

# EU automotive production chains: country-specific features in terms of regional integration development

Elena V. Sapir 

ORIGINAL ARTICLE

Doctor of Economics, Professor  
P.G. Demidov Yaroslavl State University, Yaroslavl, Russian Federation  
E-mail: sapir@uniyar.ac.ru

Ilya A. Gorshkov 

Student  
P.G. Demidov Yaroslavl State University, Yaroslavl, Russian Federation  
E-mail: gorshkov1424@yandex.ru

**Abstract.** The article considers the specifics of the current production chains of the automotive industry, the degree of specialisation, assessment of changes in geographical disparities in the production of goods by levels of commodity movement in the European Union. The hypothesis of the research concerns with the proportional and equitable participation of individual countries and regions in the European automotive industry in terms of deep regional integration. The methodology presented for modelling the production chains of the automotive industry confirms the general hypothesis of the research. Indeed, the production of simple nodes has become more evenly distributed across Europe. The research reveals a decrease in geographical disparities in the production of complex integrated modules. Finally, it resulted in the increased concentration of the main assembly facilities in a limited number of locations. The results obtained indicate a more even development of Europe's knowledge-intensive production base against the background of deepening integration processes. Those are useful in the development of measures to support the automotive industry in the BRICS and EAEU. It is important to support the expansion of the geography of integrated modules production to contribute the strengthening of the technological base of the regional association member countries.

**Keywords:** automotive industry; European Union; uneven spatial development; export specialisation; production chains

**JEL codes:** F18, F63, L62

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## Introduction

At the present stage, the automotive industry of the European Union is facing a number of challenges on the leadership in the global automotive industry. The automotive industry and industries directly or indirectly related to it account for about 7% of Europe's GDP and employ about 13.8 mln people<sup>1</sup>. In 2019, the European Union (consisting of 27 countries) (hereinafter – the EU) dominated the global automotive market. It has 10 of the world's 20 largest suppliers of automotive components and 4 of the 10 largest manufacturers of finished vehicles by revenue<sup>2</sup>. During the same period, Europe's share in the total global production of passenger cars was 21.6%. However, by 2024, the share of finished car production in the EU countries had decreased to 17.4%<sup>3</sup>. It is justified by the technological lag in the region's automotive industry and the slow response to changes in market conditions.

<sup>1</sup> *Automotive industry*. European Commission. Source: [https://single-market-economy.ec.europa.eu/sectors/automotive-industry/policy-and-strategy\\_en](https://single-market-economy.ec.europa.eu/sectors/automotive-industry/policy-and-strategy_en) (accessed on 06.05.2025)

<sup>2</sup> Deubener H. et al. *European automotive industry: What it takes to regain competitiveness*. McKinsey. 2025. Source: <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/european-automotive-industry-what-it-takes-to-regain-competitiveness#/> (accessed on 06.05.2025)

<sup>3</sup> *Production statistics 2024*. International Organization of Motor Vehicle Manufacturers. 2024. Source: <https://www.oica.net/category/production-statistics/2024-statistics/> (accessed on 06.05.2025)

At the current stage, European automakers are facing the challenges of radical changes in engine technology, growing consumer demand for unique cars, an accelerated transition from hardware-defined vehicles to software-defined ones, etc.<sup>4</sup>. Previously, European automakers, especially German companies, were provided with skilled labour, automated production, etc. Therefore, the companies themselves received significant economies of scale. Combined with low energy prices, this allowed companies to produce local products competitive on the global market. However, these advantages are currently under threat due to the active use of industrial robots and the general automation of production in the United States and China. Companies in these countries have flexible cost structure. Moreover, the trade unions have limited influence on company management.

China has an increasingly important role in the global automotive industry. It has currently established the production of internationally competitive electric vehicles [1, p.67]. In opposition to the rapidly advancing Chinese automotive industry, the EU states reduce the dependence of regional production chains on supplies abroad, especially from China<sup>5</sup>. There is a gradual process of reindustrialisation and regionalisation of value chains within the framework of the association. Indeed, the transfer of the most complex and capital-intensive passenger car production processes to the EU countries. Nowadays, the automotive industry production network of the EU has developed a stable system of relationships between suppliers, automotive companies and countries. Therefore, the majority of car assembly plants and factories for the production of parts and components are located in the Western European countries (hereinafter – WE). At the same time, there are several countries forming a core of this system. They accumulate the most knowledge-intensive and profitable stages of the car manufacturing process [2]. Meanwhile, the one of European integration tasks is levelling of the cross-country differences in the technical and production base [3, p. 51].

Therefore, there is an issue of a decrease in the unevenness in the geographical structure of countries' specialisation at the EU certain stages of passenger car production in terms of the economic internationalisation and the development of a Single Market. Indeed, the countries with the peripheral economy should correlate with the central European economies and in terms of the level of production development and technical base of the automotive industry.

#### *Review of literature and research*

The problem of uneven development of production chains in the European automotive sector has become the subject of research by a lot of domestic and foreign scientists, consulting agencies and international organisations.

The Russian researchers consider the issues of self-sufficiency of the European automotive industry, export specialisation, and export structure of European economies. They also deal with the specifics of the institutional regulation and the trends towards reducing asymmetry in the development of Eastern European and Western European countries<sup>6</sup> (hereinafter – EE and WE) [4, p. 124; 5, p. 96; 6, p. 562]. The EE countries are actively attracting foreign investment due to cheap labour. However, they risk to lose their advantage in terms of automation [7]. There is a gradual reduction in the technological gap in the levels of development of the countries of the Eastern and Western macroregions [8, p. 50]. The advantages of cooperation are considered as a driver of technological development: the formation of a model of open innovation, joint work in terms of non-competitive research [9]. Mechanisms of state support and administrative regulation play a special role in the European automotive industry [10]. The segment of electric vehicles (EV) and hybrids is actively gaining a foothold in the European automotive market, and EV production volumes are increasing [11, p. 236]. There is a change in the sectoral structure of the WE countries towards an increase in the share of high-tech information services in the cost of products [12].

The works by foreign scientists are devoted to two central groups of problems: the first is the sustainability

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<sup>4</sup> Waas A. et al. *European Auto Industry is at a Crossroad*. Boston Consulting Group. 2023. Source: <https://www.bcg.com/publications/2023/european-auto-industry-is-under-pressure> (accessed on 06.05.2025)

<sup>5</sup> *Updating the 2020 New Industrial Strategy: Building a stronger Single Market for Europe's recovery*. European Commission. Brussels. 2021. COM (2021) 350 Final. P. 11.

<sup>6</sup> *Western Europe: Germany, Austria, Belgium, Sweden. Eastern Europe: Poland, Hungary, Slovakia, Czech Republic, Romania*

and self-sufficiency of production chains; the second one is the uneven participation of countries in certain stages of European automotive chains [14-17; 18, p. 177]. Special attention is paid to the growing dependence of European battery production on the supply of Chinese raw materials [13]. It also concerns with the gradual increase in the degree of integration of production processes within the region [25]. There is a loss of global market share by European automakers due to competition with Asian companies. Moreover, there is a shift in production focus to sustainable development and digital services [19; 20, p. 25]. In the automotive industry of the EU there are imbalances in the distribution of countries by stages of the value chain [21]. The relocation of factories to Eastern European countries allows automakers with the strong economies to supply themselves with cheaper components and increase their competitiveness [22]. Pavlinek [23] notes an increase in the degree of involvement of peripheral EU states in the regional automotive industry. At the same time, it is expected to strengthen the territorial specialisation of production, change in the geographical distribution of automotive enterprises in the EU. Moreover, the author identified a key advantage and time of significant vulnerability of the automotive industry in the integrated periphery of Eastern Europe. They are as follows: attracting foreign direct investment due to low production costs, especially cheap labour [24].

Reports from international organisations and consulting agencies examine the current state of the EU automotive industry and its risks. The agencies note the instability of the current situation in the automotive industry, the technological lag in the production of electric vehicles, and dependence on imports of critical raw materials for the production of batteries of the EU<sup>7,8</sup>. The report of the European Automobile Manufacturers Association<sup>9</sup> (ACEA) for 2023 and 2022 identifies the leaders in car assembly among European countries: Germany, Spain, the Czech Republic, and Slovakia. Countries are experiencing an increase in production volumes caused by a gradual decrease in the impact of supply chain disruptions.

Therefore, the following issues have been widely studied in the scientific literature: the increasing dependence of the EU automotive industry on foreign investors and their products; decline in competitiveness relative to the US and Chinese automakers in the electric vehicle segment; increase in imbalances in the level of development of the automotive industry of the European automotive industry. At the same time, the issue of country-specific aspects of export specialisation at certain stages of the production chain is understudied. This research examines the extent of the discrepancy in the nature of specialisation of individual countries and regions, the course of the development of European integration.

## Methods

During the research the following hypotheses were put forward:

H1: a decrease in geographical (cross-country) imbalances in the production of simple nodes.

H2: a reduction in the disparity in the production of integrated modules.

H3: the imbalances in the localisation of assembly plants increasing.

To test the hypotheses, an analysis of the European automotive industry production chain was conducted. It corresponds to the following categories of goods: the product movement; intermediate goods used in car assembly (simple components); enlarged modules: (1) curb chassis and (2) body for passenger cars); ready-made cars of various types. This specification of the levels of product movement is necessary to further determine the specialisation of countries at certain stages of the car creation chain (Table 1).

**Table 1** – Classification of goods by levels of movement in the automotive industry in Europe

The level of product movement	Customs Tariff Number (CTN)	Product Name
Simple components	870840	Transmission box

<sup>7</sup> Deubener H. et al. *European automotive industry: What it takes to regain competitiveness*. McKinsey. 2025. Source: <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/european-automotive-industry-what-it-takes-to-regain-competitiveness#/> (accessed on 06.05.2025)

<sup>8</sup> Waas A. et al. *European Auto Industry is at a Crossroad*. Boston Consulting Group. 2023. Source: <https://www.bcg.com/publications/2023/european-auto-industry-is-under-pressure> (accessed on 06.05.2025)

<sup>9</sup> *Economic and market Report Global and EU auto industry: full year 2023*. ACEA. 2024. Source: [https://www.acea.auto/files/Economic\\_and\\_Market\\_Report-Full\\_year\\_2023.pdf](https://www.acea.auto/files/Economic_and_Market_Report-Full_year_2023.pdf) (accessed on 10.05.2025)

The level of product movement	Customs Tariff Number (CTN)	Product Name
	870880	Amortisation System
	8507	Battery accumulators
	840820	Diesel engines
	840734	Engines with a cylinder capacity exceeding 1 litre
	8501	Electric motors and generators
Enlarged modules	8706	Chassis equipped with an engine
	870710	Bodywork for passenger cars
Ready-made cars	870323	Cars with gasoline engine capacity from 1.5-3 litres
	870332	Cars with diesel engine capacity from 1.5-2.5 litres
	870340	Diesel cars with electric motor
	870380	Electric vehicles

Source: composed by the authors based on T. Sturgeon et al., 2016<sup>10</sup>

*Stage 1. Determination of the specifics of commodity movement at the level of individual goods*

The empirical verification of the research hypothesis was conducted in several stages. At the first stage, the coefficients of the export specialisation of the European Union countries for the main components, integrated modules, and finished cars (Formula 1) were calculated.

$$RCA_{ip} = \frac{(X(M)_{ipw}/X(M)_{itw})}{(X(M)_{prw}/X(M)_{tw})} \quad (1)$$

where RCA is the coefficient of export specialisation (according to the method of B. Balash),  
X (M) is the export (import) flow,  
p is the product of interest according to the CTN code,  
i is the country under study, w is the worlds' flow,  
r is intercountry flows in the European Union (27 countries),  
t is the total volume of exports (import).

The numerator is the share of exports or imports of goods in the total exports or imports of the country under study. The denominator is the share of exports or imports of the studied product in the total exports or imports of EU countries.

The RCA coefficients were calculated for the EU. According to the results, two countries with the highest RCA scores for each of the products were selected. To assess the specialisation of individual economies at a particular stage of the production chain, 9 countries most involved in international trade in automotive products were considered and divided into two macroregions: Western Europe – Belgium, Germany, Austria, Sweden; Eastern Europe – Romania, Slovakia, Czech Republic, Poland, Hungary.

*Stage 2. Determining the location of individual economies at the stages of the production chain*

The assessment of the location of individual countries at specific stages of the passenger car production chain was conducted by calculating the weighted average coefficient of export specialisation for a group of goods proposed by the authors (Formula 2).

<sup>10</sup> Sturgeon T. et al. (2016). *The Philippines in the Automotive Global Value Chain. The Duke Centre on Globalization. Governance & Competitiveness Centre on Globalization. Source: [https://gvcc.duke.edu/wp-content/uploads/2016\\_Philippines\\_Automotive\\_Global\\_Value\\_Chain.pdf](https://gvcc.duke.edu/wp-content/uploads/2016_Philippines_Automotive_Global_Value_Chain.pdf) (accessed on 10.05.2025)*

$$ARCA_{ik} = \sum_{p=1}^{Pk} (RCA_{ip} * d_{ipk}) \quad (2)$$

where ARCA is the RCA indicator weighted by the share of exports of goods in the commodity movement group, RCA is the coefficient of specialisation for a particular commodity item within the commodity movement group, p is the product of interest according to the CTN code,

i is the country under study,

k is the level of commodity movement (according to Table 1),

pk is the number of product items in group k (for simple components – 6 items, for enlarged modules – 2 items, for ready made vehicles – 4 items),

d is the share of exports of goods by a country within the commodity distribution group.

The higher the weighted average coefficient of export specialisation of countries for a certain group of goods, the more significant the country's role in the production of group k goods. The coefficient provides the country's strategic role in the automotive production chains of the EU. The indicator is calculated for nine countries for three groups.

To detail analysis of the distribution of European countries by individual stages of the production chain, a graphical method based on the construction of bell curve has been applied. Traditionally, the concept of a bell curve shows the relationship between a stage of the production chain and its added value. Their initial stages are represented by research and development with high added value. However, in our work the bell curve has been modified: three stages have been postponed on the abscissa (X) axis according to the distribution scheme: components, assemblies, and readymade cars. The values of the ARCA coefficients are on the ordinate (Y) axis. The resulting graph allows us to assess the degree of participation of countries in a specific part of the production chain and draw conclusions about the role of the economy in the automotive industry of the region.

### Stage 3. Assessment of the uniformity of the distribution of production capacities in the EU

At the final stage of the study, to determine the degree of uniformity of capacities distribution in the EU automotive sector, the indicators of the standard deviation of the export specialisation coefficients of the countries for 2010 and 2023 were calculated. The choice of the initial period is due to the restructuring of production chain and recovery of the global economy in 2010 to the level preceding the global financial crisis. The standard deviation indicator (Formula 3) shows the imbalances in the production and technological potential of the EU countries in the automotive industry in the post-crisis period.

$$\sigma_{gk} = \sqrt{\frac{\sum (ARCA_{ik} - (\overline{ARCA})_k)^2}{(n - 1)}} \quad (3)$$

where  $\sigma_{gk}$  is the standard deviation for the group of countries,

g at the level of commodity movement k,

g is the group of countries,

$\overline{ARCA}$  is the arithmetic mean of the weighted average coefficients of countries at the level of commodity movement k, n is the number of analysed countries.

To assess changes in the degree of participation of EU macro-regions in the production process, the value of the average standard deviation for the enlarged regions of the European Union (Western Europe and Eastern Europe) is used (Formula 4).

$$\overline{\sigma}_{gks} = \frac{\sigma_{gk1s} + \sigma_{gk2s} + \sigma_{gk3s}}{ns} \quad (4)$$

where  $\overline{\sigma}_{gks}$  the average value of the standard deviation for the countries of Western / Eastern Europe,

s is the macroregion (Western / Eastern Europe),  
 $\sigma_{gkis}$  the standard deviation of the weighted average coefficient of export specialisation of goods for the group of countries g at the level of commodity movement k (1, 2, 3).

The obtained indicator estimates the overall change in the imbalances in the distribution of production chain stages in the geographical regions of the EU. Based on a comparison of the average standard deviation at the beginning and end of the period, the structure of the distribution of production capacities of the automotive industry in WE and EE has changed.

## Results

### *1 The level (state) of specialisation of EU countries in the automotive industry*

According to the results of the calculations in the first stage, the countries with the highest value of the coefficient of export specialisation for individual goods were identified (Table 2). Two countries with the highest specialisation rates in terms of selected product line and product group were included in the Table 2.

**Table 2** – Values of the highest indicators of export specialisation (RCA) of the EU-27 countries for selected goods

Product Name	Country	RCA	Product Name	Country	RCA
Transmission box	Romania	5.16	Electric motors and generators	Hungary	3.54
Amortisation System	Slovakia	4.72	Battery accumulators	Hungary	9.99
Diesel engines	Slovakia	5.81	Engines, V <sup>11</sup> > 1L	Hungary	9.11
Bodywork	Czech Republic	5.64	Chassis	Sweden	11.59
Cars with petrol engine, V 1.5-3L	Slovakia	5.81	Cars with diesel engine, V 1.5-2.5 litres	Czech Republic	3.02
Diesel cars with electric motor	Slovakia	8.57	Electric vehicles	Belgium	2.21

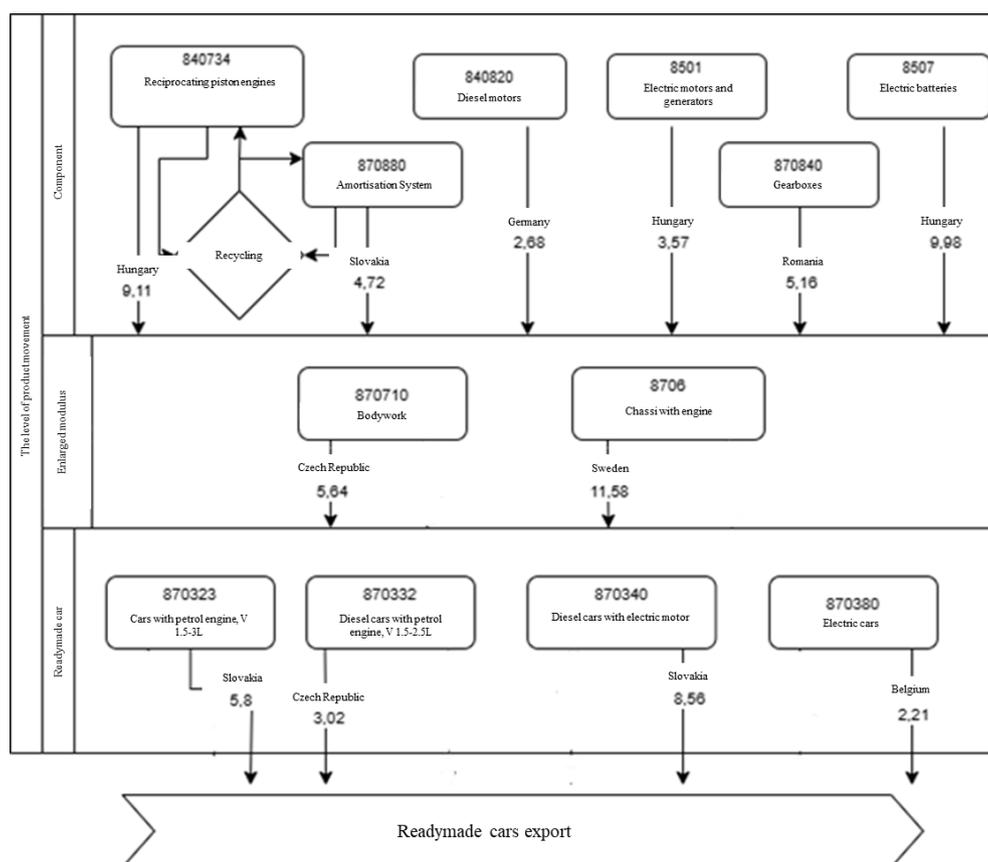
*Source: developed by the authors according to UN Comtrade data*

According to research results, the following positions of EU countries in the automotive industry were determined: centres for (1) the production of highly processed components (Hungary); (2) the assembly of components into integrated modules (Czech Republic); (3) the integration of imported goods into a single unit and the production of a finished car (Slovakia, Czech Republic, Germany); (4) the role of manufacture and export of curb chassis (Sweden) in the segment of intermediate and consumer goods of the international automotive market.

We have compiled a general scheme for the distribution of automotive components in production chains in the EU (Fig.1).

Eastern European countries specialise in internal combustion engines. The production of enlarged modules is concentrated to a greater extent in Germany, Sweden, the Czech Republic, and Poland. The main assembly plants of the European automotive industry are located in the countries of Central Eastern Europe; individual capacities are localised in Germany; electric vehicles are also assembled in Belgium.

<sup>11</sup> Note: V – engine cylinder capacity



**Figure 1.** A product distribution scheme focused on the EU's leading countries in terms of RCA<sup>12</sup>

Source: developed by the authors according to UN Comtrade data

### 2 Modern configuration of production chains in the EU automotive industry

At the second stage, the weighted average indicators of export specialisation (ARCA) by levels of commodity movement for the selected countries were calculated (Table 3).

**Table 3 – Matrix of ARCA indicators by levels of product movement**

Country	Simple components	Enlarged modules	Readymade car
Austria	3.313	0.330	0.524
Belgium	0.369	0.141	1.758
Czech Republic	2.039	4.911	2.387
Finland	1.951	0.150	0.265
Germany	1.523	2.213	1.951
Hungary	8.157	1.132	1.834
Poland	3.610	3.377	0.567
Romania	3.956	0.923	0.224
Slovakia	2.247	1.023	5.992
Sweden	2.787	11.041	1.761

Source: developed by the authors according to UN Comtrade data

Based on the weighted average coefficients of specialisation, we constructed graphs to show the degree of participation of the countries of the eastern and western parts of the EU at certain stages of the value chain (Fig. 2). The results of the second stage clarify and expand the provisions obtained in the first one.

<sup>12</sup> Note: The value under the country name is the coefficient of export specialisation



In the analysed Eastern European countries, the imbalances in the component manufacturing segment decreased during the study period. The production processes to design complex nodes have acquired a more uniform geographical distribution across the world countries. There is a decrease in differences in the distribution of the final assembly of readymade cars in the macroregion.

The Western European countries under study have a reduction in the asymmetry in the level of specialisation of countries by stages of the production chain. There is a decrease in imbalances in the production and trade of components and enlarged assemblies against the background of a reduction in the number of assembly plants in Western European countries.

Therefore, the results of the third stage show a reduction in the overall disparities in the geographical location of individual stages of passenger car production across the EU regions. At the same time, in the Western, Central, and Eastern parts of Europe there is an increase in imbalances in the distribution of carmaker assembly plants. For both regions and the Union as a whole, there is a tendency to move towards a more even distribution of the production links of components and assemblies.

### **Conclusions**

Hence, all three formulated hypotheses were confirmed during the research. Firstly, the geographical imbalances in the production of simple components and components of the automotive industry have decreased over the period under study. Secondly, the production of enlarged technologically complex modules has become more evenly distributed across the Europe. A number of countries have managed to strengthen their own technological base of the industry and integrate into the production chain in its more knowledge-intensive segments. Thirdly, the geography of localisation of assembly plants in Europe has become more limited. There is a formation of a limited pool of countries that control the main capacities of the final assembly of readymade cars.

The study revealed the country-specific features of the automotive industry production networks of the European Union. Among the countries of Western Europe, Germany is of particular interest. The country has an identified export specialisation at each of the levels of commodity movement. Moreover, despite ARCA's low performance in comparison with other countries in absolute terms, Germany is the leader in exporting components, integrated modules and readymade vehicles, surpassing the production scale of other economies in the region by several times. Assembly and manufacturing plants of both European and non-regional automakers are concentrated in Germany. Its automotive industry is characterised by technological leadership among the EU countries in the development of diesel, gasoline engines, hybrid systems, and electric vehicles. The main importing countries of German components are the USA, Poland, China, Turkey, the Czech Republic, Austria, and Slovakia. Some of the products produced are aimed at non-regional exports. However, the significant volumes of components are still supplied to enterprises in the EU member states. Most European automakers depend on the supply of German-made components. The German automotive sector features underline the country's status as a leading one in regional value chains and a major player in the international automotive market.

Sweden's atypically high level of specialisation at the assembly production stage in 2023 can be recognised as a natural consequence of the active expansion of national automakers into foreign markets. Swedish companies supply equipped chassis for vehicle assembly in other countries. This method significantly reduces the costs associated with customs formalities. The main markets for the enlarged modules of Swedish manufacturers are Mexico, Egypt, Spain, Israel, Australia, and Brazil. Indeed, the largest flow of loaded chassis belongs to the segment of commercial vehicles, represented among others by trucks of the Scania and Volvo brands, Sweden.

The automotive industry in Slovakia is focused on assembling of ready-made cars of different brands, design of ready-to-install automotive components, commissioning work, etc. [26]. Moreover, the assembly plants of the Korea company KIA and its first-order suppliers – Mobis – are located in the country. More than 35% of gasoline car shipments are to Germany; about 30% of hybrid car exports are to the United States; a third of diesel cars are exported to Italy. The main volume of deliveries of finished Slovak-made cars concerns

with the countries of Europe and North America.

Among the Eastern European countries, Hungary is the most actively produces the components. For instance, Continental's Hungarian plants in Vaca, Debrecen and Győr produce braking and electronics systems; ZF Friedrichshafen provides assembly plants with transmission elements, suspension, and control systems. A significant share of Hungarian components is imported by European countries specialising in the final assembly of cars (Germany, Belgium, Slovakia, Czech Republic). About 7% of the country's battery exports is to the United States, about 51% to Germany, and 10% to Belgium<sup>13</sup>.

According to the results of the analysis of the dynamics of the imbalances in the export specialisation of countries at the stage of production of simple components, minimal change was revealed among Western European countries. However, the geographical distribution structure of automotive component manufacturing enterprises in Eastern Europe became more homogeneous. The distribution of component production capacities in Eastern European countries was achieved due to an increase in the volume of exports of components by Romania and Slovakia. It increased by 6.4 and 2.9 times, respectively. The largest share of the supplied products of the countries is accounted for by the European leaders of the automotive industry: Germany, the Czech Republic, Hungary, Sweden, and Poland.

At the stage of production of enlarged modules, there is a high level of concentration of production within individual countries. The high deviation rate in 2010 for Eastern European countries is explained by Slovakia's particularly large annual exports of passenger car bodies, which amounted to about \$ 1.1 bn USD. However, the country's total exports in 2010 were \$ 65.3 bn USD. The share of exports of body parts accounted for 1.8% of total exports; the main supplies of these goods were to Germany (~59%) and the Russian Federation (~41%). In 2023, exports of the commodity item under study decreased by 99.5%. It was caused by the cessation of body supplies to the Russian Federation and the relocation of German assembly plants to Slovakia.

Finally, at the stage of final assembly, there is a slight change in the localisation of car assembly plants in the countries of the western macroregion of the Union and a concentration of assembly facilities in a limited number of Eastern European countries. Slovakia is the most involved in the assembly stage today. It has significantly strengthened its position in the export of passenger cars: its share in the country's total exports increased from 8.0% in 2010 to 16.2% in 2023 due to increased trade in gasoline, hybrid, and electric vehicles. A significant part of the deliveries of passenger cars abroad in the reporting period were made to Germany – 21.3%, the USA – 11.7%, Great Britain – 9.1%. Hungary and the Czech Republic have significantly strengthened their specialisation in the final assembly stage. Since 2010, their car exports have increased by 318% and 215%, respectively. Germany, Sweden, and Belgium specialise in the level of ready-made cars. At the same time, Germany has the largest exports of passenger cars of all types. Germany and Belgium are focused on the production of electric vehicles. Swedish enterprises at this stage are mainly focused on the production of gasoline and diesel cars. However, the production of hybrids and electric cars is not well established.

Therefore, there is a reduction in the imbalances in the distribution of production capacity across regions at the level of simple components. There is also a decrease in asymmetry in the localisation of plants for the production of complex components. However, the concentration of assembly plants in individual countries of the macro-regions is increasing with an emphasis on the economies of Eastern Europe.

In the future, the structure of the geographical distribution of production capacities among the EU countries will result in the homogeneous participation of the countries of the macro-regions in certain stages. At the same time, the concentration of manufacturing enterprises focused on the production of simple and less profitable products in Eastern European countries is expected to increase.

The practical significance of the research is in the possibility of use of the European Union experience in the development of the EAEU automotive industry. With certain assumptions, the most developed members of the Union (the Russian Federation and the Republic of Belarus) can become centres for the concentration of complex and knowledge-intensive stages of the production chain. However, the production of components

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<sup>13</sup> The estimates given here and further in the section are obtained by the authors based on Trade Map data. Source: <https://www.trademap.org/> (accessed on 07.06.2025)

and assembly of readymade cars can be localised in Kyrgyzstan, Armenia, and Kazakhstan. However, one of the serious limitations of the automotive network development in the Eurasian Union is the insufficient volume of production and sale of domestically produced passenger cars to establish an international production system within the Union.

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#### CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

#### AUTHORS' CONTRIBUTION

Elena V. Sapir – conceptualization, project administration, writing – original draft.

Ilya A. Gorshkov – investigation, formal analysis.

#### References

- Smirnov, S. V. (2021). Building cars with electric motors abroad: From the beginning to the present day. *Nauchnoye nasledie*, (80-1), 63-68 (in Russian).
- Domański, B., & Lung, Y. (2009). The changing face of the European periphery in the automotive industry. *European Urban and Regional Studies*, 16(1), 5-10. <https://doi.org/10.1177/0969776408098928>
- Yeremchenko, O. A., & Kurakova, N. G. (2023). Measuring the level of technological sovereignty in foreign countries: The experience of the European Union. *Ekonomika nauki*, 9(3), 47-60. <https://doi.org/10.22394/2410-132X-2023-9-3-47-60> 68 (in Russian).
- Sidorova, E., & Sidorov, A. (2023). The strategic autonomy of the European Union in the economy: Concept and challenges of implementation. *International Trends*, 21(3), 119-142. <https://doi.org/10.17994/IT.2023.21.3.74.7>
- Belov, V. B. (2019). The economic and political role of Germany in the European Union. *Actualnye Problemi Evropy*, (4), 93-113. Retrieved from <https://elibrary.ru/waymnt> (in Russian).
- Vasilchenko, A. D. (2024). On the interdependence between specialization and structure of machinery exports: Case of European economies. *Zhurnal ekonomicheskikh issledovaniy Sankt-Peterburgskogo universiteta*, 40(4), 551-569. <https://doi.org/10.21638/spbu05.2024.402> (in Russian).
- Vozmilova, S. S., & Volgina, N. A. (2016). Automotive industry in the countries of Central Eastern Europe: Current development trends. *Vestnik RUDN. Seriya: Ekonomika*, (1), 7-21. Retrieved from <https://cyberleninka.ru/article/n/avtomobilstroenie-v-stranah-tsentralnoy-vostochnoy-evropy-sovremennyyetendentsii-razvitiya> (in Russian).
- Shishelina, L. (2019). Some results of three decades of transformation in Central Europe. *Sovremennaya Evropa*, 6(92), 48-56. <http://dx.doi.org/10.15211/soveurope620194856> (in Russian).
- Podstrakova, M. I. (2021). European automotive industry under great transformation in the industry. *Rossiyskiy Vneshnee`konomicheskij Vestnik*, (5), 116-123. <https://doi.org/10.24412.2072-8042-2021-5-116-123> (in Russian).
- Messaoui, M. A., & Gorlova, O. S. (2022). State regulation of the development of the automotive industry in the European Union. *Humanitarian Scientific Journal*, (2), 98-102. Retrieved from <https://elibrary.ru/ivsamb> (in Russian).
- Zakrevskaya, Y. A. (2023). The global and Russian automotive industry: The period of adaptation. *Obrazovanie i zakon*, (12), 228-237. Retrieved from <https://elibrary.ru/ceuxet> (in Russian).
- Rodionova, I., & Madry, Ts. (2021). Production of knowledge-intensive goods and services: The positions of the countries of Central and Eastern Europe. *Socialnoe ekonomicheskoe problemy yrazvitiya regionov v usloviyax globalnoy nestabil`nosti*, 99-114. Retrieved from <https://elibrary.ru/dqqofn> (in Russian).
- Britsche, A., & Fekete, M. (2024). Supply chain resilience in the European automotive industry. *Management Systems in Production Engineering*, 32(3), 380-400. Retrieved from <https://doi.org/10.2478/mspe->

2024-0036

14. Gerócs, T., Meszmann, T. T., & Pinkasz, A. (2021). Uneven development in the European automotive industry: Labor fragmentation and value-added production in the Hungarian semi-periphery. In *Global Commodity Chains and Labor Relations* (pp. 274–296). [https://doi.org/10.1163/9789004448049\\_012](https://doi.org/10.1163/9789004448049_012)
15. Jipa-Muşat, I., Campling, L., & Prevezer, M. (2025). Business politics as a causal mechanism shaping uneven regional development across Romania's automotive industry. *Journal of Economic Geography*, 25(3), 447-467.
16. Domański, B., Micek, G., Guzik, R., Gwosdz, K., & Kocaj, A. (2024). *The evolution of European manufacturing industries: The dynamics of core-periphery relationships*. <https://doi.org/10.4324/9781003430117>
17. Vošta, M., & Kocourek, A. (2017). Competitiveness of the European automobile industry in the global context. *Politics in Central Europe*, 13(1), 69-86. <https://doi.org/10.1515/pce-2016-0023>
18. Gáspár, T., & Sass, M. (2023). 'Space-time dents' in global value chains: The Hungarian case. *Society and Economy*, 45(3), 173-185. Retrieved from <http://dx.doi.org/10.1556/204.2023.00020>
19. Čížinská, R., Hrtúsová, T., & others. (2021). *Position and perspectives of the European automotive industry*. ŠKODA: AUTO University. Retrieved from [https://www.researchgate.net/publication/355144184\\_Position\\_and\\_Perspectives\\_of\\_the\\_European\\_Automotive\\_Industry](https://www.researchgate.net/publication/355144184_Position_and_Perspectives_of_the_European_Automotive_Industry)
20. Tocci, N. (2021). *European strategic autonomy: What it is, why we need it, how to achieve it*. Istituto Affari Internazionali (IAI). Retrieved from <https://www.iai.it/sites/default/files/9788893681780.pdf>
21. Megyeri, E., Pelle, A., & Tabajdi, G. (2023). The realities of EU industrial policies analysed through automotive value chain dynamics. *Society and Economy*, 45(3), 250-269. <http://dx.doi.org/10.1556/204.2023.00005>
22. Jürgens, U., & Krzywdzinski, M. (2009). Changing East–West division of labor in the European automotive industry. *European Urban and Regional Studies*, 16(1), 27-42. <https://doi.org/10.1177/0969776408098931>
23. Pavlínek, P. (2020). Restructuring and internationalization of the European automotive industry. *Journal of Economic Geography*, 20(2), 509-541. <https://doi.org/10.1093/jeg/lby070>
24. Pavlínek, P. (2020). Restructuring and internationalization of the European automotive industry. *Journal of Economic Geography*, 20(2), 509-541. <https://doi.org/10.1007/s10663-022-09554-9>
25. Fana, M., & Villani, D. (2021). The automotive supply chain in Europe: An input-output analysis of value added and employment composition. *JRC Working Papers Series on Labour, Education, and Technology*, (1), 4-31. Retrieved from <https://publications.jrc.ec.europa.eu/repository/handle/JRC123473>
26. Saxunova, D., Novackova, D., & Bajzikova, L. (2018). Focus on the automotive industry in the context of a globalization process in Slovakia. *Journal of Eastern Europe Research in Business and Economics*. <https://doi.org/10.5171/2018.435685>.

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