

TRANSFORMATION OF GLOBAL VALUE CHAINS BASED ON VECTORS OF TECHNOLOGICAL DEVELOPMENT

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ABSTRACT

The importance of global value chains in the context of global production is identified in the article and argues areas for their improvement. The main vectors and driving forces of the technological development of the industry (3D-printing, industrial Internet, robotics) are analyzed. Based on the analysis of statistical materials of the United Nations Industrial Development Organization (UNIDO, UN), it was concluded that there is a high correlation between changes in the nature of the industrialization of developed countries and the formation of new generation global value chains. The value added of intermediate goods in the gross export of European countries and the world average has been studied. The aggregate index of participation in global value chains of European countries and countries around the world has been determined. The dynamics of the structure of manufacturability of export products of European countries is analyzed.

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Industrial and commercial capital have contributed to the process of globalization, forming a distinct type of international economic networks or global commodity chains. The creation of global product chains and global value chains is facilitated by international differences in production costs, such as lower wages and lower transport and trade costs, tax differentials, better logistics, stronger property rights protection mechanism and contract enforcement, and others.

The value chain is understood as an activity that creates added value during which a product (service) goes through all stages: idea, design, production, marketing, sales and service. The cost of goods (services) increases at each segment of the value chain. The complexity of the value chain and the links between the participants in the various stages of this activity depends on the country and enterprise.

Global value chains are one of the most important objects of analysis in the context of global production. They are typical for capital- and knowledge-intensive industries such as the aircraft industry, the automotive industry, the computer industry, heavy engineering and the semiconductor industry.

The existence of various types of global value chains raises questions about the nature of industrial policy aimed at improving the position of companies, industries and countries in such chains, or directions for improving value chains [1].

The first direction includes the improvement of the product (service) itself and launch to the market of new products that differ in consumer properties.

The second way is the transition from one value chain to another.

The third area is functional improvement, or the search for less competitive niches in the value chains.

The fourth direction is the improvement of the technological and production process, leading to the minimization of production costs.

Technological development vectors such as the large-scale implementation of 3D printing, the industrial Internet, robotization and new energy sources not only revolutionize industrial production, but also lead to a radical transformation of global value chains – the basis of the modern model of the international division of labor and the production management mechanism.

Many western experts surely talk about the breakthrough potential of layer-by-layer build-up and object synthesis technologies. 3D-technologies have the most disruptive potential for future business models in the engineering and manufacturing industries through the formation and growth of software platforms that will coordinate 3D-ecosystems.

The perspective of smart manufacturing involves creating an environment where all information – from the factory machine to the supply chain will be available in real time. Management will be able to improve business processes by monitoring the current state of capital assets, technological processes, resources and ready-made products.

Based on the analysis of the statistical materials of the United Nations Industrial Development Organization (UNIDO, UN), it can be concluded that there is a high correlation between changes in the nature of the industrialization of developed countries and the formation of new generation global value chains. This connection should be taken into account by governments when forming an adequate type of industrial policy, which, in order to increase its effectiveness, must be coordinated with other countries – partners in the formation of global value chains.

In addition, industrial policy targets will make it possible to abandon the traditional “export orientation and import substitution” and move to a more productive approach – the prospects for expanding the influence of national enterprises in global value chains.

The assessment of the degree of participation of the

national economy in the global value chain, as a rule, is determined on the basis of two aspects:

1) backward participation – the share of imported components used for the production of export products;

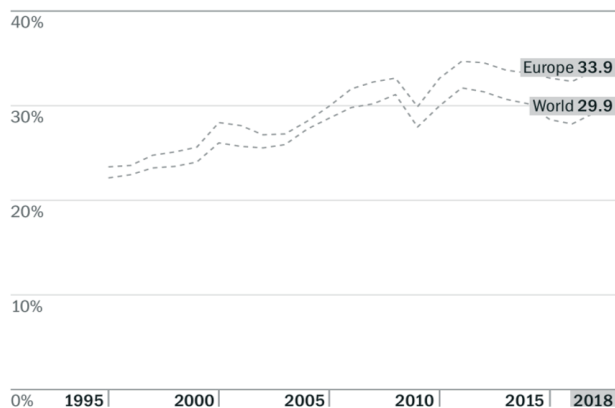


Fig. 1. Foreign value added in domestic exports (%) all manufactures [1]

2) forward participation – the share of exported national components used in production in other countries.

The aggregate index of participation in global value chains of European countries is 49,2% (33,9% (Fig. 1) at the stage of backward participation and 15,3% (Fig. 1) at the stage of forward participation); for countries around the world, a similar index is equivalent to 45,5% (29,9% (Fig. 1) and 15,6% (Fig. 2), accordingly).

In other words, European enterprises appear to a much greater extent as producers of final goods and use foreign economic relations to supply raw materials and components. According to average global statistics, enterprises are generally less integrated into global value chains, mostly themselves appearing as suppliers of intermediate products for global transnational corporations.



Fig. 2. Domestic value added in foreign exports (% of domestic exports) all manufactures [1]

Despite increased participation in global value chains, it provides uneven benefits to different countries, characterized by an asymmetric distribution of value added.

At the same time, a higher actual level of involvement of European corporations in global value chains due to such industries as mechanical engineering, vehicle production, and the chemical industry is provided by the high added value of purchased intermediate consumption goods in other countries.

Figure 3 shows the change in the level of manufacturability of exported industrial products on average for European countries.

UNIDO methodological work classifies manufacturing industries in three categories of technological intensity: high, medium-high and low technology. This classification is based on indicators of (direct as well as indirect) technological intensity which reflect to some degree “technology-producer” or “technology-user” aspects.

The structure of exporting products of European countries is characterized by high technological complexity, it usually implies the prospect of higher value-added production and the availability of skilled, better-paid jobs.

High-technology goods have been among the most dynamic components of international trade over the twenty five years. A country’s ability to compete in high technology markets is therefore important to its overall competitiveness in the world economy.

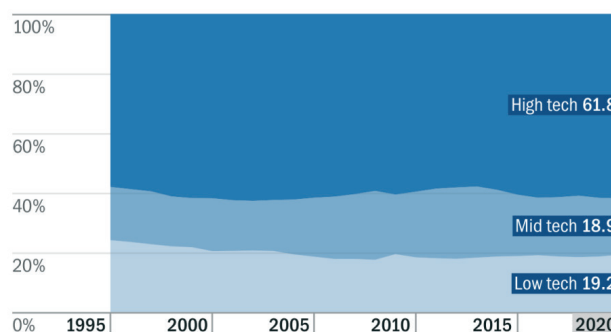


Fig.3. Dynamics of the structure of exporting products of European countries [1]

High-technology manufacturing contributes strongly to the growth of global manufacturing. Between 1995 and 2020, high-technology exports grew substantially faster than medium-high-technology exports in most European countries. Exports were particularly oriented towards high- and medium-high-technology manufactures in Europe more than 60% of its total manufacturing exports.

Globalization in the sphere of production processes, which is being improved, including in the form of global value chains, has become one of the engines of

the technological development of the world economy, a significant factor in building up high-tech export potential, and developing technical and scientific competencies. Participation in global value chains, first

of all, is a tool for technological growth in the sphere of industrial production, an incentive for raising the educational level, accordingly, for the development of innovative activity.

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