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SUPPLY CHAINS IN GLOBAL PRODUCTION

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Introduction. Analyzing the current processes of global sales and sales interaction over the past two decades shows that the world's system of exchanges has undergone significant changes that have been caused by a multitude of factors. The formation of a complex model of global production, determined by the peculiarities of the transformation of individual economies' growth models, the specifics of their industrialization and the forms of development of their national production business, its institutional and market-wise restructuring and the degree of inclusion in the system of international division of labor. The change in the level and depth of the specialization of individual countries in the field of production and sale of products, in turn, has accelerated the overcoming of economic distance (which is measured by the cost of transport and information services). Based on the above, namely, within the framework of forming a new model of global production, the issue of studying the role and value of supply chains in this model is made relevant.

Aim and tasks. The purpose of the article is to study the modern transformation of supply chains within the global production system. The findings will allow to determine what exactly needs to be done in the direction of further redeveloping the regulatory tools of global supply chain management.

Research results. The article presents the results of studying the transformation of supply chains' role in global production. It is determined that taking into account the existing specificity of industrialization and fragmentation of national production, as well as the rapid spread of the results of scientific and technological progress in the world economy, there is a need for a more thorough study of this change. As a result of analyzing open source statistical data, a conclusion was reached regarding the transition from the competition of individual business entities to the competition of global supply chains. Particular features of supply chains, which determine the specifics of the goods' logistics in the processes of global production, are determined, as well as the peculiarities of the operation of the main global logistics networks: Global Logistics Network, Worldwide Partners Alliance, Tandem Global Logistics and Choice Logistics.

Conclusions. Given that the existing transformation of supply chains is a result of increased global competition of North and South economies, the need for reassessing and redeveloping the regulatory tools of global chain management is substantiated.

Key words: supply chains, global production, world trade, added value.

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ЛАНЦЮГИ ПОСТАЧАННЯ В ГЛОБАЛЬНОМУ ВИРОБНИЦТВІ

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Проблема. Аналіз сучасних процесів глобальної товарно-збутової взаємодії за останні два десятиліття показує, що система світових обмінів зазнала суттєвих змін, які були викликані безліччю факторів. Відбувається формування складної моделі глобального виробництва, що визначається особливостями трансформації моделей зростання окремих економік, специфікою їх індустріалізації та формами розвитку національного виробничого бізнесу, його інституційно-ринкової перебудови і ступенем включення в систему міжнародного поділу праці. Зміна рівня та глибини спеціалізації окремих країн у сфері виробництва та реалізації продукції в свою чергу викликало прискорення подолання економічної відстані (яка вимірюється за допомогою вартості транспортних та інформаційних послуг). На підставі вищевикладеного, а саме в рамках формування нової моделі глобального виробництва актуалізується питання дослідження місця та значення ланцюгів постачання в цій моделі.

Мета та завдання. Метою статті є дослідження сучасної трансформації ланцюгів постачання в системі глобального виробництва. Отримані висновки дозволять визначити, що саме треба робити у напрямку подальшого переосмислення регулятивних інструментів глобального управління ланцюгами постачання.

Результати. В статті наведено результати дослідження трансформації ролі ланцюгів постачання в глобальному виробництві. Визначено, що враховуючі існуючу специфіку індустріалізації та фрагментації національного виробництва, а також стрімке поширення в світовій економіці результатів науково-технічного прогресу виникає необхідність більш ґрунтовного дослідження зміни ролі ланцюгів постачання у глобальному виробництві. В результаті аналізу статистичних даних відкритих джерел отримано висновок, щодо переходу від конкуренції окремих бізнес-суб'єктів до конкуренції глобальних ланцюгів постачання. Визначено специфічні ознаки ланцюгів постачання, що визначають специфіку логістики руху товару в процесах глобального виробництва, а також проаналізовано особливості функціонування основних глобальних логістичних мереж: Global Logistics Network, Worldwide Partners Alliance, Tandem Global Logistics та Choice Logistics.

Висновки. Враховуючі, що існуюча трансформація ланцюгів постачання є наслідком посилення глобальної конкуренції моделей розвитку економік Півночі та Півдня, обґрунтовано необхідність переосмислення регулятивних інструментів глобального управління ланцюгами.

Ключові слова: ланцюги постачання, глобальне виробництва, світова торгівля, додана вартість.

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Introduction. The analysis of modern processes of global sales interaction over the past two decades shows that the world's system of exchanges has undergone significant changes that have been caused by a multitude of factors. One of them is the formation of a qualitatively new level of development of national and global logistics systems, which has affected the cost of delivering goods of final and intermediate consumption within manufacturing chains in the global economy. Logistics' performance in international trade in general and in a production chain in particular is a central element of economic growth and competitiveness of countries participating in these processes, and the logistics sector is today recognized as one of the key elements of economic development, due to the availability of a high-tech material and technical base. In turn, countries with low logistics performance face high costs, not only because of transportation costs, but also because of the unreliability of supply chains, which is a major barrier to integration and / or competition in value chains. The formation of a complex model of global production takes place, determined by the peculiarities of the transformation of individual economies' growth models, the specifics of their industrialization and the forms of development of their national production business, its institutional and market-wise restructuring and the degree of inclusion in the system of international division of labor.

Another important consequence of the transformation of world trade is the change in the level and depth of specialization of individual countries in the field of production and sales, which in turn caused an acceleration of overcoming the economic distance (which is measured by the cost of transport and information services). This ensures the rapid expansion of goods and services, resources and ideas with the most rational use of them and the achievement of a synergistic effect. Based on the above, namely, in the framework of forming a new model of global production, the issue of studying the place and value of supply chains in this model is made relevant.

Analysis of recent researches and publications. Significant contributions to the

development of the theoretical foundations of studying supply chains at the international level have been made by such well-known foreign and domestic scientists as J-F. Arvis, D. Saslavsky, L. Ojala, B. Shepherd, C. Busch, A. Raj, T. Naula, [1], K. Backer [2], D. Bauersox & D. Closs [3], M. Christopher [4], E. Kricavsky [5], T. Kurant [6], I. Smirnov [7] and others. Highly appreciating the contribution of the abovementioned scientists and their results, it should be noted that, taking into account the existing specificity of industrialization and fragmentation of national production, as well as the rapid spread of scientific and technological progress in the world economy, there is a need for a more thorough study of the changing role of supply chains in global production.

Aim and tasks. The purpose of the article is to study the modern transformation of supply chains within the global production system. The findings will allow to determine what exactly needs to be done in the direction of further redevelopment of regulatory tools of global supply chain management.

Results. According to the analytical estimates of the global forecast department of the Economist Intelligence Unit's London Research Center, the economies of the world today are much more economically interconnected, because production chains, often within single companies, encompass many countries at once. Modern economies depend on the import of raw materials, components and even services. The volume of international trade in the first decade of the XXI century makes up, on average, 96% of world GDP, compared with 55% in the 1970's. At the same time, more than half of international trade is not in finished goods, but in raw materials and components for producing them [8].

It should be noted that the change in the share of transport and logistics services in world GDP, as well as in the GDP of developed and developing countries and countries with economies in transition, oscillated between 0.85% and 1.45% in the years 1980-2014 [9; 10]. In 1980, the transport and logistics services accounted for 1,09% of world GDP, while by 2015 this indicator reached to 1,19%. In 2015,

the share of developed countries accounted for about 61.5% of world exports of transport and logistics services. In 2015, the export of services by this category of countries fell by 11.9% [10]. The decline in this indicator for developing countries constituted 6.0%. Figure 1 shows the dynamics of world exports of transport and logistics services in 2000-2015, as well as changes in their export volumes by different groups of countries.

According to UNCTAD 2015, transport and logistics services in the world accounted for 18.2% of world exports of all types of services, or 876.1 billion dollars, with a

forecasted growth of up to 15.5 trillion dollars by 2023, in physical terms - 54.7 billion tons and an expected growth to 92.1 billion tons [11]. The market leaders are the US (23%), the EU (18%) and China (15%). By regions, the Asia-Pacific region (hereinafter APR) accounts for about 47% of total revenue [11]. In the export of international transport and logistics services, the EU occupies a significant place, accounting for 43.4% of exports of this type of services. Asia accounts for about 31.3%, America accounts for 14.0%, and the share of all other regions is 11.3% [9].

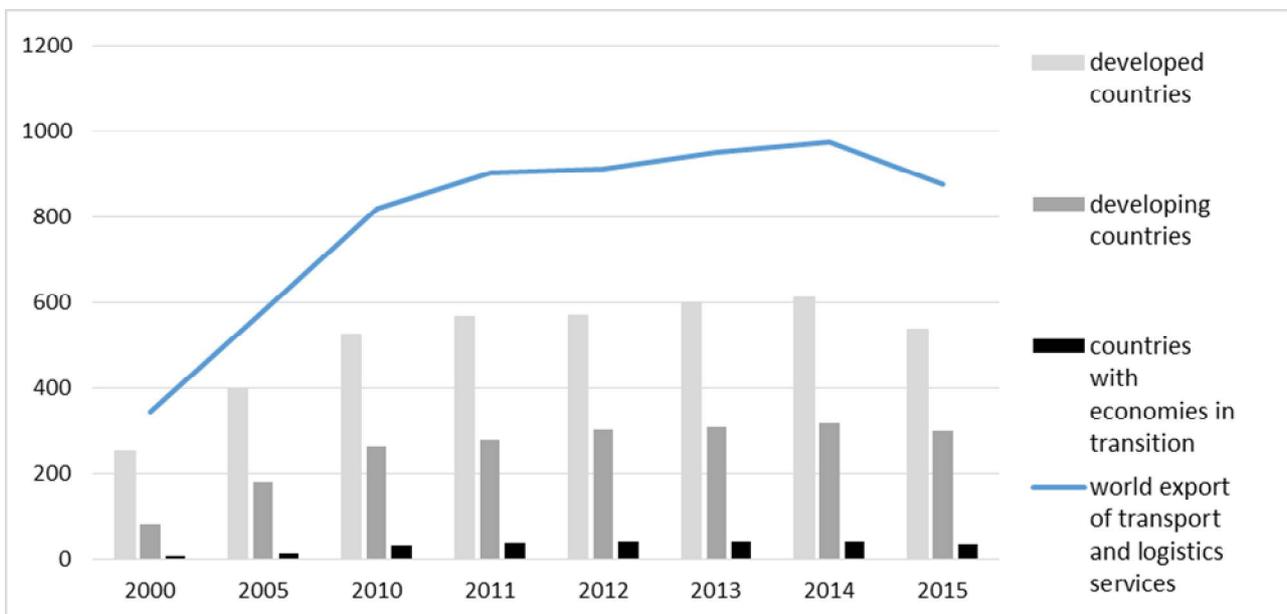


Fig.1. Dynamics of world exports of transport and logistics services in 2000-2015, billion USD.
Source: compiled by [12]

The development of transport and logistics services in a particular country or region is mainly influenced by three factors:

- spatial factor, i.e. geographic location in relation to the main international cargo and passenger traffic routes. Transport and logistics services play an important role in developing the competitive advantages of countries and regions in terms of the implementation of their transit potential;

- own cargo and passenger potential of a given country (region), which is part of a more general concept of social and economic potential;

- strategic direction of policy in the field of transport and logistics services.

Until the beginning of the XXI century, due to a favorable combination of these factors, the United States, the EU and Japan (followed in a series of indicators by China and South Korea) dominated the field of transportation services, with the absolute leader in exports being the United States. However, the country's share in world exports of transport and logistics services declined from 13.3% in 2000 to 9.4% in 2014. The leaders in this area are Germany, France, Singapore, Denmark, Japan, Great Britain, PRC, The Republic of Korea, the Netherlands and Hong Kong, which accounted (together) for 43.4% in 2014 [12, p. 271].

It should be noted that Germany's leading position in the field has been proven for

three consecutive years by its first place in the ranking of the Logistics Performance Index (LPI). This index is calculated by the World Bank, investigating 160 countries of the world by indicators of efficiency of trade logistics [1]. Defining the index also promotes timely detection of existing problems and weaknesses in the existing logistics system in a country, and allows identifying possible ways to increase its efficiency.

In the course of several researched periods, Germany has the best position in the LPI rating, which is the result of the country's existing infrastructure, regulatory framework, geographic location and economic policy. The 2016 ranking shows that the gap between the LPIs of high-income countries and low-income countries is about 45% on average. For example, comparing Ukraine with Germany in 2016, Ukraine's indicators are 55% less than the German ones (2.74 versus 4.23), while the logistics performance indicators of the USA and Argentina are 3.99 and 2.96, respectively [11].

The analysis of world practice has shown that, until recently, the services of 1st and 2nd levels (1PL and 2PL) prevailed in the structure of the world market of transport and logistics services. Increasing global competition and, consequently, the need to find solutions to reduce costs within GVCs have objectively led to an increase in the role of the 3rd level segment (3PL). In 2015, the global market for data services amounted to 721 billion USD, with a forecast growth to \$1.3 trillion by 2022. [13]. In a regional context, the largest share in the 3PL market structure is occupied by Asia-Pacific, North America and Europe, which in general reflects their leading role in shaping global value chains (GVCs).

The logic of the use of supply chains of level 3PL depends largely on the length of the corresponding GVC, since the longer it is, the higher its demand for network solutions provided by a 3PL operator. In a sectoral view, 3PL solutions are in highest demand in high technology and industrial production sectors, including electronics, IT, automotive and food industry. For example, in the USA, the longest production chains have developed in the production of meat and includes the stages all

the way from the production of animal fodder to the supply of prepared meat to places of its consumption [2, p.18].

Among the top-10 of the world's 3PL logistics providers, judging by total revenue in 2015, are mainly companies from the EU (50%) and the US (30%), including DHL Supply Chain & Global Forwarding (Germany) - \$29.6 billion, Kuehne + Nagel (Switzerland) - \$21.1 billion, and DB Schenker (Germany) - \$17.2 billion. [14].

Countries in the world today are much more economically interconnected because technological chains, often of single companies, encompass many countries at once. Modern economies depend on the import of raw materials, components and even services. The interests of exporters today are significantly more important for states than the interests of industries that compete with foreign imports. The volume of international trade in 2016 amounted to 96% of world GDP, compared with 55% in 1970. At the same time, more than half of international trade is not in end goods, but in raw materials and components for their production [15]. Considering the aforementioned sharp increase in the volume of international commodity turnover of raw materials, materials and components, it is necessary to agree with the opinion of the majority of specialists in the field of logistics that, at the present stage of development of the world economy, there is a shift from the competition of separate business subjects to the competition of global supply chains.

Different approaches to the relationship between the supply chain and logistics chain categories are found in literature on the subject, from identifying them as one (see, for example, [3, c. 231]) to differentiation by type of controlled flows. For example, in the field of international trade, the main links of supply chains are usually exporters and importers, carriers and other providers of logistics services, foreign trade resellers, banks, insurance organizations, customs authorities, as well as various customs intermediaries (customs representatives, customs carriers, owners of warehouses of temporary storage and customs warehouses, etc.).

Analyzing the existing theoretical approaches to defining the essence and subject composition of supply chains undoubtedly points to their structuredness, order in interconnections and the permeating nature of interaction from the sources of raw materials to the end consumers, but does not postulate the linearity of the supply chains' structure. In the author's view, the very non-linear nature of the interaction in organizing the movement of goods from suppliers to consumers in supply chains distinguishes them from global value creation chains.

In addition, due to the objective multidimensionality and complexity of the supply chain structure, the term "network" is often used in literature instead of the term "chain". For example, M. Christopher, who justifies the need to use a network approach in managing relationships in supply chains, points out that "it is usually the case of many suppliers and customers, and therefore suppliers and customers of the customer should be taken into account in the general system" [4, p. 29].

A traditional feature of the classification of supply chains is their level of complexity, which characterizes their subject composition, structure and the nature of the interconnections between the focal company and the diverse suppliers and consumers. Both foreign and domestic scientists and specialists, based on the level of complexity, distinguish between direct, expanded and maximum supply chains. Meanwhile, in the world of scientific practice, for the more complete typology of supply chains, additional classification features are used. Without setting the goal of their detailed study in the framework of this research, it is to note that in a global supply chain, flows of commodity-material values cross both the state and customs borders of neighboring countries, and in the international supply chains the focal company interacts with suppliers and consumers of different levels on a single customs territory, where there are no "internal" customs borders between members of associations.

A similar approach to the typology of supply chains, based on geographical features, does not fully reflect the peculiarities of the processes of globalization and transnationalization in international trade. Both

global and interstate supply chains, in their composition and location, are international supply chains, which, in turn, makes it necessary to take into account, when designing them, both the features of national legislation and the content of interstate, including multilateral, treaties and agreements.

Given the fact that, in global supply chains, goods, financial and information flows traverse the state and customs borders of adjacent countries, including transit countries, often on different continents, the authors propose to consider freight transportation technologies as an additional classification mark for their identification.

Note that in the most general case, they differentiate into single-type (unimodal) and multi-type (mixed) freight traffic. Since the movement of commodities through state and customs borders of countries on different continents is usually carried out by several modes of transport, the use of mixed cargo transport technologies will be considered the main feature of a global supply chain in international trade.

Based on the above, it can be concluded that a global supply chain is a technologically or organizationally and economically determined sequence of suppliers and consumers of goods and services located in different states and in different customs territories; the movement of goods between them is organized on the basis of mixed freight transportation technologies.

In all other cases, that is, when organizing the movement of commodities and material assets within the territorial space of several countries participating in interstate associations that do not have "internal" customs borders, and/or using technologies of unimodal transportation of goods, supply chains, in the author's opinion, are not to be considered global.

The peculiarities of the logistics system of the European region are primarily due to the specificity of relations between EU member states. Since January 2013, the amount of members of this international community has approached 30. Such a large number of participants in an association of individual states is a vivid example of integration. As far as the logistics system of the EU is concerned,

it is not as large in terms of geographic scope as in the North American region, but more complex and multifaceted due to the diversity of languages, cultures, and political and economic systems that creates a set of barriers to the formation of a global logistics network and system.

In order to regulate barriers within the EU, a number of institutions have been set up in all areas of activity. In order to monitor pan-European logistics, in 1984, the European Logistics Association (ELA) was created, which was formed as a result of the unification of the European Logistics Forum (Amsterdam, Netherlands) and a group of logistic associations from Germany. The headquarters of the ELA are located in Brussels (Belgium). Among the European logistics organizations, particularly noteworthy is the Union of German Logistics (Bundesverband Logistik, BVL), which was established in 1976 as a federation of logistic operators.

The analysis would not be complete without exploring the peculiarities of the operation of major global logistics networks, such as Global Logistics Network, Worldwide Partners Alliance, Tandem Global Logistics and Choice Logistics.

Network Global Logistics is a market leader in efficient distribution. The network manages about 550 objects (storage facilities and distribution centers) strategically located around the world [16]. Worldwide Partners Alliance is a global network of leading transport and logistics providers specializing in air and maritime transportation, and has 440 facilities (warehouses and distribution centers) located around the world [17]. The next global logistics network is Choice Logistics, which occupies the leading positions in delivering spare parts and products. The network has more than 420 offices around the world, including field warehouses, regional distribution centers and internal nodes [18]. Tandem Global Logistics is present in large industrial centers around the world, covering more than 75 countries with approximately 220 offices [19].

In order to investigate the relationship with GVCs, the geographic location of these networks was analyzed (Fig. 2). It is thus possible to see the location of the largest

aggregate of premises subordinate to one or another network, which depends not only on the size of the continent, but also on the development of GVCs in a particular area.

It should be noted that the data shown in Fig. 3 illustrates the current trend of the reintegration of emerging economies in Southeast Asia, which forms a new production path and a vector of commodity flow in the South-South and South-North directions. In the region, there are serious preconditions for the transformation of GVCs, in which the specialization of ASEAN countries and China gradually changes. The latter's transition from the production of cheap goods to the development of industries with a higher level of value added (machine building, information technology, telecommunications) opens a new window of opportunity for Indonesia and Vietnam. A high proportion of workforce in the population and low labor costs in ASEAN countries form the conditions for low-cost mass production, which may follow the path of the Chinese economic boom that took place at the end of the twentieth century.

At the same time, a new chain of intra-regional division of labor is forming. Vietnam is leading in the production of footwear, the Philippines specialize in outsourcing, Indonesia and Malaysia produce food and raw materials. However, there is also a certain risk of trade inhibition in the region, should there be no serious shifts in the solution of infrastructure problems in supply chain management. Thailand and Vietnam do not have quality rail links. There are no suitable roads for use between Thailand and Burma. At the technological level, the solution to infrastructure problems can be fueled by the more active participation of Japan, which today develops alternative export trends, including the construction of social infrastructure. However, today, in Indonesia, Vietnam, the Philippines and Thailand, the process of developing a public-private partnership in the infrastructure sector suffers from a lack of investment, requiring the inclusion of, for example, European countries, whose corporations are in search of cheap labor and a dynamic domestic market with a growing urban population.

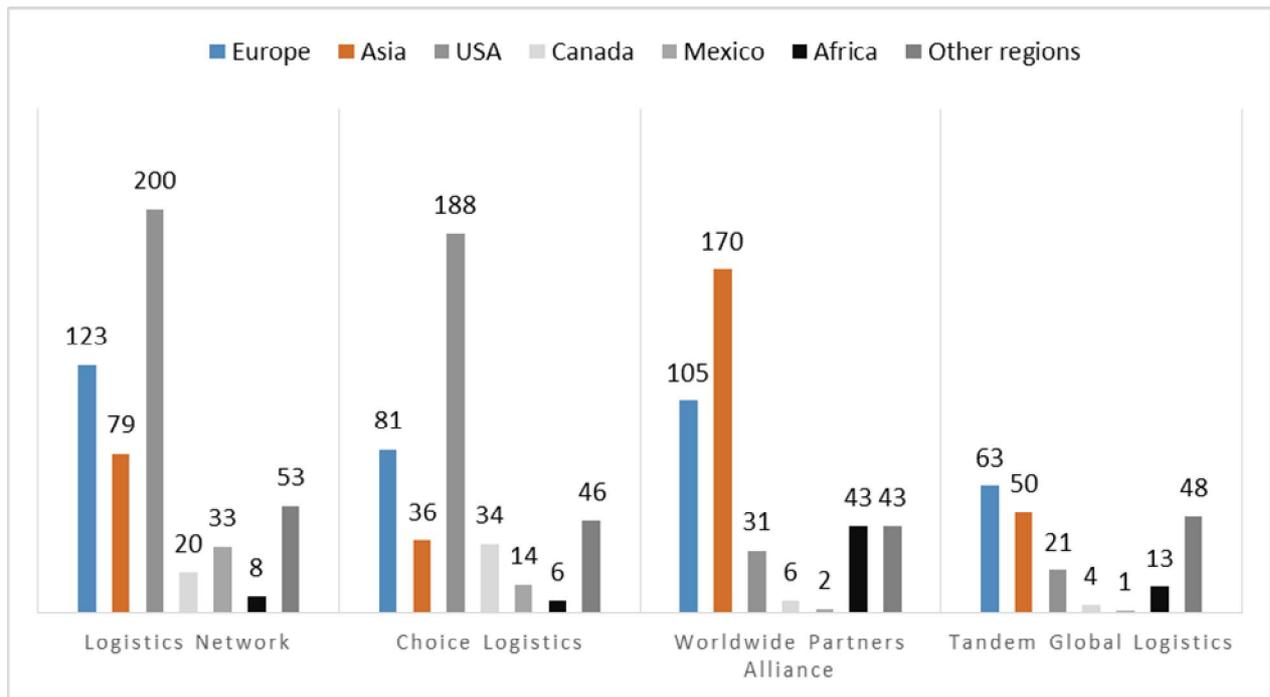


Fig. 2. Territorial location of certain global logistics networks

Source: compiled by the author from open statistical data of said networks [16-19].

In the system of global production, cardinal transformation of supply chains that lead to sectoral shifts and the emergence of relevant consequences in the commodity exchange system can be traced.

Firstly, the supranational ramified logistics superstructure and the significant geographical diversification of supply deliveries significantly reduce the macroeconomic stability of production chains. For example, the Thai floods and the Fukushima accident in 2011 identified a high level of instability of the new global commodity supply system, when the lack of supply of components from some countries halted production in others.

Such a structure of global supply chains, firstly, has raised its sensitivity to changes in the structure of logistics and transport costs and fluctuations in currency exchange rates and, secondly, increased the likelihood of competitive pressure from individual countries on regional economies integrated into global production.

Secondly, the transformational changes in global production and exchange weaken the

political and economic sovereignty of countries that are excessively integrated into it. So, developed economies, trying to refrain from declining, actively used programs to support domestic demand, financing it with unlimited liquidity.

As an example - the situation in the EU, the external economic weakness of which results in a macroeconomic problem of the whole European zone, where Germany alone appears to be more or less stable. However, its competitiveness, relying on social dumping, is seriously undermining intra-European markets and destroying the social systems of less powerful countries. Also, the strengthening of Euro-skepticism, the migration crisis, the "Brexit" and the deformation of the traditional French-German axis of the EU weakens the balance of influence within the association. All this suggests that both global and regional models of production-trade cooperation experience a radical transformation, in which the deepening of the transnationalization of supply chains only increases the volatility of existing integration ties.

This situation has forced some EU member states to turn back to forgotten strategies of supporting national interests, which signifies an attempt to return to a partially closed type of economy.

This feature forms the third point, in which it can be noted that globalization processes are consistently deformed through the expansion of instruments of macroeconomic regulation of the competitiveness of economies, the reduction of trade barriers and the gradual rise of national systems of customs protectionism in some countries. All this is a far from complete list of instruments whose empirical multiplication is an indicator of the coming end of globalization and the return to autarky.

Fourthly, after the crisis on the global markets, the reformulation and reconfiguration of global supply chains has become a topical issue. As an example, it should be noted that, at the time of the initial industrialization, the Old World countries initiated economic growth at the expense of emerging economies. This was due to the fact that, while controlling logistics and dominant supply chains, they had been developing trade financing and investment management. But the 2008-2009 global crisis marked the beginning of a new stage in the development of production, in which a closed economy and intra-regional trade turned out to be more beneficial.

Thus, on the one hand, there is a marked transnationalization of global supply chains. On the other hand, one can observe attempts to stabilize the interactions of national economies through the development of regional intra-block trade. As an example, the strengthening of domestic trade in BRICS and ASEAN countries, as well as the latter's growing trade turnover with the People's Republic of China, Japan and South Korea. The demand for such shifts is partially stimulated by the very competition of two trade associations formed in Asia, one of which is promoted by the United States, and the other by the PRC. It should be noted that the process of integration in the region is basically "from below", upward, i.e. to a greater extent provided by market motives

than institutional integration on the initiative of states. The latter is carried out mainly in the form of informal or semi-formal ties, mechanisms for reaching consensus, while economic integration is developing at a steady pace.

Conclusions and further researches directions. Developing economies are increasing the volumes of investment exports in order to expand access to global markets and integrate as effectively as possible into GVCs. At the same time, in the world, there is a process of transfer of industrial investments, whose unchanged catalyst are the logistics costs of production and sales. As an example, the increase in the cost of production in the People's Republic of China, and the consequential migration of low-cost segments of GVCs to other regions with still cheap labor (Vietnam, Bangladesh, Cambodia). Or, an another, reversive vector of geographical return of productions to some developed countries (USA, Western Europe) is caused by significant cost savings, which reaches as much as 20-30% of the real production price.

In general terms, the existing transformation of supply chains is a consequence of the increasing global competition of development models of the North's and South's economies. To determine the benefits of possible changes in the expansion (or vice versa narrowing) of the geography of global logistics with varying levels of state presence, it is necessary to rethink regulatory instruments of global management of chains. Solving this problem is hindered by a number of factors, which include:

- the low level of localization of large corporations in Eastern Europe, Central Asia and Latin America due to the presence of a significant shadow economy that is reverse-correlated with the revenue of large local companies, as well as restrictions on attracting foreign investment;
- a high level of competition in emerging markets together with a low level of service development in them.

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