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GLOBAL OR MORE REGIONAL? ANALYSIS OF GLOBAL EMBEDDEDNESS OF THE CENTRAL EUROPEAN'S AUTOMOTIVE INDUSTRY VIA VOLKSWAGEN GROUP'S INTRA-FIRM LINKAGES¹

Abstract. Due to the global value chain in the automotive industry, the Central European countries (the Czech Republic, Hungary, Poland, and Slovakia) were involved in the world economy in the last decades. The global value chains as the pattern of the intra-firm linkages are complex and ever-changing frameworks, which reflect on the local and global issues. This study aims to describe the global embeddedness of the Central European countries within the value chain of the automotive enterprises. Via a firm analysis of the Volkswagen Group, the paper describes the spatial distribution and the sharing of production among European, overseas (North- and South American, Asian) and Central European affiliates. Based on statistical data and empirical analysis, the paper will explore that Central Europe has a key role not only in the successful relocation and fragmentation of European road vehicle production, but also has important global linkages within the automotive industry.

Keywords: global value chain, automotive industry, Central Europe, Volkswagen.

JEL classification: F15; F23; L23; L62.

GLOBALNE CZY RACZEJ REGIONALNE? ANALIZA GLOBALNEGO OSADZENIA PRZEMYSŁU MOTORYZACYJNEGO KRAJÓW EUROPY ŚRODKOWEJ POPURZEC POWIĄZANIA WEWNĄTRZKORPORACYJNE GRUPY VOLKSWAGENA

Abstrakt. Wobec globalnego charakteru łańcucha wartości w przemyśle motoryzacyjnym, kraje Europy Środkowej w ostatnich dekadach włączyły się w gospodarkę światową. Globalne łańcuchy wartości jako model powiązań wewnątrz korporacyjnych mają charakter złożonych i wciąż zmieniających się ram, które znajdują odbicie w zagadnieniach w skali lokalnej i globalnej. Opracowanie ma na celu omówienie zmieniającego się modelu globalnej sieci produkcyjnej, jeżeli chodzi o powiązania przemysłu motoryzacyjnego w Europie Środkowej (czeskiego, polskiego, słowackiego i węgierskiego) w zmieniającej się gospodarce światowej. Na podstawie danych statystycznych i analizy empirycznej w artykule wykazano, że Europa Środkowa odgrywa główną rolę nie tylko w udanej relokacji i fragmentacji produkcji samochodów, lecz zajmuje również globalną pozycję w przemyśle motoryzacyjnym. Na przykładzie analizy grupy Volkswagena artykuł omawia dystrybucję przestrzenną i podział produkcji wśród filii europejskich, zamorskich i środkowo-europejskich. Artykuł ilustruje doceńnianie w skali globalnej krajów środkowo-europejskich z punktu widzenia łańcucha wartości przedsiębiorstwa.

Słowa kluczowe: globalny łańcuch wartości, przemysł motoryzacyjny, Europa Środkowa, Volkswagen.

Kody JEL: F15; F23; L23; L62

Introduction

The global embeddedness of the Central European countries (CECs) into the world economy was led by their outstanding export growth in the last decades. Beltramello and his co-authors (2012) certified that as part of the global value chain, the four CECs (i.e., the Czech Republic, Hungary, Poland, and Slovakia) were showing the best export performances among the OECD countries in the

period of 1995-2007. These strong international linkages have readjusted the global role of the Central European region, meaning that through their intermediate exports they have not only European, but strong global linkages as well (Ando and Kimura 2013, Éltető and Toporowski 2013, Cieślík 2014). Therefore, many studies focused on the development of exports within the global value chains – what is the main driving force behind global trade – to describe the global position of the Central European

region, including the differences regarding how deeply these emerging economies have been involved in the global value chains (Grodzicki 2014). Frank (2013) investigated the Slovak exports to the Asian countries. Comparing the figures between 2000 and 2011, machinery and transport equipment exports show an average growth in industry branches where multinational companies have an important role (automotive industry, consumer electronic industry). Guzik and his co-authors (2008) analysed the global linkages of the Polish software industry, while Plank and Staritz (2013) dealt with the integration of the electronics industry in Hungary and Romania into global production networks. The clothing industry of the CECs was examined by Smith and his co-authors (2014), and the Slovakian experiences were described by Pickles and his co-authors (2006).

In addition, the automotive industry showing an outstanding development in the last 25 years in the CECs, incorporated these economies into the framework of the global value chain. Therefore, the unfolding of the global production linkages with regards to the Central European automotive industry has the most abundant literature. They not only analysing the development of the automotive industry in the region (Jürgens and Krzywdzinski 2009, Pavlínek 2008, Pavlínek et al. 2009, Pavlínek and Ženka 2011, Barta 2012, Túry 2014, Molnár et al. 2015), but setting these emerging economies into the (framework of the) global value chain as well (Humphrey and Memedovic 2003, Schmitt and Van Biesebroeck 2013, and many others). Regarding the global pattern of the intra-firm linkages of the automotive companies, regional integration is still the dominant trend on the production side, despite their global presence (Sturgeon and Florida 2000). Road vehicle manufacturers in Western Europe and North America heavily concentrate their production and sales activity to their home region. According to the aforementioned interpretations, the Central European (Czech, Hungarian, Polish, and Slovak) affiliates of multinational companies have strong linkages to production sites and markets in Western Europe. This "supply role" of the Central European region has been observed by several authors (e.g. Sturgeon and

Florida 2000, Humphrey and Memedovic 2003, Barta 2012).

The purpose of this paper is to demonstrate that addition to the regional embeddedness, global linkages show an alternative pattern to the theory of the regionally organised automotive value chains. Our hypothesis is based on the fact that the production of the European affiliates exceeds the European sales of the Volkswagen Group. This is true for the entire automotive industry, because the European automotive industry had a trade surplus of 90 billion euros in 2016 (ACEA 2017), what means that the European Union is a net exporter of automotive products. Based on the existing literature and firm analyses of the Volkswagen Group, this study proves that the automotive production and the value chain of the OEMs (Original Equipment Manufacturers) are not arranged only along large regions, but – due to a worldwide cooperation of the production places – also globally. The aim of this study is to complement the automotive value chain interpretations via exploring the global linkages of the affiliates located in Central Europe.

Linkages among the global value chains – the position of the automotive sector in the Central European countries

To ensure their market presence and to boost their competitiveness (Dunning 1993) the big European and overseas carmakers use the specific attributes of the region to relocate some of their activities, just like companies from the Far East do. Ten car manufacturing companies from Japan to the U.S. and another half dozen automotive firms (in the bus and truck industry) currently have almost three dozen production sites throughout the CECs. It will come as no surprise that given developments in the 2000s, the region has been labelled the "new Detroit" (Unicredit 2007).

In 2016, more than 3.5 million vehicles rolled off the production lines in the four CECs: the Czech Republic, Hungary, Poland, and Slovakia (OICA 2017). This represents 18.7% and 3.7% of European and world outputs respec-

Table 1

Share of automotive products in exports (total and extra-EU28) of the selected countries, in %

Country	2000		2005		2010		2015	
	automotive	extra-EU automotive	automotive	extra-EU automotive	automotive	extra-EU automotive	automotive	extra-EU automotive
Czech Republic	16.1	10.2	17.0	9.3	18.1	13.8	21.1	15.1
Hungary	16.9	6.9	16.4	9.3	14.3	15.3	22.0	12.0
Poland	12.6	4.4	16.0	12.2	14.8	12.9	12.0	12.4
Slovakia	20.2	7.2	18.1	20.8	20.9	30.6	28.5	21.9

Source: Author's calculations based on Eurostat Comext 2017.

tively. The CECs' share in the European output is more than three-fold (3.2 times higher) since 2000 and the rate of the world output more than doubled (2.5 times higher).

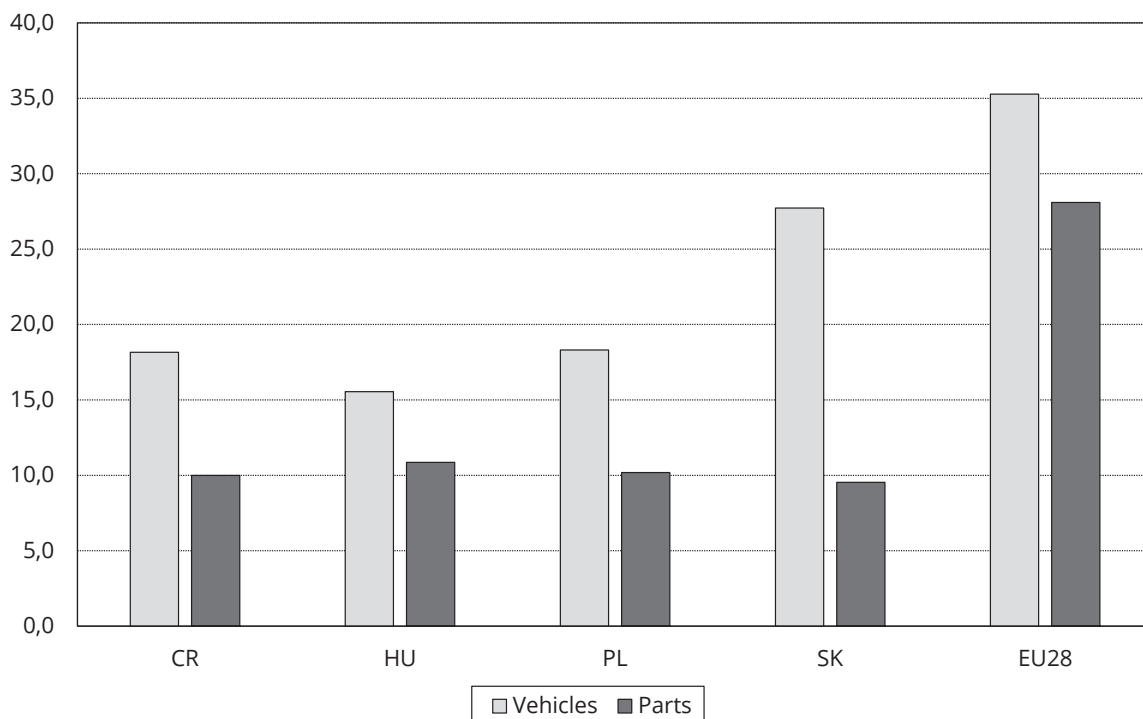
Therefore, the output has been growing since the beginning of the 2000s and the export share of the automotive sector² in the CECs has been growing tremendously (see Table 1).

Extra-EU trade in all CECs had been increasing since 2000, what moderated and turned into decrease after

2013. Slovakia had the biggest extra-EU trade share in 2000 and 2011 almost of one third of the total automotive exports went to third (non EU) countries. Looking at the direct global linkages (extra-EU) of the automotive trade by main commodities, in almost all countries the extra-EU exports of vehicles have been directed more towards external markets than to the EU itself (see Figure 1). On the other hand, trade of parts and accessories has remained much more regional than global. This is true not only for

Figure 1

Extra-EU exports by main commodity groups in 2016 as percent of total exports



Source: Authors' calculations based on Eurostat 2017.

the countries surveyed, but also for the external relations of the European automotive industry. Figure 1 shows that in 2016 28% of the EU exports of parts and accessories and 35% of the EU vehicle exports were directed to third countries. Slovakia has the most globalized car trade. In 2016, 28% of her road vehicle exports were oriented towards extra-EU countries, which was the highest index among the four countries.

Position of the Central European subsidiaries within the Volkswagen Group's global value chain

In 2016, the Volkswagen Group, with its production of 10.4 million vehicles (from motorcycles to heavy trucks), was the second largest automotive company in the world, after the Japanese Toyota Motor Corporation. The compa-

ny sold its vehicles in 153 countries, all over the world from Canada to New Zealand. Despite this, concerning the geographical distribution of the production, Europe still plays a decisive role. Volkswagen Group operates 120 production plants worldwide, where 71 places are in 20 European countries and a further 49 places in 11 other countries in the overseas regions (Volkswagen 2017b). In order to analyse the changing spatial pattern of activities of the Volkswagen Group, we take into account the regional figures from 2010 and 2016 (see Table 2). In terms of sales, Asia – mostly the Chinese market – has had an outstanding role since the early 2000s. However in Europe, Volkswagen assembled 1 million more cars a year than it sold, which means that the company's European production sites (including the Central Europeans) delivered indirectly or directly to the global market.

Table 2**Regional distribution of production, sales^a (deliveries to customers) of the Volkswagen Group in the main markets and production locations (in 2010 and 2016)**

Region	2010		2016	
	production	deliveries	production	deliveries
Europe	4 109 505	3 198 930	4 944 095	4 023 700
Russia	78 081	133 503	145 245	166 972
North America	428 401	549 578	518 970	939 173
South America	912 948	907 778	343 685	421 539
Asia-Pacific	1 692 517	2 145 787	4 050 432	4 318 539
Other countries/markets	119 613	267 518	123 854	427 074
Worldwide	7 341 065	7 203 094	10 126 281	10 296 997

^a regional production figures based on OICA (Organisation Internationale des Constructeurs d'Automobiles) statistic, which may lead to discrepancies compared to Volkswagen annual reports. Data of deliveries based on Volkswagen annual reports.

Source: OICA 2011, 2017; Volkswagen 2011, 2017a.

A business with wide vertical and horizontal extension should seek to coordinate activities within the company. There have been examples in the past, such as integrated engine development in the 1970s, when parallel developments at Volkswagen, Audi and Porsche were integrated (Tolliday 1995, p. 117) as a basis of the company's success. This integration had become necessary due to the emergence of new competitors and a decline in competitiveness in the 1970s. Besides increasing global production, enhancing international competitiveness through a competitive internal structure is currently the main target for the company (Volkswagen 2010, p. 198). Therefore, the organisational structure of the company responds to internal and external challenges. Globalisation means a structural step forward following international production and sales. Thinking globally for a company means (Eisenberg 2011, p. 10):

- ☞ Global production and platforms;
- ☞ Global design – no or minimum local adaptation;
- ☞ Global sourcing of local materials;
- ☞ Worldwide cooperation with suppliers;
- ☞ Flexibility in selection/changes of the production sites.

According to Pries (2003), Volkswagen is a “globally operating transnational company” since the beginning of the 1990s. In the case of corporate governance and profit strategies, this means that the company has followed the globalised centralism and intra-organisational competition strategy since the 1990s. In practice, this means that carrying out a value activity in an affiliate is not only a question of ability, but of which subsidiary can make it the cheapest. The assignment of tasks is the result of competitive bidding within the company (Audi Hungaria 2014).

Trade patterns of the local firms

For the analysis of the global embeddedness of the Central European's automotive industry, the study deals

with those Volkswagen companies which produce motor cars and light commercial or leisure activity vehicles. We will not cover affiliates that produce heavy commercial vehicles (trucks) and buses. On the one hand, such production exists only in Poland and thus would distort the picture. On the other hand, they are formerly independent companies (MAN and Scania) which were integrated only a few years into the global production of the Volkswagen Group. We take into account Škoda Auto in the Czech Republic, Audi Hungaria in Hungary, Volkswagen Slovakia in Slovakia, Volkswagen Poznań, Volkswagen Motor Polska, and Sitech in Poland. During the research, an unforeseen problem was faced, which reduced the number of firms with statistical data. In Poland, there is no public e-access to the financial reports of companies. For the case of Poland, we only have the companies' press releases and business registration documents from the National Court Register.

Škoda Auto

Twenty-six years after Volkswagen acquired interests in the Czech company, Škoda has become a global brand. While in the early 1900s Škoda cars were exported to only 30 countries (Pavlínek 2015, p. 354), today the Czech company is active in more than 100 markets. Under the umbrella of Volkswagen Group, sales in Western European and overseas markets began and global production was launched as well. In addition to the Czech Republic, Škoda vehicles are made in other European countries (Bosnia and Herzegovina, Russia, and Ukraine) and Asia (China, India, and Kazakhstan) as well. In those production locations, assembly is from parts and components exported from the Czech Republic.

In 2016, more than one million Škoda Autos were manufactured, constituting 11% of the personal vehicle production of the Volkswagen Group. Cars are made not

only in the Czech Republic (711,309): more than one-third (38%) of the total output is assembled abroad (see Table 3). There are production plants in Slovakia (41,247), Russia (58,013), India (13,789) and China (327,950). If we look at

the figures we can see that three of the four foreign affiliates produce for local markets. Czech and Slovak production is exported into foreign markets, mainly to European countries.

Table 3

Production and sales of Škoda cars, ranked by deliveries to customers in 2016

	Production (vehicles)	Deliveries to customers (vehicles)
Total Škoda brand	1,152,308	1,126,477
China	327,950	317,088
Germany	-	165,196
Czech Republic	711,309	88,016
United Kingdom	-	80,325
Poland	-	56,180
Russia	58,013	55,386
...		
Slovakia	41,247	18,860
...		
India	13,789	13,022

Source: Skoda Auto 2017, pp. 22-26.

On the other hand, because the Czech company is a part of the Volkswagen Group, production covers not only Škoda cars but other brands from the Group, including parts and components. In 2016, Škoda assembled 53,862 SEAT vehicles in the Czech Republic and 6,186 Volkswagen and Audi cars worldwide at its foreign plants.

Regarding component manufacturing at Škoda, in 2016, 529,621 engines and 1,093,606 gearboxes were produced. The components are not channelled solely into internal production, but are also intended for other Volkswagen Group brands. 40% and 63% of the production (respec-

tively) goes to exports, i.e. 210,188 engines and 706,906 gearboxes were produced for other brands (Škoda Auto, 2016, p. 20). The production figures also show that additional gearboxes and engines are needed for Škoda's vehicle production, which the company purchases from other Volkswagen subsidiaries, so intra-firm linkages on the demand side are also active.

Based on the Škoda Auto's annual reports, there is an increasing number of Volkswagen and Škoda affiliates which have intra-firm relations with the Czech company. For instance, in 2015, Škoda Auto gained new contracts for

Table 4

Spatial pattern of intra-firm linkages of Škoda Auto a.s.

Sales to the related parties as percent of total intra-firm sales

	2010	2011	2012	2013	2014	2015	2016
Volkswagen AG	6.3	5.3	2.2	4.0	3.5	3.5	2.6
Companies controlled by ultimate parent company	61.6	76.1	48.6	52.7	56.5	88.1	90.1
Germany	n.a.	n.a.	28.9	27.4	28.7	-	-
Other EU	n.a.	n.a.	2.7	2.7	2.5	2.8	2.9
India	n.a.	n.a.	1.3	0.8	0.8	0.9	1.0
Russia	12.1	16.3	15.0	11.5	7.4	4.0	2.8
Other related parties	20.0	2.4	1.3	0.8	0.7	0.7	0.6

n.a.: not available

Source: Škoda Auto a.s. Annual Reports 2010-2015.

delivering vehicles with Audi Volkswagen Korea Ltd., Porsche Colombia S.A.S., and Porsche Croatia d.o.o. New contracts for sales of genuine parts, bodyworks, and other products were signed mainly with European affiliates but an even higher number of South American and Asian partners (Škoda Auto, 2016, 2017).

Regarding intra-firm linkages within the Volkswagen Group, since 2011 there is no detailed data published on the receivables from companies controlled ultimately by the parent company: only the main partners are indicated. The figures in 2010 show remarkable trade relations with the South American (Volkswagen do Brasil Ltda.), South African (Volkswagen of South Africa (Pty) Ltd.) and Chinese (Shanghai Volkswagen Automotive Co. Ltd.) affiliates. Based on the latest figures concerning the period 2010 and 2016, there is an increasing trend in export volumes to the companies controlled by the ultimate parent company (see Table 4). Regarding trade with the Russian partner (OOO Volkswagen Group Rus) on the one hand because of falling sales (decreasing/stagnating demand) there is a consistent intra-firm trade. On the other hand the increasing local content in Russia also causes a drop in trade in absolute terms as well. In the case of trade relations and market expectations with India, local assembly started in 2002. At that time, half of intra-firm trade was realised with the Indian subsidiary (Škoda Auto, 2003). Because of the increasing local content, trade of goods and services (receivables) has been continuously decreasing, from 31% in 2003 to 25% in 2005 and to 15% in 2007 (Škoda Auto, 2004, 2006, 2008). Today, intra-firm trade with Škoda's Indian subsidiarity – as proportion of intra-firm trade – is marginal.

Audi Hungaria

Audi branded cars were assembled in various Volkswagen production plants, like in Slovakia, Russia, Spain, China, India, and Indonesia, but because Audi Hungaria³ is the

largest engine factory in the Volkswagen Group, the subsidiary has a unique position within Audi AG. Due to continuous investment, the Győr plant produces exclusively the TT sport vehicles (TT models are produced completely at the Hungarian subsidiary) and exports to all around the world. Audi Hungaria produced a total of 2,022 thousand engines and 160 thousand vehicles in 2016.

As part of the Volkswagen Group it has several partner locations worldwide, with which the company has direct and indirect linkages. The Hungarian subsidiary has linkages mainly with the parent companies (Audi AG and Volkswagen AG), but it also has relations with other Volkswagen subsidiaries in Europe, Mexico, China, and India (see Table 5).⁴ Looking at the long term figures, the ties with the parent company became stronger until the trade linkages with European and Chinese production plants were weakened. In the case of the Chinese relations, the figures show remarkable changes. The reason for this is the large-scale investments in Chinese production since 2010 (Mull 2011), whereby the local content of Chinese production increased. On the other hand starting the assembly from September 2016 at Audi's new production site in San José Chiapa (Mexico) eventuated increasing trade between the Mexican and Hungarian affiliates (see Table 5).

Besides the global economic crisis, the Volkswagen's (diesel) emission scandal in the U.S. had been high on the agenda since 2015. Some of the engines involved in fraud were assembled in the company's factory in Hungary. That is because within intra-firm trade, global value chains linked production among others to other European factories. One of these factories is the Volkswagen's Bratislava factory where the SUV model of Audi is exclusively assembled. The scandal, along with the decline in production, also had a tangible impact here. In late 2016, Volkswagen announced that its brand Audi bought back 25,000 diesel Audi Q7 models in the U.S.⁵ The model was assembled in the Bratislava plant and the engines were assembled in the Győr plant in Hungary. The scandal also highlighted the indirect global linkages of the Audi's Hungarian affiliate.

Table 5

Spatial pattern of intra-firm linkages of Audi Hungaria Zrt.

Sales to related parties and affiliates to the above detailed countries, as percent of total intra-firm sales

	2010	2011	2012	2013	2014	2015	2016
Audi AG	59.88	58.33	55.66	60.62	73.70	75.48	66.78
Volkswagen AG	9.60	8.53	8.79	9.14	7.42	4.79	6.00
Germany	1.00	3.81	4.78	5.58	4.87	5.31	5.85
Other EU countries	16.50	16.56	15.90	12.10	8.89	10.73	17.37
China	12.10	11.97	13.40	11.08	3.99	2.24	2.27
Mexico	0.90	0.78	1.43	1.01	0.68	0.43	1.10
USA	0.01	0.00	0.00	0.00	0.00	0.00	0.00
India	0.00	0.00	0.00	0.42	0.42	0.96	0.56

Source: Audi Hungaria Motor Kft., Kiegészítő melléklet 2010-2016.

Volkswagen Slovakia

The Bratislava factory produces small city cars and sport utility vehicles (SUV), car bodies and gearboxes. In subsequent years, several new production locations were founded. In 1999, the Martin factory of Volkswagen Slovakia started the production of car components for gearboxes and chassis (differential gears, flanges, flanged shafts, brake drums, and brake wheels). The components are mounted in Volkswagen, Audi, Škoda, SEAT and Porsche cars. Since 2004, the Košice plant has been preparing Volkswagen semi-knocked-down (SKD) assembly kits (Volkswagen Slovakia 2016) for the Russian Volkswagen affiliate. The fourth factory of the company was opened in Stupava in 2014. The new technology centre produces plant components for

vehicle production, which are used not only in Slovakia but also in other Group plants. The product range includes innovative devices and tools such as locking tongues, manipulators or machine protection components.

In 2016, Volkswagen Slovakia produced 388,687 cars and, in addition, the Bratislava plant produced 263,700 gearboxes. The Martin plant output reached 33.3 million components.

Concerning trade linkages within the global supply chain, the biggest partner is the parent company (see Table 6). Volkswagen AG has a 45.45% share of all delivered goods and services. At the same time, since 2012 the importance of the parent company has been decreasing, with an increasing number of deliveries realised to the entities under control of the Volkswagen Group.

Table 6

Spatial pattern of intra-firm linkages of Volkswagen Slovakia a.s.

Sales to related parties and affiliates, as percent of total intra-firm sales

	2012	2013	2014	2015	2016
Volkswagen AG	68.93	65.23	63.23	53.34	45,45
Entities under control of the Volkswagen Group	31.04	34.73	36.73	46.62	54,49
Associated companies within the Volkswagen Group	0.03	0.03	0.03	0.04	0,05

Source: Volkswagen Slovakia a.s. Účtovná závierka (Financial statement) between 2013 and 2016.

Volkswagen Slovakia is among the biggest exporters of the country. Beside the embeddedness into the European market the factory has unique position within the Volkswagen Group. It is the only Volkswagen factory to produce the models Volkswagen Touareg, Audi Q7, Volkswagen up!, SEAT Mii, Škoda Citigo and the car bodies of Porsche Cayenne (Volkswagen Slovakia 2017). The vehicles are exported to 148 countries worldwide. Taking into account the export figures (see Table 7), Volkswagen Slovakia is Europe-oriented, but at the same time one quarter of trade is

directed to overseas countries, i.e., to the United States of America and China. Exports to the US have been growing steadily and dynamically during the observed period, while exports to China decreased from 21% to 11%. To explore the reasons we need to examine the product portfolio. Next to the components, there are small cars and SUVs. The main market for small cars (up!, Citigo, Mii) is Europe; SUV cars go to the USA and China. For example, the Slovak vehicle exports to China consist mainly of SUV (Audi Q7 and Volkswagen Touareg) cars produced in Volkswagen's

Table 7

Export relations of Volkswagen Slovakia a.s.

	2010	2011	2012	2013	2014	2015	2016
Export total, m EUR	4,000	5,160	6,500	6,480	6,100	7,100	7,500
Export ratio (%)	99.3	99.8	99.7	99.7	99.7	99.6	99.9
Germany (%)	36.0	41.9	40.2	33.7	33.7	36.8	32.0
USA (%)	n.a.	8.7%	n.a.	10.4	11.3	13.4	16.0
China (%)	n.a.	21.1%	9.5	19.9%	17.5	10.0	11.0
United Kingdom (%)	n.a.	n.a.	7.1	n.a.	n.a.	n.a.	n.a.
Russia (%)	n.a.	5.3	n.a.	n.a.	n.a.	n.a.	n.a.

Source: Press releases and yearly reports (e.g. Čísla a fakty, Výročná správa) of Volkswagen Slovakia a.s. TASR.

plant in Bratislava (Gradziuk and Szczudlik 2015). Therefore, the volume of production and the export ratios are highly influenced by demand of the overseas countries.

Volkswagen in Poland

Thanks to global acquisitions of Volkswagen AG (MAN, Scania), today there are eight production locations in Poland. The product portfolio is broad, from component manufacturing to the assembly of cars, light- and heavy vehicles and buses. Volkswagen produces automotive components and assembles vans in Poznań. In Polkowice, Volkswagen Motor Polska manufactures engines and Sitech produces seating components. The newest factory opened in Września is exclusively producing vans (Volkswagen Crafter). The Swedish firm Scania, the majority of which is owned by Volkswagen AG, has a factory in Słupsk where buses are assembled. Volkswagen-owned German MAN has a bus and component factory in Poznań, a component manufacturing factory in Starachowice and a truck production facility in Niepołomice-Kraków. The export revenues of the three car and component manufacturing related companies of the Volkswagen Group in Poland altogether had more than 16 billion złoty in 2015 (Rzeczpospolita, 2016), which is the second position in the Polish export ranking. This study deals with those Volkswagen companies in Poland which produce motor cars and light commercial or leisure activity vehicles and its parts.

Volkswagen Poznań

The Polish affiliate (belongs to Volkswagen Nutzfahrzeuge) has three production locations. One in Poznań, where body building, paint shop and assembly, and an aluminium foundry (heads, steering gear housing) are located, and one in Swarzędz, where the production of components for welding and installation cockpits takes place. The Volkswagen's Poznań foundry ended the last year with an output of 4.47 million components. In 2014, 98% of production was exported, mainly to Germany. Volkswagen Poznań was the fourth largest exporter in 2015 (Rzeczpospolita, 2016). In 2016 in the Poznań plant 185,200 Transporters and Caddys (small van) were produced. The Polish factory plays a key role in the production of small commercial vehicles. Last year 199,486 Volkswagen Transporter models were manufactured in Europe, where of 172,884 vehicles in the Hannover plant and 26,602 vehicles in Poznań were assembled. In the production of Volkswagen Caddy the Polish factory has a global role the type is manufactured exclusively in Poznań (Volkswagen 2017a, Portal Gospodarczy 2017). The Polish subsidiary also supports Volkswagen's access to global markets. Volkswagen will assemble Caddy in Relizane (Algeria) from 2017 and it is possible to assume that the whole procedure will look similar to the previous assembly of the Caddy model in Russia i.e. the final assembly in Algeria will be based on parts produced in Poznań.⁶

In 2016 the third production facility of the Volkswagen Poznań was opened in Września (near Poznań in Western Poland), especially for the new Volkswagen Crafter. The production capacity is up to 100,000 vehicles a year. The position of the Polish subsidiary is further strengthened, that the new Volkswagen Crafter⁷ is only assembled in the Września plant and exported to Europe where the main market is.

Volkswagen Motor Polska

Assembly of internal combustion engines began in the Polkowice plant in 1999. Production was continuously improved at the affiliate. Until the end of 2012, four-cylinder pump-injector diesel engines were produced. Parallel to this, production of common rail engines started in 2008. From 2013, production of the latest engine generation (the Modular Diesel System – MDB) was started.

In 2016, there were 647,000 four-cylinder diesel engines assembled for Volkswagen Passenger Cars, Volkswagen Commercial Vehicles, Audi, Škoda, and SEAT models. In the factory, there were also produced engine components, including cylinder heads, camshafts and crankshafts, crankcases, connecting rods, and integrated valve gear modules – for diesel engines for other Volkswagen plants around the world.⁸ Volkswagen Motor Polska was the sixth largest exporter in 2015 (Rzeczpospolita, 2016). Engines from Polkowice were delivered to Volkswagen Poznań and to other Audi, SEAT, Škoda, and Volkswagen plants in Germany, the Czech Republic, Portugal, Spain, India, Mexico, USA, and South Africa as well.⁹ The importance of international relations is indicated by the fact that since 2011 the Polkowice plant has been the only supplier in the company that sends 2.0 CR (common rail) engines to the assembly plant in Chattanooga, USA.

Sitech

The parent company has five production locations: next to the Polish factory, there are three sites in Germany (Wolfsburg, Hanover, Emden) and one in China (Shanghai). In 2016, there were 1,695 people working at the factory where about 11.7 million components (back structures, frames, consoles, headrests) were produced. The export partners are Volkswagen factories in Germany, China, Argentina, India, Mexico, Russia, South Africa, the Czech Republic, Spain, Slovakia, and Hungary (Sitech Sp. z o. o. company report, 2016).

Global role of Central European Volkswagen subsidiaries

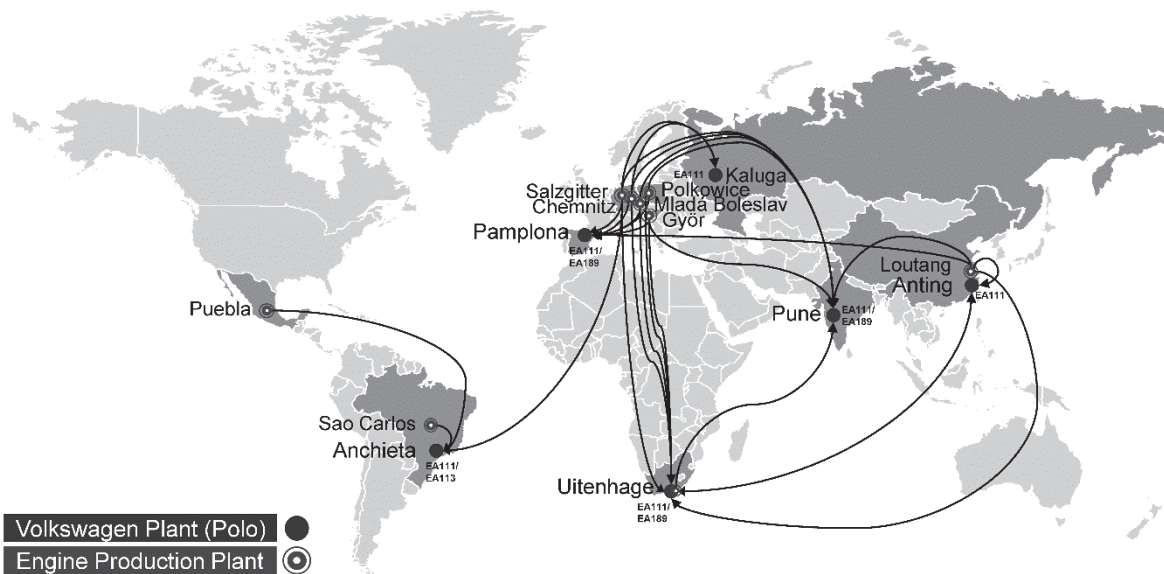
The Volkswagen is a global firm, at the same time Europe still has a decisive role in the company's strategy. Europe's share is preponderant in the globally organised processes of production and sales. Within Europe, the spa-

tial distribution is as follows: Germany and Central Europe are marked by production, while Western European export markets can be characterised as consumption countries, despite being home to some Volkswagen production locations. Analysing the intra-firm trade, Germany and Europe have a dominant role, nevertheless intra-firm linkages of the examined companies show some alternative relations. Central Europe has an important role within the Group because several unique components and partial units are

manufactured there. Production of many models were reallocated or new models were started to be produced in the Central European production locations. Certain components and parts are also produced exclusively in Volkswagen subsidiaries. Export means not only complete vehicles, but also booming the intra-firm trade in parts and partial units globally. Examples are the case of Škoda's Indian trade relations or the global linkages of the Central European engine production (see Chart 1).

Chart 1

An example of the complexity of the global value chain: the EA111¹⁰ motor delivering/production matrix for assembly of the Volkswagen Polo



Source: Eisenberg 2011, p. 13.

The Audi's factory in Győr is the largest engine factory within the Group and also the only factory where Audi TT models are produced. Poland has its unique position with the production of diesel powertrains. Škoda is a global brand that exports finished and semi-knocked-down (SKD) vehicles and also main parts not only to Europe but to overseas countries as well. Volkswagen Slovakia has a unique position within the Group, because it is the only Volkswagen factory to produce the models Volkswagen Touareg, Audi Q7, Volkswagen up!, SEAT Mii, and Škoda Citigo. Volkswagen Motor Polska exports engines not only to Europe but to Volkswagen's U.S. factory as well.

Conclusion

Due to the continuous investments of transnational companies, the global embeddedness of the Central European's automotive industry has strengthened in the last decades. Despite the integration into the global networks, the Central European automotive production and trade are mainly integrated into the European supply chains.

Based on statistical data and empirical analysis, the paper showed that within Volkswagen Group, Central Europe's global linkages are also significant. Via a firm analysis of the Volkswagen Group, the paper describes the spatial distribution and the sharing of production among the company's affiliates especially the role of the Central European affiliates in the global value chain. There are local subsidiaries producing parts and accessories and others assembly vehicles in the CECs. Concerning the trade linkages, the assembly of vehicles are more globalized than production of parts and accessories. A number of examples are found that Central European affiliates exclusively producing to the global markets. On the same time production of parts and accessories are also has (indirect) global linkages via export of European-assembled vehicles to the third countries.

Basically, the role of the European production places will be reduced by the globalisation of Volkswagen's vehicle sales and assemblies. However, by building up new assembly capacities in the overseas markets (North American, Chinese and Indian), the previously considerable global

relationships of the Central European affiliates will be reduced.

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² The automotive sector was illustrated by exports of automotive products, i.e. motor cars and other motor vehicles principally designed for the transport of persons (other than public transport-type vehicles) including station wagons and racing cars, motor vehicles for the transport of goods and special purpose motor vehicles, road motor vehicles, n.e.s., parts and accessories of motor vehicles and tractors, internal combustion piston engines for the vehicles listed above, electrical equipment, n.e.s., for internal combustion engines and vehicles, and parts thereof (SITC groups 781, 782, 783, 784, and subgroups 713.2, 778.3).

³ Previously Audi Hungaria Motor Kft with effect from January 1, 2017, was merged with Audi Hungaria Services Zrt., and the latter company was renamed Audi Hungaria Zrt., at the same time. Therefore from now on we refer to Audi Hungaria Motor Kft as an Audi Hungaria Zrt.

⁴ Volkswagen de México, S.A. de C.V.; FAW-Volkswagen Automotive Company Ltd.; Volkswagen FAW Engine (Dalian) Co. Ltd.; Shanghai-Volkswagen Automotive Company Ltd.; Skoda Auto India Private Limited.

⁵ <http://www.reuters.com/article/us-volkswagen-emissions-audi-idUSKCN12L1WD>.

⁶ <http://40ton.net/poznanski-volkswagen-caddy-bedzie-montowany-afryce-algierskich-zakladach-firmy-sovac/>

⁷ The previous model of Volkswagen Crafter was produced by Daimler AG.

⁸ https://www.volkswagen-media-services.com/en/detailpage/-/detail/Volkswagen-Motor-Polska-Sp-z-oo/view/3475099/680154b15b8a7325830b8b8b1e42389f?p_p_auth=zw2VFh6X

⁹ <http://www.vwmp.com.pl/Produkt.html>

¹⁰ The EA111 series is an internal combustion engine series, which was introduced in the mid-1970s by Audi.

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