility of supply chains shifting from China to other countries has great opportunities that cannot be ignored. In this process, the sectors that meet the domestic demand without using imported products and imported intermediate inputs and then produce for export must increase

their production with different incentive mechanisms and they should be directed to foreign markets more than ever.

It is seen that 4 out of 6 sectors in Turkey with a potential to take place in global supply chain at a high level after COVID-19 are among the business activities that are closed down most. As the production increases in the sectors in question, economic growth and development potential will increase as well. In case of a China-oriented problem in global supply chain, as well as the emergence of foreign trade advantages for Turkey, the establishment of new businesses to meet growing demand and / or increasing the capacity of existing businesses, and the reduction of unemployment as a result, is predictable. For the solution of many chronic economic problems of Turkey from current account deficit to unemployment and from budget deficit to insufficient capacity utilization, entering the new normal period with proactive preparations may lead to positive developments.

- Accelerating digitalization,
- Strengthening the economic stability and environment of confidence in Turkey,
- Reducing tax burdens on production and labor,
- Providing cheap energy to the manufacturing industry,
- Minimizing customs clearance costs,
- To stimulate domestic demand, expanding and continuing the support for deferring tax liabilities such as VAT, withholding tax and SGK (SSI/social security institution) premiums containing all sectors,
- Increasing social awareness about food security and food waste in the sectors in which China and Turkey have highest production similarity such as *''manufacture of food products, beverages and tobacco products sector and crop and animal production, hunting and related service activities, forestry and logging, Fishing and aquaculture sector*'', which is the main supplier of the sector. In this context, ensuring the effective continuity of the "Protect Food Campaign" carried out in cooperation with the Ministry of Agriculture and Forestry and the Food and Agriculture Organization (FAO),
- Keeping the stability of Turkey's success in the field of health technology during epidemic process.
- Through policies and incentives to increase their competitiveness, supporting the sectors "Manufacture of food products, beverages and tobacco products", "Manufacture of textiles, wearing apparel and leather products", " Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials", "Manufacture of other non-metallic mineral products", "Manufacture of computer, electronic and optical products" which have a high production similarity with China using domestic input,

- To accelerate the creation of new employment opportunities alongside a positive contribution to Turkey's foreign trade volume in case of a China-oriented problem in global supply chain, active labor policies should be implemented for the sectors "Manufacture of food products, beverages and tobacco products", "Manufacture of textiles, wearing apparel and leather products", "Manufacture of other non-metallic mineral products ", ""Manufacture of computer, electronic and optical products" and "construction".
- If these sectors do not have the qualified workforce they need, it does not seem possible to realize these potentials. For this reason, it is a necessity to train the qualified labor force needed by these sectors with the reforms to be made in the education system.

It is concluded that the rate of domestic intermediate inputs used in the sectors determined as a result of the analysis is similar in both countries. As a result of the analysis, suggestions made for the identified sectors may ultimately be part of a temporary and short-term solution. In other production sectors in Turkey, the use of imported intermediate inputs appears at different rates that vary according to the sectors. In this context, public and private sector initiatives regarding domestic and national intermediate input supply in all sectors should be accelerated. Although it is the subject of another research that developing a manufacturing industry without using imported intermediate inputs is a rational and effective solution, it can be suggested to develop diversified supply models for sectors that have to use imported intermediate inputs.

REFERENCES

Altunkaynak, B. and Gamgam, H. (2012). *Parametrik olmayan yöntemler*. (4. Baskı). Ankara: Seçkin Yayıncılık.

Aydoğuş, O. (2010). *Girdi-çikti modellerine giriş*. (3. baskı). Ankara:Efil Yayınevi.

Balassa, B. (1965). *Trade liberalisation and 'Revealed' comparative advantage*. The Manchester School, 33, 99-123.

Banga, R. (2013). Measuring Value in Global Value Chains. UNCTAD, Background Paper No. RVC-8.

Bermingham, F., Leng, S. and Magnier, M. (2020). Coronavirus: China faces fght to hang onto foreign manufacturers as US, Japan, EU make COVID-19 exit plans. South China Morning Post. Retrieved June 07, 2020, from https://www.scmp.com/economy/china-economy/article/3081415/coronavirus-china-faces-fght-hang-foreign-manufacturers-us.

Bezdek, R. (1984). Tests of Three Hypotheses Relating to the Leontief Input-Output Model. Royal Statistics Society, 147(3), 499-509.

Borin, A. and Mancini, M. (2019). Measuring What Matters in Global Value Chains and Value-Added Trade. The World Bank.

Caliò, S., Caloghirou, Y., Dimas, P. Tsakanikas, A. and Roth, F. (2020). The Contribution of Intangible Inputs and Participation in Global Value Chains to Productivity Performance: Evidence From the EU-28, 2000-2014. (No. 5). Hamburg Discussion Papers in International Economics.

Chenery, H. B. and Watanabe, T. (1958). International comparison of the structure of production. *Econometrica, 26(*4), 487-521.

Daudin, G., Schweisguth, D. and Rifflart, C. (2011). Who produces for whom in the world economy?. *Canadian Journal of Economics, 44*(4), 1403-1437.

Dietzenbacher, E. and Los, B. (2000). Structural decomposition analyses with dependent determinants. *Economic System Research, 12*(4), 497-514.

Dornbusch, R., Fischer, S. and Samuelson, P. A. (1980). Heckscher-Ohlin Trade Theory with a continuum of goods. *The Quarterly Journal of Economics, 95*(2), 203-224.

EUROSTAT (2020). Index of Correspondence Tables. Retrieved May 04, 2020, from https://ec.europa.eu/eurostat/ramon/relations/index.cfm?TargetUrl=LST_REL&StrLanguageCod.

Farlie, D.J.G. (1960). The performance of some correlation coefficients for a general bivariate distribution, Great Britain. *Biometrika Trust, 47*(3/4), 307-323.

Gao, H. and Ren, M. (2020). Overreliance on China and dynamic balancing in the shift of global value Chains in response to Global Pandemic COVID-19: An Australian and New Zealand perspective. *Asian Business & Management*, 1-5.

Gereffi, G., Humphrey, J. and Sturgeon, T. (2005). The governance of global value chains. *Review of International Political Economy, 12*(1), 78-104.

Giammetti, R., Papi, L., Teobaldelli, D. and Ticchi, D. (2020). The Italian Value Chain in the Pandemic: The Input–Output Impact of Covid-19 Lockdown. Journal of Industrial and Business Economics, 1-15.

Gibbons, J.D. (1993). *Nonparametric measures of association*. California:Sage Publication.

Güler, İ. (2019). *İktisadi kalkinma temelinde gayrimenkul ekonomisi*. Ankara: Gazi Kitabevi.

Güler, İ. (2020a). Post-Pandemi Süreci için ekonomik kalkinma arayişi: Türkiye örneği. *Adam Akademi Sosyal Bilimler Dergisi, 10*(1), 19-50.

Güler, İ. (2020b). The effort to reduce negative externality in post Covid-19 period in Turkish economy: Example of transportation sector. *Gaziantep University Journal Of Social Sciences, Volume 19*(Covid-19 Special Issue), 702-727.

Güler, İ. and Küçükkiremitçi, O. (2020). *Ticaret savaşlari ekseninde türkiye'de üretimin ithalata bağimlilik düzeyinin dönemler arasi benzerlik analizi*. M. Çetinkaya ve G. Muratoğlu (Ed.) içinde: Ticaret ve Kur Savaşları-Küresel Ekonomik Politiğe Yansımaları Küresel Ekonomik Politiğe Yansımaları. (Bölüm 4: 119-156). (1. Baskı). Ankara: Gazi Kitabevi.

Hazari, B. R. (1970). Empirical identification of key sectors in the Indian economy. *The Review of Economics and Statistics, 52(*3), 301-305.

Hewings, G. J. and Wang, L. (2020). Will increasing tariffs on China really bring the manufacturing plants back to the US?. *Global Economic Review*, 1-23.

Hummels, D., Ishii, J. and Yi, K.M. (2001). The nature and growth of vertical specialization in world trade. *Journal of International Economics, 54*, 75-96.

Johnson, R. C. and Noguera, G. (2012). Accounting for intermediates: Production sharing and trade in value added. *Journal of International Economics, 86*(2), 224–236.

Kohl, T. (2019). The Belt and Road Initiative's Effect on Supply-Chain Trade: Evidence From Structural Gravity Equations. *Cambridge Journal of Regions, Economy and Society, 12*(1), 77-104.

Korum, U. (1963). *Input-output analizi*. Ankara Üniversitesi Siyasal Bilgiler Fakültesi Yayınları, Yayın No. 164-146, Ankara: Sevinç Matbaası.

Leontief, V. W. (1946). Exports, imports, domestic output, and employment. *The Quarterly Journal of Economics,* 171-193.

Leontıef, V. W. (1949). Structural matrices of national economics. *Econometrica: Journal of the Econometric Society, 17,* 273-282.

Leontıef, V. W. (1974). Structure of the world economy: Outline of a simple input-output formulation. *The American Economic Review, 64*(6), 823-834.

Leontief, V. W. (1985). *Input-output analysis*. In: Input-Output Economics (1986). (2nd Edition). New York: Oxford University Press.

Leontıef, V. W. (1986a). *An alternative to aggregation in input-output analysis and national accounts.* In: Input-Output Economics. (2nd Edition). New York: Oxford University Press.

Leontıef, V. W. (1986b). Input-Output Analysis. In: Input-Output Economics. (2nd Edition). New York: Oxford University Press.

Leontıef, V. W. (1951). The Structure of the American Economy. New York: Oxford University Press.

Leontief, W. (1936). Quantitative input and output relations in the economic systems of the United States. *The Review of Economic Statistics,* 105-125.

Los, B. and Timmer, M. P. (2018). Measuring Bilateral Exports of Value Added: A Unified Framework (No. w24896). National Bureau of Economic Research.

Official Gazette of the Republic of Turkey, (2020). İthalat Rejimi Kararına Ek Karar (Karar Sayısı.2514) Retrieved from https://www.resmigazete.gov.tr/eskiler/2020/05/20200511M1-2.pdf, 11.05.2020.

Öçal, M and Korkmaz, A. Türkiye'de emek piyasasi politikalarinda yeni bir dönem: işsizlik yardimi. *Mehmet Akif Ersoy Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 7*(3), 731-754.

Öney, E. (1980). *İktisadi planlama*. Ankara Üniversitesi Siyasal Bilgiler Yayınları No:438. Ankara: Sevinç Matbaası.

Özaydın, M. M. (2013). Genç işsizlikle mücadelede aktif işgücü piyasasi politikalarinin rolü ve önemi. *Journal of Youth Research,* 120.

Özaydın, M. M. (2014). Yoksullukla Mücadelede sosyal yardimlara vatandaşlik temelli bir alternatif: Temel gelir. *Finans Politik & Ekonomik Yorumlar, 51*(589), 93-108.

Özaydın, M. M. and Öztürk, M. (2020). Refah Devletinin krizi ekseninde yoksulluk ve yeni sosyal risklerle mücadele. *Mehmet Akif Ersoy Üniversitesi Sosyal Bilimler Enstitüsü Dergisi,* (31), 205-219.

Quesnay, F. (1758). *Tableau economique*. In: Kuczynski, M. and Meek, R. L. (Editor), Quesnay's Tableau Economique. Macmillan, London.

Rasmussen, P.N. (1956). *Studies in intersectorel relations*. Amsterdam: Nourth-Holland.

Republic of Turkey Ministry of Family and Social Policies, 2020, E.T., 28.12.2020, www.ailevecalisma.gov.tr.

Ricardo, D. (1817). *On the principles of political economy and taxation*. 1971, Middlesex, Penguin Books

Shapiro, S.S. and Wilk, M.B. (1965). An analysis of variance test for normality (complete samples). *Biometrika, 52*(3/4), 591-611.

Smith, A. (1776). *The wealth of nations*. Cannan ed. New York: Modern Library.

Timmer, M. P., Dietzenbacher, E., Los, B., Stehrer, R. and De Vries, G. J. (2015). An illustrated user guide to the world input–output database: the case of global automotive production. Review of International Economics, 23(3), 575-605.

Timmer, M. P., Los, B., Stehrer, R. and De Vries, G. J. (2013). Fragmentation, incomes and jobs: An analysis of European competitiveness. *Economic Policy*, *28*(76), 613-661.

Turkey Statistical Institute (TURKSTAT) (2020). Girdi-Çıktı Tabloları, Metaveri, Analitik Çerçeve, Kapsam, Tanımlar ve Sınıflamalar, Retrieved from http://www.tuik.gov.tr/PreTablo.do?alt_id=1021, 01.05.2020

The Union of Chambers and Commodity Exchanges of Turkey (TOBB). Company Establishment and Liquidation Statics. https://www.tobb.org.tr/BilgiErisimMudurlugu/Sayfalar/KurulanKapananSirketistatistikleri.php, 28.12.2020

Ulutaş, U. (2020). *Koronavirüs Sonrası Küresel Trendler*. Ulutaş U. (Ed.). in: COVID-19 Sonrası Küresel Sistem: Eski Sorunlar Yeni Trendler (Part 1: 10-19). Ankara: SAM Yayınları.

Viet, V. Q. (1980). *Sensitivity analysis in input-output: Theory and application*. PhD Thesis, New York University.

Walras, L. (1954). *Elements of pure economics, or the theory of social wealth*. çev. W. Jaffé, Homewood, Ill.:R.D. Irwin.

World Input-Output Database, [WIOD] (2016). National Input-Output Tables, Turkey NIOT, Retrieved from http://www.wiod.org/database/niots16, 26.03.2020.