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## Russian Industry in Global Value-Added Chains

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**Abstract:**

*The paper analyzes Russia's participation in global value-added chains in the context of global trends in their development and the challenges facing the Russian economy in modernizing its industry.*

*The analysis is based on the OECD's TiVA indicators. The results indicate that the extent of Russia's involvement in GVACs is very significant, but the nature of this participation is purely raw.*

*The specificity of the participation of the Russian Federation in the international fragmentation of production within GVACs is that most of the links in value chains are bottom-up. Russia is extremely limited in using imported flows to create export products with high added value.*

*The study confirms that in the international division of labor, Russia retains a historically established specialization, with predominance in the export of mineral and agricultural raw materials, which determines the current profile of Russia's participation in global value-added chains.*

**Keywords:** *Global value-added chains, Competitiveness, International division of labor, Import substitution.*

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## 1. Introduction

At present, industrial policy is implemented in Russia aimed at modernizing national industries and producing competitive products that involves the technological re-equipment of the economy sectors based on the high growth rate of renewal of fixed assets, growth of innovative activity of enterprises, introduction of new technologies and advanced methods in management, work, large-scale investment, development of human capital. The organization of the production process has undergone significant changes in the last two to three decades. Today, the production process goes beyond national boundaries, being split into specialized operations and distributed among the links of global value-added chains (GVACs). Involvement of countries in such GVACs has long become a modern way of participating by countries in the international division of labor, which introduces fundamental changes in national economic strategies. The approach from the position of value-added chains allows for a deeper exploration of the aspects of the interaction between different sectors of the economy of different countries, identifying trends and opportunities for modernization, identifying barriers to economic development and potential risks, and developing recommendations on public policy to eliminate them.

Despite the huge number of publications united by the themes of the development of GVACs in the world and in individual countries, the issues of Russia's participation in global value chains are largely white spots. To date, there are very few publications on the problems of Russia's participation in GVACs and the possibility of modernizing the economy from the perspective of the value-added approach, while the ongoing modernization policy requires a deeper understanding of Russia's role in global value-added chains in order to identify opportunities for the modernization of the Russian economy and its branches and the development on their basis of recommendations for improving public policy measures.

In this connection, the need for an analysis of the degree and quality of involvement of the Russian economy in global value-added chains is very relevant and timely, which has determined the purpose of this study.

## 2. Literature review

The analysis of countries' participation in global value-added chains significantly changes the understanding of competitiveness. In the context of value-added chains, the competitiveness of the industry and the economy includes not only the competitiveness of a firm, industry or economy, but the “competitiveness” of their place in the chain (Avdasheva *et al.*, 2005). Institutional context significantly impacts international behavior of firms by facilitating or restricting internationalization processes (Korsakienė *et al.*, 2015; Bondarenko *et al.*, 2017).

In the context of country participation in GVACs, modernization is defined as improving the ability of a firm, industry or economy as a whole to move to more complex and profitable economic niches based on the use of higher-skill labor (Gereffi, 1999) or as a transition from economic activity with a low added value to economic activity with higher added value based on internal innovation resources and capabilities, and continuous improvement of processes, products and functions (McDermott, 2007; Prause, 2016). The concept of modernization within the framework of the value chain approach is because it is important for the country's development to move to higher value-added chains or links in the same value creation chain (Gereffi and Kaplinsky, 2001; Bogdanova *et al.*, 2016).

Within the framework of the value-added chain approach, the opportunities for modernizing economies and their sectors for economic growth are considered both in terms of creating high added value and in terms of its redistribution within GVACs. Humphrey and Schmitz (2002) point to several types of modernization, representing different “niches”.

First, modernization of a link in the chain. Modernization of processes: increasing the efficiency of production processes through the reorganization of the production system and the use of advanced technologies; or product upgrading: shifting to more complex products or products with higher added value. Second, a functional upgrade, implying a transition to a more profitable link in the chain. Third, modernization of the chain – transition to more profitable chains of value creation. The first two types of modernization relate to upgrading the chain of value creation within the link, the second type involves moving along the value chain towards more profitable links and the third type of modernization involves moving to a new value chain (Dzhukha *et al.*, 2017; Kormishkin *et al.*, 2016).

Factors contributing to the emergence and wide spread of GVACs are analyzed in the works of Kee and Tang (2016), Moïse and Sorescu (2015) factors reducing the use of offshoring in developing economies and the return of production to developed economies are shown in a study by De Backer *et al.* (2016); the impact of revolutionary advances in information and communication technologies (ICTs) on the development of production fragmentation and GVACs are highlighted in the works of Baldwin (2016), Strange and Zucchella (2017), Fyodorov and Kuzmin (2013); the involvement of the service sector in international fragmentation is shown in Miroudot (2017); the impact of countries' participation in GVACs on economic growth in Baldwin and Yan (2014), Keller and Yeaple (2009), Ataseven and Nair (2017), Chang *et al.* (2016), Smorodinskaya and Katukov (2017); the negative consequences of offshoring for the economies of developed countries in the form of job cuts and lower wages for low-skilled workers – in Geishecker (2008); the unforeseen consequences of the policy of sanctions in the form of trade losses of countries not participating in the sanctions war (Israel and Switzerland) are disclosed in the work of Sanandaji and Avorin (2018), in of the Pacific Region in the work of Shakhovskaya *et al.* (2018), in of the Russian region in the work of Chernova *et al.*

(2017).

Nevertheless, the processes of industrial modernization of the countries with a transitional economy the Russian Federation, are not sufficiently studied from the position of participation in global value-added chains. Volchkova and Turdyeva (2016) believe that Russia is weakly involved in the international division of labor and global value-added chains, while deep integration into the world economy would help avoid sanctions because interests of business always outstrip the politics. Smorodinskaya and Katukov (2017) hold a different opinion on Russia's involvement in GVACs. Their research shows that Russia's economy is characterized by a high degree of participation in GVACs, which exceeds the world average, but emphasizes the primitive nature of Russia's participation in the international division of labor and the mineral wealth background of this participation.

### **3. Materials and Methods**

The analysis of Russia's participation in GVACs is based on the indicators of TiVA (Trade in Value Added) published by OECD (OECD, 2017a; 2017b). In view of the fact that official statistics of the countries of the world are usually available with a delay of two to three years after the reporting period, TiVA indicators are fully represented by the OECD for the period from 1995 to 2011 inclusive. TiVA indicators for 2012-2014 are represented by the shortened nomenclature being somewhat predictive, which does not exclude a certain inaccuracy, but in no way reduces their significance for analysis (OECD, 2017c). The study was based on the following indicators:

- Value-added as a share of gross output, by industry;
- Domestic value-added embodied in gross exports;
- Foreign value-added content of gross exports, by industry;
- Domestic value-added share of gross imports;
- Domestic value-added embodied in foreign final demand;
- Foreign value-added embodied in domestic final demand;
- Origin of value-added in gross exports;
- Origin of value-added in final demand;
- Origin of value-added in gross imports.

Trade in value added is a statistical approach used to evaluate sources of added value in the production of goods and services for exports and imports by country and industry. Unlike traditional methods of measuring international trade, which register gross flows of goods and services each time they cross borders, the chosen approach monitors the added value of each industry and country in the production chain.

### **4. Results**

In the period from 2000 to 2011, the rate of growth in value added in the Russian Federation was the highest in the world (7.13%), with the outgrowing growth of gross exports of final products (OECD, 2016a). The share of foreign VA (value added) in gross exports, the most significant growth of which was observed in some developing countries (India +12.7%, Vietnam +9.1%), Asia-Pacific (South Korea +11.9%, Taiwan (PRC) +11.3%, Japan +7.3%), as well as some EU countries (Germany +5.5%, the UK +4.9%), in Russia, as in other BRICS countries, with the exception of India and South, significantly decreased: in Russia by 4.5%, in China – by 3.8%, in Brazil – by 0.7% (OECD, 2016a).

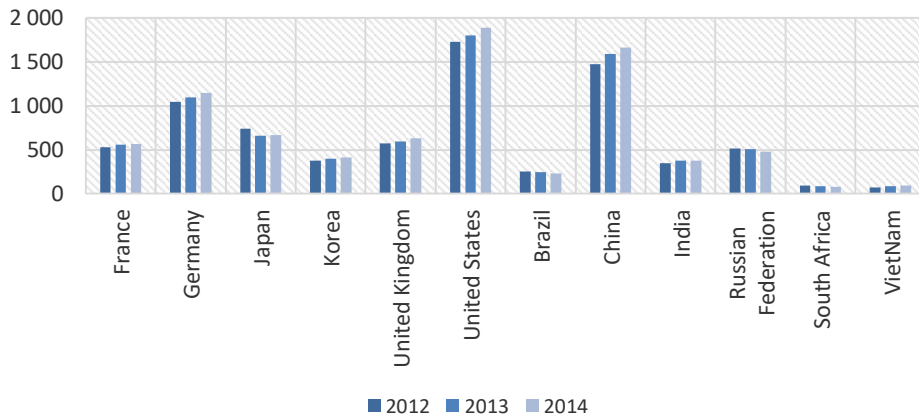
The re-importation of the national VA in Russia's gross exports in 2000 was well below most developed countries, grew more than 5 times by 2011, but remains low (\$1,678 billion). Meantime, in the BRICS countries, this indicator has grown significantly: in India, by more than 45 times (up to \$469.7 billion in 2011), in China by almost 25 times (\$18,912.2 billion in 2011), in Brazil – by 12.39 times (\$192.0 billion in 2011), which is rather a reflection of the effect of the “low base”. In the EU countries, the re-importation of the national VA, which was previously at a high level, almost quadrupled in Germany. Most of all, in 2011, the following countries re-imported their VA: China (\$18,912.2 billion), Germany (\$14,524.7 billion), the United States (\$13,705.1 billion) (OECD, 2016a). In the re-export of intermediate imports, China leads, followed by Germany, the United States, the countries of the Asia-Pacific (South Korea, Japan, Taiwan). The Russian Federation in terms of re-export of intermediate imports in 2011 was among the ten largest re-exporters (\$80,515.8 billion), which is characterized by its rather high involvement in the international fragmentation of production in this period (OECD, 2016a).

The analysis of indicators of trade in value added by the reduced nomenclature (TiVA) for the period from 2012 to 2014 shows the decline in the Russian VA in gross exports (Fig. 1) against the background of the growth of this indicator in most developed countries (with the exception of Japan, where it declined by 11%) and some BRICS countries (Brazil and South Africa, a decrease of 7% and 8%, respectively). The most significant growth of VA in gross exports was recorded in Vietnam (+26%), China (+13%), developed EU countries (Germany and the UK +10%) and the USA (+10%) (Fig. 1).

In 2014, compared to 2012, Russia's added value in foreign final demand declined (by 6%) in 2014 due to a decline in the export of Russian products to foreign markets against the backdrop of a noticeable growth in several foreign countries: by 9-10% in developed EU countries (the UK, Germany, France) and the USA. VA increased significantly in foreign final demand in Vietnam (+26%) and China (+13%). The reduction in foreign value added in Russia's domestic final demand in 2012-2014 amounted to 11.47%, while in the rapidly growing economies of Southeast Asia and Vietnam, there were significant growth rates of this indicator (+28% and +11%, respectively). The leading economies of Western Europe and

North America also demonstrated their growing involvement in GVACs: the UK +9%, Germany +8%, France +6%, USA +4%.

**Figure 1.** Domestic value added in gross exports in 2012-2014, \$ million



*Source:* Compiled by the authors on the basis of OECD (2016b).

Also, due to lower imports, there was a reduction in foreign value added in Russia's gross exports (by 2.5%), while the share of foreign value added in Russia's gross exports is relatively low: from 13.5% to 14%, while in the developed European countries it exceeds 25%, in the USA it keeps at a level slightly above 15%, in China – about 30%, and in Korea and Vietnam exceeds 37% and 36%, respectively. The leader in terms of growth of foreign value added in gross exports was Vietnam (+35%), followed by Japan (+14%), the large economies of the EU (Germany, France) and the USA.

Re-exported intermediate imports, as a percentage of intermediate imports, remain stable at just above 30%, which is below the European countries (Germany 52.62%, France 42.92%, the UK 36.9%), Korea (52.69%), China (45.45%), Vietnam (60.8%), the exports of which are highly dependent on re-importation from foreign countries, but lower than the USA and Japan (about 23%).

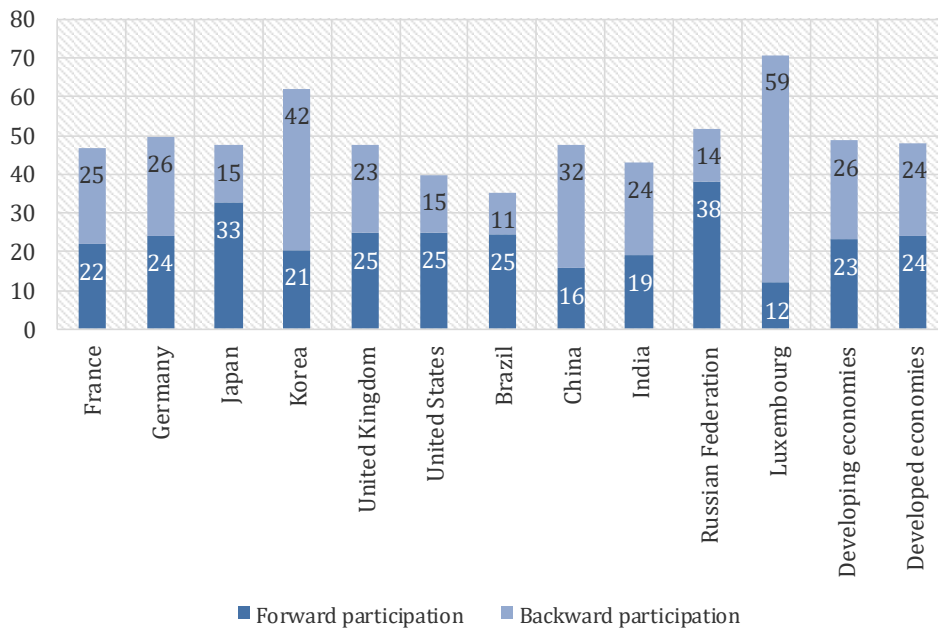
The generalizing index for the participation of countries in GVACs is the participation index. The GVAC participation index consists of two components, reflecting the top-down and bottom-up links in the chain. Individual economies participate in global value creation chains by importing foreign materials to produce goods and services that they export (reverse or top-down participation), and by exporting their intermediate goods and services to partners exporting them (forward or upward participation in GVACs).

Forward participation of the economy in GVACs corresponds to the indicator “domestic added value directed to the third economy” and reflects the domestic

value added that is contained in exports to third countries for further processing through the value-added chain and characterizes the country as a seller for its role in GVACs. Reverse participation in GVACs is correlated with “external addition of content to exports” when the economy imports intermediate products for export (a buyer for its role in GVACs).

The Russian Federation in its involvement in GVACs with a participation index of 51.8 in 2011 was superior to the developed countries of Europe (Germany 49.6, France 47, the UK 47.6) and significantly ahead of the USA (39.8) and even China (47.7), with almost threefold excess of its participation in the bottom-up links, while China and Korea on their participation in GVACs are in the top-down links (Fig. 2).

**Figure 2.** Bottom-up and top-down participation of countries in GVACs in 2011

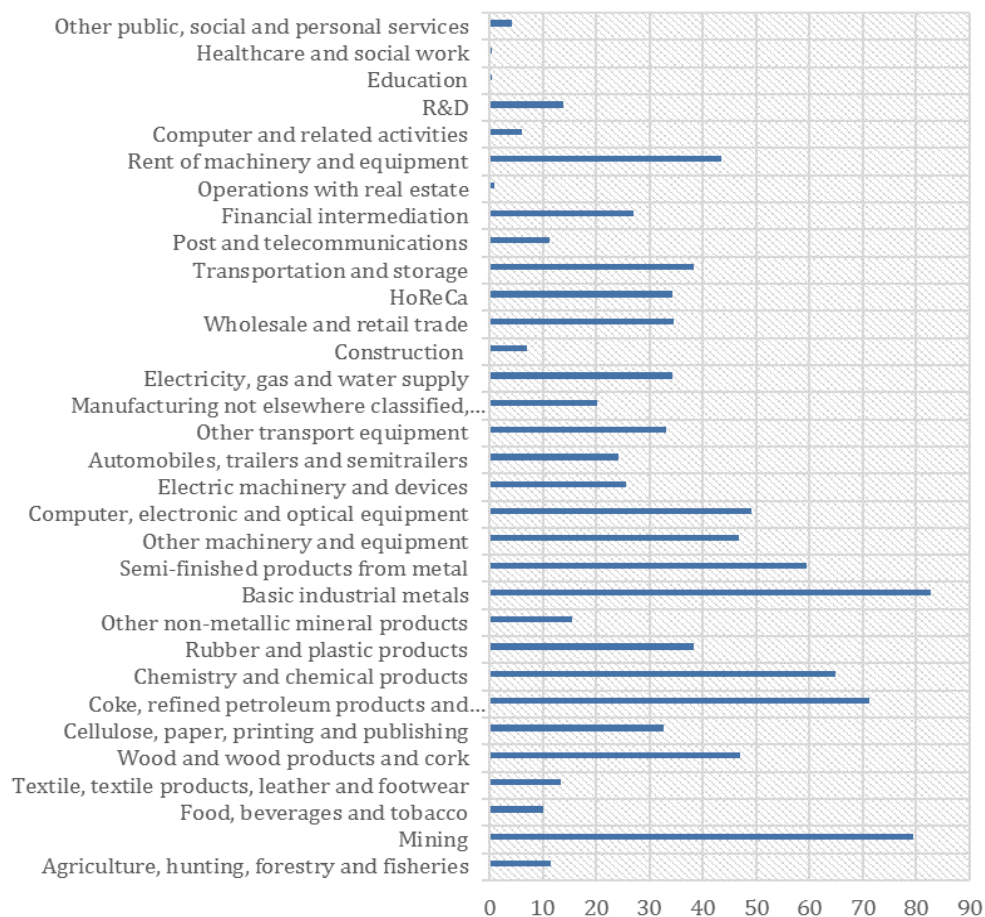


**Source:** Compiled by the authors on the basis of WTO (2017).

The highest participation in GVACs is shown by such small developed countries of Europe as Luxembourg (70.8), Belgium and Slovakia, while large countries, both developed (USA, Canada) and developing (China) show significantly less participation in GVACs. This fact is explained by the size of the economies and their provision with resources.

The share of the Russian value added, conditioned by the global final demand, which for a long time does not exceed the 30% mark, has significant differences by sectors (Figure 3).

**Figure 3.** The share of the Russian value added due to the global final demand by types of economic activity in 2014, percent



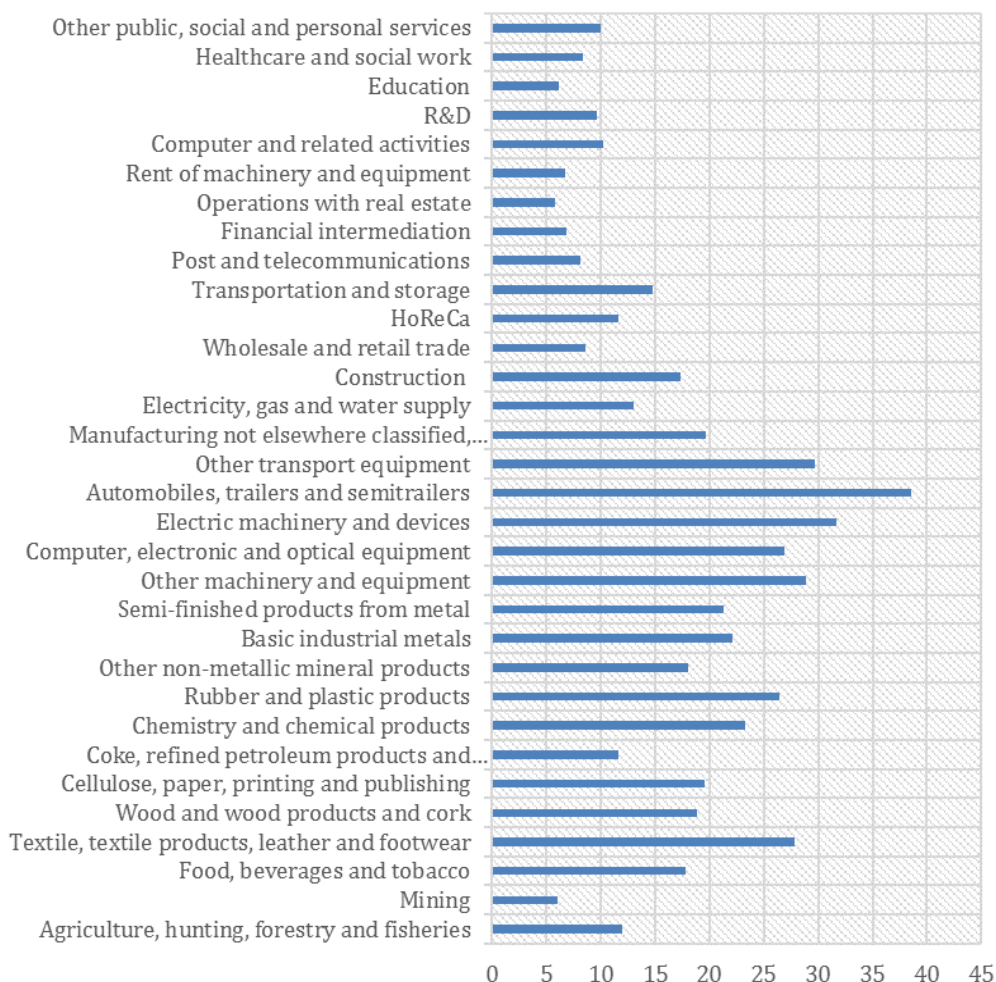
*Source:* Compiled by the authors on the basis of OECD (2016b).

The largest share of the Russian added value due to world final demand was recorded in industrial metals (82.78%) and mining (79.34%), the smallest share – in education, real estate, and healthcare. In agricultural products and in the production of food products, the share of Russian value added is low: 11.35% and 9.99%, respectively, which again indicates the mineral wealth orientation of Russian exports.

The foreign content of Russian exports is most noticeable in machine building (“cars, trailers and semitrailers”, “electrical machines and equipment”, “other transport equipment”) and is almost absent in education, healthcare, real estate operations (Figure 4).



**Figure 4.** Share of foreign value added in Russian exports by types of economic activity in 2014, percent



**Source:** Compiled by the authors on the basis of OECD (2016b).

According to the contribution of the partner countries to the Russian gross exports by value added, the largest share belongs to China (8.7%), followed by Germany (6.46%), Japan (5.53%), Italy (5.16%) and the USA (5.13%).

In the domestic final demand of the Russian Federation, a significant share of the added value belongs to China, the USA, and Germany, and for all countries, it was to some extent reduced in 2014 against the backdrop of anti-Russian sanctions and Russian response measures (Table 1).

**Table 1:** Change in foreign value added in the domestic final demand of the Russian Federation in 2014 compared with 2012, percent

Partner country	2014	Partner country	2014
Australia	85.54	Slovenia	106.55
Austria	98.90	Spain	98.12
Belgium	97.10	Sweden	89.57
Canada	82.92	Switzerland	98.52
Chili	120.85	Turkey	105.83
Czech Republic	90.94	UK	105.04
Denmark	90.08	USA	98.37
Estonia	115.69	Argentina	84.22
Finland	99.20	Brazil	105.89
France	91.15	Bulgaria	101.82
Germany	92.59	China	107.06
Greece	98.71	Cyprus	104.77
Hungary	99.27	Hong Kong (PRC)	106.90
Ireland	102.85	India	104.64
Israel	102.94	Indonesia	93.37
Italy	96.22	Lithuania	97.71
Japan	86.98	Malaysia	100.80
Republic of Korea	86.62	Morocco	113.82
Latvia	111.92	Philippines	91.02
Luxemburg	121.92	Romania	135.36
Mexico	93.64	Saudi Arabia	84.10
Netherlands	100.26	Singapore	102.20
New Zealand	108.65	South Africa	91.56
Norway	83.70	Chinese Taipei	98.45
Poland	103.40	Thailand	113.46
Portugal	104.10	Vietnam	141.24
Slovak Republic	92.16		

*Source:* Compiled by the authors on the basis of OECD (2016b).

On the basis of an analysis of the gross indicators, the three most important export markets of Russia were China (8.2%), Germany (7.7%) and the USA (7.5%), an analysis of export directions for value added adjusts the distribution of trading partners and swaps the USA and China: the USA (10.7%), Germany (8.1%) and China (7.6%).

Similarly, China, Germany and the USA are among the top three importing partners on the basis of gross indicators, although, based on an analysis of value added, the difference between China and the USA is significantly smaller than in the gross measurement, which partly reflects the higher domestic supplementary content of the US exports. In the trade in intermediate goods, the exports of the Russian Federation are directed to China, Germany, Italy, and the USA with a significant increase in China's share (OECD – WTO, 2015).

## 5. Discussion

The participation of countries in global value-added chains is a modern way of international division of labor and the emergence of national producers in global markets. In this connection, the issues of the degree and quality of participation of countries in global value-added chains become the most important challenge for both developing and transition economies and for the economies of developed countries (Smorodinskaya and Katukov, 2017).

As shown by the analysis, the opinion of Volchkova on the weak involvement of the Russian economy in the global economy (Volchkova and Turdyeva, 2016) is mistaken twice: first, Russia is deeply involved in GVACs, although this nature of this involvement leaves much to be desired in terms of its raw materials and, second, there is no doubt that the “too visible hand of politics” in recent years has begun to exert a decisive influence on economic policy, ignoring the interests of business. The analysis of Russia's participation in GVAC on the basis of the value-added approach on the whole confirms the results obtained in the study by Smorodinskaya and Katukov (2017).

Currently, despite the significant scale of Russia's participation in GVACs, the effectiveness of its participation does not correspond to the potential of the Russian economy and the national tasks of industrial modernization. And, although the analysis showed that the extent of Russia's involvement in GVACs is very significant, the nature of this participation is purely related to mineral wealth. The specificity of participation of the Russian Federation in the international fragmentation of production within GVACs is that most of the links in the value-added chains to which Russia is involved, including metallurgy, mining and chemical industries, telecommunications, etc., are upward, which means that foreign countries use goods exported from Russia as raw materials or components in their own production. Similar results were obtained in (Smorodinskaya and Katukov, 2017) for the period until 2011, where it was shown that the domestic value added, introduced by Russia into the global chains, is formed by more than 80% by the exports of mineral wealth and other intermediate goods that are widely used by other countries to make products with a high degree of processing.

Russia's leadership in the exports of domestic value added is ensured by the exports of primary commodities. As in 2011, in the structure of exports of domestic value added, the key positions are taken by the mining industry (79.34%) and basic metals (82.78%). At the same time, Russia itself is extremely limited in using imported flows to create export products with high value added. This specialization prevents Russia from moving up the links of value chains (Smorodinskaya and Katukov, 2017). The resources exported from Russia are returned to the economy of Russia already in the form of finished goods with an appropriate markup, which is further exacerbated by existing tariff and non-tariff trade restrictions (Meshkova and Moiseevchev, 2015). In particular, Russia leads by the number of trade barriers (36

trade barriers) followed by China (25), Indonesia (23), India (21), Brazil (21) South Korea (20), Turkey (20), the USA (20), Australia (14), Thailand (12), Argentina (11) and Mexico (10) (European Commission, 2018).

The analysis shows that in the international division of labor, Russia retains a historically developed specialization, with predominance in the export of mineral wealth, metals, fertilizers and agricultural raw materials, which determines the current profile of Russia's participation in GVACs. And although the global competitiveness index of Russia in 2018 reached a record level of 4.64 points, which allowed it to take the 38<sup>th</sup> place out of 137 countries, it still lags far behind most developed countries and countries with fast-growing economies (WEF, 2018).

The current position of Russia in GVACs does not provide it with possible long-term benefits from such participation and is inconsistent with those medium- and long-term tasks of scientific and technological innovation development that are fixed in key strategic and policy documents. The analysis of the TiVA database confirms that Russia faces a serious challenge to improve its economic modernization strategy, considering the new understanding of the global trade processes.

## **6. Conclusion**

The need to identify opportunities to modernize the economy and its industries and develop related recommendations to improve the measures of the governmental industrial policy of the Russian Federation requires a deeper understanding of the country's role in GVACs. An analysis based on the value-added approach showed that the mineral wealth related nature of Russia's participation in GVACs does not contribute to the successful solution of the tasks of modernizing Russian industry. Mineral wealth specialization of the Russian economy in the global international division of labor with the bottom-up location of the Russian links of the chain hinders the renovation and development of manufacturing industries. Russian mineral wealth and materials exported for processing to other countries are returned back to the Russian economy already in the form of finished products.

The existing position of Russia in global chains prevents the obtaining of long-term economic benefits from such participation and does not correspond to the tasks of scientific and technological innovation development facing the Russian industry. The possibility of accelerating the growth rates of the Russian economy and modernizing the industry is seen by the authors in the need for export-oriented import substitution.

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