

# The Impact of Covid -19 Pandemic on Supply Chain Trade<sup>1</sup>

Selahattin Armağan Vurdu<sup>a</sup>

<sup>a</sup>Institute of International Trade, Istanbul Commerce University, Istanbul, Turkey

## Abstract

Global supply chains have gained importance in developing interlinkages among markets as outsourcing of production processes became widespread. Together with the unprecedented Covid-19 crisis, the highly integrated globe encountered demand and supply shocks. As a result of the supply chain disruptions and logistical constraints, the pandemic has revealed the vulnerabilities in industrial supply chains, and both governments and enterprises have started to search for ways to build resilience, regain and improve the competitiveness and prepare for future shocks. Recently, the over-integration of the global supply chains has already being questioned and discussion of a new structurization has grown with the pandemic. In this regard, this study examines the emergence of global value chains and the growth of interdependence of economies, exemplifies how any blockage in any economy can affect the other economies using the value-added trade calculations, and evaluates the expectations for the future evolution of supply chains in terms of industries and regions.

## Article History

Received February 8, 2021

Revised May 17, 2021

Accepted May 20, 2021

Available Online

## Keywords

Global Supply Chains, Covid-19, Disruption in Supply Chains

## JEL Codes

F13, F14, F60

## 1. Introduction

In recent decades, production and distribution chains have grown in length and complexity in global means in pursuit of margin improvements. However, these operating model choices sometimes have led to risk exposure due to supply chain disruptions stemming from government acts and global impacts. Recently, as another risk aspect, Covid-19 pandemic has increased the global uncertainty and has driven enterprises to get into a search for resilience against the supply chain disruptions. This study firstly examines the concept of “global value chains” (GVCs), how GCVs are related with globalization and international trade, and how they contributed to the growth of interdependence among economies. Secondly, the study exemplifies how any

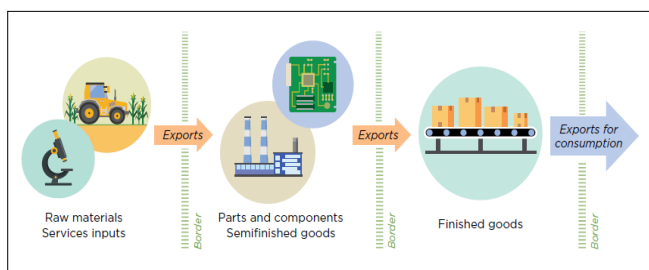
blockage in any economy can affect the other economies through GVC trade data using the value-added trade calculations. In the following chapter, since the calculation of the GVC trade needs input-output tables and cannot be directly reached through widely known international trade databases, the available sources are introduced. Subsequently, Turkey’s increasing integration to GVCs is summarized by direction and industry. Lastly, considering that half of the global trade is GVC trade and GVCs encounter disruptions recently, the after-coronavirus trends and their effects on GVCs are discussed seeking particular industries and particular economies and whether opportunities may arise for Turkey.

<sup>1</sup> An earlier version of this paper was presented at the Smart Economic Planning and Industrial Policy (SEPIP) Conference held on 13-15 October, 2020 at OSTİM Technical University Ankara and online platform.

## 2. Global Value Chains

The global value chain concept represents the distribution of the production processes across countries, specialization of firms in specific tasks and benefiting economies of scales in the production cycle of a particular product. As globalisation increased, the production and trade inter-relations among economies have enlarged across the globe. GVCs have existed for many long time however, the growth and conceptualization has become significant since 1990s as technological developments in transportation, information, and communications, the easiness in doing business, and also lowering trade barriers induced manufacturers to extend production processes beyond national borders. The country borders and exportation of the raw materials, semi-finished goods and finished goods is displayed in a basic GVC scheme below:

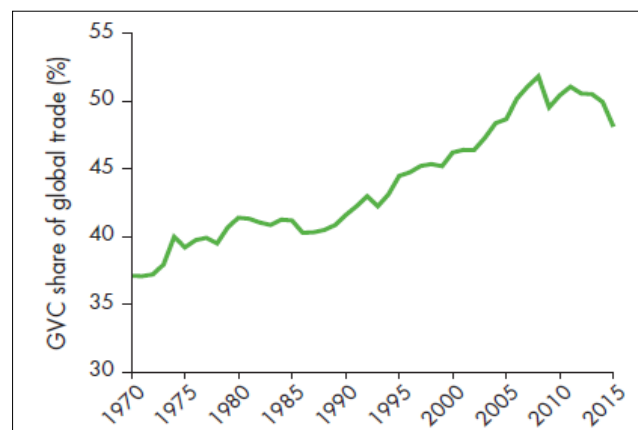
**Figure 1.** What is a global value chain (GVC)?



**Source:** World Bank

All countries have been engaging in GVCs but in different ways and to various extents. While most countries in East Asia, North America, and Western Europe have participated in complex GVCs, producing advanced and innovative manufactures and services, many countries in Africa, Latin America, and Central Asia still produce commodities that are to be processed in the developed and large emerging countries, or they engage in limited manufacturing. The industries GVC growth concentrated in have been machinery, electronics, and transportation. International trade and GVCs had been growing in line with each other and GVCs share of global trade has been approximately 50% until the growth pace declined recently due to the decline in overall economic growth and investment following the 2008 financial crisis, slowing pace and backset of trade reforms, the protectionist tendencies (World Bank, 2020).

**Figure 2.** Growth of GVC share in global trade



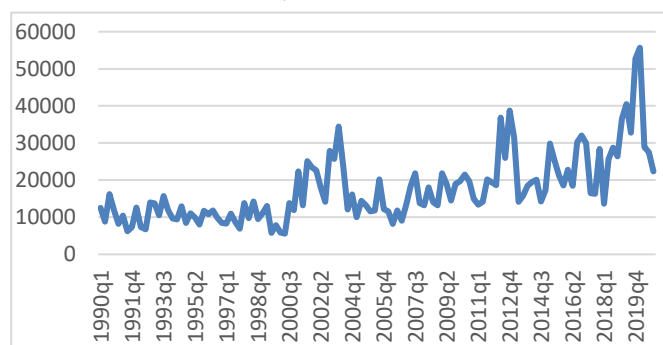
**Source:** World Bank's visualization via calculations through Eura26 database (World Bank , 2020)

The World Development Report 2020 states that the rising protectionism could induce “reshoring” of existing GVCs or their shifts to new and closer locations, which is another global trend regarded as “nearshoring”. When access to markets in the future is seen under uncertainty, companies are expected to delay investment plans until uncertainty is resolved. Such a delay results in any expansion of GVCs is likely to remain on hold (World Bank, 2020). Due to the US-China trade tensions, a new focus on network resilience and more of regional manufacturing had already emerged in 2018 and 2019. Companies that make technology hardware, one of the industries with most complex GVCs and where manufacturing has been most concentrated in China, have moved production of some products out of China over the past past 3 years as their customers in the US had concerns over security and some components were hit by US tariffs. For instance, Quanta Computer, the world’s largest notebook contract manufacturer and a significant supplier of cloud hardware for Google, Amazon and Facebook, shifted production of servers out of China to Taiwan and to the home country, US (Hille, 2020). Exhibiting a slightly different approach, Foxconn, the largest Apple supplier and the world’s largest electronic contract manufacturer with a workforce of one million in China, declared its expectation for global technology supply chains to split into two camps: “an for China and those associated with it, and another for the US and their friends” (Hille, 2020).

In the light of the information, warnings and recommendations about the current evolution and future threads related to the supply chains, it is clear that GVCs have been disrupted long before Covid-19 emerged due to the uncertainties across the globe. Worldwide Governance Indicators assessed by World Bank shows that the share of global trade conducted with countries ranked in the bottom half of the world for political stability has risen from 16% to 29 % in between 2000 and 2018. Therefore, almost 80% of

trade involves nations with declining political stability scores (McKinsey Global Institute, 2020). Several indicators of uncertainty have been shown to correlate with international trade and economic growth (World Trade Organization, 2020). Below is the figure regarding global uncertainty, measured by counting the frequency of words related to “uncertainty” in the Economist Intelligence Unit country reports (Ahir, Bloom, & Furceri, 2018) (World Uncertainty Index Data, 2020).

**Figure 3.** Global Uncertainty, 1990-2020



**Source:** Author’s visualization using the data on <https://worlduncertaintyindex.com/>

Monitoring the global uncertainty index from the year 1990 to 2020, a monthly measure of uncertainty stemming from economic policy environment had been highest in 2002Q4, 2003Q1, 2003Q2 and 2003Q3 because of the US recession and September 11 Attacks, and Iraq war and the outbreak of SARS pandemic consecutively. The second peak has been experienced with US fiscal cliff and sovereign debt crisis in Europe in 2012-2013. The third peak has become in 2019 due to trade tensions between major economies and Brexit. While this level of uncertainty declined in January 2020 with resolution expectations for the economic policies, it has risen to the highest peak of all times in the first quarter of 2020 due to the Covid-19 pandemic. After the initial shocks with the pandemic, the index has decreased however it has still been high compared to the average of previous occasions and periods. The figure also reveals that the frequency and intensity of disruptive occurrences has risen. A recent McKinsey report indicates that companies can now expect supply chain disruptions lasting a month or longer to occur every 3,7 years (McKinsey Global Institute, 2020).

Proving the already existing tendency for change in global procurement and outsourcing and that it is triggered by the pandemic, A Gartner survey conducted with 260 global supply chain leaders in February and March 2020 indicates that 33% of the participants had moved sourcing and manufacturing activities out of China before the pandemic or they plan to do so in the next 2-3 years (Gartner, Inc., 2020). It should be highlighted that the survey respondents represents not only US

or particular industries but various regions due to being located in North & South America and the EMEA and APAC regions and various industries, including high-tech, industrial and food & beverage. The survey results show that the U.S.-China trade war made supply chain leaders aware of the weaknesses of their globalized supply chains and question the logic of over-integrated networks heavily depending on outsourcing as a way of doing business.

At the time when the Covid-19 was recognized as a pandemic by the World Health Organization in March 2020, a survey published by an Institute for Supply Management revealed that nearly 75% of companies had already seen capacity disruptions in their supply chains as a result of coronavirus-related transportation restrictions, lead times had doubled and that shortage is compounded by the shortage of air and ocean freight options (Lambert, 2020). The survey had been performed between February 22 to March 5 among more than 600 U.S companies, over 60% of which had reported delays in receiving orders from China, and 53% had reported having difficulty getting information from China (Lambert, 2020). Weaknesses of the globalized supply chains disclosed in an abrupt manner which have led to demand and supply shocks at the very beginning of the pandemic.

The need for business leaders and policy makers to fundamentally rethink the way they plan, invest and operate in the future is underlined in a recent survey of 699 global CEOs of private businesses and public companies from 67 countries/territories including Western Europe, North America and Middle East conducted in June and July 2020 (PwC, 2020). In a challenge to decades of increased globalisation, 39% of CEOs believe there will be a permanent shift towards reshoring and insourcing, and an enduring increase in nationalism is expected (PwC, 2020).

### 3. A Simulation of Shutdown of the Trade Hubs on GVCs

International Trade Center (ITC) has conducted a supply chain disruption scenario by assuming a two-month long complete shutdown of industrial production in China, the European Union (UK included) and the United States which are the world’s three major supply chain trade hubs. These hubs, namely G3, represent 63% of supply chain imports and 64% of supply chain exports thus a two-month long complete shutdown of all manufacturing production in these hubs affect the trade all around the World. ITC’s simulation includes only the industrial sector, that is, agriculture and services are not included. The objective is set to point out where the supply chain disruption can take place, setting aside sectors that are likely to benefit from the structural changes in demand during Covid-19 pandemic, such as increased purchases of personal protective equipment or the office equipment for teleworking. The focus is exclusively on the effect of factory lockdowns,

neglecting the effects of trade restrictions, demand reduction etc.

In the study, supply chain trade is defined as the flows of inputs used in production located in at least two countries, with produced goods consumed in a third country. As the result of the simulation, the dollar value of the supply chain disruption has been calculated as 17% (two months out of 12) of the supply chain imports and 17% of the supply chain exports (International Trade Centre, 2020). While this assessment is only relevant for 12% of all industrial trade, it is useful in demonstrating that economic developments in one country often depend on decisions made elsewhere even though the country does not have any direct trade relations with the decision maker.

**Table 1.** Projected reduction of trade within manufacturing supply chains (\$ billion)

Exporter in the column and Importer in the row	China	EU	United States	G3
Africa	0,4	1,8	0,3	2,4
Americas	4,5	8,7	11,3	24,5
Asia	25,9	28,3	17,1	71,4
Europe	10,8	6,6	9,3	26,8
Oceania	0,4	0,2	0,2	0,8
Landlocked developing countries	0,2	0,4	0,1	0,6
Least developed countries	0,4	0,3	0,1	0,7
Small island developing states	1,3	0,6	0,7	2,6
World	41,9	46,1	38,2	126,3

**Source:** International Trade Centre (2020)

**Table 2.** Projected reduction of trade within manufacturing supply chains (%)

Exporter in the column and Importer in the row	China	EU	United States	G3
Africa	0,4%	1,2%	1,2%	0,9%
Americas	2,0%	2,0%	1,6%	1,8%
Asia	3,1%	2,5%	1,7%	2,4%
Europe	3,3%	1,5%	1,7%	2,0%
Oceania	0,4%	1,1%	2,3%	0,6%
Landlocked developing countries	0,6%	0,8%	3,2%	0,8%
Least developed countries	0,8%	0,5%	0,4%	0,6%
Small island developing states	2,7%	1,7%	1,8%	2,1%
World	2,7%	2,1%	1,7%	2,1%

**Source:** International Trade Centre (2020)

The simulation results in terms of dominance and interdependence in trade relations shows that:

- The reduction in international trade in manufacturing inputs due to the shutdown of the G3 supply chain hubs is expected to amount to \$126,3 billion, or 2,1% of the total industrial imports by the G3.
- The factory shutdown in the European Union will have the greatest repercussions for supply chain exports elsewhere.
- The EU is the world's largest importer of industrial inputs, with China the largest exporter.
- The EU is also the biggest market for three of the world's five geographic regions.
- EU is the main importer of industrial inputs from both Africa and Asia and buys almost as many industrial inputs from Latin America as the United States.
- Shutdowns are expected to reduce imports of industrial inputs by \$41,9 billion for China and \$38,2 billion for the United States.
- Countries in the Americas will export \$24,5 billion less industrial inputs, mostly caused by shutdowns in the US and EU.
- In Asia, exports of industrial inputs are expected to drop by \$71,4 billion, with most of this loss stemming from the lockdowns in China and the EU. About 50% of Asia's exposure to the EU is linked to the trading relationship between the EU and China.
- The exposure of Asian countries to China centres on electronics supply chains (Malaysia, Philippines and Thailand).
- India's exposure mainly relates to trade with the EU in automobile components.
- Europe is heavily affected by the factory shutdowns in China and the United States, as more than 90% of the \$10,8 billion and \$9,3 billion losses in exports of industrial inputs are linked to EU-China and EU-US trade.
- Non-EU European countries mainly depend on the EU market.
- Exporters in Oceania are projected to lose \$793 million in exports of industrial inputs due mainly to exposure in China.
- African exporters may lose more than \$2,4 billion in global industrial supply chain exports in the G3. More than 70% of this decline is caused by the shutdowns in the EU. However, this reduction is driven by just a few product lines and countries. For instance, 15%–20% of the loss of African exports to the EU is Morocco's losses in exports of wiring sets for vehicles to the EU. Many other African countries are affected because of their exports to China of raw materials, such as copper for Benin, Mauritius, Namibia and Zambia, and cotton for Burkina Faso.
- Figures may not be high for the less exporting regions but the declines are still significant for individual countries.

2019 trade data of Turkey has been studied and below is shown Turkey's total industrial exports and imports, the value of its industrial exports and imports traded within international supply chains, and the share this value represents in the total trade.

**Table 3.** Turkey's Position in International Supply Chains, 2019 (\$ million)

	Total trade value	Supply chain trade value	Share of supply chain trade in total
Industrial exports	166.353	20.588	12%
Industrial imports	191.857	25.059	13%

Source: International Trade Centre (2020)

Under the conditions assumed in the ITC's scenario of the two-month long complete shutdown of all manufacturing production in G3, Turkey's projected loss of trade in industrial inputs for the most affected sectors is provided for exports and imports below. The predicted reduction is displayed in relative terms as a share of the loss expected in 2020 in the total yearly exports and imports of the sector, and the value of the loss in absolute terms (\$ million). Magnitude of the loss is visualized in line with the length of the bar. The biggest export losses are in motor vehicles and parts, machinery, plastics and rubber, ferrous metals, and metal products however the share of the loss stands at 2%. The biggest import losses are in motor vehicles and parts, machinery, apparel, plastics and rubber, and metal products. Those sectors represent about 70% imported inputs required by Turkey in 2019. The convergence between the industry groups in the export loss and import loss tables is significant. The finding can be assessed as that the industries Turkey is most globally interdependent are its leading exporting industries.

**Table 4.** The Way and Magnitude of Turkey's Supply Chain Trade Losses According to the ITC's Simulation of Supply Chain Disruptions

a) Projected supply chain export loss in \$ million by sector

MOST AFFECTED SECTORS	2019		EXPECTED LOSS: Exports of industrial inputs, 2020			
	Export		Total export loss to the G3	to China	to the European Union	to the United States
Motor vehicles & parts	29 934	2%	495	2	477	16
Machinery	22 464	2%	349	13	316	20
Plastics & rubber	9 581	3%	277	6	244	27
Ferrous metals	11 613	2%	237	2	220	16
Metal products	7 366	3%	215	9	189	17
Other subsectors	85 395	1%	975	64	809	102
<b>Total</b>	<b>166 353</b>	<b>2%</b>	<b>2 548</b>	<b>96</b>	<b>2 255</b>	<b>197</b>

b) Projected supply chain import loss in \$ million by sector

MOST AFFECTED SECTORS	2019		EXPECTED LOSS: Imports of industrial inputs, 2020			
	Required imported inputs		Total import loss from the G3	from China	from the European Union	from the United States
Motor vehicles & parts	6 908	12%	836	141	657	37
Machinery	4 787	13%	601	146	420	35
Apparel	2 267	11%	239	81	152	6
Plastics & rubber	2 002	11%	220	47	159	15
Metal products	955	11%	108	26	76	6
Other subsectors	7 422	11%	821	182	579	60
<b>Total</b>	<b>24 343</b>	<b>12%</b>	<b>2 824</b>	<b>623</b>	<b>2 043</b>	<b>159</b>

Source: International Trade Centre (2020)

#### 4. Measuring Global Value Chains

Measurement of GVCs is a challenging course because customs data, which is the standard source for international trade flows, provide information on where the good was produced and where it is flowing to, but not on how it was produced and how it will be used. It is not recorded which countries contributed value to the good and whether it will be fully consumed in the importing country, or whether it will be re-exported after the importing country adds value to it. In order to trace value-added trade flows (GVC trade) across countries, it is required to combine information from customs offices with national input-output tables to construct global input-output tables in the end. The most widely known combination studies are cited below (World Bank, 2020):

- World Input-Output Database (WIOD), a collaborative project led by researchers at the University of Groningen;
- the Trade in Value Added (TiVA) database compiled by the Organisation for Economic Co-operation and Development (OECD);
- the Eora global supply chain database, constructed by a team of researchers at the University of Sydney.

Including the International Trade Center's simulation referred in previous chapter, the studies on value-added participation in trade use the input-output tables in their projections. "ITC Value Chain Indicator" has been utilized for vertical product diversification and regional value chain development.

Input-output theory was first developed by Wassily Leontief to analyze inter-industrial relations in an economy, and the economist was awarded the Nobel prize for his work in 1973 (Lindbeck, 1992). The idea is based on the fact that the sectors of an economy are in an input-output relationship. Matrices are constituted with industries' inputs and outputs in production and technical coefficients are used in the input-output tables to describe the strength of this relationship.

Global input-output tables can be used to analyze to which production processes have globalized in recent years and how countries and sectors participate in GVCs. Alternative ways of measuring the extent can be used by the researchers. A natural measure of the importance of GVC trade is the share of trade that flows through at least two borders. However, the direction of the participation to the trade in value adding process becomes a distinguisher. Two broad types of GVC trade are (World Bank, 2020):

- It is entitled "backward GVC participation", when a country's exports embody value added previously imported from abroad, which means the intermediates used in exports are from the previous stage.
- It is entitled "forward GVC participation", when a country's exports are embodied in the importing country's

exports to third countries, which means the exporter is at the early stage of production of a final good.

It should be noted that global input–output tables have limitations. One limitation is that because they rely on aggregated input–output data, the resulting sectoral disaggregation of GVC flows cannot be very detailed and fully in compliance with the broadly defined sectors. Another important limitation in constructing the global input–output tables is that because bilateral intermediate input trade flows cannot be readily read from customs data or national input–output tables, researchers have to make strong assumptions to back out them (World Bank, 2020). An other not limitation but obstacle is that to make up-to-date analysis on value-added trade may not be possible through the ready databases addressed above since they are not instantly updated. For this reason, the extent of Turkey’s sectoral dependence on the GVCs will be examined via OECD’s analysis. Additionally, it is important to mention that, for the same reason of the lack of instant data, analysis on the effect of Covid-19 pandemic on GVCs will not be applicable currently.

## 5. Turkey’s Integration into GVCs

Turkey's integration into global value chains has increased in years. While this development was mostly through backward GVC participation until 2011, the change in forward GVC participation remained relatively flat over the years. In the period after 2011, the backward GVC participation rate decreased; it is seen that forward GVC participation has increased.

According to the OECD’s TiVA database which covers 64 economies and 36 industrial sectors for the years 2005-2015, global GVC integration has steadily declined in recent years (OECD, 2018). As an indicator of GVC integration, the foreign content of Turkey’s exports has declined to 16,5% in line with the global trends. However, this percentage is 1,1 points larger than the level in 2005. The OECD average and EU28 average is far above the Turkey. This percentage is generally higher in countries with relatively open and liberal trade regimes and high degrees of foreign investment (OECD, 2018).

As an indicator of the role of foreign final demand in domestic production, 20% of Turkey’s domestic value added in 2015 was driven by consumption abroad. Motor vehicles (55,9%), basic metals (52,8%) are the industries with highest percentages. As an indicator of the importance of imports for exports, the foreign value-added content of gross exports are highest in electrical equipment (33,6%), coke and refined petroleum products (32,8%) and motor vehicles (27,4%). Approximately 29% of the total value of Turkey’s imports of intermediate goods and services was embodied in exports subsequently, - this ratio is 45,5% in OECD. By originating

industries, the highest shares of intermediate imports used in exports are motor vehicle (46,5%), textiles and apparel (35,9%) and base metals (34%). When the main trade partners of Turkey are examined in gross terms including goods and services, it is seen that value-added content of Turkey’s exports are lower than value-added content of Turkey’s imports. China is Turkey’s largest source of imports and it ranks seventh in Turkey’s export markets in value added and in gross terms. Turkey has highly integrated with European countries.

## 6. After-COVID19 Trends Affecting GVCs and Countries Individually

With the supply shock encountered with the pandemic outbreak, companies get into search for ways to build resilience, regain and improve the competitiveness and prepare for future shocks. It needs both short and long term decisions and investments and the discussions include less GVC integration and more self sufficiency and regional integration. The following are the topics discussed often about the forming aspects of the new age supply organizations:

- Return to nationalism and protectionist policies that potentially reduce globality of supply chains,
- Multi-sourcing, as the ability for a supply planning system to intelligently choose between alternate sources of supply,
- Supply network restructuring, as the change and re-definition of the structure of supplier base by initiating new contracts and revising the existing ones,
- Near-shoring, as the outsourcing of business processes, to companies in a nearby country, often sharing a border or speaking the same mother tongue with the target country,
- Reshoring, as the process of returning the production and manufacturing of goods back to the company's original country.

The following steps are taken currently:

- Increasing domestic supply,
- Domestic supply for self-sufficiency in critical products,
- Keeping higher inventories against instant risks,
- Increasing the number of suppliers,
- Shortening of supply distances and times,
- Establishing new regional networks in supply chains,
- The relocation of some of the existing foreign capital investments from Asia into new supply chain networks,
- Reduction of new foreign capital investments, but investments are still made in regional supply chain networks,
- Focusing on players in new supply chain networks in the financing of trade and investments,

- Extending buyer-supplier relationships on the value chain beyond the sole production activities, making R&D and innovation collaboratively,
- Modular design and separation of production into modules instead of parts,
- Using safe and green production as the main criterion in establishing new supply chains,
- Negotiating to revize the existing trade agreements trade agreements and to sign new ones according to anew emerging value networks, creating new trade and customs union areas for new supply chain networks,
- More public-private cooperation,
- Development of automation and the use of digital technologies in all steps of the supply chains, adopting online B2B.

As the agenda of the business World shows, the Covid-19 pandemic puts the globalization process to a serious test. The crisis highlights some of the systemic issues related to the liberal economic order and rule-based trade order that have been questioned recently. World Trade Organization, which is the only body to provide a rule-based global trade environment, is regarded to have a weak enforcement power while the measures violating its rules are taken and/or are not notified as should be done by rule. Many countries have been taking trade restrictive measure in order to satisfy the domestic demand especially in personal protective equipment. Although most of the measures have gone unapplied at the end of the year 2020, it is important to foresee the possibility of the future interruption of the supply chain especially during pandemic periods when the need for medical equipment and drugs increases. In the event of countries' being in the search of different ways to satisfy the domestic demands, the countries which are highly integrated on GVCs and have high foreign trade / GDP ratios encounter the higher risks in terms of economic growth.

McKinsey's study on GVCs shows that whether that involves reverting to domestic production, nearshoring, or new rounds of offshoring to new locations, 16 to 26% of exports could be relocating with the shift of GVCs in the next five years, and the value chains with the largest share of total exports potentially in play are pharmaceuticals, apparel, and communication equipment (McKinsey Global Institute, 2020). The value chains with the largest potential- in dollar terms- to shift production to new places are petroleum, apparel, and pharmaceuticals. However, any mathematically profitable act may not be feasible in practise.

Resource-intensive value chains, like mining, agriculture, and energy, are generally constrained by the location of natural resources of crucial inputs. But policy considerations may enable new exploration and development moving value chains at the margins. For instance, the chance to move petroleum production is limited but if the price of oil rises

and/or new technologies makes it possible, exploration and extraction now considered uneconomic in some sites could become viable.

Labor-intensive value chains, like furniture, textiles, and apparel are more probable and easier to shift and they have already been experiencing shifts. In 2005, China exported 71% of the finished apparel goods it produced. However, that share dropped to 29% in 2018. But its wages have been rising, and Chinese producers have been focusing on domestic market rather than exporting. Turkey has competitive advantages in this industry such as its raw material resources, existing high export volume, "high-quality" market perception, about 1 million human resource employed in the industry.

The value chains in the global innovations category which incorporates semiconductors, automotive, aerospace, machinery, communication, and pharmaceuticals are seen to be subject to intervention from governments because of their high value, cutting-edge technologies, perceived traditional importance for national competitiveness, and the trade measures for the same reasons made during Covid-19 pandemic. Moving these value chains may need government level cooperation in decision making (McKinsey Global Institute, 2020). Turkey has competitive advantage in automotive as it is already the top industry in the country's exports.

The US-China trade wars were expected to slow down with the first phase trade agreement signed at the beginning of 2020. The changing trends after the pandemic and the disagreements between US and China that have come back to the agenda in the recent period cause question marks about the future of relations between the two countries, as well as China's role in global trade in general. Considering the possible effects of the trend changes on countries and regions, it is evaluated that Vietnam can gain an advantage as a result of shifting some of the production to other countries in Asia in order to reduce dependence on China, and so does Mexico in North America in general means, disregard with specific sectoral shifts. Decreasing Chinese exports due to trade wars and Covid-19 crisis enables export opportunities for Turkish manufacturers, whose exports are much smaller compared to exports of Chinese and other Asian manufacturers.

India, which already provides advanced services in the field of information and communication technologies, is assessed as it will increase its share in the global market. In addition, countries with developed human capital will be able to gain an advantage in integrating into value chains for innovative goods and services and attracting investments in ICT.

Turkey's geographically proximity to Europe is a big opportunity to benefit from the nearshoring and multi-sourcing trends. Modernisation of the Customs Union, a trade

agreement with the UK would lower the trade costs and strengthen the commercial relations between EU+UK and Turkey taking into account that this region already constitutes about %50 of Turkey's exports, %32,8% of global imports, %21,8 of world GDP. Turkey's manufacturing footprint and competitive advantages may rise as an opportunity to benefit from the reshoring trends in USA which constitutes 12,8% of global imports and 23,8% of world GDP (The World Bank).

## 7. Conclusion

The global value chains (GVCs) explain the distribution of the production processes across countries, the value added by countries on goods and services before being consumed. GVCs has grown for years as globalization expanded. Consequently, international trade has increased in parallel to the GVCs growth. However, growth pace has decreased in the last years due to slowing pace of global economy in overall, backset of trade reforms, and the protectionist attitudes and the increasing uncertainty, which is in reciprocal relationship with openness to trade and investment flows. Several indicators of uncertainty have been shown to correlate with international trade and economic growth. Thus, before the supply chain disruptions caused by Covid-19 pandemic, GVCs have already being disrupted. The US-China trade tensions have been in interest of all commercial parties in the World, as they are the two trade hubs. Many surveys with the organization leaders reveals that sourcing and manufacturing activities were moved out of China to some extent before the pandemic and/or it is within the plans for next couple of years. After the Covid-19 pandemic outbreak, companies encountered capacity disruptions in their supply chains, doubling lead times and shortages due to the transportation restrictions. This reality has shown the vulnerabilities of integrated supply chain networks to the business leaders and policy makers and has made them rethink about the globalization and the way they plan, invest and operate.

The interdependencies among the economies have been discussed now more than before. Just a two-month long shutdown of industrial production in China, the European Union (UK included) and the United States may cause great import and export losses for all countries on the globe, a study by ITC shows. The study results point to the dominance of the G3 in international trade and width of domain of the G3. G3 represents 63% of supply chain imports and 64% of supply chain exports thus a two-month long complete shutdown of all manufacturing production in these hubs affect the trade all around the World. For Turkey, in such a manufacturing shutdown case of G3 for 2 months, export losses are expected to realize in motor vehicles and parts, machinery, plastics and rubber, ferrous metals, and metal products while import losses are in motor vehicles and parts, machinery, apparel, plastics and rubber, and metal products. The convergence between the industry groups in the export loss and import loss industry

groups of Turkey can be interpreted as that the industries Turkey is most globally interdependent are its leading exporting industries. However, it should be noted to keep in mind that the aggregated data in value-added trade calculations may mislead sectoral assessment.

Customs data which is the standard source for international trade flows, provide information on where the good was produced and where it is flowing to, but not on how it was produced and how it will be used, therefore, the added-value trade is not found in it directly. In order to trace value-added trade flows (GVC trade) across countries, it is required to combine information from customs offices with national input-output tables to construct global input-output tables. Studying Turkey's position on GVCs shows that:

- Turkey's integration into global value chains has increased in years.
- Turkey's GVC integration was mostly through backward GVC participation until 2011, the change in forward GVC participation remained relatively flat over the years. That is, the intermediates used in Turkey's exports were from the previous stage.
- In the period after 2011, the backward GVC participation rate decreased; it is seen that forward GVC participation has increased. That is, Turkey started to take place at the early stage of production of the final goods (and/or services) in its exports.
- As an indicator of GVC integration, the foreign content of exports is generally higher in countries with relatively open and liberal trade regimes and high degrees of foreign investment. Turkey is much less integrated to GVCs compared to EU and OECD averages.
- Approximately 29% of the total value of Turkey's imports of intermediate goods and services was embodied in exports subsequently, - this ratio is 45,5% in OECD. By originating industries, the highest shares of intermediate imports used in exports are motor vehicle (46,5%), textiles and apparel (35,9%) and base metals (34%).
- Motor vehicles and basic metals are the top industries where role of foreign final demand in domestic production is observed.
- Electrical equipment, coke and refined petroleum products, and motor vehicles are the top industries where the importance of imports for exports is high.
- China is Turkey's largest source of imports and it ranks seventh in Turkey's export markets in value added and in gross terms.
- Turkey has highly integrated with European countries.

With the Covid-19's transition effects, several trends blossomed and/or were triggered and discussions include less GVC integration and more self sufficiency and regional integration Supply network restructuring is discussed and



acted towards as the change and re-definition of the structure of supplier base by initiating new contracts and revising the existing ones.

Near-shoring, as the outsourcing of business processes, to companies in a nearby country, often sharing a border or speaking the same mother tongue with the target country, and reshoring, as the process of returning the production and manufacturing of goods back to the home country, have been significant concepts of whom future and economic effects are tried to be measured. Return to nationalism and protectionist policies that potentially reduce globality of supply chains are expected by both many politicians and many economists. Multi-sourcing, as the ability for a supply planning system to intelligently choose between alternate sources of supply is on the table since depending on one major source caused disruptions on the supply chain when the pandemic first outbreak. McKinsey's study on GVCs shows that whether that involves reverting to domestic production, nearshoring, or new rounds of offshoring to new locations, 16 to 26% of exports worth \$2.9 trillion to \$4.6 trillion could be relocating with the shift of GVCs in the next five years, and the value chains with the largest share. Economic result for the countries – and also companies- which are highly integrated in the GVCs are discussed to be possibly fierce.

The need for business leaders and policy makers to fundamentally rethink the way they plan, invest and operate in the future is underlined and Turkey is expected to obtain opportunities to reposition itself in the global supply chain and expand its exports in many industries against loss in foreign trade and economic output. Turkey has the opportunity to benefit from its proximity to EU, to deliver additional exports to US due to trade wars and the attitude against China.

## References

- Ahir, H., Bloom, N., & Furceri, D. (2018, October 29). The World Uncertainty Index. doi: 10.2139/ssrn.3275033
- Gartner, Inc. (2020, June 24). Gartner Survey Reveals 33% of Supply Chain Leaders Moved Business Out of China or Plan to by 2023. Press Release. Stamford, Conn. Gartner Geraint John | Kamala Raman. Retrieved from <https://www.gartner.com/en/newsroom/press-releases/2020-06-24-gartner-survey-reveals-33-percent-of-supply-chain-leaders-moved-business-out-of-china-or-plan-to-by-2023>
- Hille, K. (2020, August 18). China's share of global exports falls in supply chains rethink. Financial Times. Retrieved from <https://www.ft.com/content/bfef2854-f8f3-4ce6-a00f-3b11123b01e8/>
- International Trade Centre. (2020, June). SME Competitiveness Outlook 2020: COVID-19: The Great Lockdown and its Impact on Small Business. Geneva: ITC. Retrieved from <https://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/ITCSMECO2020.pdf/>
- Lambert, L. (2020, March 11). 75% of companies report coronavirus has disrupted their supply chains. Fortune. Retrieved from <https://fortune.com/2020/03/11/75-of-companies-report-coronavirus-has-disrupted-their-supply-chains/>
- Lindbeck, A. (Ed). (1992). Nobel lectures, economics 1969-1980. Singapore: World Scientific Publishing Co.
- McKinsey Global Institute. (2020, August 6). Risk, resilience, and rebalancing in global value chains. Retrieved from <https://www.mckinsey.com/business-functions/operations/our-insights/risk-resilience-and-rebalancing-in-global-value-chains/>
- OECD. (2018, December). Trade in value added. Retrieved from <http://www.oecd.org/industry/ind/TIVA-2018-Turkey.pdf>
- OECD. (2018, December). Trade in value-added indicators guide to country notes. Retrieved from <http://www.oecd.org/sti/ind/tiva-2018-guide-to-country-notes.pdf>
- PwC. (2020, August 11). CEOs: Post-covid changes are permanent and there are more to come. Retried from <https://www.pwc.com/gx/en/news-room/press-releases/2020/ceo-survey-covid-update.html>
- World Bank. (n.d). GDP (current US\$) [Data file]. Retrieved from <https://data.worldbank.org/>
- World Bank. (2020). World Development Report 2020: Trading for Development in the Age of Global Value Chains.

Washington, DC: World Bank. doi:10.1596/978-1-4648-1457-0

World Trade Organization. (2020, August 12). Trade Costs in the Time of Pandemic. Retrieved from [https://www.wto.org/english/tratop\\_e/covid19\\_e/trade\\_costs\\_report\\_e.pdf](https://www.wto.org/english/tratop_e/covid19_e/trade_costs_report_e.pdf)

World Uncertainty Index Data. (2020, July 2020). Retrieved from <https://worlduncertaintyindex.com/data/>