

LABOUR AND SOCIAL JUSTICE

THE FUTURE OF EMPLOYMENT IN THE CAR SECTOR

Four country perspectives
from Central and Eastern Europe

**Jan Drahokoupil, Ștefan Guga, Monika Martišková,
Michal Pícl, Zoltán Pogátsa**
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The automotive industry is a key sector in Central and Eastern Europe. A number of megatrends, i.e. climate change, digitalization and changing mobility concepts are transforming this sector worldwide.



The employees in Central and Eastern Europe in this sector are thus facing major changes in their future employment.



Against this background, FES Prague initiated a regional project on the future of employment in the automotive industry in Czechia, Slovakia, Hungary, and Romania. The output are four country studies and a comparative analysis put together in this publication.

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Preface

The automotive industry in Europe is facing a rapid transformation. The pressure to change is caused by a number of megatrends: Digitalization and automation, climate change and thus stricter CO₂ emissions targets, urbanization and changing concepts of mobility. Additionally, China and the Silicon Valley are entering the international market and increase the pressure on European manufacturers to remain globally successful. Automation trends and the shift away from the combustion to the electric engine will affect employment and reduce jobs in the long run.

Looking at Central and Eastern Europe, many automobile manufacturers relocated parts of their production to the region in the 1990's due to lower wages and lower labour costs. By now, the automotive industries in the Visegrad countries and Romania have become „integrated peripheries“ in the global production network. This means that they are mostly dependant on foreign capital and any strategic decision taken by the parent company elsewhere, will also have effects on them. At the same time, the automotive sector is of key economic importance and the biggest industrial employer in many countries of the region. Thus, the question is how will this transformation change employment in the sector and what leeway of possible action do local actors have to change it?

Against the backdrop of these developments, FES Prague decided in 2018 to analyse the impacts of this transformation on employment in the automotive industry from a regional perspective. The consequences comprise not only a loss of employment but also changes in content and the way of working. The project also wanted to explore potential action strategies for relevant stakeholders. In a first step, the study „The future of the automotive industry in Germany. Transformation by design or by disaster?“, elaborated by the Division for Economic and Social Policy of FES in Berlin, was translated from German into Czech and Romanian and discussed among a group of experts in both countries. In a second step, four country studies (CZ, SK, HU, RO) were elaborated to assess the importance of the sector in each national context, discuss the effects of the transformation dynamics on employment and put forward possible recommendations.

The studies were presented in separate workshops by the authors in each country.

As a conclusion of the project, the results of these four studies were presented in a regional workshop in Prague in May 2019 and discussed with trade union representatives, researchers and political decision makers from all participating countries. Together with mobility experts from Germany and the region, potential action strategies to prepare for the future were explored.

This publication brings the English translation of all four country studies together and includes a short comparative analysis of all four case studies as well as a summary of the discussions at the regional workshop. The shift towards e-mobility will most likely benefit Central and Eastern European countries in a short- to medium-term perspective because they will keep the production of conventional vehicles with combustion engines. The question is, however, what will happen after this transitional period, when the share of electric vehicles will increase and the production of cars with combustion engines will go down as it has to if the European Union is to meet its own emission targets. Developments in this direction would buy the countries in Central and Eastern Europe some time, but present a risk in the long run due to decreasing productivity and out-dated technology. Hence, relevant stakeholders need to prepare for these changes on a political and on the company level. The four country studies give insights into these developments and recommendations what potential action strategies could look like. Hence, they provide the basis for continued discussions about these and further questions on a national and the regional level.

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**ANNE SEYFFERTH
CLAUDIA EHING
KATEŘINA SMEJKALOVÁ**

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THE FUTURE OF EMPLOYMENT IN THE AUTOMOTIVE INDUSTRIES IN CENTRAL AND EASTERN EUROPE. Key challenges for policy makers and workers' representatives

JAN DRAHOKOUPIL

European Trade Union Institute, Brussels

In 2018, FES Prague initiated a regional project on the future of employment in the automotive industry in Czechia, Slovakia, Hungary, and Romania. The background of this project is the transformation of the automotive industry driven by a number of mega-trends such as climate change and digitalization. The output of this project are four country studies that describe the significance of the automotive industry for each national context, assess the impact of the transformation dynamics on employment and elaborate potential strategies for action. The results of the studies were discussed in a regional workshop in Prague in May 2019 by Jan Drahokoupil and the authors of the country studies together with trade union representatives and political decision makers.

This note highlights some of the key insights from the studies and the discussions at the regional workshop. It identifies key challenges for policy makers and workers' representatives. These include the management of job displacements, formulation of an industrial strategy, investment into life-long learning, and tackling the challenges also through social dialogue and collective bargaining on the company level.

Automotive is a key industrial sector in Central and Eastern European Countries (CEECs). The narrowly defined automotive industry accounts for about a third of production value in manufacturing. In 2017, it represented 36.2% of manufacturing production value in Slovakia, 28.5% Czechia, 26% in Hungary, and 23.4% in Romania (NACE29 in Eurostat, sbs_na_ind_r2). Car production and related employment has been growing rapidly from the late 1990s and particularly after 2002 as the region benefited from the relocations in production capacity from the traditional producers in Western Europe. In 2017, the narrowly defined automotive industry employed 185,242 workers in

Romania, 177,156 in Czechia, 97,688 in Hungary and 77,062 in Slovakia.¹

The European automotive industry recovered well from the crisis of 2008. CEECs, in particular, have seen a rapid growth of output after 2012, contributing to full capacity utilization in the region. This was accompanied by labour shortages in the sector, contributing to significant wage increases. At the same time, however, the automotive industry faces a perfect storm of fundamental challenges. First, reacting to the regulatory efforts to curb the climate change, the industry has embarked on a shift from producing cars power by the combustion engine towards an increasing reliance on electric vehicles (EVs). Such vehicles are much less complex and thus require much lower labour input. What is more, the success of European car makers in managing the electrification of drive train is far from guaranteed. There are key infrastructure challenges to overcome. The European car makers are also dependent on Chinese and Korean suppliers of cells and batteries, the key components that constitute a bulk of the value of an EV.

Second, the leading position of European car makers is challenged also by digitalization, including the development of autonomous driving. The increasing role of software is an opportunity for technology companies, most of which are based in the US, to take a leading role in the automotive value chains, occupied by European car makers. Digital technologies also enable new business models, notably the provision of mobility as a service, giving another opportunity to technology companies to undermine the position of car makers.

Finally, commonly discussed as Industry 4.0, digitalisation and automation is transforming the nature of production

¹ In Germany, 869,119 workers were employed in NACE29 in 2017 (Eurostat, sbs_na_ind_r2). However, a broader classification would cover about 2 million industrial workers.

processes. It changes the nature of work in the automotive sector and the demand for skills, with tasks performed by middle-skilled workers being at the highest risk of automation. Industry 4.0 may also undermine the comparative advantages and value capture in the production stages.

These mega trends will transform the automotive industry in CEECs. At the same time, in order to understand their impact in the region, one needs to consider the specific role played by the CEECs in the European and global automotive industry. As argued by Petr Pavlínek (2018), the region constitutes an 'integrated periphery' in the European automotive production networks. It is characterized by a high degree of dependence on foreign capital, with foreign investors controlling key producers and suppliers. Major decisions about the region are thus made abroad in headquarters of multinational corporations. The region relies on innovations imported by the multinationals from their headquarter locations. Local innovation input is thus low, restricted primary in the area of supporting and improving production processes. In general, the industry has a dual structure, with foreign companies exhibiting higher productivity and innovation intensity than the domestic firms.

CEECs compete primarily through low labour costs, specializing in assembly and production of generic and labour-intensive components. The low-wage profile protects the region from the restructuring linked with the transition towards electromobility, from which it can even benefit in the mid-term perspective, but it also represents the key challenge in sustaining the process of convergence in the region, including through wage increases (Galgóczy and Drahoukoupil, 2017). The country study on Romania by Ștefan Guga offers a detailed discussion of the constraints entailed in the low-wage specialization.

The CEECs thus share common challenges linked to their dependent position and the low wage model. However, there are also important differences between the countries. First, labour costs vary significantly also within the region, with Romania having much lower wage levels than Hungary, Czechia, and Slovakia. It thus specializes in labour intensive activities, such as the production of cable harnesses. Romania also relies much more on the production of components. The low labour costs provide less incentives to invest into automation. They also attract activities that are more difficult to automate. Assembly of cable harnesses was thus recently relocated to Romania from other CEECs countries, such as Slovakia. However, Romania also recorded significant wage increases recently. It, too, faces competition from lower wage countries, such as Serbia, Moldova, and Morocco.

Second, while all countries are characterized by a high degree of dependence on foreign investors, Czechia and Romania have retained their own brands, Škoda and Dacia. These traditional car makers have been acquired by Volkswagen and Renault respectively, but they arguably enjoy a higher degree of autonomy within the multinational companies than other affiliates that started as greenfield investments. Importantly, the two car makers have retained R&D operations. These are,

to an extent, focused on adaptation rather than development of new products, but they still represent the most developed, and somewhat exceptional, innovation-intensive operations in the region.

1.1 TRANSITION TOWARDS ELECTROMOBILITY IN LOW WAGE ECONOMIES: BACK TO THE BEGINNING?

The transition towards electromobility is driven primarily by the European emissions regulations that tighten significantly caps on CO₂ emissions by 2030. Climate change and the pollution in cities have also led to a shift in consumer demand towards EVs, particularly in the premium segment. Diesel vehicles have been largely abandoned by consumers after the emissions fraud scandals. Diesel cars, and eventually all combustion-engine powered vehicles face restriction in access to major cities in Europe.

However, there is a lot of uncertainty about the growth of the market share of EVs and even about the actual feasibility of enrolling individual electromobility on the massive scale. In any case, massive electrification of car fleets remains the strategy through which the European car makers reduce their emission targets. The estimates of the EVs market shares in 2030 vary between 20% and 50%. Hybrid vehicles are expected to have an important role in the earlier stages.

The share of EVs will grow more rapidly in higher-income countries where there is the necessary infrastructure and consumers have the purchasing power to acquire the higher priced EVs. This will, to an extent, protect producers in CEECs countries as they will benefit from a more stable demand for combustion engine vehicles in their home markets.

In fact, CEECs are likely to benefit from the restructuring induced by the transition towards electromobility in the short- and mid-term. Production of vehicles power by combustion engines is likely to grow in the region as the car makers relocate what is now considered as a declining technology to low-wage locations, with headquarter locations focusing on the new technology. For instance, Volkswagen announced that production of the Passat model will shift from Emden to the Škoda plant in Kvasiny in 2023, citing lower costs in Czechia and the future specialization of the German location in EVs.

As discussed in the Romanian study, CEECs are likely to benefit, in the mid-term perspective, also from the allocation of production of hybrid vehicles. These are likely to play an important role in the earlier stages of transition from the reliance on the combustion engine. As the hybrid vehicles and their production are more complex than that of standard cars, production of hybrid vehicles is likely to bring higher-value-adding activities and also denser supplier networks.

However, increasing focus on the declining technology represent a significant risk in the longer-term perspective. As the combustion engine becomes a declining technology, the value generated in production declines, with companies com-

peting mainly through costs. It is thus estimated that the profit margins in production of vehicles with combustion engine will drop (from 5 to 2%, according to EC, 2017: 64). Lower production value will also put downward pressure on productivity, undermining sustainability of wage increases.

The specialization in declining technology, rather than an early focus on the new technology requiring innovation and development, also undermines attempts to move into more innovation-intensive activities. However, the latter is a necessary precondition for further convergence in wages and living standards.

Signs of specialization in the declining technology are noticed in all country studies. At the same time, the region is not going to be left out of the production of EVs even in the early stages of transition. VW designated Mladá Boleslav in Czechia as one of its e-mobility sites. BMW plans to produce EVs in its Hungarian plant. In fact, there are signs that the distribution of EVs production across the European production networks may soon mirror the allocation of combustion models. Notably, in May 2019, VW announced further adjustments of its e-mobility strategy, citing a need to shift production of small EVs to a low-cost location in CEECs to meet its price target.² Accordingly, allocation of small EVs would be shifted from Emden to Bratislava, with Emden focusing on higher-margin e-SUVs.

The CEECs thus may not miss the e-mobility revolution in the end. Instead, they may soon find themselves in the familiar position also in the value chains for EVs: specializing in production of smaller cars with narrower margins, while relying on innovations imported from the headquarter locations.

1.2 AUTOMATION AND INDUSTRY 4.0: UNDERMINING THE POSITION OF FACTORY ECONOMIES?

The specialization in assembly and production of generic and labour-intensive components makes CEECs particularly vulnerable to automation. Manufacture of motor vehicles belong among the sectors with highest degree of automation and the assemblers rank among the most vulnerable occupations (Nedelkoska and Quintini, 2018). A study commissioned by the Czech government estimated that 40% of tasks involved in assembly can be automatized in 5 years, 70% in 60-15 years, and 100% in 16-30 years (Fařun et al., 2018).

The low wage profile has somewhat protected the CEECs from the job destructing effect of automation. Low wages provided less incentive to automatize than in higher-wage countries. Moreover, the region, Romania in particular, attracted activities that are more difficult, if at all possible, to automatize, such as the assembly of wire harnessing. However, as confirmed by a company-level experience shared at the closing workshop of the regional project, the cost of technol-

ogy has fallen to such an extent that wage levels have become much less relevant in the calculation of the return on investment into job-saving technologies.

As argued in the study on Czechia by Michal Pícl, automation is also an opportunity. It allows for increases in productivity that would underpin further convergence towards western income levels. Introduction of technology also creates jobs requiring higher skills, supporting also increases in wage levels. However, it remains the case that the region is facing displacement of blue-collar jobs. The job losses will be regionally concentrated, affecting the poorer regions (e.g. Chmelař et al., 2015). The challenge is thus to make sure that the gains from increasing productivity are used also to support displaced workers in finding jobs that are likely to require higher qualification and may be located outside of the region.

The threat of job losses, as emphasized in the study on Slovakia by Monika Martišková, is only one effect of the introduction of new technologies into production. The technologies associated with Industry 4.0 may also undermine the position of companies specializing in production stages of the value chain by making their competences, such as process upgrading and tooling, less relevant (see Szalavetz, 2017). Value added in production thus may shrink.

The Slovak study also discusses the effects on the nature of work. In this area, the impact of the new technologies can already be well documented. It includes the increasing pace of work, enhanced control over workers through data collection and analysis, and increased standardization of tasks. Jobs thus often become more polarized, with growing share of skill intensive and creative tasks and also that of routine and repetitive tasks with little autonomy. Technology also enables outsourcing and fragmentation that makes it more difficult for trade unions to organize and represent workers.

1.3 SOCIAL DIALOGUE AND INDUSTRIAL POLICY IN DEPENDENT ECONOMIES: WHAT IS TO BE DONE?

The number of people employed in the automotive has most likely peaked in Europe, regardless of whether the European car makers will succeed in the transition from the combustion to the electric engine. CEECs may be somewhat protected as the production of vehicles powered by the combustion engine is facing relocation to the lower-cost areas. However, the high risk of automation makes the management of job displacements a relevant policy issue also in the region. Current job shortages, however, seem to have removed the issue from the radar of policy makers.

The other policy challenge brought by both the introduction of Industry 4.0 technologies and the electromobility transition is that of being left with products and activities that bring only low value added. That challenge is not new; it follows the dependent position of the region in the automotive production networks. In any case, a sustained convergence in wages and living standards requires a move into in-

² <https://www.spiegel.de/wirtschaft/unternehmen/vw-will-elektro-leinwagen-statt-in-emden-in-osteuropa-bauen-a-1267882.html>

novation-based activities that bring higher value added. As these will not be imported by multinationals automatically, they require an industrial strategy and investment into education and life-long learning. The Slovak study offers a comprehensive discussion of measures that can be implemented by individual stakeholders.

The country studies emphasize the role of the social dialogue, both on the national level and in companies as an institutional precondition for successful formulation of a longer term and inclusive industrial strategy. At the same time, as discussed in the study on Hungary by Zoltán Pogátsa, such a model is weak in the region. In particular, the dependent status implies that key decision makers are not actually based in the region. That could be compensated by the active role of the state that would forge strategic partnerships with the investors. However, public policy is still largely trapped in the old paradigm of attracting investors through tax reliefs and, as most extreme in the Hungarian case, labour law liberalization.

However, as Monika Martišková argued at the regional workshop, existing structures of social dialogue can be a relevant tool for addressing the challenges faced by the industry. In particular, trade unions in CEECs have become relevant players. They can mobilize significant power resources. They can raise issues in the policy debates on the national level and influence legislation through tripartite structures. Trade union campaigns have indeed brought the issue of digitalization on the agenda in some of the CEECs, but there is a need for campaigns targeting the challenges in the automotive sector specifically. Trade unions in the region are also increasingly capable of organising employees in companies, thus they can

address the impact of new technologies on job quality in company level agreements. At the same time, as emphasized by the trade unionists from the region present at the workshop, mobilizing resources to prepare for the transformation of the industry remains a challenge, with many organizations struggling with enforcing the basic rights to organize.

The *Transformationsatlas*³, a survey designed by the German trade union IG Metall which was discussed at the workshop, is an example of trade union action on both national and company levels. Almost 2.000 companies from all sectors organized by IG Metall participated. It combines a sectoral analysis of the challenges, for instance in the automotive sector, with tools to assess the risks and opportunities on the company level. In this way, the employees gain awareness of the risks faced by the sector and the company. They are also provided with guidelines to address them through collective bargaining and other actions on the company level. The mapping of situation in companies then informs campaigns on the national and European levels. Coordination of such campaigns on the European level and in the region can improve trade union strategies and it also allows for an efficient use of the scarce resources. At the same time, trade unions in CEECs need to develop strategies that reflects specificities of industrial relations in the region. One example mentioned in the workshop is using the access to headquarter management through the European Works Councils to exert pressure on local management. The four studies represent a valuable resource that can inform such efforts.

³ <https://www.igmetall.de/politik-und-gesellschaft/zukunft-der-arbeit/digitalisierung/transformation-viele-arbeitgeber-haben-keine-strategie>

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2

SHORT SUMMARIES

SUMMARY OF THE CZECH CASE STUDY

MICHAL PÍČL

The automotive industry is undergoing a number of significant changes all over the world as a result of global megatrends such as urbanization and climate, demographic, technological and geopolitical changes. It is clear that the complex effects of these changes on the automotive industry are already extensive, and will be even more so in the near future. Their effect on the Czech economy, where the automotive industry has a tradition going back to 1898, is expected to be significant. This is partly because of the industry's considerable economic performance, but also because of the labour market, where it is one of the Czech Republic's key industrial employers.

There are growing calls for electro mobility, the use of which is limited in the Czech Republic by insufficiently-developed infrastructure. The impact of electro mobility on the Czech economy may be considerable as a result of the corresponding changes in production, given that the production of electric motors is less labour-intensive than is the production of combustion engines. However, what type of engine will be made where is a strategic decision that is taken by individual parent companies, and as such is hard to influence.

The increase in the global population and the overall greater demands for mobility lead to growing demand for self-driving car solutions. In combination with the shared use of such vehicles, it will be possible in future to make much better use of their capacity, and thus to increase the overall volume of transport. Nevertheless, the Czech Republic does not currently provide sufficiently favourable conditions for the testing and development of such solutions, and this may have negative consequences for Czech employment in this branch.

The above-mentioned change that car ownership itself will undergo will be one of the key dimensions of the future development of automobility. This could in the future solve the problem not only of the growing number of inhabitants, but also the question of saving energy and the environment. In its current form and position in the value chain, however, the Czech automotive industry would clearly be unlikely to profit much from the added value of new business models that link manufacture with car-sharing, aided by innovative software

solutions. Indeed, in such a scenario it is possible that we would even see a deepening of the country's disadvantageous position as a mere supplier of parts, the value of which will fall further in the new model where realisation of added value will come in sharing rather than in sales.

The most crucial impact, however, will come from the change in the process of auto manufacturing, in other words in the move towards robotisation, automatised and above all digitalisation. This is, for now, being held back in the Czech Republic by low wages, which make it economically advantageous to use human labour in the production process rather than expensive technologies. However, as the price of labour grows, and technologies become cheaper, it may also have a significant impact on the Czech Republic and its employment rate, since a number of processes in the Czech automotive industry could easily be automatised. If technological unemployment as a result of the automation of processes carried out by Czech producers really were to occur on a large scale, it would be heavily concentrated on a regional basis, in many regions that are already peripheral and structurally weak, "kept above water" by large foreign automotive employers. To some extent a dilemma then arises regarding the desirability of pressure to raise the still very low wages. The need also arises for specific preventive structural development strategies that would stop the affected regions from being over-dependent on an automotive industry managed from abroad.

As can be seen, the mantinels for finding a solution to these threats in the Czech Republic are exceptionally narrow. If we are to make use of the potential of the expected changes in such a way as to preserve employment in the Czech Republic and ensure well-paid work, then it is essential that the local automotive industry be transformed so that the country's position in the international production chain moves towards one that allows greater autonomy and thus the ability to politically shape the whole process on the national level. This can take place only by means of a long-term, properly thought-out and complex economic and industrial strategy on which there has to be society-wide, cross-party agreement lasting for several governments and parliaments.

One of the ways to expand the possibility of influencing the transformation of the automotive industry is to expand employee participation in decision-making at a company level

and collective bargaining at a sectoral level. Collective bargaining in the central and eastern European region is well below the standards of many of the home countries from which the companies operating here come.

SUMMARY OF THE HUNGARIAN CASE STUDY

ZOLTÁN POGÁTSA

Changes facing the car industry

According to industry analysts, the global car industry is going to face the following challenges in the coming years:

1. The electric car
2. Self-driving cars
3. Automatization of production
4. Collective mobility
5. Digitalisation

The significance of the car industry in Hungary

Similarly, to the entire Visegrad region, the car industry is Hungary's most important industry. Slovakia is widely considered to be the world's number one producer of cars per capita, but with the new BMW plant in Debrecen Hungarian foreign minister Sijjártó asserts Hungary is about to catch up.

Together with suppliers, some 620 companies are present in the Hungarian automotive sector. This means some 170,000 workplaces, a significant number when compared to the 4 million strong Hungarian labour market.

The estimated 8,038bn HUF value added of the sector currently amounts to 18% of manufacturing, or 10% of Gross Domestic Product. Automotive exports amount to a fourth of Hungarian exports, with 92% of the revenues attained abroad.

The main pillars of the Hungarian car industry are Audi in Győr, Mercedes in Kecskemét and Suzuki in Szentendre. They are about to be joined by BMW in Debrecen. Some 15 of the largest 20 global automotive suppliers are present in the country.

The segmentation of the Hungarian automotive sectors

For the purposes of our study, we can divide the Hungarian automotive industry into the following categories:

- a) **Car manufacturers:** AUDI, Mercedes, Suzuki, Kravtex-Kühne (buses) and BMW. These are mostly high-end producers, with high-end models. However, the production phases that are present in Hungary are almost entirely low end. (Even in the case of Audi, as we prove in the paper.)
- b) **High-end suppliers:** these are the suppliers that manufacture complex and high-end components,

especially ones that are already wholly or partially part of the technological revolution in the industry. They include Bosch, Continental, Knorr-Bremse, Hintenberger, Takata, etc. This category also includes service providers such as Formel D.

- c) **Low-end suppliers:** these are suppliers that contribute with components and parts that are not technology intensive, such as cables, plastics, traditional seats, metal whole parts. Examples include Lear, Yai Yanfeng, F Segura, Rehau, Veritas, Westcast, ZF, etc.
- d) **Suppliers of outgoing technologies:** these are suppliers whose fate currently depends on the traditional fossil technologies. The manufacture, engines, ducts and other components tied to this traditional technology.

Examples include: Denso, Opel, Johnson Electronic, etc.

The adaptability of the Hungarian automotive sector

The above categories have very different potentials for adaptation:

- a) Fortunately, the **car manufacturers** present in Hungary are mainly high end, and the technological revolution is happening in this upper part of the industry. Most of the manufacturers present in Hungary are at the forefront of these changes. Audi already has a partially self-driving car on the market, and Mercedes and BMW are also industry leaders. This is good news for the Hungarian car industry. However, it is yet unclear where these industry pioneers plan to implement their new production: in their home economies (mostly Germany), or in their satellite economies such as Hungary. Much will depend on this decision.
- b) **High-end suppliers** will find it easier to adapt to the changes in the industry, and in fact many of them are already well on their way. Examples include electronic components for self-driving and electronic cars. However, much depends on the future decision of the primary car manufacturers. These high-end suppliers will find a more secure future in Hungary only if car manufacturers introduce their new technologies here.
- c) **Low-end manufacturers** will definitely have a future as long as there is car manufacturing in Hungary, since their product line up does not depend on technological changes. They supply components that will be needed in cars and buses regardless of major changes. They also usually work very closely with the car manufacturers and are very flexible in their production.
- d) **Suppliers of outgoing technologies** will be hardest hit by the forthcoming changes. They are currently involved in production that is destined to exit in a few years' time. A prime example is the Opel plan in Szentgotthárd, which once manufactured entire cars, but is now constrained to making fossil engines for outgoing models.

What do we know about the strategies of the car manufacturers?

As we have highlighted, Hungary is fortunate in having attracted car manufacturers that are at the forefront of the industry wide revolution. This is a good sign, but it does not guarantee a secure future. Much will depend on the locational strategies of these international players in coming years.

It is currently impossible to tell how the transnational car manufacturers present in Hungary will organise their activities once technological changes kick in. We can deduce some ideas from the case of Volkswagen, a manufacturer that is not present in Hungary but in the neighbouring Visegrad states. VW at the end of 2018 announced that by 2025 it wishes to sell 50 different models that would be pure electric drive, with 2–3 million such cars being sold worldwide. This would make up as much as a quarter of the overall sales of the holding in that year.

In order to achieve this, VW will

1. concentrate its new technology electric car production in its home economy of Germany (Zwickau, Hannover, Emden). There is an expected related productivity increase of 20–25%.
2. Traditional technology (fossil) cars will be produced in Eastern Europe.
3. There will be a loss of 30 thousand jobs across the holding company, 23 thousand of them in Germany. However, the battery technology and software development branches will see an increase of 20–25%.

It is clear that the revolutions in the car industry are happening at the top end of the range. Tesla is a very important challenger in this respect. The new technology is likely to appear at the top end, and in fact it is already on the threshold of commercialisation. High-end production in international production chains usually means home country. Satellite economies in the past have traditionally received low-end production phases. Automotive investors in Hungary might be high end for the most part, as are their products, but the actual production phases carried out in Hungary are low end. This makes a Volkswagen type strategy likely for these other manufacturers as well.

This puts Hungary into a double squeeze: technology from above and wages from below. Low wage assembly and manufacturing are gradually being priced out of the markets as wage increases are continuing. The two-year collective agreement signed at the Kecskemét Mercedes plant at the end of 2018 stipulates a 35% wage increase until 2020, 22% of which will be effective in 2019. The Kecskemét plant has been notorious for its low wages, so the basis is low. (The starting wage during the trial period for instance is currently lower than at Tesco.)

The basic gross wage after the initial trial period develops as follows:

- 2018 – HUF225 006
- 2019 – HUF274 507
- 2020 – HUF 310 193

Audi unions are currently fighting for an 18% increase.

The strategies of the unions

Consultations with union leaders reveal that Hungarian union workers are not in a position to develop a strategy. On the one hand they are far stronger than unions in other sectors. While the nation-wide union density is about 9%, at major car manufacturers (Audi, Mercedes) it is well above 50%. The exception is Suzuki, which had notoriously fired workers who had attempted to create a union. There have also been recent successes in terms of pressuring these firms into major concessions related to wages, benefits and working conditions.

Strategy, however, is not part of the strength of these unions. Unlike in Germany, they are not considered a strategic partner. In the German case unions enjoy Mitbestimmung rights, and are considered a vital player by the government at the federal and the Land level, especially whenever Social Democrats are in power. In Hungary, however, unions have no Mitbestimmung rights, and the right-wing government hardly talks to them, treating these domestic players as far less important than foreign investors, in spite of the often xenophobic rhetoric about 'economic colonisation'.

Unions in Hungary are not consulted about the strategies of their employers. Transnational firms tend to plan many years ahead, yet Hungarian unions receive no official communication about plans ahead. They rely on rumours and hearsay, which is often contradictory and frequently turns out to be unfounded, partial or distorted. The Hungarian government has struck strategic agreements with the multinationals, but these have not involved common planning ahead about technological change or consultations with unions. The agreements themselves have been declared a state secret.

A technological change at this scale would require retraining the workforce. However, it has been the experience of union leaders that so far introductions of new machines or production phases have not been huge deals. The equipment arrives, and often what takes weeks of training according to the original German manuals is trained in Hungary within a matter of days. This simultaneously indicates that the value added of the production phases is low (simple assembly mostly), and that automotive transnationals have made use of satellites such as Hungary to transfer low complexity, low value-added phases. Union leaders are afraid that this trend will continue. In terms of the massive technological change, they are concerned that this suggests that the Volkswagen strategy will apply, in that cutting-edge technology will be produced in Germany, and production of receding technology will be kept in and even transferred to Eastern Europe. This also means that over time more job losses can be expected in the East than in the West. However, at the time of writing, in absence of concrete strategies from the multinationals involved, we cannot predict their number.

It is also important to mention that the larger part of the automotive workforce is employed by the supplier base. High-end suppliers are already involved in the technological revolutions, but most of their activities will take place wherever the manufacturers decide to locate their productions. Low-end supplier will remain in Hungary as long as there is a car manufacturing industry, and will find it easier to adopt, but they constitute a low wage sector that guarantees no more than economic survival, especially for more peripheral areas of the country. Finally, suppliers tied to traditional technologies will disappear. Unionisation in supplier firms is much weaker than in the manufacturers themselves, especially in the smaller plants working with a few hundred workers or even less. They have even less bargaining power about future changes, as they are made to understand that demand for their products depends on the longer-term strategies of the manufacturers.

SUMMARY OF THE SLOVAKIAN CASE STUDY

MONIKA MARTIŠKOVÁ

The aim of this study was to assess the extent of changes and to indicate possible scenarios for future development in the automotive industry in Slovakia within the context of new technologies, ecology pressures and growing economic protectionism. As we have shown in this study, the automotive industry in Slovakia has mostly production function while other, higher value-added activities are absent. New technologies introduction will even decrease value-added of physical production and, consequently, new technologies (mainly robotics and automation) will cause a decline in demand for middle and low-skilled jobs and the polarization of labor market. This development is predicted regardless to other factors of development. For manual workers it means jobs reduction, but also a reduced added-value of their work, and thus a reduction of their real wages. We have tried to outline the future of automotive industry workers from the point of view of local institutional actors and their contribution to the upgrading capabilities of companies located in Slovakia and operating in global automotive production networks. Favorable industrial upgrading scenarios in different variants mainly require targeted public support strategies to transfer and accumulate know-how from MNCs towards local actors. On the part of workers, this means increased participation in lifelong learning and the ability to acquire new skills and knowledge. New technologies may deteriorate working conditions and real wage. The main challenge for trade unions thus will be employees' protection and their working conditions from the negative consequences of technology deployment. Increasing unionization rates and maintaining social dialogue will be even more difficult than today, and it will possibly lead to strategies reconsideration to represent new occupations and workers in new forms of employment. Localization strategies of MNCs may change as well, but to predict the development remains difficult. This may also mean that, despite the creation of favorable conditions for global capital through education enhancement as we suggested, it

will not be sufficient to improve Slovakia's position in the global production networks. Therefore, strategies to support participation in higher value-added activities should not only apply to automotive industry but across the sectors in the economy.

SUMMARY OF THE ROMANIAN CASE STUDY

Ștefan Guga

In contrast to 10 or 15 years ago, today Romania has a small and stagnant automobile market and a large and growing automotive industry, which has since become the country's most important industrial sector. The industry produces largely for export and is almost entirely controlled by foreign capital. In order to benefit from Romania's large reserves of cheap labour, automotive OEMs and suppliers have invested in labour-intensive processes with low complexity and technological input. Increasing integration in the transnational supply chains of the European automotive industry has turned Romania's industrial infrastructure into an assembly platform for products designed and sold in Western countries, with local actors being largely deprived of strategic control over the functioning of local operations. Similar to other countries in Central and Eastern Europe, the current state of the Romanian automotive industry showcases the country's status as a dependent market economy. The same goes for the worsening labour shortages, which are an inevitable consequence of dependent development in the European periphery.

In Romania, the impact of the major technological changes that have recently begun to sweep the global automotive industry (powertrain electrification, connected and autonomous technology, digitalization) are filtered through its specific position in the European industry's value chains. The report argues that the technological transition will mostly likely be delayed in Romania, with a potentially positive impact on industrial activity and employment, at least in the short- and medium-term. Engine and transmission manufacturing, which is highly complex, does not have a strong footprint in Romania, nor does the manufacturing of other major components that are vulnerable in the face of powertrain electrification. Given the low purchasing power of the majority of the population, the development of a mass market in EVs or connected and autonomous vehicles will be impaired at least until the prices of these technologies match those of traditional ones. Likewise, digitalization in production will not take place at the same pace as described in various "plants of the future" scenarios, since heavy investments aimed at reducing the content of manual labour cannot represent a priority in a country with very low labour costs. For now, whatever change can be discerned is by all standards only minor: a few hundred electric vehicles sold annually, the appearance of a handful of mobility service providers restricted to large cities or equipping some indirectly productive workers with tablets. The tendency for Romania to become a location where such technologies are developed is however more ob-

vious in the recent growth of R&D activities tied to electric powertrains and connectivity hardware and software. Somewhat paradoxically, this does not signal a potential surpassing of the low-cost, labour-intensive manufacturing, but rather consolidates the dependent status of the Romanian automotive industry.

Low labour-costs, and not technological endowments, are still considered to be the main competitive advantage for attracting automotive investments to Romania. The accelerated wage growth of recent years has barely made a mark on the still huge differences between Romania and Western European countries. The questionable long-term sustainability of the way in which Romania's automotive industry has developed is probably most visible in the rapid tightening of the labour market and the accompanying shortages of cheap labour. Barring a major economic crisis in the near future, this problem will only get worse, especially since neither the employers nor the government seem to be willing to tackle its real causes. At present, this appears to be a much more palpable threat to the industry than global technological change. A future scenario in which the present vicious circle between low labour costs and shortages of cheap labour will make further industrial development unviable is not at all implausible — in the long run, continued wage growth necessary to ensure adequate labour supply is not compatible with low-complexity, labour-intensive manufacturing. While this is still far from being a real issue, the impact of the low-cost development model on technological advancement both in industry and in the market is major and immediate. Romania will not be able to genuinely benefit from automotive technological advancement without surpassing this model.

3

THE FUTURE OF EMPLOYMENT IN THE AUTOMOTIVE INDUSTRY IN THE CZECH REPUBLIC

MICHAL PÍCL

3.1 RESUMÉ

The automotive industry is undergoing a number of significant changes all over the world as a result of global megatrends such as urbanisation and climate, demographic, technological and geopolitical changes. It is clear that the complex effects of these changes on the automotive industry are already extensive, and will be even more so in the near future. Their effect on the Czech economy, where the automotive industry has a tradition going back to 1898, is expected to be marked. This is partly because of the industry's considerable economic performance, but also because of the labour market, where it is one of the Czech Republic's key industrial employers.

There are growing calls for electromobility, the use of which is limited in the Czech Republic by insufficiently-developed infrastructure. The impact of electromobility on the Czech economy may be considerable as a result of the corresponding changes in production, given that the production of electric motors is less labour-intensive than is the production of combustion engines. However, what type of engine will be made where is a strategic decision that is taken by individual parent companies, and as such is hard to influence.

The increase in the global population and the overall greater demands for mobility lead to growing demand for self-driving car solutions. In combination with the shared use of such vehicles, it will be possible in future to make much better use of their capacity, and thus to increase the overall volume of transport. Nevertheless, the Czech Republic does not currently provide sufficiently favourable conditions for the testing and development of such solutions, and this may have negative consequences for Czech employment in this branch.

The above-mentioned change that car ownership itself will undergo will be one of the key dimensions of the future development of automobility. This could in the future solve the problem not only of the growing number of inhabitants, but also the question of saving energy and the environment. In its current form and position in the value chain, however, the Czech automotive industry would clearly be unlikely to profit much from the added value of new business models that link

manufacture with car-sharing, aided by innovative software solutions. Indeed, in such a scenario it is possible that we would even see a deepening of the country's disadvantageous position as a mere supplier of parts, the value of which will fall further in the new model where realisation of added value will come in sharing rather than in sales.

The most crucial impact, however, will come from the change in the process of auto manufacturing, in other words in the move towards robotization, automatised and above all digitalisation. This is, for now, being held back in the Czech Republic by low wages, which make it economically advantageous to use human labour in the production process rather than expensive technologies. However, as the price of labour grows, and technologies become cheaper, it may also have a significant impact on the Czech Republic and its employment rate, since a number of processes in the Czech automotive industry could easily be automatised. If technological unemployment as a result of the automation of processes carried out by Czech producers really were to occur on a large scale, it would be heavily concentrated on a regional basis, in many regions that are already peripheral and structurally weak, "kept above water" by large foreign automotive employers. To some extent a dilemma then arises regarding the desirability of pressure to raise the still very low wages. The need also arises for specific preventive structural development strategies that would stop the affected regions from being over-dependent on an automotive industry managed from abroad.

As can be seen, the margins for finding a solution to these threats in the Czech Republic are exceptionally narrow. If we are to make use of the potential of the expected changes in such a way as to preserve employment in the Czech Republic and ensure well-paid work, then it is essential that the local automotive industry be transformed so that the country's position in the international production chain moves towards one that allows greater autonomy and thus the ability to politically shape the whole process on the national level. This can take place only by means of a long-term, properly thought-out and complex economic and industrial strategy on which there has to be society-wide, cross-party agreement lasting for several governments and parliaments.

One of the ways to expand the possibility of influencing the transformation of the automotive industry is to expand employee participation in decision-making at a company level and collective bargaining at a sectoral level. Collective bargaining in the central and eastern European region is well below the standards of many of the home countries from which the companies operating here come.

3.2 THE AUTOMOTIVE INDUSTRY IN THE CZECH REPUBLIC

Change in the Czech automotive industry from 1989 until the present day

Vehicle manufacturing has a long tradition on the territory of the Czech Republic. The first car to be made here was the Präsident, made in Kopřivnice in 1898. The best-known domestic names of the time in carmaking were Laurin & Klement, Walter, Praga, and Nesseldorfer Wagenbaufabrik (later TATRA) from Kopřivnice.

After 1946, following the move to a centrally-planned economy, automotive production and the sale of vehicles and their parts were concentrated in large, state-owned companies. Among the best-known were the post-war Automobilové závody, the Czechoslovak automotive and aerospace parts makers collected under the name PAL (Příslušenství Automobilů a Letadel, or Car and Aeroplane Parts), combined tyre production under the name BARUM (Baťa, Rubena, Matador) and the Mototechna enterprise. The directive organisa-

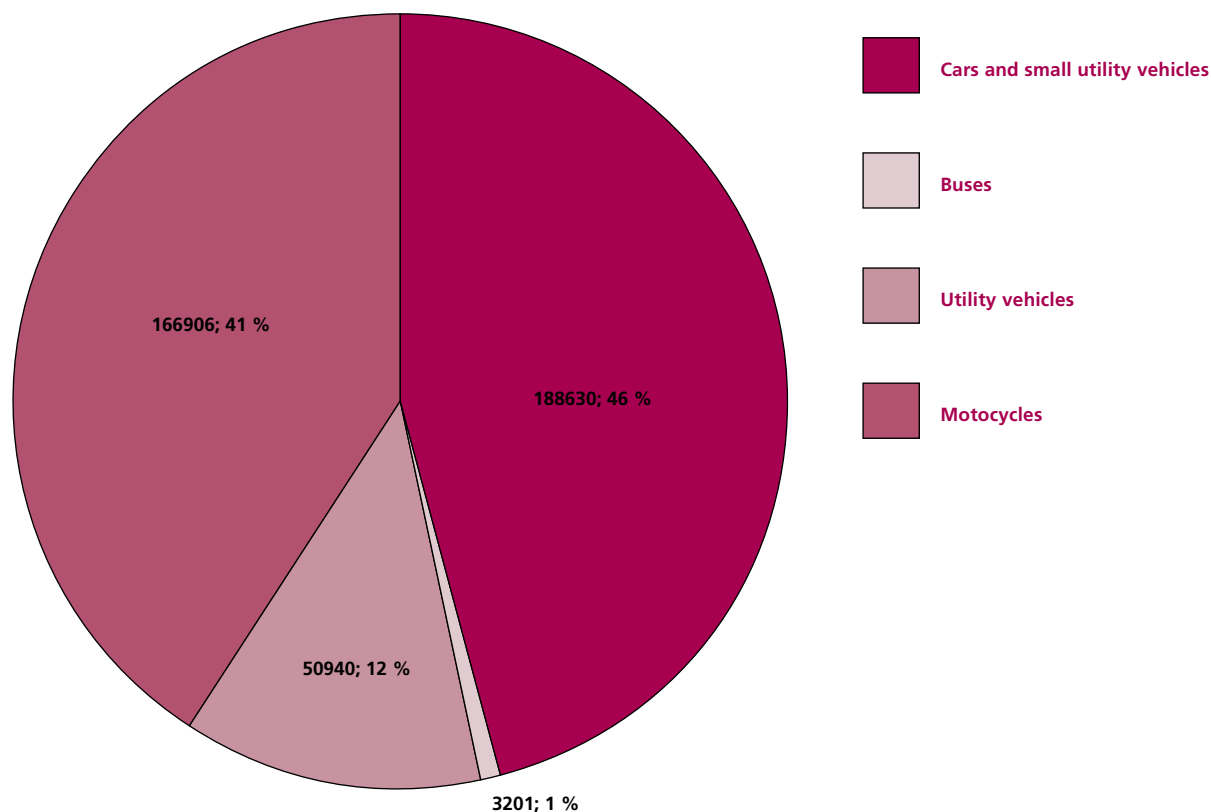
tional structures were changed and renamed several times (ČZAL = Československé závody automobilové a letecké, or Czechoslovak Automotive and Aeroplane Factories, Československé závody na výrobu vozidel, or Czechoslovak Vehicle Production Factories, Sdružení SNA = Sdružení středních nákladních automobilů, or Association of Medium-Sized Vans), until the Československé automobilové závody (ČAZ, or Czechoslovak Automotive Factories) was created in 1965. This functioned as the management centre for the automotive industry essentially until 1988, when its activity came to an end under the name APK (Automobilový průmysl, kombinát or Combined Automotive Industry). (AutoSAP, 2017)

After 1989 one of the most important questions in the post-communist countries of central and eastern Europe was the privatisation of former state enterprises. The transfer of all sectors of the economy, in other words industry, agriculture and services, into private hands and the development of the private sector formed the central element of all the plans for economic transformation, and the automotive industry was no exception.

The vehicle production market in Czechoslovakia at the time was dominated by the production of cars and small utility vehicles, over 97% of the volume of which consisted of cars produced under the Škoda brand. Close behind cars, comprising over 40% of the total volume of Czechoslovak vehicle production in 1989, came motorcycles, of which the greatest share in volume came from the JAWA Týnec nad Sázavou

Graph no. 1

Number of vehicles produced in Czechoslovakia in 1989



Source: AutoSAP. Graph: author

enterprise (60%), followed by ZVL Povážská Bystrica with 27 % and ČMZ Strakonice with 13 %. The production of utility vehicles was dominated by the three largest domestic brands Liaz (35 %), Avia (33 %) and Tatra (30 %)⁴.

As noted by Gelb & Gray (1991), the governments of the states of central and eastern Europe in the early 1990s were gradually preparing conditions for the development of private capital. They introduced new laws focusing on how to handle the state-owned enterprises, removing limitations on the activities of private companies, making private purchases free of charge and reducing the bureaucracy involved in founding new companies. In Czechoslovakia, the implementation of economic transformation started in 1990. After a number of expert debates among economists, the path chosen for transformation was of a liberal economic type. A key step was the transformation of ownership relations known as privatisation. An extremely important introductory stage of transformation was the maintenance of macroeconomic stability (Petříček, 2006).

The automotive industry did not escape these privatisation plans. In 1990, Škoda formed part of the state-owned enterprise Automobilové závody, and as the result of a failure of good management found itself with major operational and economic problems. The search for a suitable foreign investor became a privatisation priority for Petr Pithart's government, since on its own the factory would have no chance of survival. Out of an original twenty-four interested parties, the German concern Volkswagen (VW) was the eventual winner as the result of the restructuring plan it put forward, and in 1991 Škoda became both a joint stock automotive company and part of the VW concern. To begin with, Volkswagen took a 30% share in the company, which in 1994 increased to 60.3%, and a year later to 70%. Since 2002 Škoda Auto has been 100% owned by Volkswagen.

Not all privatisation journeys went as smoothly as that of Škoda Auto, however. Tatra Kopřivnice is an example. After the lengthy consideration of various foreign partners, the company was in the end privatised using the coupon method. This did not turn out to be a very fortunate decision. The company became majority-owned by share funds, the management of which changed hands and failed to provide Tatra with a proper direction. This led to a multitude of problems. Since March 2013 the company TATRA TRUCKS has been owned by Czech shareholders and has undergone complex restructuring, which in 2015 enabled it to present its new armoured vehicle, TITUS, and in 2017 to celebrate, in its new condition, the 120th anniversary of the start of the production of motor vehicles in Kopřivnice.

If Škoda was saved by foreign ownership, the truck-maker Avia ended up paying dearly for it. Avia was initially privatised in 1992 by Czech owners, but they then sought foreign capital for the company's further development. In 1995 Avia was

bought by the South Korean company Daewoo. In 2006 its new owner became the Indian automotive company Ashok Leyland, which as a result of losses decided in 2013 to transfer manufacture to India and to sell all its production activities in the Czech Republic. The company was not revived until 2016, when Avia was bought by the Czech industrial group Czechoslovak Group, and started up production in the Czech Republic once again.

However, restructuring did not concern only the big factories. Together with the companies' manufacturing policy, the whole supply chain changed. As noted by Pavlínek (2016), so that Volkswagen could meet new standards as soon as possible, it restructured the supplier bases of its newly-acquired Czech plant. Škoda actively supported the foreign takeover of its domestic suppliers so that foreign technologies could be transferred to the Czech market. By 2005 a total of 94 joint ventures had been set up between Škoda Auto's domestic and foreign suppliers, mostly in the Czech Republic and to a lesser extent in Slovakia. The foreign suppliers built 58 factories from which to supply Škoda Auto. Mergers, acquisitions and newly-built factories in foreign hands were not limited just to supplying Škoda Auto, but had an influence on the whole of the Czech automotive industry.

The departure from the market of insufficiently competitive domestic companies unable to meet the growing standards was an essential part of the restructuring and modernisation of the domestic automotive industry, which as a result increased its overall competitiveness. Without this departure, the sector would not have been able to survive in the long term.

Investment support was forthcoming not only to the motor vehicle manufacturing segment, but to the manufacturing industry as a whole. The automotive industry forms a significant part of this, today accounting for approximately a quarter of industrial production as a whole. The targeted support given to the influx of foreign investments, above all by means of investment incentives⁵, attracted further foreign investment into the country. The result was a significant inversion of ratios in the ownership structure of the whole of the manufacturing industry. While in 1993 only 8% of overall GVA in the manufacturing industry was foreign-owned, in 2016 it was over 60% of the total volume. The public-sector owned manufacturing sector, meanwhile, amounted to just under 40% of GVA in 1993, but it is now just under 1%.

⁴ The remaining 1.18 % or approximately 600 utility vehicles were made by the BAZ enterprise (V3S).

⁵ With the exception of the initial phase of transformation, 1990–1992, conservative governments for many years resisted the idea of providing investment incentives and subsidies. Nevertheless, the share of foreign investors in the Czech economy grew continuously. (Zemplerová, 1998) Investment incentives were introduced in the Czech Republic on 29 April 1998 by the temporary caretaker government of Josef Tošovský on the basis of government resolution no. 298/1998. Following this, investment incentives underwent a number of changes. The provision of incentives culminated in law no. 72/2000 Sb. on investment incentives, which took effect on 1 May 2000. It was later amended by law 453/2001 Sb., law 320/2002 Sb., law 438/2003 Sb., law 19/2004 Sb. and law 280/2004 Sb. Law 72/2000 Sb. on investment incentives still forms the basis of the current incentive system in the Czech Republic. (Pícl, 2013)

The volume of the manufacturing industry owned by the domestic private sector underwent a similarly interesting development. By the height of coupon privatisation it had risen by more than 34% since 1993, only to fall over the course of the years to 39% of GVA by 2016. Indeed, this is just under 16% less than it was at the start of the period in question. As graph no. 2 shows, the ownership structure of the whole of the manufacturing industry (including automotive manufacture) thus underwent a complete change in favour of foreign ownership. In addition to the accessibility of foreign capital, this also brought with it a high degree of dependence on it, and control of the Czech economy and individual companies by foreign parent companies. This is a key characteristic of the current state and outlook of the Czech automotive industry.

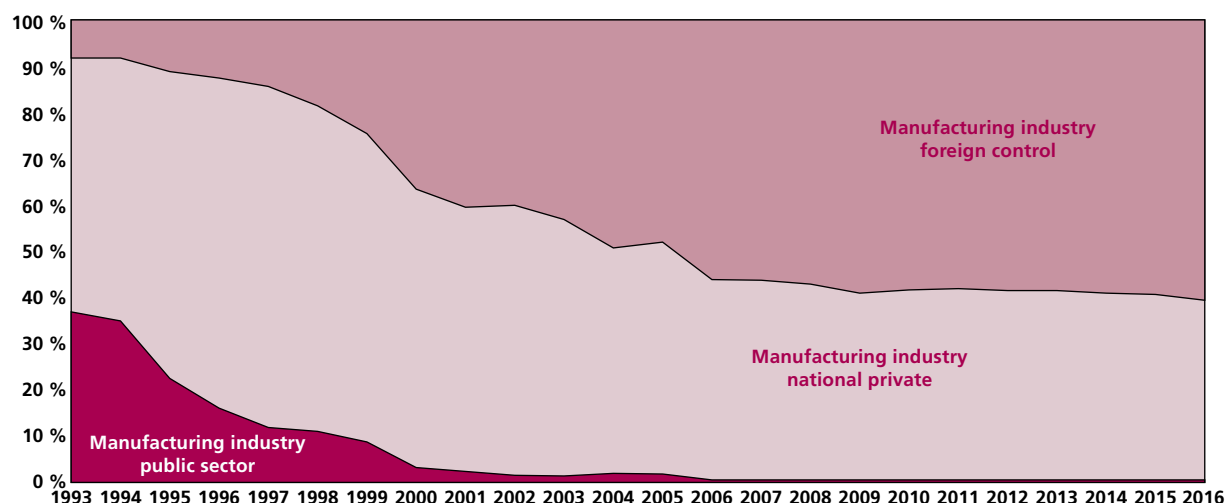
The transformation of the sector and the influx of foreign investments (FDI) into the automotive industry was aided not

only by institutional and legislative change. After 1998 it was aided to a considerable degree by targeted support of FDI by means of investment incentives. It was thanks to incentives that Toyota Peugeot Citroën Automobile (TPCA) entered the Czech Republic in 2003, gaining for its plant in Kolín an investment incentive with state aid capped at over 3.5 bn Kč. The automotive manufacturing sector received the most support in the form of investment incentives in 2006, when investment incentives were approved in 33 cases with a record volume of public aid capped at 12.2 bn Kč. There was then a fall during the most recent economic crisis, when together with the reduction in investment activity by companies, the related overall state support for it also fell.

Investment incentives are also viewed positively by business-people. In a recent survey by Deloitte (2017) their existence and the support for the automotive industry as a competitive

Graph no. 2

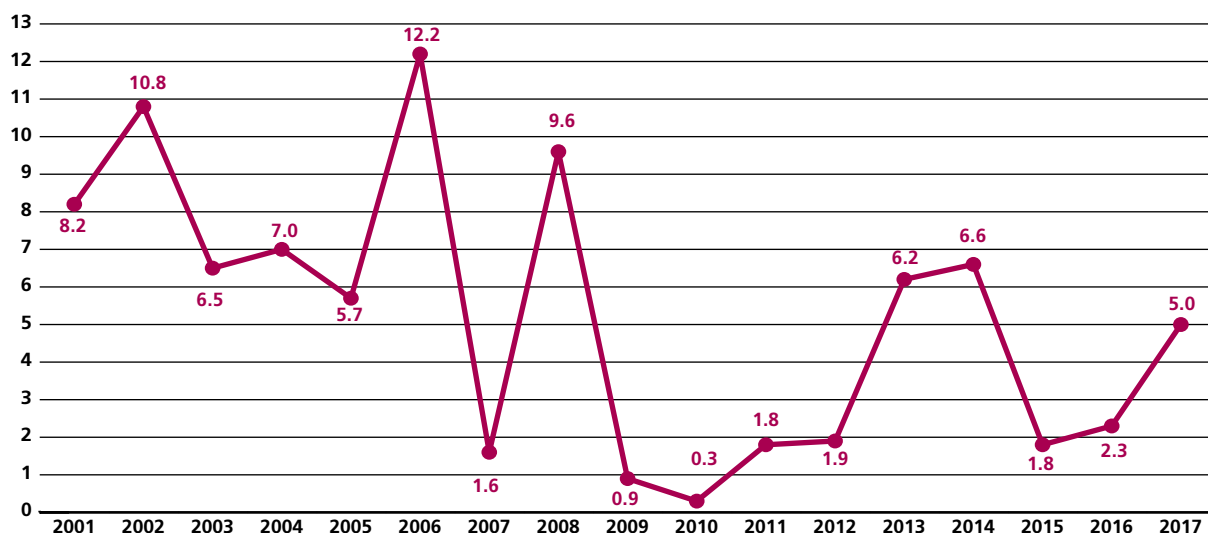
Manufacturing industry – Share of GVA of sectors according to ownership, branches to GDP, GVA of given branch in %



Source: SÚ. Graph: author

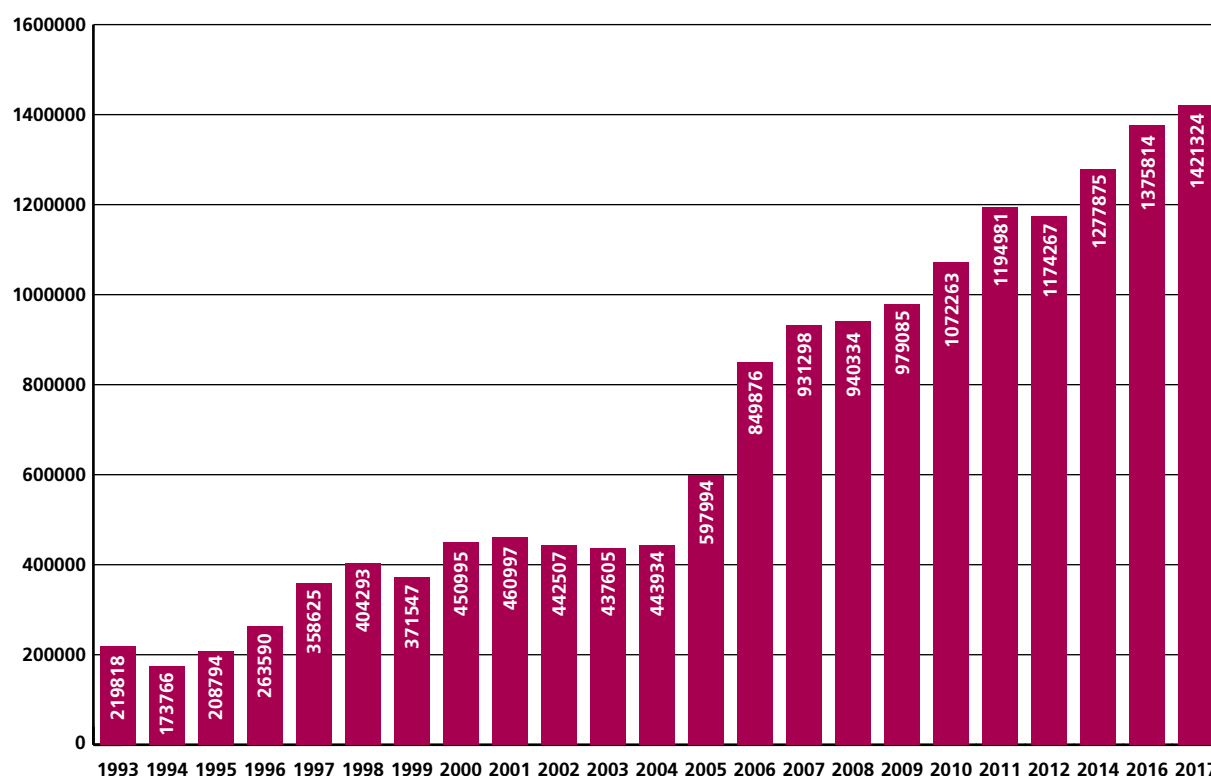
Graph no. 3

Investment incentives provided (automotive manufacture) – State aid cap in bn. Kč from 2001–2017



Source: CzechInvest – Agency for the Support of Business and Investment. Graph: author

Graph no. 4

Production of cars and small utility vehicles in the Czech Republic, 1993–2017

Source: AutoSAP, CzechInvest. Graph: author

advantage for the Czech Republic was viewed positively by 85% of high-level employees of automotive industry companies. Satisfaction with the incentives has grown considerably over the years. In 2015, for example, only 33% of respondents in the poll in question were satisfied with the system of investment incentives, a figure that had grown to 50% by 2017. For long, one of the weak points of the Czech investment incentive system was that they were too little focused on attracting investments that promised higher added value, thus frequently trapping the country in a disadvantageous, dependent position in European and global value chains. However, this has been gradually changing in recent years.

As a result of long years of tradition and of focused support, the Czech Republic is currently home to one of the greatest concentrations of automotive production, design, research and development in the world. Data from the automotive industry association (AutoSAP)⁶ indicate that in 2016 a total of 1.35 million vehicles were produced in the Czech Republic, making the country the fifth largest manufacturer of motor vehicles in Europe, and the largest producer of cars in the central and eastern European region. According to information from the CzechInvest agency, over half of the top 100

global tier-one automotive industry suppliers are active in the country⁷, which underscores its long-term focus on quality.

Production, structure of employment, wages

PRODUCTION

The importance of the automotive industry to the Czech Republic is palpable, both from the point of view of economic output and the labour market, where the automotive branch is one of the main employers in Czech industry. The automotive industry creates over 24% of the value of Czech industrial production, and 22% of Czech exports abroad. According to AutoSAP data, in 2017 the Czech Republic produced 134 cars per 1 000 inhabitants, which puts the country among the leading world manufacturers of cars per inhabitant. During the last 24 years, automotive manufacture in the Czech Republic has grown more than 540%. Data from AutoSAP show that not even the recent economic crisis made much of a dent in the number of cars manufactured – only in 2012 can a slight fall be seen in the number of cars produced. On the labour market, however, the economic crisis did make itself

⁶ AutoSAP is the most significant automotive industry association in the Czech Republic. As of 1.3.2018 its members comprised 14 manufacturing companies, 94 suppliers and 40 tertiary organisations, with an 85% share in market revenue. The aim of the association is to develop the automotive sector in the Czech Republic, promote the interests of its members, speak with one voice to public authorities and to keep statistics regarding the whole branch.

⁷ The automotive industry differentiates several levels within the chain. Tier 1 is used to designate direct suppliers with several assembly groups and systems. Tier 2 are the suppliers of sub-assemblies and individual assembly parts. Tier 3 designates the suppliers of raw materials and individual components such as connective material. The higher up a supplier is in the chain, the greater the demands placed on rapid and precise data processing within the company, but also on exchange between suppliers, or directly with the automotive company.

felt, and the increase in the number of cars manufactured was accompanied by a fall in the number of employees (see graph no. 5). What is shown here in exemplary fashion is the low bargaining power and protection of Czech employees in European value chains. While German industry managed to avoid major layoffs through the use of measures such as “Kurzarbeit”, in the Czech Republic workers were laid off, although the volume of production rose at the same time.

The production of motor vehicles in the Czech Republic is represented not only by the three best-known automotive companies (Škoda Auto, Hyundai Motor Manufacturing Czechia, TPCA) but also by bus and truck manufacturers. Together with a whole range of companies involved in R&D and design, this makes the Czech Republic a compact centre for automotive production.

While the production of cars has grown over the years, thanks in part to international connections and the arrival of further foreign investors, the production of utility vehicles in the Czech Republic fell steeply after 1989. In 1990 the country produced approximately 47 thousand utility vehicles, but five years later this had fallen to a mere 5.4 thousand, and by 2009 to just under 1.1 thousand. The main reason for this long-term decline consisted of unsuccessful privatisations and the continuous search for new owners, which had a deleterious effect on the development of production and also sales activities.

There was a similar drop in the production of buses after 1989, caused above all by a fall in sales on the domestic mar-

ket. From over three thousand in 1990, annual bus production fell to around one thousand a year in the first half of the 1990s. Now, however, the number of buses produced in the country is returning to over three thousand a year.

EMPLOYMENT

As mentioned above, the automotive industry is also one of the most significant employers in Czech industry. According to AutoSAP data, the member companies of that association alone had over 126 thousand employees in 2017. In all, an estimated 150 thousand people work in the automotive industry in the Czech Republic. We should not forget, however, that many other branches of industry have ties to the automotive industry, such as the textile and metallurgical industries. These represent further jobs on which the condition of the automotive industry has an influence.

Of the total number of employees in the Czech automotive industry, many more are employed in companies involved in the production of automotive parts than of final products (see graph no. 6), a result of the way the branch is structured in the Czech Republic. The structure is disadvantageous over the long term - the position of parts suppliers is less profitable and more dependent, when labour is priced, than is final production or research and development. This results in varying wage levels between these production phases.

Also of fundamental importance is the direct dependency of some Czech regions on the automotive industry, as can be seen in figure 1. The greatest concentration of companies can be found in the Central Bohemian Region, which is also high-

Figure no. 1

Geographic distribution of companies forming part of the Czech automotive industry



Source: CzechInvest – Agency for the Support of Business and Investment (2017)

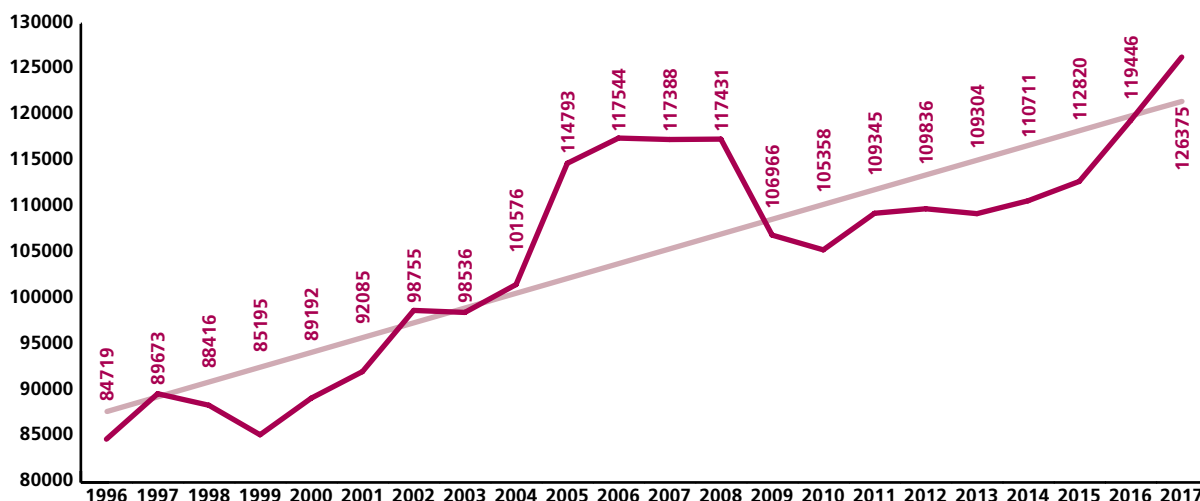
ly dependent on the economic cycle of the branch. The band of regions formed by the Central Bohemian, Hradec Králové and Liberec regions is also highly dependent, as is the area on the border of the Moravian-Silesian and Zlín regions.

As can be seen from graph no. 5, the number of employers in the automotive industry is growing in a largely linear fashion. In this 21-year period alone, the number of employees

rose by over 41 percent. Falls in the number of employees can be observed only in the periods of economic crisis after 1997 and 2008. The most significant fall in the number of employees occurred during the period of economic crisis from 2008 to 2013, with over 10% of employees being laid off between the start of the crisis and 2010. By the end of the crisis period in 2013, companies associated in AutoSAP had 8 thousand employees fewer than at its start in 2008, although produc-

Graph no. 5

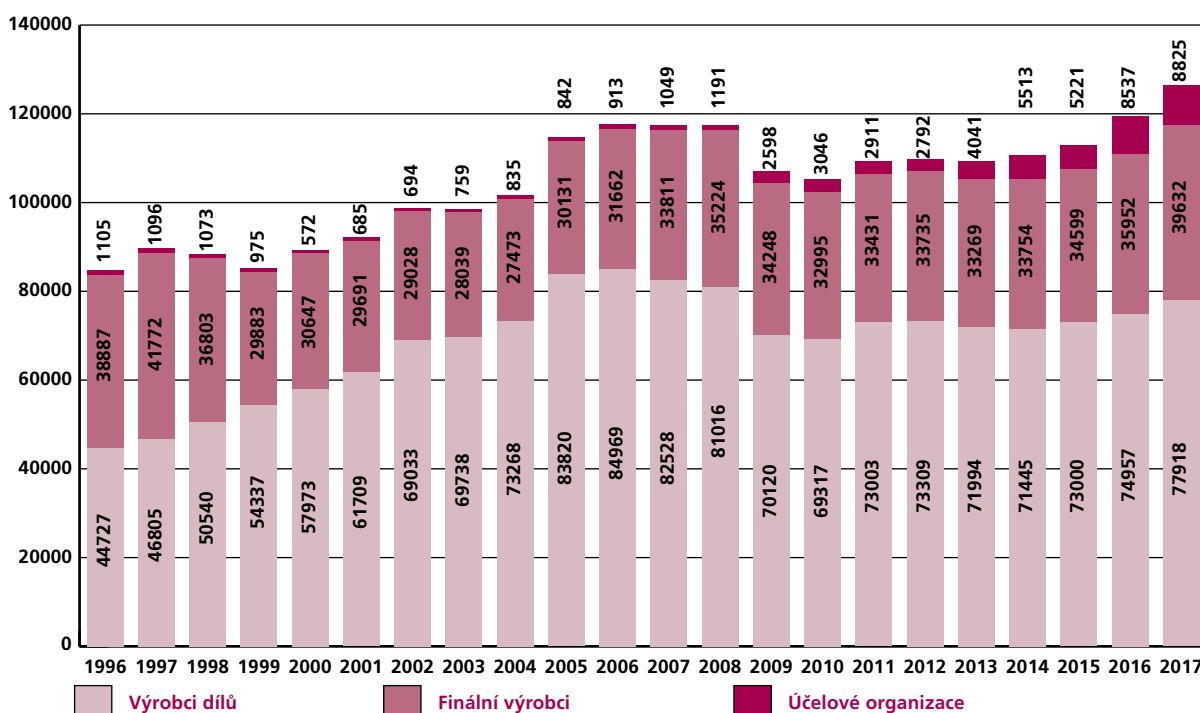
Development of the overall number of employees (AutoSAP) in the period 1996–2017



Source: AutoSAP. Graph: author

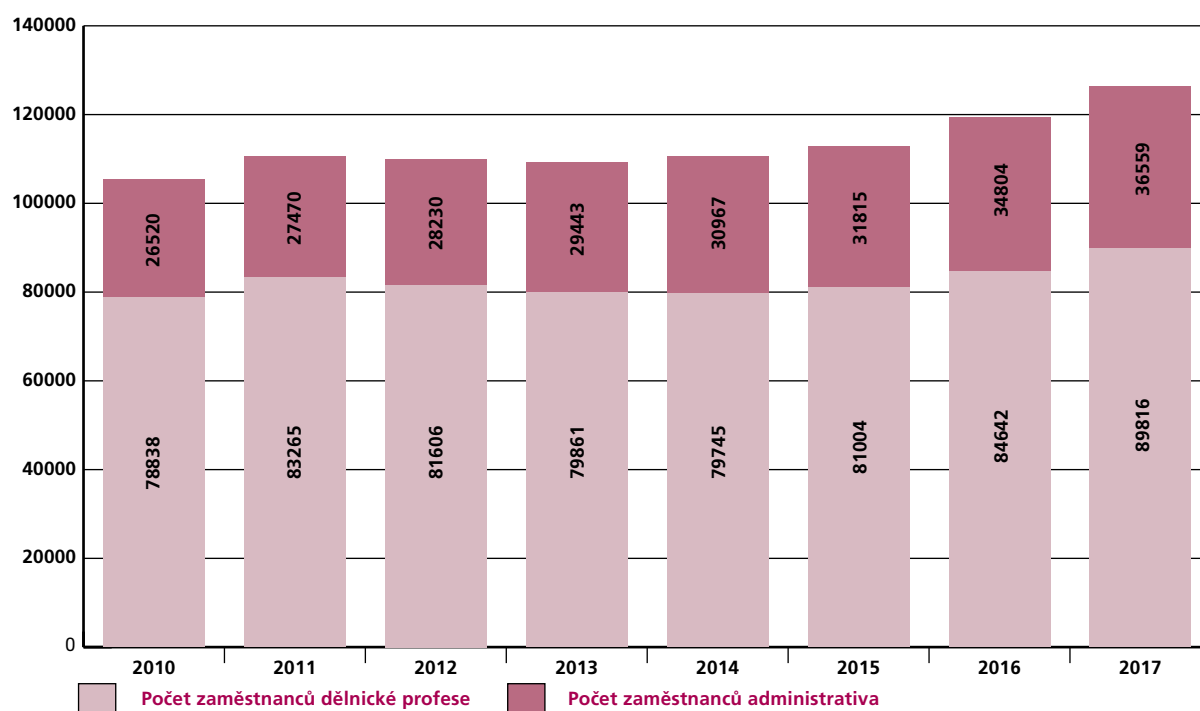
Graph no. 6

Total number of employees by manufacturing structure (AutoSAP), 1996–2017



Source: AutoSAP. Graph: author

Graph no. 7
Total number of employees in AutoSAP by profession, 2010–2017



Source: AutoSAP. Graph: author

tion increased over the same period. It was thus clearly a strategic decision on the part of the parent companies to cut back on Czech labour during the crisis, a cut which Czech politicians and unions were unable to challenge because of their unfavourable negotiating position.

A more detailed look at the structure of production reveals that during the most recent economic crisis, employees were more likely to be laid off by parts makers than final producers. The year-on-year fall in the crisis years of 2008/2009 was only 3% in the case of final producers as opposed to parts makers, where the fall in employees was over 13%.

In terms of professional division, most employees are manual workers. In 2017 there were just under 90 thousand manual workers in the companies belonging to AutoSAP, with over 36.5 thousand employees engaged in administrative activity.

WAGES

In the wage arena, on one hand a marked shift also took place in the Czech Republic overall. Thanks to the final producers and the R&D network for the automotive industry in the Czech Republic, remuneration in the branch is above average. Between 1996 and 2017 wages in member companies of AutoSAP grew at a tempo of approximately 6%. A slight slowdown, to 3–4% growth on average, can be noted during the period of the most recent economic crisis (2008–2013). While wages in the automotive sector have overall always remained above the average earnings in the economy as a whole, on the other hand they are, in the great majority of cases, far below the average, indeed sometimes minimum,

wages in the countries from which the companies come. The justification that tends to be given for this is that Czech labour is less productive, but this explanation is only partially valid. Productivity is in part determined by what part of production the foreign owners decide to perform in the Czech Republic, while in part the measurement of productivity relies on the price of what is produced. However, this price is low precisely because of low wages, and can hardly be used to justify them. The relatively high wages then, paradoxically, lead in some regions of the Czech Republic to labour being sucked away from other, worse-paid branches. This is fatal in particular for the public sector, such as education and health care.

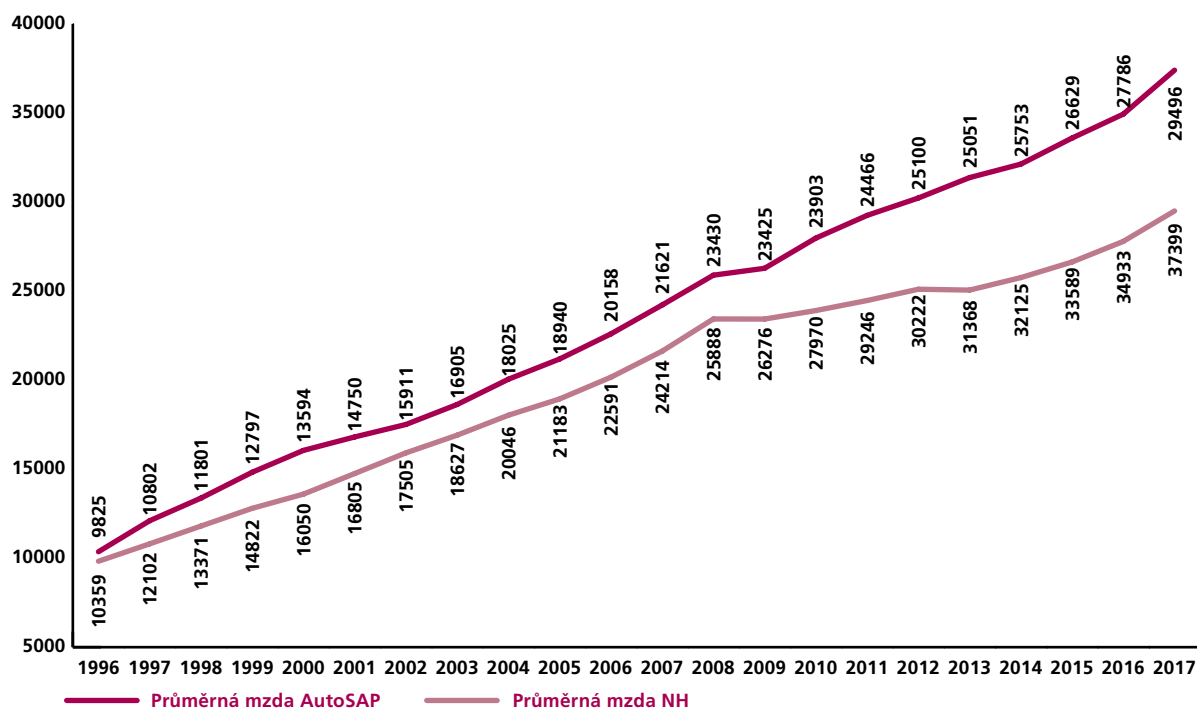
After more detailed analysis of individual branches of manufacturing we find that there are major disproportions in remuneration between employers engaged in final production and parts manufacturers. This significant difference can be seen in graph no. 9. Whereas employees in final production have earnings considerably above average, employees of parts manufacturers lag behind them considerably, to the tune of over ten thousand crowns on average. However, it is also interesting to note the development in wage comparison between final producers and utility organisations, which are companies providing various services connected to the automotive industry, such as research, development and so on. While in the period under observation (graph 9) average earnings in utility organisations were until 2013 higher than for final producers, from 2014 the average earnings of employees in final production companies have been higher, a difference that in 2017 – among AutoSAP member companies – was on average just under 7 thousand crowns gross a month higher.

As can be seen from graph no. 10, an even greater discrepancy in remuneration can be noted if we compare manual professions with employees in administration. Although in both professions wages grew during the period under obser-

vation at, on average, the same speed of approximately 5%, in recent years the average wages of employees in the administrative field have been growing fast, and thus the original difference in remuneration between these groups of em-

Graph no. 8

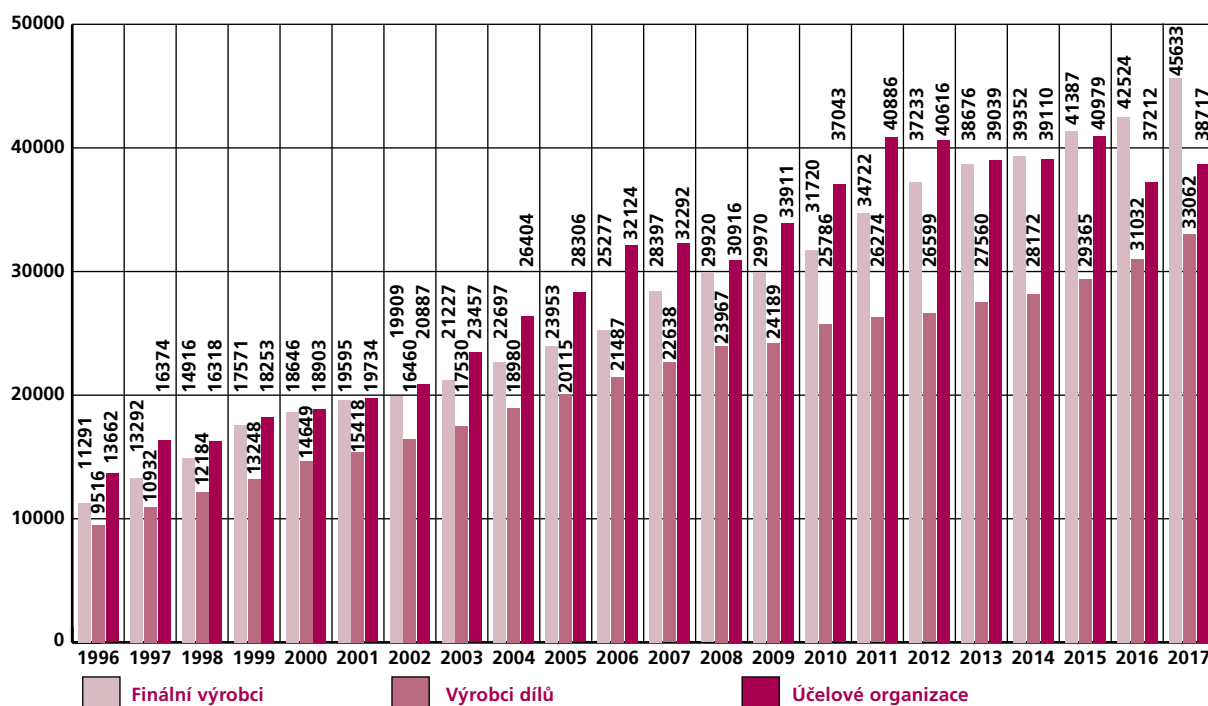
Development of average gross monthly wages in AutoSAP in Kč, 1996–2017



Source: AutoSAP. Graph: author

Graph no. 9

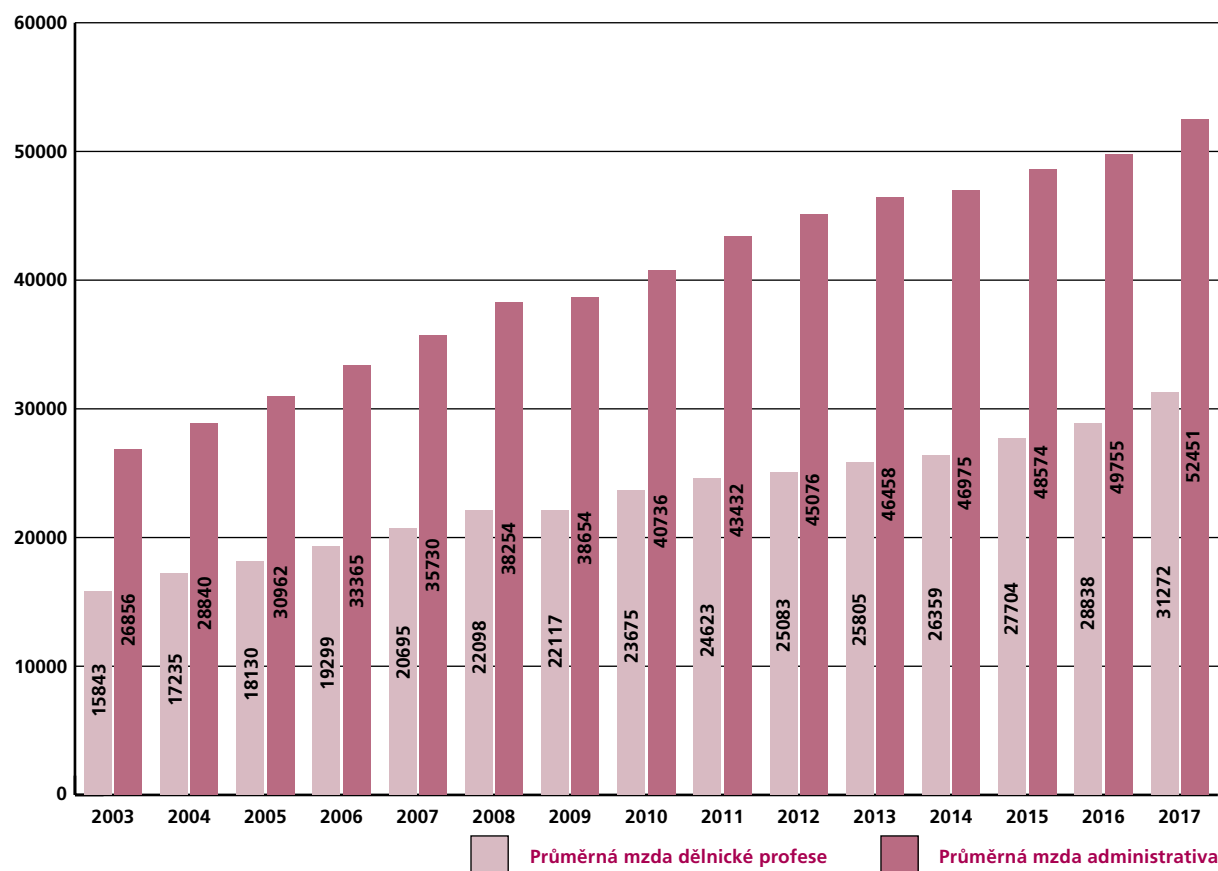
Development of average monthly wages in AutoSAP in individual manufacturing branches (Kč), 1996–2017



Source: AutoSAP. Graph: author

Graph no. 10

Development of average gross monthly wage in AutoSAP by profession (Kč), 2003–2017



Source: AutoSAP. Graph: author

ployees has, over a period of 14 years, doubled from the original difference of 11 thousand crowns gross. In AutoSAP member companies the difference is now over 21 thousand crowns gross.

UNIONS IN THE AUTOMOTIVE INDUSTRY

The largest trade union association in the automotive industry is the KOVO Trade Union, historically the oldest and largest trade union organisation. Within OS KOVO there is a Branch Section for the automotive industry, which brings together company-level union organisations in the branch and is the specialist partner for negotiations with employers' organisations. According to the association's data, there is a total of 111 company-level union organisations in the automotive industry, representing 86 thousand employees⁸. It can thus be said that approximately half of the automotive industry's employees are represented by company-level organisations of OS KOVO and are thus covered by the collective agreements into which the union enters. In some multinational companies, Czech employee representatives may also be involved in European company councils. OS KOVO is also a member of the IndustriAll European Trade Union (earlier the European Metalworkers' Federation – EMF) and of the IndustriALL Global Union (earlier the International Metalworkers'

Federation – IMF). OS KOVO has been a member of these organisations since 1991⁹.

In addition to this, a significant number of employees in the automotive industry are covered by the independent trade union organisation at the Škoda Auto plant in Mladá Boleslav, which until 2013 was part of OS KOVO. After lengthy disagreements, the organisation left OS KOVO and became independent. According to publicly-accessible data from 2014¹⁰ its members numbered over 19 thousand people, including seniors. The union organisations at the Škoda Kvasiny and Vrchlabí plants later followed suit and also became independent. The departure of such large and significant union organisations weakened OS KOVO, both financially as a result of the loss of member subscriptions, and in terms of negotiating position, based on the number of members.

A higher-level collective agreement is not entered into in the automotive industry, because employers' associations are against it. The collective bargaining stipulated by law thus takes place exclusively on a company level. Here, however, there is a particularly uneven distribution of forces, to the

⁸ State as of January 2019.

⁹ For OS KOVO's international activity see: <https://www.oskovo.cz/specializace/mezinarodni-cinnost>

¹⁰ https://www.tyden.cz/rubriky/byznys/cesko/vrchlabsky-zavod-sko-dy-auto-opousti-odborovy-svaz-kovo_301695.html

detriment of employees. Instead of a sector-level collective agreement, only an informal agreement on cooperation is concluded. This is updated according to need, and contains basic propositions and rules for the conduct of social dialogue. Social dialogue on a sectoral level thus takes the form of informal talks only, both on a regular basis and according to need.

TRENDS IN THE AUTOMOTIVE INDUSTRY AND THEIR INFLUENCE ON FUTURE DEVELOPMENT IN THE CZECH REPUBLIC

The impact of megatrends such as urbanisation and climate, demographic, technological and geopolitical change is far-reaching, and has not avoided the automotive industry.

The sharp increase in the global population, for example, raises the urgent question of how in future to satisfy the demand for mobility for all with people's specific demands. These vary considerably, above all between the urban and rural populations and between generations.

The development prognoses available indicate that as a result of technological innovation, by 2030 there will be a significant expansion of autonomous and shared forms of mobility, which are in this respect promising. This will have an influence not only on the way in which vehicles are driven and used, but will also have a radical impact on the question of which sections of the population the demand for vehicles will come from in the future, and the form of the automotive industry's business models.

A further urgent question is global warming and resulting climate change, which is now also beginning to make itself felt in our climate conditions, in the form of excessive drought, for example. This is a fact to which governments will have to react rapidly. Automobile transport is a likely target of intervention, for one thing because in its current form it is undoubtedly one of the main culprits in the current situation, and for another because the area can be relatively easily and rapidly regulated. However, this will inevitably have an impact on production and thus on employment in this sector.

In terms of the future form of the automotive industry, the clash between various types of actors and approaches will be important. On one hand we have the traditional automotive powers of Europe and the US, as opposed to the rise above all of China. This clash comes with a significant geopolitical dimension, and is a confrontation between various economic and political systems. On the other hand there is the clash between traditional automotive companies with their models of development aided by gradual innovation, and the new actors, above all the American internet giants, who act disruptively, in other words by means of rapid, revolutionary changes.

All these trends are taking place at the same time and condition each other in various ways. Above all, however, they have a massive influence on the shape of the automotive industry of the future and employment in it. This relates both to

the number of jobs and their quality, including wage levels and the qualifications needed. The text that follows will look in more detail at the directions that the automotive industry is already taking in this respect, and will relate them to the concrete case of the Czech Republic¹¹.

ELECTROMOBILITY

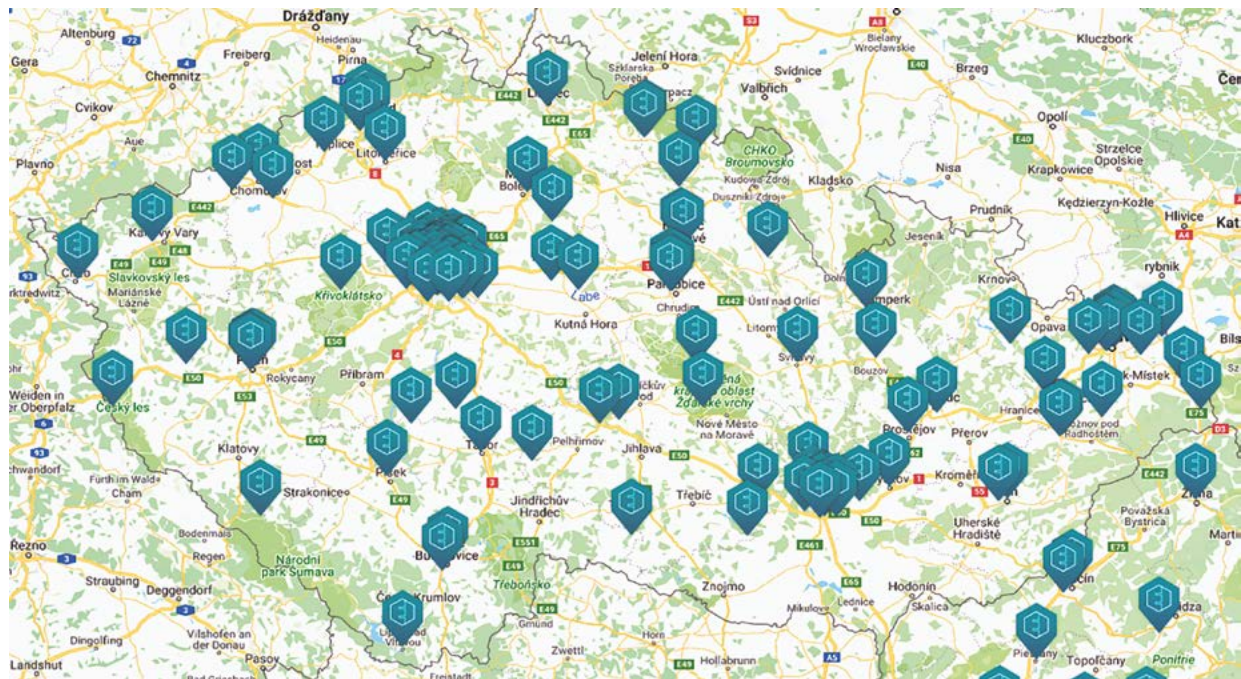
Climate change and newly-introduced standards for carbon dioxide emissions, local caps on emissions, plus the geopolitical and economic interest in reducing dependency on oil imports are all driving the major automotive markets in Europe and America in the direction of electromobility. (FES, 2018)

On the basis of the Paris Agreement, states worldwide have undertaken efforts to transit to a low-carbon economy. Over and above the framework of this agreement, the countries of Europe are already introducing policies in support of low-carbon transport, including norms for lowering CO₂ emissions in transport and investing in low-carbon technologies. China has since 2019 introduced compulsory quotas for automotive manufacturers relating to vehicles with zero or low emissions. In California, a regulation has been introduced that aims to help increase the use of vehicles with zero or low emissions. Representatives of EU states have agreed that by 2025 CO₂ emissions from cars should be 15% lower than today, and by 2030 as much as 37.5% lower than in 2021. As FES (2018) states, the answer to this is increasingly becoming the electric motor, which in the short- to medium term is the most acceptable reaction, in product and technological terms, to the challenge of minimising the negative external effects of automobile transport, above all its emissions.

However, the transformation cannot be expected to take the form of a technological leap. A boom in electromobility is limited by the lack of a network of charging stations able to deal with the expected high volumes of electric cars. Experts thus expect in the first few decades to see a varied mix of hybrid motors, combining the traditional and electric motors. This will, however, depend on the policies of individual governments in this area. Targeted tax support, for example (exempting electric cars from road tax, cheaper electricity for the purposes of charging, accelerated write-offs etc.) may play a considerable role in supporting change. This is being taken into account by the Czech automotive industry, whose representatives undertook in their memorandum with the government to perform a joint analysis of the ways in which the purchase and operation of electric cars could be supported. A basic change that is able to help expand the fleet of electric cars is support for the expansion of the network of charging stations. Their locations will have to be spread naturally between public and private charging points. Contemporary analyses then tend to assume that home charging will cover a significant part of the charging needs of electric cars. As we can see in figure 2, the only dense network of charg-

¹¹ In September 2017 representatives of the automotive industry in the Czech Republic signed a memorandum with the government on the future of the Czech automobile industry, including an Action Plan that outlines future directions. This chapter is based on it, among other sources.

Figure no. 2

Distribution of charging stations in the Czech Republic

Source: Elektřina.cz

ing stations is around the large cities; peripheral areas are not covered by charging stations at all. This has an influence on Czech users, who are showing hesitancy towards going for electric cars.

A change for the better ought to be helped by targeted investment support for the creation of charging infrastructure, both at home for internal charging and in public, on land owned by the state, for example. This can be seen in economically-stable countries such as France, Germany and Norway. However, Latvia, for example, which until recently struggled with fiscal problems, also does a great deal to subsidise this form of mobility. The result is growing confidence in electromobility on the part of citizens, and an ensuing rapid growth in the volume of electric cars bought.

For the Czech Republic, however, electromobility is more than just a consumer issue. Given that the automotive industry has a major share in the Czech economy, it is a question of fundamental importance whether vehicles with the motor of the future will be made here at all, or whether production will be limited to the parent companies. This is connected to the question of what impact the change in motor technology will have on Czech employment. The answer to this question is not as yet, going by current developments, overly positive. As noted by Drahekoupil (2018), the transition to electric motors will, in general, mean lower employment, since an electric engine is far easier to manufacture than its combustion equivalent. It does not require as many parts, which threatens many suppliers. The Czech position is further complicated by the fact that the enterprises located here are in the position of suppliers to and peripheral branches of multinational companies who have for long tended to locate

their production innovation close to the company's headquarters, which is where their research base also tends to be located.

This trend is also confirmed by recent events. Germany's Volkswagen did not choose the Czech Škoda company for its new electromobility centre, but its plants in Hannover, Emden and Zittau in Germany. However, the company is transferring to the Czech Republic the production of the combustion engine – the life of which, and above all demand for which, will over time die away. In the short term this expansion of combustion engine production in the Czech Republic will have a positive effect on employment. From the long-term perspective, however, the influence of the expected global pressure to lower CO₂ emissions from cars and the fall in demand for combustion engines means that if the Czech Republic does not change its manufacturing orientation in the coming years, it will find itself under serious threat.

SELF-DRIVING VEHICLES

Self-driving vehicles are currently one of the most prominent goals in automobility. As the result of elimination of the "human factor" they promise a reduction in accidents of up to 95% of the still very high number of human lives claimed by the automobile industry. Because of the global increase in population numbers and the overall higher demands for mobility, the number of kilometres driven will clearly continue to go up, which will lead to further demand for the automatisation of driving. With the help of autonomous cars and above all of the shared use of such vehicles, it will in future be possible to make much more use of their capacity, and to increase the overall volume of such transport. Self-driving vehicles will also open up possibilities for people to whom in the

past driving was inaccessible, such as people with physical handicaps. It will, however, be necessary at the same time to make sure that the overall volume of traffic does not go up, or at least not until environmentally-sustainable motors become a matter of course. If not, the attempt to achieve autonomous driving could undermine the attempt to reduce emissions and stop climate change.

It is above all the question of automatised driving that stands at the centre of a conflict between the traditional automotive companies, who thus far have bet more on some sort of development of advanced assisted driving, and the American technological giants that are aiming at the disruptive invention of a completely autonomous vehicle. Which approach comes to dominate will have important consequences. If it is the approach of Google and co., the proud European automotive companies are likely to become mere parts suppliers for the revolutionary software solutions of the competition on the other side of the Atlantic. The consequences for employment in the European, and thus in the Czech automotive sector, may be immense.

Unfortunately, the Czech Republic does not today provide the right conditions for these solutions to be tested and developed here. Central Europe as a whole, the Czech Republic included, currently lacks the necessary polygon to become a testing centre. If the Czech Republic is to make use of the rise of the self-driving vehicle trend, the first thing it needs to do is create the necessary conditions for testing. The expected investment by the BMW automotive plant could bring a major change in this respect. Last November the company gained the promise of half a billion crowns in investment incentives from the Czech Republic for its project for the construction of a testing polygon. A new testing centre for self-driving vehicles and electric cars could thus be created near Solokov. The investment could, in the future, provide the Czech Republic with a significant technological benefit, which through its orientation towards one of the most significant mobility trends of the future could help to maintain employment in the Czech automotive industry.

SHARED OWNERSHIP

One of the further dimensions of future development is the change that car ownership will itself go through. Sharing in the form of operative leasing, in other words the long-term rental of a car instead of its purchase, is already very widespread. On top of that, more and more people are now sharing cars through various digital platforms and applications. This may in the future solve the problem of the growing number of inhabitants and the satisfaction of their mobility demands, as well as the need to save energy and the environment. The change in the concept of car ownership will be gradual. It is connected with the gradual generational change in which young people are less and less inclined to own vehicles. As FES (2018) states, instead they expect a reliable, flexible and affordable approach to modern and combinable transport systems into which the use of cars is integrated. In the Czech Republic this issue is connected with the gradual rise of various platforms and the availability of shared cars, mostly concentrated for now in the big cities. Moreo-

ver, they are not always affordable, and car share schemes frequently suffer from immature systems and technical imperfections.

What will be important for the future of employment in the Czech automobile industry are the business models that the foreign carmakers active in the country decide to go for, and what role in this they allot to their Czech subsidiaries. In its existing form and position in the value chains, the Czech automotive industry is unlikely to profit much from the added value of new business models connecting production with car-sharing with the aid of innovative software solutions. In such a scenario, its disadvantageous position as a mere supplier of parts might even be deepened, since the value of such parts might even fall further in the new model where added value is realised in sharing rather than during sale. Car-sharing could bring new jobs related to its servicing, but these jobs might in part require different qualifications from the jobs that may have been lost.

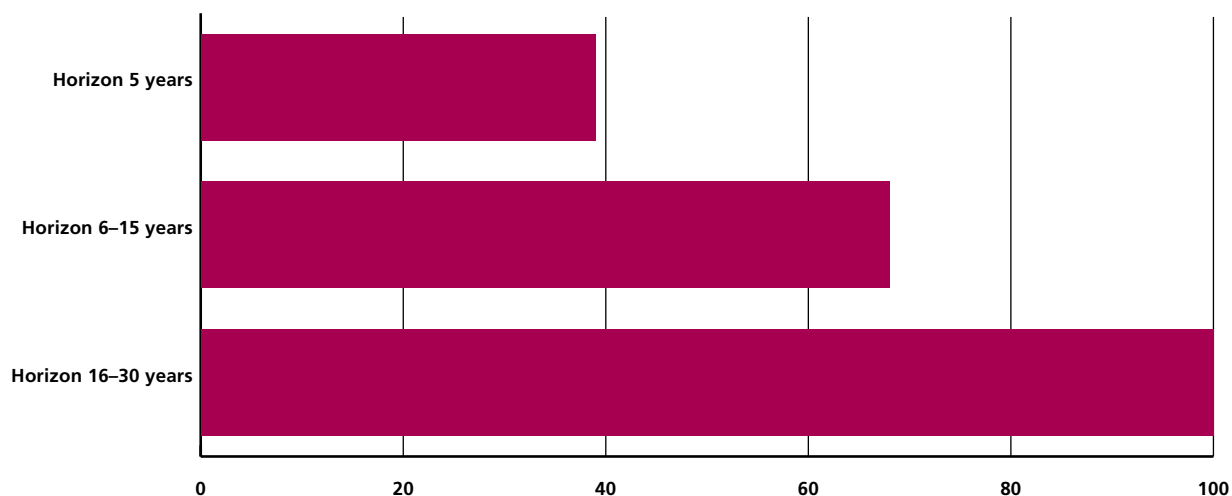
DIGITALISATION AND INDUSTRY 4.0

The Czech Republic has long made use of its competitive advantage of low wages. The advance of robotisation, automatisation and above all digitalisation has, for the time being, been slowed down by the fact that it is economically advantageous here to involve human labour in the manufacturing process. The Czech manufacturing industry, including the automotive sector, has a production process characterised by a number of routine manual tasks that have a high potential for being automatised. The low level of Czech wages is thus for now slowing the process of automatisation, but the unavoidable reality in the end will be that labour is squeezed out of the manufacturing process as wages grow and technologies become cheaper. A number of specialist studies have been produced on the subject of the influence of new technologies on the economy¹². A number of them suggest that countries whose economies are founded on routine manual labour consisting of a series of simple tasks performed in an easily-predictable environment are highly likely to come under threat in the future. As noted by a study produced by Deloitte (2018), an example of such activity is the welding of car parts according to a given model in the controlled environment of the production line. However, as Deloitte (2018) goes on, not all activities in the automotive area can be automatised as yet. A car will in future be able to be put together on a production line with the aid of robots, but the repairing of the car is a job for mechanics, and here the degree of job loss will be lesser. A summarising study by the Technology Centre of the Academy of Sciences of the Czech Republic (2018) gives credence to the theory that it is profession with a medium qualification level and also a medium wage level that run a higher threat of being replaced by artificial intelligence. This also concerns the Czech automobile industry. The degree of threat is then spread over time. The share of replaceable skills in the five-year horizon is approximately 40% in the category of *manual workers in assembly of products and equipment*, while in a

¹² Frey, Osborne (2013), OSTEU (2015), OECD (2016), NVF (2016), IBA (2017), MGI (2017), MGI (2018), Deloitte (2018), PWC (2018), OECD (2018), EK (2018), TC AV ČR (2018)

Graph no. 11

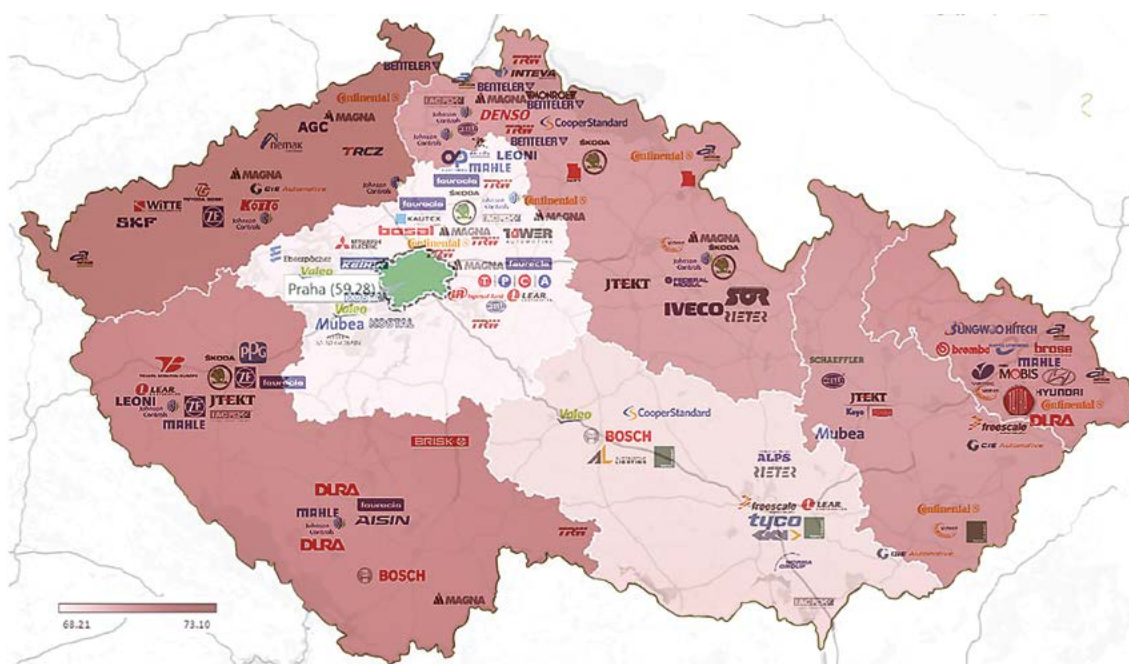
Share of replaceable skills over time in %, category manual workers in assembly of products and equipment



Source: TC AV ČR. Graph: author

Figure no. 3

Regions of the Czech Republic by degree of threat from digitalisation (NUTS-2)



Source: Model OSTEU (2015), CzechInvest (2017). Map: author

6-15 year horizon they are over 70%, and in a 16–30 year horizon these activities will be replaced altogether.

The Office of the Government (2015) has looked at the regional impacts of digitalisation on the Czech Republic and found that in terms of European trends, the Czech Republic is not in any way an aberration, given the structure of its economy. Prague and the Central Bohemian Region, in other words more economically-advanced regions, have a significantly lower index of digitalisation risk, while the greatest risk is found in the North-Western region (the Ústecký and Kar-

lovarský regions). If we compare this data with the geographical distribution of automotive industry companies in the Czech Republic (figure 3) we find that a number of automotive companies are indeed located in the threatened regions. If technological unemployment as the result of process automation does occur with Czech producers, it would be heavily concentrated on a regional basis, and often in regions that are peripheral and structurally weak as it is.

All in all, the Czech automotive industry is one of the branches in which robotisation and automation will make them-

selves most keenly felt. As well as threats, however, they also bring opportunities. As Deloitte (2018) notes, labour automation clearly leads to a growth in manufacturing productivity, GDP and wages. With the use of technological potential for automation and on condition that the labour force adapts, the average tempo of economic growth in the economy in the next 16 years could, as a result, reach 3.9% a year. The economy's potential would increase by 78% by 2033, which is more than twice the amount of growth compared to a scenario without robotisation. What will be important, however, is that a way is found in which Czech employees, indeed the Czech economy as a whole, can benefit from this development. Given foreign ownership, this is far from being something automatic – thus far the parent companies have taken record-sized parts of their profits out of the country, and these profits thus end up being invested neither in technological innovations nor into wage growth.

It is important that companies are prepared for the changes. According to a survey of the outlook for the automotive industry carried out by Deloitte (2017)¹³, 53% of respondents are focusing on ways in which they can introduce innovative solutions into their production. Compared to the last time Deloitte carried out the survey in 2015, this represented a 17% growth. A marked increase in the trend for introducing innovation into production can be seen. On the other hand, results in the degree of preparation for new solutions in connection with Industry 4.0 were markedly worse. Only 29% of all respondents said they were currently considering introducing measures connected with Industry 4.0, and mostly in the long-term horizon at that. A mere 27% were currently using them and planned to continue to expand them. A further 27% were not certain, but were considering introducing such measures in the end. These low values may be a significant problem for the future development of the branch, when one takes into account the rapid growth in digital technologies in surrounding countries. The slow growth of technologies here is connected, as has already been mentioned, with low labour costs. These are viewed as a key competitive advantage by representatives of the automotive industry themselves. In the survey, 96% of respondents said they saw labour costs as a competitive advantage. For now, therefore, they see no reason to change the status quo. On the other hand, remaining in this position in the long term may represent a major threat to the future and development of the automotive branch in the Czech Republic, because it will begin to lag behind in technological terms.

3.3 SUMMARY AND RECOMMENDATIONS

The history of the automotive industry on the territory of the Czech Republic goes back to 1898. Since then the industry has undergone a great many changes. A major transformation occurred after 1946, when the industry had to adapt to the imperative of a centrally-managed economy with state-owned enterprises. Even during this period, however, consid-

erable advances were made, both in development and in the number of vehicles produced here. The year 1989 marked another great turning point, above all regarding the change in ownership structure of the manufacturing plants. Their privatisation led either to their development and establishment in the global supply chain, or on the other hand to the departure of uncompetitive firms from the market after they failed to respond adequately to this challenge. The privatisation process also saw private foreign capital come to dominate over domestic private and state capital.

The significance of the automotive industry to the Czech Republic is beyond doubt, whether in terms of economic output or the labour market. Production by the member companies of automotive industry associations accounts for over 24% of industrial production in the Czech Republic, 9% of GDP and just under 22% of exports. The automotive industry is also one of the most significant employers in Czech industry. According to AutoSAP data alone, association members employed over 126,000 people in 2017. It is estimated that up to 150,000 people are employed in the branch in the Czech Republic, when further related sectors are accounted for.

As in the past, the automotive industry today continues to undergo a number of major changes that have the potential to transform the whole branch in a fundamental way. This concerns not only technological innovations in the ways in which cars themselves function, but also the production process and sales models that correspond to new general conditions and consumer demands. Urbanisation and climate, demographic and technological changes, as well as new global power constellations, all have an influence on the Czech automotive industry. There are changing demands for mobility, both in terms of its function – probably the greatest shift here is occurring in the change in the very concept of car ownership and its change into sharing – and in terms of the technologies used. In this, the main issues are the continued tightening of environmental demands, especially concerning CO₂ emissions. This goes hand in hand with the change in fuel type, with the main role being played in the shift to electromobility and the transition to alternative fuels based on hydrogen and CNG.

The expansion of electromobility in the Czech Republic is limited above all by the lack of a network of charging stations able to satisfy the expected large volumes of electric cars. A key area that will help to expand the fleet of electric vehicles is **support for expansion of the network of charging stations**. Their location will in the future have to be spread naturally between public and non-public charging points. Once these infrastructural needs are met, the state can move to support electromobility by using it in public vehicle fleets and subsidising private demand for it. This could have at least indirect positive consequences for employment in the Czech automotive industry, if the industry manages to become involved in the trend in sufficient time. However, this decision is largely one that is not in the hands of the Czech actors, whether private or public. It is thus worth mentioning that the impacts here of a transition to electromobility are gener-

¹³ The survey was carried out by means of a questionnaire sent to top employees at companies in the Czech automotive industry, both final producers and suppliers.

ally negative – the technology involved is considerably easier to produce than is the combustion engine.

A further technology of the future will be autonomous driving. The Czech Republic does not today provide a sufficient environment for this technology to be tested and developed here. If the country does want to make use of the rise of self-driving vehicles, it will, to start with, have to **create the necessary conditions for testing, for example by building a testing polygon that is currently lacking**. We have also mentioned the change that car ownership itself will undergo, and this will be a further key dimension of the future development of automobility. It is something that in the future could help to deal not only with the problem of the increasing population, but with the need to save energy and the environment. In its existing form and position in the value chains, the Czech automotive industry would be unlikely to profit much from the added value of new business models connecting production with car-sharing with the aid of innovative software solutions. Indeed, in such a scenario it is possible that we would even see a deepening of the country's disadvantageous position as a mere supplier of parts, the value of which will fall further in the new model where realisation of added value will come in sharing rather than in sales.

Of fundamental importance to the Czech Republic will be the way in which the country reacts to digitalisation and Industry 4.0. Given that the Czech automotive industry's manufacturing process is characterised above all by routine manual tasks with a high technical potential for automatising, underestimating the coming trends may result in an enormous and uncontrolled squeezing of labour out of the manufacturing process. This would have major consequences for the whole of society. It is thus important not to cling to the status quo, but to **start to prepare rapidly for new technologies and the related transformation of production**. These coming changes are not yet much reflected in Czech manufacturers' production policy, but this is dependent on the strategy of their parent companies and the Czech manufacturers themselves are thus not even able to reflect it much. Given this state of affairs and the existing defined value chains, Czech employers and the state will remain highly limited in their ability to affect the industry's future orientation and adaptation to these changes. There arises here a certain dilemma regarding the advisability of putting upward pressure on the still very low wage levels, and there

also arises a need for **specific preventive strategies of structural development** that in regions where the automotive industry is highly concentrated will reduce their high level of dependence on an automotive industry that is governed from abroad.

A key point in the transformation of the automotive industry in the Czech Republic must be a **shift in position in the international production chain** in a direction that would allow greater autonomy and thus also the ability to shape the whole process politically on the national level. Support for the branch in the form of **investment incentives** should in future be limited only to strategic activity as defined in a **complex and long-term economic strategy for the country** and should correspond to expected future trends. It should also be focused on **areas of strategic services and technology centres** with a high proportion of educated labour and research and development activities. This has to go hand in hand with a **corresponding educational strategy** to prepare the Czech labour market for a future full of change, and also to prepare it to cover those areas of the economy on which the country intends to bet strategically in the future.

A further way in which to widen the possibility of influencing whether the transformation of the automotive industry will take place in such a way as to preserve employment in it is to **expand employee involvement in decision-making on the company level and collective bargaining on the branch level**. It has been shown, and indeed is illustrated by the economic success of Germany, that this element provides stability and ensures, in the long term, all-round better results, including in the social sphere, than company decision-making that is based purely on the logic of short-term profit, even where such decisions are to the detriment of employees. A whole range of parent companies operating in the Czech Republic are subject to such measures in their home countries – in Germany, for example, employee involvement in decision-making is widespread. It is thus not out of order to require them, with the help of EU politicians and trade union organisations if need be, to allow similar rights for their employees in the countries of central Europe. In this way a whole range of turbulent situations that need to be prepared for in keeping with developments, can be dealt with in a socially-sensitive way, directly at the workplaces affected by them. The fact that such rights are so widely neglected in the region should no longer be perceived as a competitive advantage.

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4

ELECTRIC CARS, AUTONOMOUS CARS, AUTOMATION, DIGITALISATION.

The expected impacts of technology change on the automotive industry in Hungary

DR. ZOLTÁN POGÁTSA

The study analyses the magnitude of shock the Hungarian automotive industry, which is one of the leading sectors of the national economy and which reached historical peaks in the past decade, will be exposed to in the coming decade. We will also discuss the way the industry gets prepared for the new trends of the coming period, and pay particular attention to the role trade unions will have in this process.

4.1 MAIN TRENDS IN THE AUTOMOTIVE INDUSTRY IN THE COMING DECADES

We expect several trend-changes in the global automotive industry:

Automation in production

One of the greatest challenges of the 21st century is not so much the new technology of motoring itself, but rather the fact that automation will make human labour superfluous. Routinisable work in the blue-collar segment will be taken over by machines or robots and routinisable activities of white-collar workers by algorithms. People will be left only with non-routinisable jobs and the human-to-human activities (due to female dominance in this latter segment, it is often called pink collar work).

Automation in the automotive industry is well advanced. A simple factory visit has proven that essential finishing processes are already done by robots, internal logistics is automated through the just in sequence method and production processes are largely digitized. The question therefore is how fast will the remaining jobs be automated.

Electric cars

The replacement of cars with fossil fuels to avoid their harmful material and noise emission by electric cars is a complete

technology change. Diesel cars are already being forced out. They are already banned from some cities in the West of Europe and within a few years' restriction will be introduced for highways and motorways, as well to limit their presence. Norway plans to phase out the sales of conventionally fuelled cars by 2015, China and Germany by 2030 and France by 2040. The replacement of gasoline fuelled vehicles will also come in the next decade. Some producers already disclosed their plans and timelines. On the one hand, electric cars will be built along different technologies and components and on the other, they will comprise of less components (according to certain estimates ca. 60% less). Changing over to electric cars therefore will bring an in-depth development of the automotive industry.

For the time being, the presence of electric cars on the roads is relatively modest. In 2017, not even in the US, did the sales of electric, hybrid and other cars exceeded 4% of the total sales. The most successful producer of electric cars, the Renault - Nissan - Mitsubishi alliance sold 600,000 vehicles before mid-2018. The second most successful brand is Tesla, with 500,000 cars sold. The most common model is Nissan Leaf with 370,000 a Tesla S with 253,000 cars sold globally. The global benchmark of 4 million cars was exceeded in September 2018, but this is still only 1/300 of the vehicles in use worldwide. 2.6 million cars of them are fully electric and the rest is hybrid or other.

Autonomous cars

Parallel to electric cars there is another area of development: autonomous driving. While due to its environmental nature the idea of electric cars is highly popular against the background of global climate change, due to the related safety challenges autonomous driving will have to be introduced with more caution.

- Autonomous driving Level 1 could be called "no-leg"

driving. The system controls speed and breaking. Cruise control is a good example for this.

- Autonomous driving Level 2 is the “no-hand” driving, when the system controls the car. The lane departure warning or self-parking systems are current examples. However, the driver must retain control over the direction as intervention may be required any time.
- Level 3 is the “no-leg, no-hand” version. Under certain well-defined conditions, the system controls the direction and the speed but the driver still needs to be ready to intervene at any point in time. Some experts say that this level is rather problematic as the attention of the driver - which may be needed any time - can easily be diverted by other activities. In their view it would be more expedient to introduce immediately Level 4.
- At Level 4, the system takes over control and the driver will have to take over only in the most special situations.
- Level 5 will be the one when no driver will be needed at all. In principle, there will be no steering transmission, the seats can be turned to the inside of the car and the interior space can be increased or even converted to a sleeping area.

Audi was the first mass producer to bring a Level 3 automated driving vehicle to the market. After 2017, the “Audi AI” system made the type A8 already capable of switching to automated driving at 60km/h speed. Mercedes and BMW, also present in Hungary, are at the forefront of testing self-driving technologies, as well. The Waymo project of Google in 2018 announced an autonomous taxi service.

Internal logistic systems of factories work systematically with autonomous vehicles, among them with lorries and trucks.

Car-sharing

Autonomous cars can bring about changes in the ownership of the means of transport as well. Instead of the well-known passenger or family cars forecasts predict the spread of community owned (electric, autonomous) cars that can be booked through an app. This solution promises the consumers important savings: they can avoid the cost of buying and servicing a car and the cost of accidents will not borne by them, either. The number of vehicles present in urban areas can also be decreased substantially. Some estimates indicate that the number of cars could be reduced to one fifth if exclusively those cars were in urban areas that are in use in traffic (if people do not drive their own cars, they do not have to park them, either). Four cars out of five are parked and waiting somewhere for the driver to return. Other experts underline that other conditions may rather cause an increase in the number of cars. First, people without a driving license can also become active in traffic (e.g. elderly with reduced mobility). Second, the distance between autonomous vehicles is shorter than between conventional cars, therefore more vehicles will fit on a unit road surface.

In Germany, StreetScooter, the affiliate of Deutsche Post, rents minivans on pay per minute base with a transmission system supplied by Bosch.

The main goal of this study is to analyse the impacts these industry trends will have on the Hungarian automotive industry and to what extent can trade unions, the government, the suppliers, universities and other stakeholders get prepared for them.

4.2 THE STRUCTURE AND THE IMPORTANCE OF THE AUTOMOTIVE INDUSTRY IN HUNGARY

Similarly, to other countries in the Eastern European region, the automotive industry is an important sector in Hungary. Including the suppliers, the Hungarian automotive industry covers approximately 620 companies. This means 170,000 jobs and considering a range of 4 million jobs domestically, the importance of the sector is indeed considerable.

The annual 8038 billion HUF added value of the sector makes up 18% of the total manufacturing output, in other words 10% of the GDP.

The export of the Hungarian automotive industry is a quarter of the total national export volume. 92% of the sectoral revenues come from exports.

Fifteen out of the twenty largest global direct suppliers are present in Hungary.

Structurally, the automotive industry comprises of car production plants and multiple levels of suppliers.

Car producers in Hungary can be categorised on the basis of the starting year or the number of employees.

SUZUKI (1992–): 2700 WORKERS

- In 1992, the first Suzuki Swift rolled out of the Esztergom plant of the Japanese car manufacturer. Since then, Swift was followed by other models on the conveyor belt. In 2000, Wagon R+, 2003 Ignis, 2005 a new generation of Swift, 2006 SX4 produced in cooperation with Fiat 2008: Splash, 2010: the third generation Swift, 2013 the SX4 S-Cross and 2015 the new Vitara. Based on the international sales figures, the latter has taken a lead in the sport utility vehicle (“SUV”) category and in the passenger car segment. The production of Swift was stopped at the end of 2016.
- The Hungarian Suzuki, the Magyar Suzuki Zrt, produces 175 000 cars in a year with a range of 2700-3000 employees. With its syndicated partners, the company implements a research and development programme of 5.3 billion HUF and develops new marketable and competitive prototypes for passenger cars and efficient manufacturing technologies.
- Suzuki is still the best sold car in Hungary Against the background of this study it is important to underline that the Hungarian Suzuki company has once already prevented its employees from unionizing. Currently, workers are making a second attempt but the employers’ reaction is again most radical. As yet, it is

not clear if this attempt becomes successful and workers unionise.

AUDI (1994–): 13,400 WORKERS

- Audi launched production in the Győr plant in 1993 with parts manufacture. In 1995, the plant started the manufacturing of cars, specifically the TT Coupé sports car then from 1999 the Roadster. Later, the first model ever produced completely in Győr was the A3 four-door. The site has an annual capacity of around 160 000 vehicles. Audi produces 9% of the total Hungarian export value. 2018 the Győr plant started the manufacturing of the Q3 sport utility vehicles and in 2020 the Q4.
- Audi stands out from domestic car manufacturers along with its unique research and development capacities. This type of integration of the Győr site into the global production chain of Audi is more complex than it seems at first glance. The annual spending on R&D is 48 billion HUF, which is 17.6% of the total domestic R&D spending. This makes Audi the largest research and development company in Hungary. (Only Richter from the pharmaceutical industry is comparable, any other domestic company spends at least by an order of magnitude less on R&D.) The R&D spending of Audi exceeds the annual budget of the Hungarian Academy of Sciences, which employs 5400 people and has a major scientific output.
- The impact of Audi on the Hungarian research sector is yet difficult to determine. Audi has some joint projects with the Széchenyi István University from Győr, they even run a department jointly: the university trains students as required by the Audi profile. At the same time, there are no public data on the number of Audi engineers working site in research and development at the Győr. The site has several dynamometers to test electric engines and related development is conducted jointly with the Széchenyi István University and the Budapest University of Technology and Economics.
- According to some figures from 2017, the spending on R&D was composed of two basic parts: The R&D spending of the plant itself is not more than 2.3 billion HUF. The so called “external R&D” however, amounts to 45.8 billion HUF. What the latter exactly means is something the company does not wish to reveal to journalists interested.¹⁴ It can easily be a form of transfer pricing (a hidden profit exchange) with the mother company or another foreign company from the same holding. It is also important to see that according to the annual report the R&D activities reduced the corporation tax payable by 4.3 billion HUF and Audi Hungaria was liable to pay only 786 billion HUF.
- Against that background it is difficult to define the actual volume of R&D activities conducted in the Győr

site. It is not difficult to imagine that the volumes are far more modest than what the picture of the official accounting data suggests.

- The trade union in Audi is very strong and lately it has organised a successful strike and halted the international suppliers ‘chain of the group and managed to receive significant wage increase.

MERCEDES (2012–): 4300 WORKERS

- Production started in Kecskemét in 2012; B-Class is manufactured here. The annual production is around 190 000 vehicles.
- In 2018, the company started to build the second factory unit which will operate in the so called „full flex” system: the site will be capable of manufacturing not just a single model but several ones on demand. This production line is also suited to produce electric cars.
- Within the frame of the Mercedes Academy, 170 students are in the dual training and 40 at a college/university level. The company started to provide its employees basic information on the production of electric cars through presentations and VHS materials.
- Trade unions in the Mercedes plant are very strong and won a fight for significant wage increases.
- At the same time, the global management of Mercedes went lately through a crisis and surprisingly many of its members resigned. A strategy of technology change can only be set up after such global management changes are completed. Similarly, the role of the Hungarian site in that process can be clarified only afterwards.

BMW (2018–)

- The construction works of site in Debrecen are going on now. More than a thousand workplaces are envisaged with a production line of an annual manufacturing capacity of 150 000 cars. BMW had already purchased spare parts and services from Hungarian suppliers at a value of 1.4 billion Euros per year.
- There is still uncertainty if future workers of the Debrecen Mercedes site can have the possibility to organise.

KRAVTEX-KÜHNE

- Since 1999 the company has manufactured 2000 lightweight Credo buses almost exclusively for Volán and for municipal transport companies. There are 100 workers in Győr in the assembly, 340 in Mosonmagyaróvár in the manufacturing of machinery and bus frames. The share of domestic value added of the buses is 75-80%. Beyond the Raba chassis the complete frame with the assembled metal components delivered by Kühne are also Hungarian products. Furthermore, Hungarian products are the passenger doors (Ikarus Szegedi Alkatrészgyártó), the side windows (OROSHÁZA GLAS) and the windscreens (Hirschler), fibre reinforced plastic parts (Tálos), plastic flooring (Graboplast) and a number of other raw materials and components (Alexovics, Semperform).

¹⁴ Péter Bucsky was among the first to reveal this phenomenon in his articles published on the G7 portal.

The following companies stand out with high value added among the suppliers present in the domestic market

BOSCH

- Produces electric and hydraulic fork heads with 1100 employees in Eger and in Maklár. The sites supply more than 100 automotive companies worldwide. Hydraulic fork heads will be obsolete after the introduction of electric cars but the demand for electric fork heads will remain.
- Bosch cooperates with the University of Debrecen and the Budapest Business School and offers students the possibility for internship and theses. In 2017, the company opened an automotive engineering laboratory in the Technical Faculty of the University of Debrecen and has funded it ever since.
- Development of starting motors, generators and hybrid motors.
- In Miskolc the company manufactures hand tools and machines for do-it-yourself use but not the automotive industry.
- There is a strong trade union organisation at Bosch.

CONTINENTAL

- The Budapest site of Continental produces automotive electronics and microelectronic circuit modules for almost all segments of vehicle electronics, for the Powertrain and Interior and Chassis&Safety divisions of the group and for car manufacturers worldwide. Main products of the factory in the capital are: electric control units, propulsion systems, mechatronic systems, displays and infotainment systems. The core products in the Budapest site are the main systems for autonomous, electrically powered and connected vehicles. For the production of high-tech products, the company continuously replaces the production means and control software with the latest systems of industry 4.0 solutions. One of the production halls is fully automated - what will make hundreds of jobs redundant.
- In 2015, Continental set up a central preparatory department for the development and the harmonisation of the various research activities focusing on artificial intelligence. The technology company is at the forefront of applying artificial intelligence in the automotive industry. Next to NVIDIA Baidu, the company cooperates with numerous other research institutes in this area, e.g. the Oxford University, the Technical University Darmstadt or the Madras Technical University (India).
- The ADAS unit of Continental opened a competence centre in Budapest in May 2018 to develop deep machine learning. The company continues to upskill workers with low educational qualifications to technicians but recruitment has become very difficult and the motivation of workers to learn is very weak, even trade unions admit this. Reportedly, the company tries to ease the lack of labour force with the employment of workers from the Ukraine and the Philippines.

- Szeged: belts, hoses, technical rubber products
- Nyíregyháza: air springs, Makó/Vác: cooling and heating units, fuel hoses

KNORR-BREMSE

- The development engineers in Budapest presented a pilot system for self-driving trucks.

SK INNOVATION

- The South-Korean production company opened a battery plant in Komárom in 2018 with a production hall of 430 000 square meters to supply electric cars. Mass production will start in 2020, the batteries produced will have a capacity of 7.5 GWh and supplies 250 000 cars. The start of the second phase of the construction works, with same capacities planned, will depend on the quantity of the incoming orders. This is an investment of 239 billion with 410 jobs.

SAMSUNG SDI

- Another South Korean producer and opened a battery plant in Göd, also to supply electric cars, with an investment of 100 billion HUF; the plant employs 600 workers. Among the Korean producers LG has the largest battery plant in the region, in Poland (investment value equal to 400 million HUF).

BYD

- Chinese producer of electric buses in Komárom. BYD is a market leader in the production of electric buses and before 2018 it invested 6.2 billion HUF, with a Hungarian state grant of 900 million HUF. At full capacity and with 300 employees, the company will manufacture 400 buses on annual bases.

HIRTENBERGER

- Since 2003 the company operates in Pápa with 607 employees and produces primarily pyrotechnic articles for safety devices in vehicles. Previously, they produced seatbelt pretensioners. The company is a supplier of Mercedes and BMW and of some other producers in the region. A new product is the so-called activator which in a collision will break down and make a shell-like dent in the bonnet. This is produced in the region for Audi and Skoda.

TAKATA

- Miskolc: airbags 1000 workers

FORMEL D

- Not all suppliers are producers. In Hungary, Formel D is the provider of supplied services for the automotive industry (preparing user manuals, redacting new models etc.) - even if this is a rather small segment. The company is continuously shifting and reacting relatively swiftly to new technologies.

Low added value suppliers

LEAR

- The Gyöngyös site of Lear made 500 workers redundant in 2018. Due to the increased wages, the production of harnesses was no longer profitable in Hungary. This work-process cannot be automated and the company therefore decided to transfer the production to Romania and the Ukraine where wages are lower. The company was established in 1997 and at its height, in 2004, it employed 2200 workers. The seat cover production in Mór was closed down, as well. For the time being, seat assembly is still in Győr and employs 500 people.

YAI (YANFENG)

- The company in Pápa is a joint-venture company of the Shanghai-based Yanfeng Chinese Automotive Trim Systems and Johnson Controls from the US. Their main products are the injection moulded interior accessories, leather and synthetic leather upholstery (Mercedes, Porsche, BMW, Ferrari, Fiat, Volvo and Maserati). The products are produced manually with 1600 active workers. The company exports to Germany, Italy, Slovakia, Sweden and the US.

F SEGURA

- The Szolnok site of the Spanish company employs ca. 500 workers in the pressing and welding for engine and coachwork sets.
- Their site signed a cooperation agreement on digitalisation with the Institute for Computer Science and Control of the Hungarian Academy of Sciences (cloud-based systems, data collection systems, autonomous internal logistics).

REHAU

- Swiss producer of bumpers present in Hungary with sites in Győr and Újhartyán (Pest county). The company supplies Mercedes in Kecskemét, Audi in Győr and Volkswagen in Slovakia.

ZF

- Eger: gear boxes

Suppliers with Kifejezetten conventional technologies

DENSO

- Denso is partly owned by Toyota and offers specialised services to supply cars using fossil fuels. The factory in Székesfehérvár was opened in 1997. Currently, it employs 4000 workers.
- The Hungarian products are all in connection with engines with fossil fuels: fuelling systems, diesel metering pump, pressure accumulator injection systems, system controls, spark plugs, injectors.

OPEL

- The Opel site in Szentgotthárd started to operate as a car manufacturing factory owned by General Motors in 1992. At first, Opel Astra was produced here and in 1998 they finished with the assembly of this model. Szentgotthárd produced altogether 80,835 Astra cars and the majority was sold in the domestic market. For Chinese orders, they also assembled Opel Vectra cars.
- Then the site was downgraded to engine production. This is its main profile until the present day: they produce diesel and petrol engines and parts. In 2017 the loss-making Opel brand in Europe was purchased by Peugeot-Citroen (PSA) which plans to bring the production of the 1.2 litre 3-cylinder turbocharged petrol engines to the flexible factory. (Furthermore, they produce similar small engines for the Tychyven factory in Poland. The production of this range of engines can remain in Szentgotthárd till the end of the life cycle of the relevant Opel brands (Insignia, Astra) run out, i.e. until around 2024.
- In total, 630 000 engines of 38 versions are produced here on an annual basis. The flex production line produces 470 000 pieces.

JOHNSON ELECTRONIC

- 1600 workers in Ózd and Hatvan. The main products of the Ózd site are the air-conditioners for vehicles, components of engine cooling systems, headlight aiming, subunits of vehicle door latches and micro-engines. Clients are BMW, Daimler, Toyota, Renault, Jaguar, Land Rover, the VW-groups and sub-unit suppliers like Valeo, Visteon, Mahle, Denso, Brose and Continental. Uniquely for Hungary, there is a complete development and testing process in Hatvan, the site is responsible for it from the first idea to the launch of the serial production.
- The main product of the Hatvan factory is the new generation engine cooling modules. One of the global targets is automation and the application of artificial intelligence in the production processes. Both sites in Hungary are involved in priority automation projects. Furthermore, they produce and install ready-to-use production lines for factories in Serbia, Mexico and China.
- The company is actively engaged in cooperating with local secondary vocational schools and the University of Miskolc.

LINAMAR

- The Canadian-owned company employs ca. 2500 workers in Orosháza and Békéscsaba. They produce common rail direct fuel injection units.

MODINE

- Mezőkövesd/Gyöngyös: engine oil coolers, transmission oil coolers, retarders, heat exchangers.

VERITAS

- Dunakiliti: fuel systems, oil and feed air pipes; 1200 employees.

WESCAST

- Oroszlány: exhaust manifold, turbocharger housing

4.3 TRANSITION TO THE NEW TRENDS

Suppliers must adapt themselves to the changes announced by the vehicle manufacturers. Some global vehicle manufacturers have already announced their Agenda for Change for the coming years. The Volkswagen Group, in Hungary modestly but massively present in the Visegrád region, for example announced that by becoming a leader in the sector by 2022 they plan to sell 27 different (VW, Audi, even Skoda) electric cars with a projected global volume of 2-3 million cars a year. This can be as much as the quarter of the global shares of the group.

Against the background of our study this change is of special interest: VW plans to concentrate the production of the electric vehicles to their domestic sites (Zwickau, Hannover, Emden). They project a productivity increase of 20-25%. Their flagship site in Zwickau produces currently 300,000 conventional vehicles per year, primarily Golf cars. The site uses sustainable energy.

They have already started the production of electric cars at two other sites in China: in Anting and Foshan. Production in the US is also on the agenda.

The production of conventional cars (i.e. with combustion engines) is fully transferred to Eastern Europe. The Group calculates with 30 000 workers in total, which means that the change will go along with major redundancies. In some work phases, however, like in software development and batteries, the number of employees can increase by a quarter. The company claims that the new batteries can be charged to 80 % in half an hour. The suppliers of VW had to commit themselves in their agreements to use sustainable energy in their own production, too.

A specificity of the VW decision is that it was taken in agreement with the workers.

SUZUKI AND MERCEDES

- Suzuki and Mercedes produce conventional cars in Hungary. These companies have not yet made anything public about the time scale, the regional distribution and the timetable of the introduction of the new industry trends.

AUDI

- Audi is already producing electric cars. Its luxury electric car „e-tron“ is first available on the market in spring 2019 and the goal is, of course, to catch up with the predominant Tesla (e.g. 94% on the luxury electric car segment in the US). The competitors are Jaguar I-Pace, Porsche Taycan and Mercedes EQ. Győr will not be involved in the e-tron manufacturing. Its production will be taken to the Belgian site of the Audi group - although not to Germany, but still, to a high-wage economy.

BMW

- BMW definitely plans the manufacturing of electric cars in its site in Debrecen. The annual capacity foreseen is around 150 000 cars. The share of electric cars is not known for the time being.

Suppliers

Suppliers with technology-intensive production stand out in their capacities to adapt to the new trends of the automotive industry.

- **Continental** produces already today high added value electronic and control units and deliberately shifted to the technology of autonomous and connected vehicles.
- **Hirtenberger** is a safety technology company. The products developed by the Austrian mother company and manufactured in Hungary can be of paramount importance in the transition to autonomous vehicles. The big question remains here the same: how will the mother company decide about the allocation of the production and of the production phases.
- **Bosch** is in principle ready to supply electric cars as it has already started to produce hydraulic and electronic fork heads in Hungary.

These were the technology intensive examples. Probably, the low added value suppliers can also survive, like injection moulders, seat cover manufacturers etc. (Yanfeng). As the case of the Lear company has shown, the labour-intensive segment is rather under the threat of increasing wages and less under the pressure of industry technology change.

Finally, we can clearly identify which are the suppliers in the manufacturing of petrol and particularly of the diesel engine components. These will be most exposed to the industry technology change. Based on the number of employees, primarily:

- **Opel:** The former car manufacturer produces explicitly engines with fossil fuels, which are for two models to be phased out in a few years' time (Insignia and Astra). Due to its geographically peripheral location it is not clear if the factory in Szentgotthárd can retain any production at all.

4.4 POSSIBLE TRADE UNIONS ANSWERS

After the change of the political system, the Hungarian economy opted for a model called competitive state capitalism with dependence on foreign capital. Other countries in the region made efforts to implement the model of domestically owned capital and voucher privatisation which led in the majority of the cases to 'crony capitalism'. Many countries in the region made a shift to the Hungarian model. In this process, they enjoyed the support of international organizations.

Competitive state with dependence on foreign working capital differs substantially from other forms of capitalism as known in the West e.g. from the model of corporative-social market economy. As the "variants of capitalism" research

programme in economics underlines, the German model is the so-called coordinated market economy in which the state (or regional, local) actor is in close coordination with the economic and social partners. This means in practice that the state sets up economic development strategies to replace the textbook case of harsh market conditions. It may even become the owner of large corporations but in any case, through the development banks it supports domestic companies with funding. In cooperation with universities, research institutes and vocational institutions it provides them technology and qualified labour force. Also, it guarantees trade unions a broad range of powers too.

Coordination, however, is not only among the state and the economic and social partners but also within the latter group. Employers, for example, continue to consult with the trade unions. These parties sign at the company, the sectoral or national level multiannual agreements and define the expected technology changes, productivity and wages development. This is a living practice in the West and the North of Europe and had been the same in the South before the crisis. The German system allows elected workers' representatives to sit in the company board with the right to vote. "Mitbestimmung" is the German word for this co-determination system.

The Eastern European model of the competitive state with dependence on foreign working capital is not only not capable of this but has no ambition to do so, either. An important difference is that the majority of the economic partners are not national but foreign investors. This means, among others, that strategic decisions are not taken in Hungary but at the mother company in Western Europe, the United States, Japan or in China. The most the Hungarian site can do is lobbying through its international network to receive the possibly highest added value production phase but it will have to compete with numerous other sites for this. The mother company, or more developed economies with high human capital will always be ahead. The management of a Hungarian site is not really the negotiating partner for the Hungarian government as it is not in the position to take autonomous decisions on development and strategy.

This is why there was basically no coordination at all between the Hungarian government and the multinational sector before 2010. Unlike the Western European models of capitalism, the competitive state with dependence on foreign working capital is not involved in strategic policy making. This model does not have a well-considered and well-funded human capital policy (education, training, health), technology policy, regional policy or wage policy. It expects all this from foreign working capital - and in return it offers as cheap labour force as possible, deregulation, weak union rights, low taxes, generous tax benefits and direct public support. Instead of creating a joint investment platform, it is permanently competing with the other countries of the region. The competitive state with dependence on FDI is reactive and not coordinative.

The Orbán government discontinued this tradition in its rhetoric but in reality, it made extensive use of it after 2010. Taxes

were decreased continuously and multinationals received unprecedented grants and tax benefits. The (classified) strategic agreements that were made with (only the global management of) multinationals investing in Hungary could in principle become a coordinative component, but according to details disclosed, these agreements are rather reactive in their content. Which means, that the Orbán government did not overcome its predecessors, on the contrary: it deepened the model of the competitive state with dependence on FDI. It liberalised the labour code and with the act on overtime it sought to ensure adequate human resources. In international comparison, it continues to sell cheap Hungarian labour force. It cut the funding sources for human capital and technological subsystems and engaged in confrontations with workers of these sectors.

The relation between the government and the economic and social partners is not coordinative. Instead of approaching the evidenced representative organizations (VOSZ-National Association of Entrepreneurs and Employers, MASZSZ-Hungarian Trade Union Confederation etc.) it created its own chambers to keep up the appearance of negotiations. Furthermore, it conducts ostensible "national consultations". There seems to be no comprehensive strategy for economic development, legislation is the follow-up of the prime minister's announcements and there is a total lack of any policy preparation or social dialogue.

The government does not promote the dialogue between employers and unions. It does not encourage multiannual agreements at the company and sectoral level but clearly facilitates capital and is radical in cutting the rights and entitlements of trade unions. The government communication is concerned about the capacities of the country to attract investments which may get lost because of the trade union actions.

Consequently, Hungarian trade unions are not equipped with rights that help create a cooperative and coordinated relation with the companies. The relation of the two parties was rather passive for a very long time, now it is more confrontational. It resembles a former phase of the Western European union movement that preceded the implementation of the coordinated and cooperative model.

Against this background, the Hungarian unions cannot become partners in the challenges of technology change. The investors do not need and the government has no aspirations to facilitate the development of such a role of the unions. Due to the fact that the majority of the investors opted for Hungary on the basis of its cheap labour force and the deregulated industrial relations, not even they think of trade unions as possible strategic partners. Perhaps not to the extent we are expecting now, but there was some improvement in the technology of the automotive industry already. The Hungarian companies adapted themselves to these developments. They updated the production processes, acquired new machines and introduced new technologies, in many cases there was also a model change. Even in these cases, however, trade unions did not experience any long-term vision or planning

jointly discussed by the company management and the unions. Workers and trade unions learned about the plan immediately before its implementation, and they were given no chance to comment on the longer-term view. There was no formulation of a joint vision, as the plans had not even been shared with them. The relatively low added value of the production in Hungary is well reflected by the fact that company managements have never deemed it necessary to provide longer training courses to their employees and help them get prepared for the technology change. Shifts and changes were always handled with one or two weeks of “instruction”, moreover, union leaders reported that training modules that lasted one or two weeks in Western Europe were completed in one or two days in the Hungarian factories. This does not only suggest the high absorption capacity of Hungarian employees, but also that the added value content of the work they perform does not require their involvement into longer term planning.

So, it happened that whilst car manufacturers present in Hungary are, due to rather fortunate developments, basically in the forefront of technology change, Hungary will not necessarily benefit from this. In the course of technology change, global actors will not involve either the Hungarian government or the Hungarian trade unions as partners into their decision making on localising within the production chain. According to details acquired through litigation, the label “strategic partner” does not mean that the Hungarian government was a full-fledged partner of the transnational companies in the strategic decision making as we have learnt from the famous „Deutschland AG” cooperation of the German federal and regional governments and the German companies. These companies do not look at Hungarian trade unions as their strategic partners either. There are, however, other stakeholders of technology change. Domestic universities and research institutes could also link in the process. But they are not strategic partners and their funding and opera-

tion is also disrupted. As a result of the extreme centralisation, it is hardly possible in Hungary to create local forms of cooperation on the basis of subsidiarity. Such initiatives, if they exist, were centrally launched by the government and their sustainability (primarily their funding) depends on the decision of the government, as well.

4.5 CONCLUSIONS

In conclusion, we have seen that while Hungary and its model of the competitive state with dependence on FDI has fortunately attracted automotive companies, which may not be leaders, but are definitely challengers in technology change, this will not necessarily have long term benefits for the country. First: instead of building its model of organising the economy on the basis of subsidiarity, consensus, local cooperation and strong employers’ and workers’ rights and instead of facilitating joint strategic planning in a coordinated manner, this model makes economic actors depend on decisions taken by foreign-based production chains and does not allow them any involvement in this process. It may well happen that similarly to the example of Volkswagen, Suzuki, Audi, Mercedes and BMW will also decide and implement the change to the high added value new technology in their own national economies and in Eastern Europe they will only phase-out their conventional production. (We have seen this in the case of the Opel site in Szentgotthárd.)

In this case, the fate of the overwhelmingly foreign owned supply chains established in Hungary, will be sealed, too. The goal of this study was to highlight that a part of these companies are already involved in and are also capable of adapting themselves to technology change; should manufacturers active in Hungary, however, not implement the change here, even suppliers will lose their location advantages (like the geographic vicinity in transportation) and do nothing else than supply foreign economic actors.

5

THE FUTURE OF WORKERS IN THE AUTOMOTIVE INDUSTRY IN SLOVAKIA

MONIKA MARTIŠKOVÁ

“Of all OECD countries, automation presents the biggest threat for Slovakia” (TASR, 4 April 2018)

“Wage growth in Slovakia outpaced productivity growth; the answer could be automation” (Pravda, 24 June 2018)

“Slovakia is the leader in automation, but robots should not be seen as competition” (Trend, 1 May 2018)

5.1 INTRODUCTION

In the future, Slovakia's automotive industry will face several challenges at the same time. Production activities will be transformed both in their content and form, entailing changes in technological processes of production along with changes in the nature of products and in who or what will make these products. Green and technological transformations of the means of transport and of their production options raise a number of questions concerning the future of work in the automotive industry. As witnessed by newspaper headlines on this theme, Slovak workers must be ready to face changes in the content – and some of them also in availability – of their jobs. The aim of this study is to examine the extent of these changes and present possible future development scenarios for workers in the automotive industry.

The geographic proximity of central Europe to advanced western European countries, EU membership, low labour costs and manpower availability made the entire V4 region a desirable destination for foreign investment in the automotive and other industries (Kureková 2018, Pavlínek 2017). Because investments in the region were sought by both investors and governments, the countries started to compete for foreign investment. When Slovakia submitted its investment invitations in late 1990s and early years of the millennium, the country suffered from high unemployment and a generally low performance of its economy; attracting foreign investors was therefore perceived as a suitable strategy for addressing economic problems of the country. In that situation, investments which the country succeeded to attract involved almost exclusively creation of manufacturing jobs, i. e. lower-skilled and lower value-added jobs. Because this ‘assembly-line’ ap-

proach still persists in the automotive industry, Slovakia could be caught unprepared for the upcoming technological revolution. Introduction of new technologies is expected to bring changes in the international division of labour, including changes in the localisation strategies of corporations; all this can have significant implications also for the Slovak economy.

The present study therefore analyses the current position and the importance of the Slovak automotive industry for the economy of Slovakia and for global economy. It maps out the impact of technological changes on the future position of the Slovak automotive industry and highlights the challenges its workforce will face in the coming years in connection with the deployment of new technologies. Based on the analysis of the current position of producers and suppliers in global production networks, possible scenarios are drawn up of future development of Slovak automotive industry with regard to its workforce, and recommendations are made for public policies and social dialogue.

5.2 GLOBAL PRODUCTION NETWORKS AND THE AUTOMOTIVE INDUSTRY

The analysis of Slovakia's current position in the global automotive industry makes it necessary to throw light also on the weaknesses of this important sector for the Slovak economy. To this end, we conceptualise it through its integration in global production networks (GPNs). The concept of **global production networks** describes the functioning of production chains, which comprise not only business companies, but also regional, national and supranational institutions, customers, as well as trade unions and other interest groups (Henderson et al. 2002).

By including a wider range of actors who influence the decision-making of multinational corporations, this concept makes it possible to analyse the relations between the various actors and their power relations. The relations between these actors are not equal because each of them controls different amounts of key resources (capital, know-how, knowledge, skills, natural resources or market size) and also because of different mobility of individual factors (e. g. capital is much more mobile than people); moreover, their activities and resources are unevenly distributed in space (Dicken 2007). In

Table 1
Actors in global production networks

	CHARACTERISTICS	SOURCES OF POWER	APPLICATION EXAMPLES
MULTINATIONAL CORPORATIONS	Strong position due to their ability to coordinate processes and transactions in GPNs without having to own entities that are subject to their influence	Ability to benefit from geographic differences in the distribution of production factors Capital mobility, ability to relocate resources	Amount of investment in the given territory Localisation and relocation decisions depending on value-added creation activity
STATE	Territorial unit in which corporations localise their activities	Power to 'regulate' and 'manage' inflow and maintenance of global capital on its territory	Creating conditions for foreign investors Supporting local actors, transfer of know-how Supporting improvements in the status of domestic companies Legislation and tax collection Education system setup
WORKERS (INCLUDING TRADE UNIONS)	Considered as the production factor, value creation component of lesser significance Much less mobile than capital	Education level Possibility and ability to form trade unions Legal guarantees of rights Knowledge of local environment, employee needs, lobbying	Consultation, collective bargaining, strikes International cooperation Tripartite national and sectoral actions
CONSUMERS	Consumers of final products Purchasers of semi-finished products for manufacturing in supply networks	Variability of preferences Purchasing power of consumers	Consumer behaviour, influence of marketing Ecology
CIVIL SOCIETY, NON-PROFIT ORGANISATIONS, INTEREST ASSOCIATIONS	Local, national and transnational associations (environmental, workers' rights advocacy, employers' and other associations)	Global cooperation Pressure actions, confronting multinational corporations (e. g. as regards working conditions)	Campaigns, media outreach, national and international lobbying

Source: Drawn up by the author according to Dicken (2007)

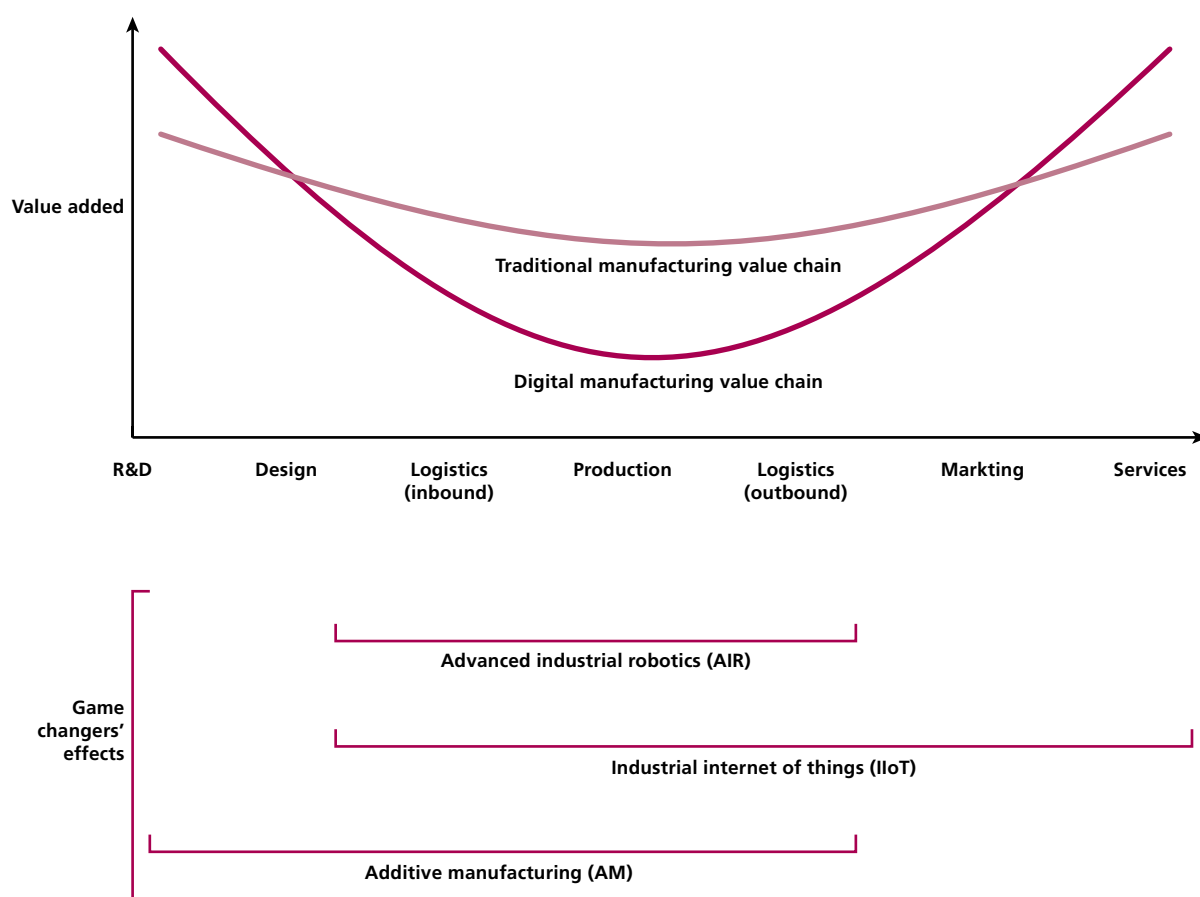
this connection, Table 1 presents the actors and the sources of their power, i.e. variables determining their position in global production networks and their power to change this position. This categorisation is particularly important for establishing mutual interactions between the actors and their power to influence the development, which will be relevant for drawing up recommendations in Chapter Four of this study, analysing different development scenarios and roles of individual actors.

The automotive industry is organised globally but, at the same time, it is still regionally localised and has a fragmented structure of individual production tasks. This means that it creates a dense network of suppliers with the dominant po-

sition of final car manufacturers and tier 1 suppliers¹⁵ who determine the conditions under which they buy products from lower-tier suppliers, and thus also largely determine the profits of the latter. Moreover, in addition to manufacturing, tier 1 suppliers and final manufacturers (OEM) have also their own research and development and product design capabilities, and participate in the distribution and sale of products to final customers, i. e. in the **activities with higher val-**

¹⁵ Tiers in the automotive industry refer to the level of supply sophistication where tier 2 and tier 3 suppliers carry out less sophisticated production activities than tier 1 suppliers who supply complete automobile components (such as doors, seats, electronics etc.) for final manufacturers denoted as Original Equipment Manufacturers (OEM).

Figure 1
Value added creation in the traditional and the digital value chain



Source: Eurofound 2018

ue-added than manufacturing alone (Figure 1). The creation of value added thus determines the position of individual functions in the production chain, the power position of individual companies and their working conditions (Gereffi and Sturgeon 2009). In Slovakia, as will be shown later, there is enormous dominance of manufacturing activities, which places production plants in a dependent position and means less favourable working conditions for employees.

The concept of global production networks also describes the ways of **how to achieve transition from low value-added production to more sophisticated production and higher value-added activities at company level**, which could be the right way for Slovakia to obtain long-term benefits from the presence of foreign investors. There are several ways of **achieving the 'upgrading'**, i. e. the shift from low value-added to higher value-added activities; they depend on mutual interactions between companies, multinational corporations, the state, regional representatives and interest groups of employees (unions) and employers, and other organisations. The various forms of upgrading and their implications for public policies are listed in the table below (Table 2). The ways of achieving individual types of upgrading are discussed in Chapter Four of this study, which presents various scenarios of possible development and the role of actors therein.

Upgrading applies to both domestic manufacturers and branches of foreign companies. **The introduction of new technologies** which, at the first sight, may seem to be truly revolutionary, is nothing new in this regard. New technologies can be seen as available technologies which, if properly implemented, may improve production effectiveness and lead to new product development. Thus, from the upgrading point of view, the introduction of new technologies represents the desirable state, especially if it leads to enhancing the competitiveness of the given location and of the given plant by means of factors other than low labour costs.

However, **a truly revolutionary consequence of technological changes will be the change in the distribution of added value among the various activities of the production chain**; as a result, value added in the production – the predominant activity of companies in Slovakia – will be further falling, while recording growth in the pre- and post-production activities (Figure 1). This is one of the main reasons for the potential of new technologies to significantly change localisation strategies of companies and the international division of labour. If Slovakia fails to sufficiently engage in activities with higher value-added in the production chain, it could face the loss of jobs, wage stagnation and comprehensive transformation of work activities. The following sec-

Table 2
Forms of upgrading and public policy implications

UPGRADING TYPE	EXAMPLE	DISSEMINATION	PUBLIC POLICY IMPLICATIONS	SUCCESS FACTORS
Process-based	Increasing effectiveness of production or development processes, e. g. by introducing new technology or new software enabling more effective organisation of production	Common in a majority of GPN companies	Creation of pro-innovation and stable institutional and legislative environment	Successful introduction of new technologies, competences and capacities of local management and local workforce
Product-based	Introducing higher value-added product or service	Less frequent than process-based, but process improvement may lead to the production of more sophisticated products	Creation of pro-innovation and stable institutional and legislative environment	MNC strategy, competitiveness of the plant
Intersectoral	Use of the acquired know-how for the production of own, competitive goods and services, e. g. in a related industry	Occurs exceptionally	Depends mainly on skills of managers and employees, but can be actively supported e. g. by subsidies, export promotion, or by creating clusters and fostering cooperation	Quality public institutions, national and local strategies for the development and support of strategic sectors, ability to identify these sectors
Functional	Introducing higher value-added activities, such as research and development in a company that has performed only assembly operations	Not frequent	Promoting excellence in higher education, supporting cooperation between research institutions and companies	Quality public institutions, national and local strategies for the development and support of strategic sectors, ability to identify these sectors

Source: Blažek, Uhlir (2011), 'Success factors' column added

tion will present basic characteristics of the automotive industry in Slovakia.

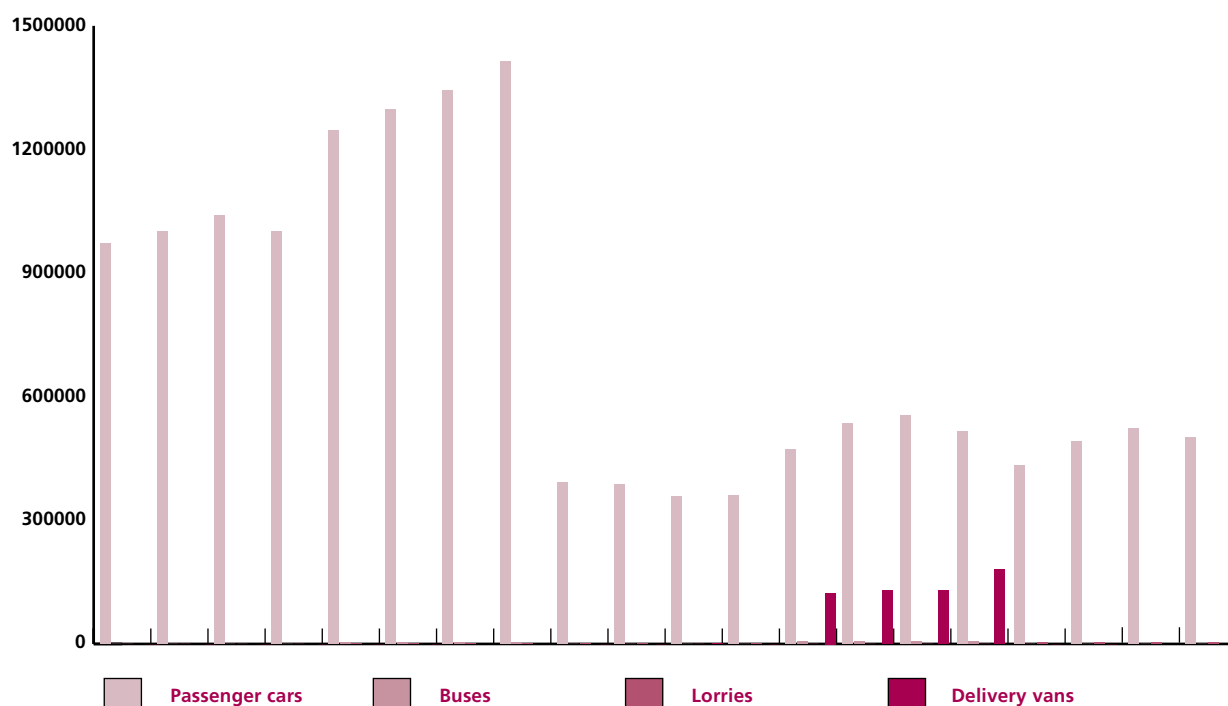
Slovak automotive industry – basic characteristics

Record production of cars in Slovakia reflects the dominant production function of this sector in the location, with marked prevalence of foreign-owned companies. Among the V4 countries, the volume of passenger cars manufactured in Slovakia is topped only by the Czech Republic, and **Slovakia is the world leader in the per capita passenger car production**. Slovakia makes no other motor vehicles than passenger cars, but the neighbouring V4 countries have at least partly diversified their production in this sector – passenger cars and delivery vans being made in Poland (as the only EU10 country), buses in the Czech Republic (33% of EU27 production) and lorries in Hungary (70% of EU10 production) (see Charts 1 and 2). Slovakia makes around 25% of passenger cars in EU10 countries; in Europe as a whole it is 6%.

The share of the automotive industry in total exports is as high as 26%. **The dependent position of the Slovak automotive industry is witnessed also by the narrow diversification of export target countries.** More than 50% of total output goes to three European countries, 85% to only five European countries, one third of exports goes to Germany, 14% to France, 13% to the United Kingdom, and 6% each to Spain and Italy (Chart 3). This narrow export orientation mainly to a few EU countries makes the Slovak automotive industry dependent on global economic developments that the country can hardly influence, as it was shown for instance during the economic crisis in the post-2008/2009 period.

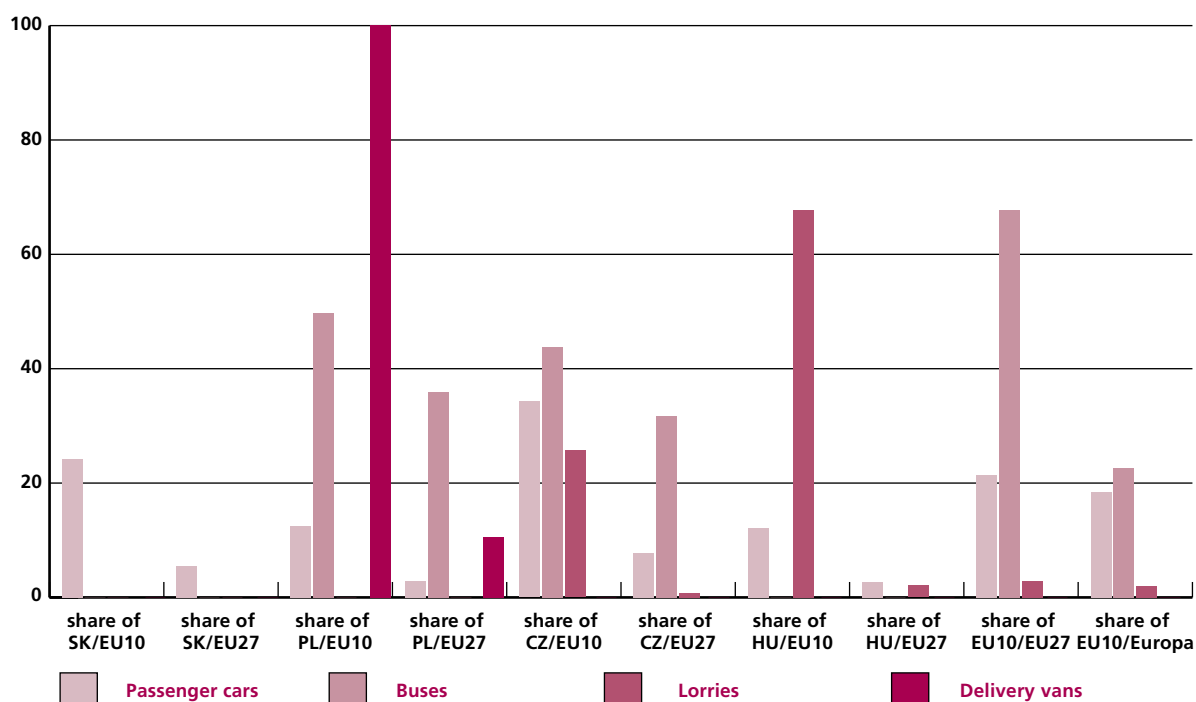
Out of the total of some 400 companies operating in the industry, 57 are tier 1 suppliers, 79 tier 2 suppliers and 83 tier 3 suppliers; in 2018, 129 companies had 50 or more employees (Statistical Office of the Slovak Republic [ŠÚSR] 2018). **Most of these companies are foreign-owned; domestic firms operate mainly in lower tiers of the supply chain.** From

Chart 1
Production volumes of cars, buses, lorries and light commercial vehicles (delivery vans), years 2014–2017



Source: OICA, data, drawn up by the author

Chart 2
Production shares of selected EU10 and EU27 countries in 2017

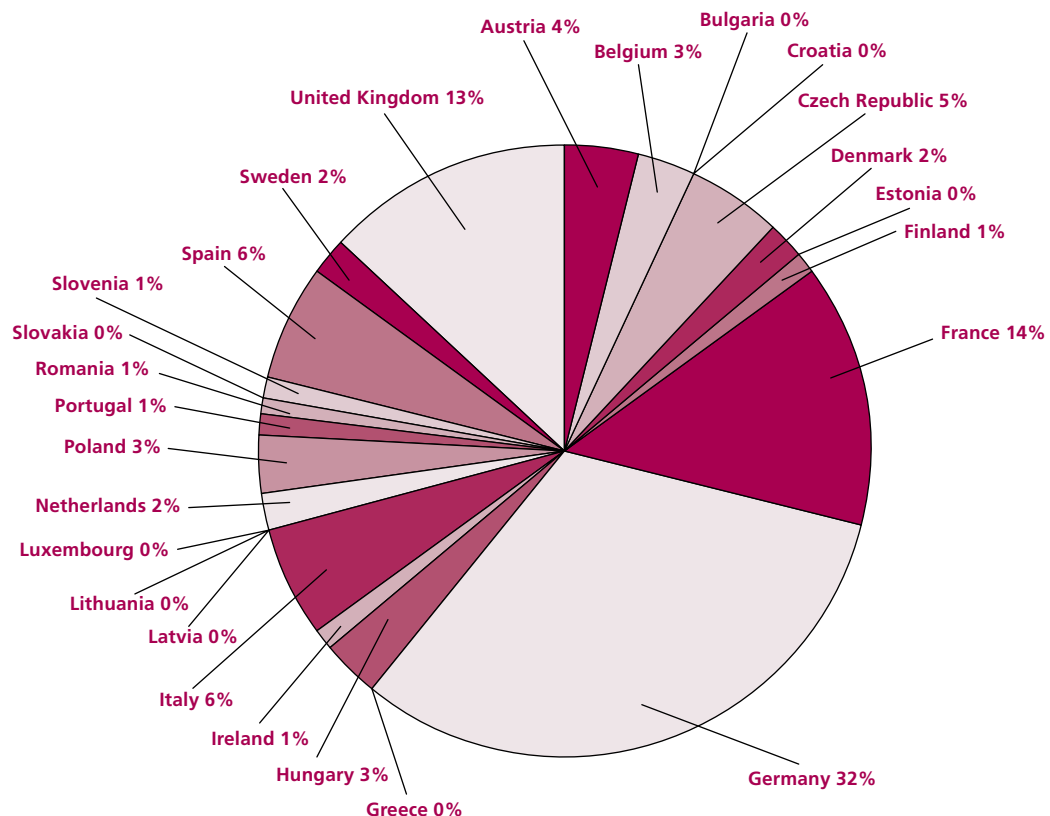


Source: OICA, data, drawn up by the author

this perspective, foreign capital in Slovakia holds a very high share of the created value-added, amounting to around 60% in industrial production as a whole and to as much as 93% in the automotive sector (Pavlínek 2017).

The Slovak automotive industry unquestionably holds a pivotal position in the Slovak economy with its approx. 5% share in the GDP (Šlušná and Balog 2015); in the broader sense, when including also other sectors with linkages to the auto-

Chart 3
Shares of Slovak automotive industry exports to EU countries in 2016



Source: ComExt database (Eurostat), drawn up by the author

Table 3
Entities in the automotive industry

	2015	2016	2017	2018
Small (0 to 49 workers)	124	118	144	183
Medium-sized (50 to 249 workers)	76	75	76	76
Large (250 or more workers)	53	52	62	62
Self-employed (in thous.)			70	67

Source: ŠÚSR

motive, this share may be as high as 13% (Luptáček et al. 2013).

However, in the broader context of production networks, Slovakia belongs among **'integrated peripheries'**¹⁶, i. e. production locations with prevailing low value-added production situated in countries with cheap labour and geographic proximity to important markets (for instance, Mexico is integrated periphery for the United States and the CEE region is integrated periphery for Western Europe) (Pavlínek 2002, Humprey and Memedovic 2003). Slovakia became integrated periphery mainly due to its proximity to large western European markets, low costs of production, especially

low labour costs, satisfactory infrastructure which is important for supply networks, and not least because of government's investment incentives. **At the same time, these are the factors which could keep Slovakia in a long-term dependent position of integrated periphery with weak prospects of transition to higher value-added activities** (Pula 2018, Pavlínek 2019). The next section will therefore consider the situation of workers, the role of trade unions and of the state, and their mutual interactions in connection with achieving higher value added in the production chain.

The state and global production networks

Slovakia entered the competition for attracting foreign direct investment with very aggressive bids which included, besides tax holiday incentives and construction of road infrastructure, creation of foreign-language schools or building luxury ac-

¹⁶ Locations with the predominant production function are sometimes called also 'assembly platforms'; this term, like the term integrated peripheries, refers to locations with then almost exclusively production function and dependent position in GPNs (e.g. Pula 2018).

commodation for managers (Pavlínek 2017). For instance, the price paid to KIA company per job created was more than 75,000 EUR, and Slovakia provided similar support also to key suppliers of the company. The support provided to the latest Jaguar Land Rover (JLR) investment is estimated at 44,600 EUR per supported job. This support, however, does not include construction costs of the industrial park that will be used mainly by the carmaker.¹⁷

The state has thus played and continues to play an important role in attracting foreign investors to building industrial production capacities in Slovakia. Horner (2017) distinguishes four basic types of state interactions with multinationals in GPNs: facilitator, regulator, producer and buyer. The strategy of attracting foreign investors, actively deployed by Slovakia for several decades, is connected with the first function, i. e. that of facilitator; it comprises the provision of subsidies and tax incentives, but less support is provided for investment in research and development and for the education system. The argument for this strategy is that a location achieves deeper integration in global production networks primarily through the transfer of knowledge from foreign companies to local workforce and domestic producers, and that spatial proximity is therefore sufficient. However, research has revealed that the **level of interactions between branches of foreign companies in Slovakia and domestic companies is very low** (Pavlínek 2018) and, moreover, domestic companies are almost exclusively tier 2 or tier 3 suppliers, situated at lower levels of suppliers' hierarchy, with less favourable upgrading prospects (Rugraff 2010, Pavlínek 2018). The state has thus facilitated the presence of production in the territory of Slovakia, while doing less to strategically contribute to improving the position of its territory in GPN.

Slovakia's investment in research and development has long stood at 1.13% of the GDP, one of the lowest levels in EU countries. **Yet, development forecasts indicate that there is an inverse relationship between the level of education and the threat to jobs from automation**, since most low-skilled jobs can be automated. In addition, state investment support is almost exclusively granted to production companies. For instance, in 2017 the governmental SARIO agency supported 15 investments which created 3,056 jobs, but only 2% (74 job positions) of them in the research and development (R&D) sector. The amount of support per one R&D job was 20,000 EUR compared with 37,000 EUR per job created in the automotive sector (INESS 2017).

Low support for R&D is the consequence of the lack of a clearly defined innovation support strategy, but is also connected with the high concentration of assembly plants and their need to expand production capacities. In other words, most applications for investment incentives are submitted by

companies that are already operating in Slovakia (67% in 2017), and support is the most often granted for production expansion purposes. **Slovakia, similarly to many other small economies, is thus suffering from 'path dependency'**; this means that because of the lack of adequate research and development capacities and lack of adequate support for innovation creation, it stays on the chosen path of industrial production. The biggest obstacles to innovation in small regions, which also include Slovakia, are linked to the inability of individual actors (researchers, companies, political representation, non-profit sector and trade unions) to cooperate, inadequate orientation to applied research, and to the lack of funds (Blažek & Csank 2016). Cooperation between schools and employers in Slovakia takes place mostly at the level of secondary schools and has the form of dual education and of cooperation at regional level. Cooperation with universities has mainly the form of student internships, and low cooperation in concrete research and development projects reveals **a gap in dual education at higher education level** (Gandžalová et al. 2018).

In October 2018, the government approved a set of 35 measures designed to help implement Industry 4.0. In the area of research, development and innovation promotion, emphasis is laid on supporting the links between individual actors and on creating favourable conditions for innovation. What is, however, missing is a change in the provision of state subsidies to investors and their new focus on higher value-added investments. In the labour market and education fields, the strategy outlines as many as 14 measures, focused mainly on the system of education and on school graduates. **It contains also a measure on supporting lifelong learning, including the tripartite dialogue** on appropriate implementation of lifelong learning, but no concrete strategy has been yet proposed. Despite the fact that lifelong learning is an important component of the preparation of the today's working population for technological changes in the production, Slovak workers' participation rate in lifelong learning is very low – only 3.4% in 2017 compared with 9.8% in the Czech Republic, 6% in Hungary, 4% in Poland and 11% in EU28 (Eurostat 2018, trng_lfe_01). The government-approved Smart Industry Strategy identifies most problem areas of state policies aimed at maintaining foreign investments, but the state continues in its role of the 'host' to global capital, without a clearer vision and a more pro-active diversification of the national economy.

Summary: Position of Slovakia in global production networks and the role of the state

Based on the above figures and statistics, key characteristics of the automotive industry in Slovakia can be summarised as follows:

- In global production networks, Slovakia is placed in the category of integrated periphery countries, referred to in literature as countries with very limited prospects for climbing up from that position
- The automotive industry as a sector has great economic significance, contributing with as much as 13% to the

¹⁷ The cost per job created by PSA was 44,000 EUR, compared to 42,000 EUR for Hyundai in the Czech Republic or 32,000 EUR for TPCA, also in the Czech Republic (Kolesár 2007). The current LandRover investment is a similar story, where total cost per job created can climb up to 214,000 EUR, if including industrial park construction costs.

GDP creation and with as much as 26% to total exports

- The sector has the highest presence of foreign companies whose share in value-added creation is as high as 93%; total number of companies operating in the sector is 388
- Only 12% of all supply chain companies have their own research and development; 60% report they are not engaged in any research
- Only 4% of companies consider setting up research centres in Slovakia

It follows from the above that Slovakia's integration in global production networks takes place almost exclusively in the field of production, i. e. in low value-added activities. Research and development activities that could ensure transition to higher value-added activities are conducted in only a few dozen companies; moreover, public policies have long failed to address support for R&D. High concentration of foreign capital with weak links to local suppliers constitutes a problem from the perspective of future development of the industry; on the other hand, competition inside corporations, which also involves their Slovak branch companies, forces them to constantly streamline their production and introduce new technologies.

5.3 WORKERS IN THE SLOVAK AUTOMOTIVE INDUSTRY

Employers and politicians often invoke 'skilled labour' as one of the reasons for arrival of automotive producers and suppliers to Slovakia. On their arrival, early investors (such as Volkswagen in Bratislava) were building on the local car-making tradition, but the producers who came later on were bringing 'green field' investments, and the reference to qualified workforce is thus more often related to technical skills

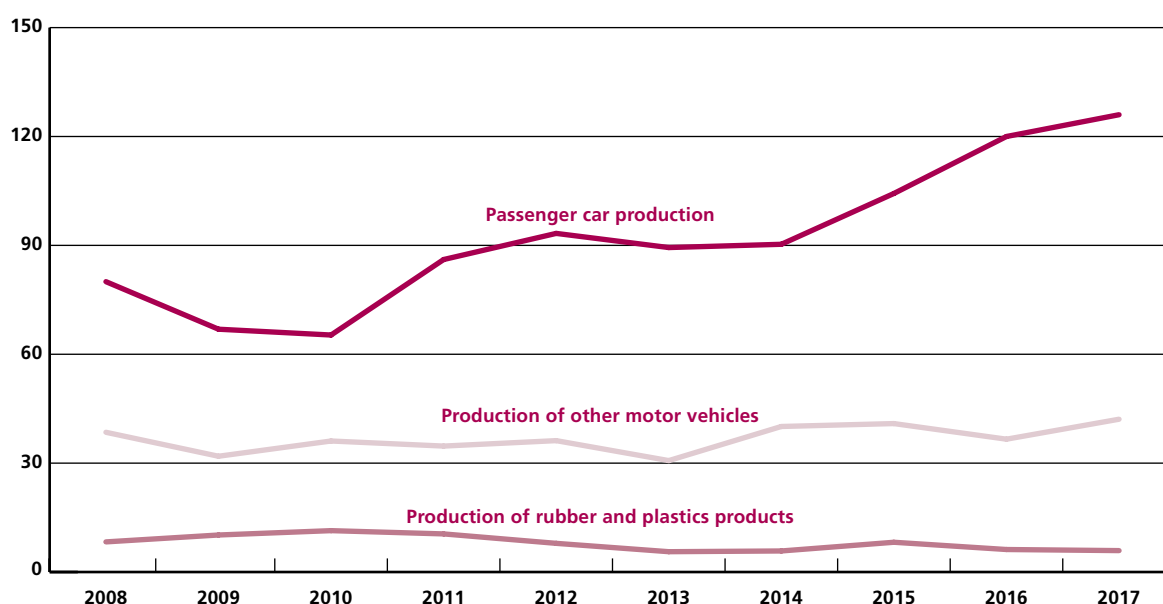
and ability to learn in the production processes (Pavlínek 2018). Only to a lesser extent is workforce qualification related to higher value-added activities in the automotive industry, especially in R&D.

With the arrival of carmakers and their subcontractors, employment in the industry was rising to reach the current 126,000 persons (5% out of total employment; employees plus self-employed) according to NACE classification (C29). In the years 2015 to 2017, employment in the sector recorded a continuous year-on-year growth of around 5%.

In spite of the growth of employment in the sector, **employers estimate that by 2020 there will be a labour shortage of around 14,000 persons** (ZAP 2017). At the same time, 82% of companies consider the lack of labour to be the highest risk factor for the decline in sales (PwC 2018). The arrival of foreign workers thus became one of the instruments for addressing that shortage. **In 2018, around 50,000 workers from abroad worked in Slovakia, approx. 30% of them in the production;** as of September 2018, the number of Serbian employees alone recorded a year-on-year increase by around 8,000. Working conditions of low-skilled foreign workers are often less favourable than those of local workers, mainly because they are recruited through third parties (employment agencies) which are not properly supervised. Besides importing workers from abroad, companies have lately turned to robotics (for more details see Chapter 5.5).

Imports of foreign labour and flexibilization of work in response to fluctuations in demand opened up the space for the rise of agency employment. In the post-crisis development, the number of temporary agency workers kept growing and, for a number of years, agency employment became the primary recruitment method for employers. In 2016, the

Chart 4
Development of employment in the automotive industry (and associated sectors)



Source: Eurostat (lfsa_egan22d)

automotive industry employed 72% of around 57,000 agency workers in Slovakia (Kahancová 2016). The boom of agency employment was fuelled, besides the demand of companies for this type of employment, also by the lack of adequate legal protection and the even less adequate supervision from the side of the state. A growing number of workers from abroad are being currently employed through temporary employment agencies. Because their working conditions depend on third parties, they are less transparent and less easy to be controlled for compliance with Slovak labour legislation. At the same time, however, increased legislative protection of agency workers introduced over the last decade brought their number slightly down and made their working conditions more equal, especially in unionised companies.

Concerning the structure of employment by skill level, **vast majority of employees in the car industry are blue-collar production workers**. In Slovakia, the share of workers with higher education in the production sector is around 14.4% of total workforce, compared with around 18% in the Czech Republic (Eurostat 2018). Research and development engagement of Slovak car companies is very low even in comparison with the neighbouring countries. In 2015, the

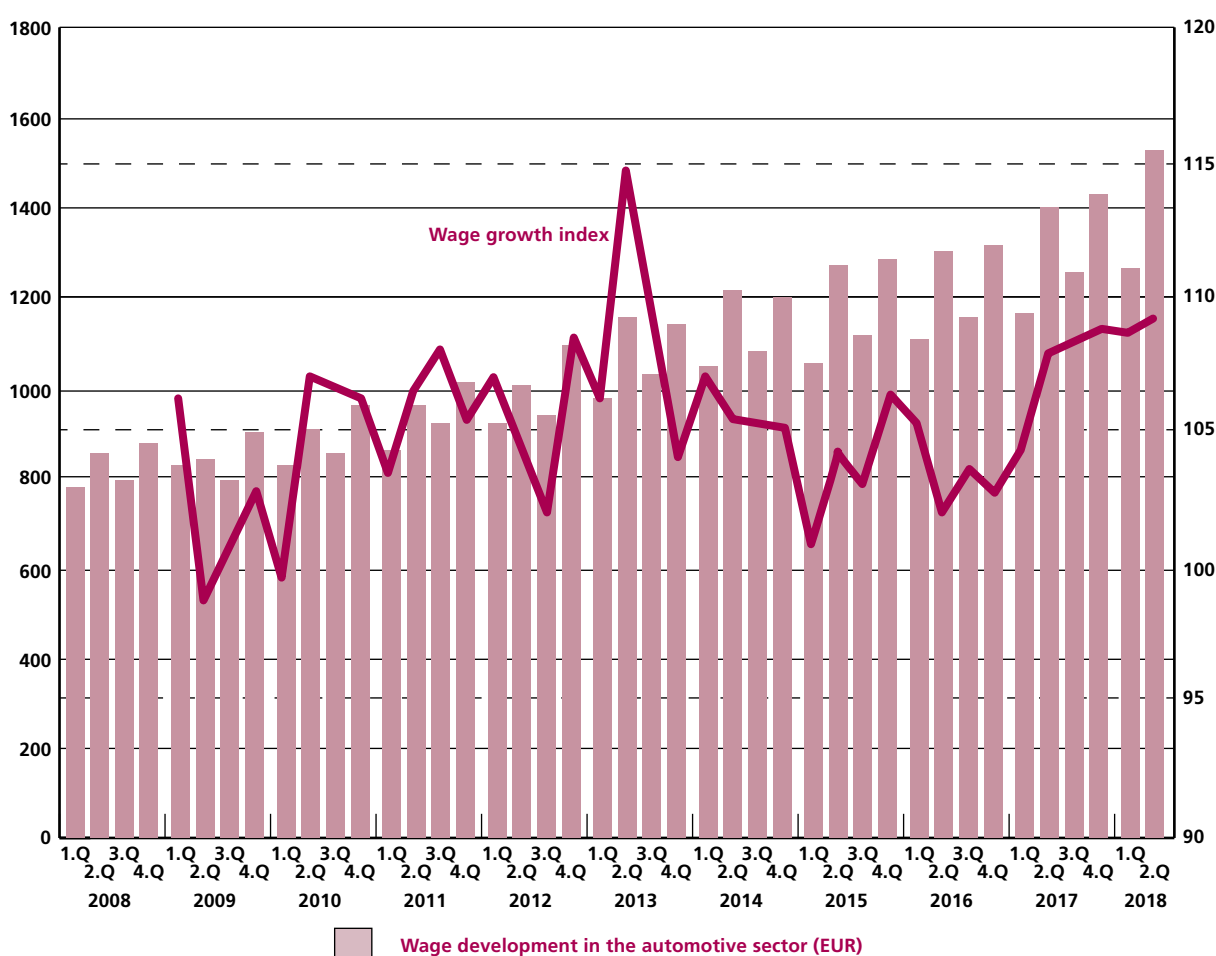
number of R&D staff in Slovak automotive companies was only 795, in comparison with 3,682 in the neighbouring Czech Republic and 108,134 in Germany (EUROSTAT 2018). It is thus not surprising that **the contribution of highly skilled workers to value-added creation is only around 2%**, while in Germany it is 34% (Slušná and Balog 2015). As many as 60% of companies in this sector have no own research and development, 25% participate in the corporation's R&D, and only 12% of research results are destined to be used also by third parties (PwC 2018). Even more alarming is the fact that only 4% of companies that do not have research yet consider its introduction in Slovakia (PwC 2018).

Wages in the sector

Economic boom and labour shortages of recent years have had a major impact on significant wage increases in the industry. Since 2008, wages in the industry almost doubled. Average wage in the industry stands currently at 1,520 EUR (2Q 2018, ŠÚSR 2018) and nominal wage growth has recently come close to 10% (Chart 5).

Although, on the whole, wages in the sector exceed the average wage in the country, they amount to only about one half or even less of wages in Western European countries.

Chart 5
Wage development in the automotive industry



Source: ŠÚSR 2018, drawn up by the author

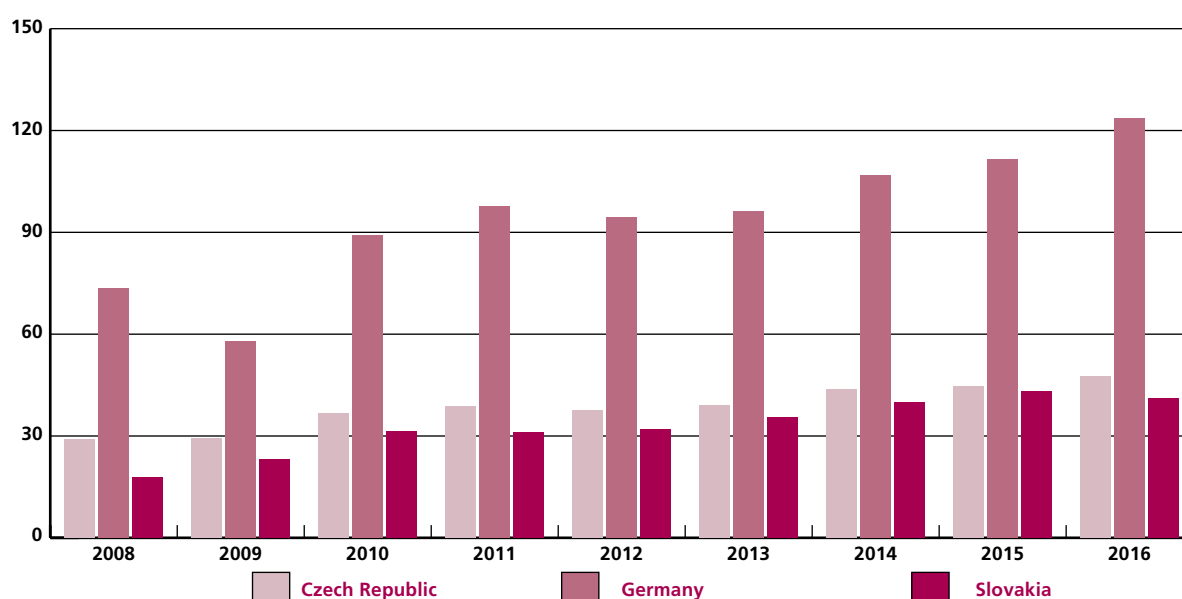
The reason for this situation is the low value-added of employees' work connected mainly with the high share of capital in value added (Myant 2018). This is confirmed also by other Eurostat data according to which the value of production per employee in the Slovak automotive industry represents 80% of the value generated in Germany; **however, value-added of a Slovak employee's work is only 11% compared with 28% in Germany** (Chart 7). This is connected with the large share of capital in value-added creation and also with low wages in the sector. According to Eurostat data, value added per employee in the Slovak automotive

sector in 2016 was 41,000 EUR. In comparison, value added per employee in Germany was 123,700 EUR (Chart 6).

Position of trade unions in the Slovak automotive industry

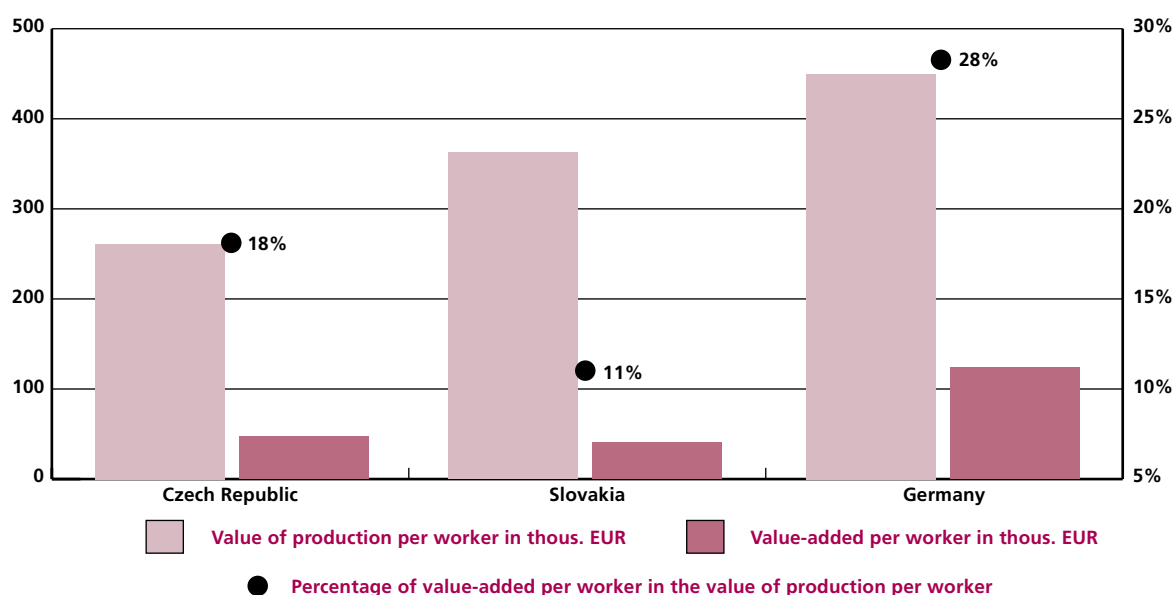
The presence of companies with the almost exclusively production character makes it more difficult for trade unions to push for better working conditions, especially because of the low share of value added by work in the total created value, as suggested in the previous section. It is also one of the reasons for vastly different wages from Western Europe.

Chart 6
Value added per employee in the automotive industry (in EUR ,000)



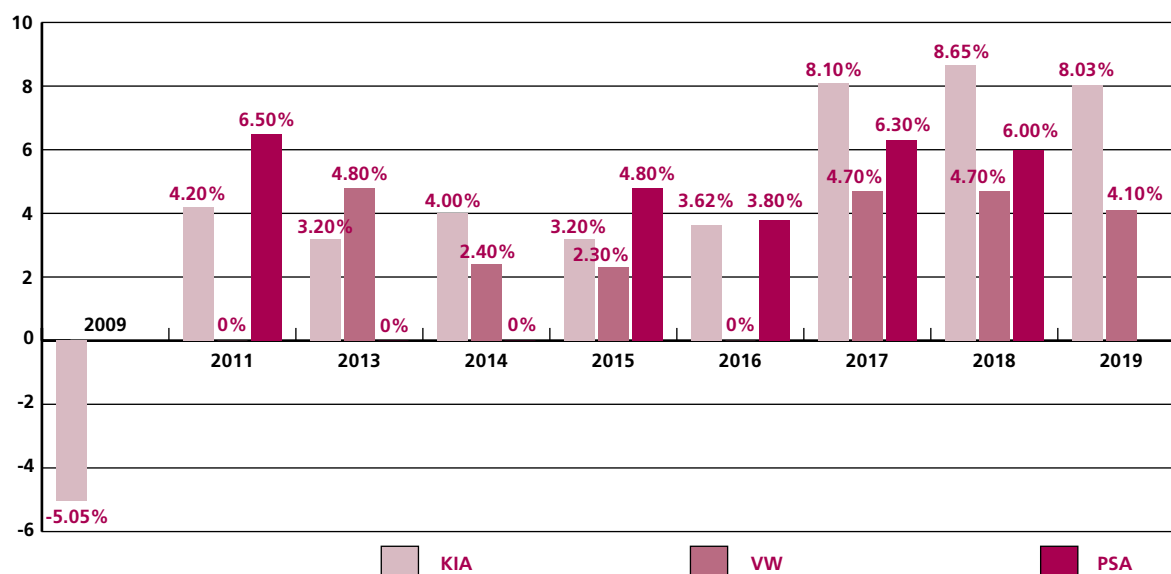
Source: Eurostat (sbs_na_ind_r2, NACE C29)

Chart 7
Share of value added per employee in the total production value (in thous. EUR)



Source: Eurostat (sbs_na_ind_r2, NACE C29)

Chart 8
Wage increases under collective agreements



Source: Drawn up by the author

The social dialogue and collective bargaining in the automotive industry are conducted at sectoral level with the participation of OZ KOVO and the Union of Engineering Industry in Slovakia (ZSP). The umbrella organisation for companies in this sector is the Automotive Industry Association (ZAP), which is a member of ZSP, but does not conduct autonomous collective bargaining. This means that since there is no separate social dialogue at sectoral level in the automotive industry, its working conditions are governed by sectoral collective agreement concluded for the machinery sector. This determines the extent of agreed working conditions where the higher-level collective agreement is adapted to working conditions in the operations of domestic producers with lower value-added. **Minimum wage tariffs set out for the machinery sector are thus almost one half lower than final producers' wage tariffs, and are barely higher than minimum wage rates under the law** (Martíšková&Sedláková 2016). In 2017, company-level collective agreements in the machinery sector covered around 7% of companies with more than 50 employees (i. e. 92 companies out of 1,294 medium-sized or large companies, source: ePraca 2017). The unionisation rate of machinery sector workers was, on the average, around 10%; the ZPS represents around 20% of employers in the sector. Separate data for the automotive industry are not available.

The weakened sectoral social dialogue thus means for both the workers and the trade unions that negotiations on real improvements in working conditions must be conducted at company level; this implies highly diversified working conditions in the industry and a weaker position of trade unions. Moreover, there is a trend in recent years towards trade union fragmentation, as witnessed by the withdrawal from OZ KOVO in 2016 of the Volkswagen trade union, its largest member. Among the reasons for the withdrawal were, besides personal differences,

divergent views on workers' unionisation and on the provision of services¹⁸. A new trade union confederation – the Joint Trade Unions of Slovakia (SOS) – was created in 2018, bringing together unions from automotive, healthcare, education, police and other sectors, with the ambition to stand as a social partner¹⁹. The weakening of social dialogue at sectoral level is also the reason for social partners – both trade unions and employers – to submit more frequent proposals for legislative amendments at the national level in response to specific problems at plant level. It is also the reason for frequent changes in the Slovak labour law.

Also thanks to the economic boom of recent years, trade unions have been able to obtain wage increases and to achieve more equal working conditions for precarious employees (Kahancová 2016). **The best results have been obtained in wage negotiations with final manufacturers, collective agreements concluded in 2017 and 2018 providing for a 4 to 8% annual wage growth** (Chart 8). Trade unions achieve improvements in working conditions both by means of company-level collective agreements (e. g. by regulating benefits for agency workers or by direct applicability of collective agreements to agency workers) and by means of legislative amendments (for instance, stricter requirements for employment of agency workers under the 2015 Labour Code amendment).

As regards further development, trade unions will face several challenges that will force them to change their strategies on striving for decent working conditions in the automotive industry in Slovakia. The first such challenge is the growing

¹⁸ Source: Interview with the representative of the organisation in November 2017.

¹⁹ <https://www.teraz.sk/ekonomika/pat-odborovych-organizacii-vytvoril/356570-clanok.html>

proportion of foreign workers, especially those from non-EU countries; the second major challenge consists in the introduction of new technologies and the threat of rising structural unemployment; and the third challenge involves their active participation in the debate on digitalisation and automation, especially in connection with the retraining of workers.

Summary: Workers in the automotive industry in Slovakia

Basic characteristics of employment and of work in the automotive industry in Slovakia can be summarised as follows:

- The sector is important for the economy not only because of its contribution to the creation of GDP but also from the employment perspective. The number of people working in the automotive industry, including the self-employed, is around 126,000, i. e. around 5% of total employment
- The sector currently suffers from the shortage of labour; the lack of labour in the next three years is estimated at 14,000 workers
- The share of highly qualified workers in the sector is around 14%, with only 795 persons working in research and development. The contribution of highly skilled work to value-added creation is only 2%
- The term ‘qualified workforce’ refers more often to flexible workforce capable of learning and of working at different manual positions depending on the current needs of manufacturers
- Employee’s value-added represents 11% of total created value
- Automotive industry workers are covered by the higher-level collective agreement concluded for the machinery sector
- Unionisation rate in the sector is around 10%; employers’ associations represent around 20% of companies in the sector

The trade union fragmentation taking place in recent years has also weakened the voice of the workers. Moreover, low unionisation rate of workers means that trade unions are not able to push for more substantial improvements in working conditions although, mainly because of labour market shortages, they have achieved some success in recent years. State investment subsidies have greatly influenced and continue to influence the mix of work opportunities where a dominant position is held by production jobs. Employers’ cooperation with schools focuses on secondary vocational education (dual education) and less so on research and development cooperation with universities, which is rather limited.

5.4 THE SLOVAK AUTOMOTIVE SECTOR ON THE THRESHOLD OF THE FOURTH INDUSTRIAL REVOLUTION

The Slovak economy’s dependency on the automotive industry raises several questions: Is Slovakia’s position in global production networks sustainable or is there a risk that car manufacturers would leave for other countries with cheaper

labour? Or, conversely, is there a way of how to climb up the value ladder? And if it exists, how is such upgrading to be achieved? Moreover, digitalisation and automation of production give rise to additional questions in connection with changes in production processes and their impact on the character of work. Will production plants be fully robotised? Will it be possible to have absolute control over workers? What changes will take place in the pace of work and in knowledge intensity? To answer those questions, this section first gives a brief overview of the trends in the technology deployment field and of the trends in the management of multinational corporations to which most major automotive companies in Slovakia belong, followed by a discussion on implications for work quality and quantity, and on other potential challenges that will be faced by the workers.

Digitalisation and automation of the industry in Slovakia

In the context of the fourth industrial revolution, new technologies and innovations constitute the decisive aspect of the development of companies and improvement of their position in the value chain. Technologies make it possible to shorten production cycle times by better aligning the development, design and production stages, thus triggering changes in the management structure of manufacturing companies (Ferreira et al 2017). Key motivation for introducing new technologies in the production is the reduction of costs and thus the most effective (the leanest and the fastest) production. This objective of implementing innovations is certainly not new, but what is new is the extent of these changes. Experts and observers agree that this wave of introduction of new technologies significantly transforms the work environment, the content of work and the number of job positions (Eurofound 2018).

The introduction of new technologies in Central and Eastern European countries takes place at a slower pace (Doerrenbacher et al. 2017). This is due, on the one hand, to the low cost of labour which acts against the intensive introduction of technologies which reduce the number of workers and, on the other hand, to the lack of autonomy of local branches or lack of experience of the management with implementing new production processes. Conversely, **the argument that speaks in favour of introducing new technologies** is the high share of export of the companies’ output, forcing them to maintain their competitiveness against foreign companies (Pula 2018). Another reason for introducing new technologies are labour market shortages experienced over the last few years, and the need to synchronise technologies across the corporation and production chain.

According to a survey conducted among Slovak machinery and electrical engineering companies, **40% of companies have not yet started deploying new technologies**, and only 8% of them developed and are implementing their own Industry 4.0 strategy (Industry 4UM, 2017). The software for monitoring the process of production and its coordination with suppliers (Enterprise Resource Planning – ERP) is used by 41% machinery companies compared with 65% in Germany. Customer behaviour monitoring software (Customer Rela-

relationship Management – CRM) is used by 25% of companies. Although the robotisation rate is significantly lower than in Germany, it is the highest among the V4 countries (Chart 9). The area where Slovakia lags the most behind is the number of scientists and engineers; this suggests that most technologies are deployed in Slovakia in order to synchronise production processes across branch operations and originate in parent multinational corporations, and that the share of own research is very small.

Because of the dominant position of production companies in the Slovak economy, the estimates of the future rate of job automation in Slovakia are among the highest. According to the OECD study, as many as 33% of jobs in Slovakia can be automated – one of the highest numbers in Europe (Arntz et al. 2016). In the entire industrial production sector of Slovakia there are around 1.30 robots per 100 employees, compared with as many as 3.32 robots in Germany. These numbers are higher in the automotive industry, with 11.62 and around 4.70 robots per 100 employees in

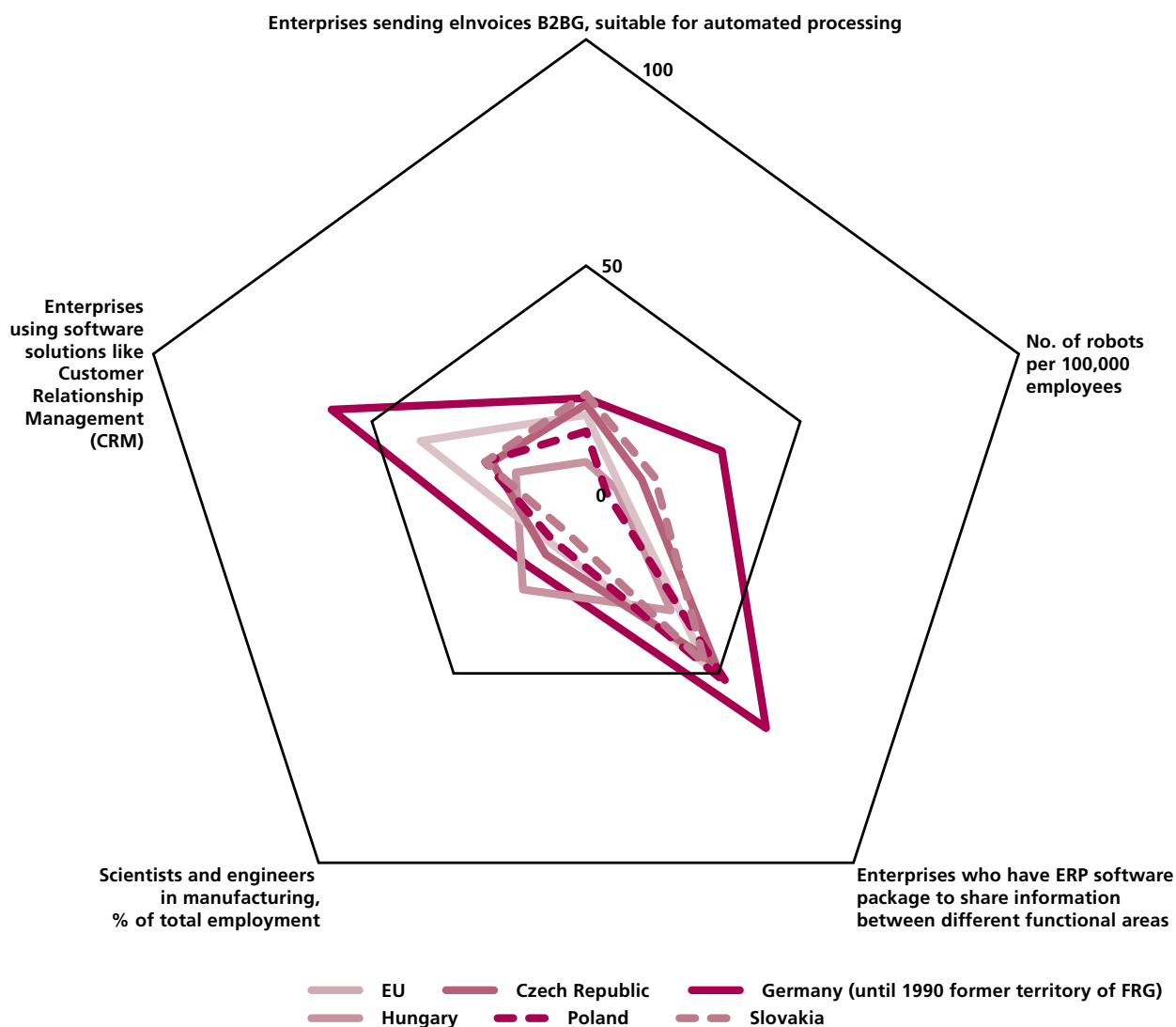
Germany and Slovakia, respectively (IFR 2018). **In comparison with the V4 countries, the robotisation rate of Slovakia is the highest already now.** But new technologies are not only about robotics as they also include process automation (e. g. in the logistics) or completely new technological processes, such as additive manufacturing or the use of 3D printers.

On the whole, it can be noted that most routine operations (both manual and non-manual) will undergo a certain degree of automation. The introduction of new technologies can be observed in the following three directions (Eurofound 2018):

- 1) **Automation of work**, i. e. replacement of human labour with robots in the production and the logistics (e. g. collaborative robots, autonomous warehouse trucks or automated internal logistics of plants).
- 2) **Digitalisation of manufacturing and associated processes** using sensors and enabling the collection of data concerning all levels of management of branches

Chart 9

Selected indicators of technology introduction in the machinery industry in V4 countries, Germany and EU28



Source: Drawn up by the author on the basis of Eurostat and IFR data

and of the corporation as a whole (internet of things, big data, additive manufacturing or 3D printing)

3) **Working through online platforms**

All three uses of new technologies bring a reduction in the number of workers in stereotypic jobs and increase the demand for highly skilled job positions, called also 'complex' positions. Of special relevance for the automotive industry are the first two uses which will have a significant impact on the production practices and on job tasks of workers; they will be therefore discussed in more detail below.

In connection with introducing new technologies in the automotive industry, Doerrenbacher et al. (2017) identified several trends of their introduction by companies, especially within the framework of multinational corporations, which have an impact on their working conditions:

- 1) **Introduction of technologies designed to support the maintenance of 'lean' processes** and their standardisation, in the framework of both the corporation and the supply chain, creates pressure on the performance especially by **accelerating the pace of work**, as well as also by **reducing human work** (e. g. the use of welding plants by most carmakers). **The character of work is being polarised**, i. e. it is changing either in the direction of simplification (attendants of automated machines and robots, so-called machine feeding jobs) or, on the contrary, in the direction of skills upgrading needed to understand and operate new technologies.
- 2) **Outsourcing**, which the new technologies enable extending from production processes (supply chain fragmentation) to support services (business process outsourcing), for instance in the HR field (such as automated centralisation of the selection of suitable applicants, centralisation of recruitment activities in a few locations, accounting processes and others), leads to the reduction of support service staff in branch operations of corporations, but also to increasing the intensity of work performance, mainly due to tighter time schedules and the need to cooperate with colleagues from around the world.
- 3) **Control of workflows, standardisation of work processes and of work performance** by means of electronic systems which, until now, have been used to collect financial and capital flow data (e.g. the most widely used system is SAP). However, these systems make it also possible to oversee workers and their performance, and have an impact on the entire field of human resource management. Local HR specificities, local needs, and workers' habits are therefore expected to receive increasingly less attention in favour of standardised management of human resources of multinational corporations.
- 4) **IT systems and process standardisation** lead to the collection of big data and enable their rapid analysis; this, in turn, has the effect of administrative staff reductions and of extensive control over all production processes and workers' performance.

Introduction of new technologies thus has and will continue to have an impact on both the quality of work and the quantity of workforce. Forecasts of quantitative consequences, i. e. job reductions with regard to workforce structure, have already been mentioned. But equally important are the consequences of changes in work processes for the manner in which the work is performed. **The consequences of new technologies may include increased control over work processes**, i. e. also over human work (down to the level of individual movements, keystrokes etc.), **production efficiency improvements** (maximum use of working time, fast and efficient work), and **acceleration of the pace of work**.

New technologies will also bring a reduction of physically strenuous and repetitive jobs, jobs harmful to health, as well as **polarisation of jobs, with a majority of highly qualified, complex jobs on the one side and low-skilled or even primitive jobs like simple machine operator jobs** with very low added value on the other side. There will be an increased demand for workers capable of handling complex and non-routine tasks, and the more workers will be able to take part in this process, the higher will be their position and added value. For workers in the digitalisation era this mainly implies the need for retraining and the ability to learn and to accept changes.

Other trends in the automotive industry

New technologies will change not only the process of production, but also the types of products and customer behaviour. These trends are very difficult to predict – much will depend on changes in consumer behaviour and in the regulation of the sector (Eurofound 2018).

Motor vehicle, especially passenger car transport, is one of the chief sources of high CO₂ air concentrations, especially in the cities. This is the reason for the pressure to reduce CO₂ emissions to the lowest possible level, together with restrictions on private passenger transport as such. Among the current discussions on this topic it is important to mention the European Commissions' proposal for a regulation of October 2018, calling for an up to 40% reduction of emissions from motor vehicles manufactured after 2030. As Slovak automakers consider this goal to be very 'harsh and almost infeasible', Slovakia was pushing for a 30% reduction (Pravda.sk 2018). The pressure on greener transport will result in the transformations of production, most probably towards hybrid or fully electric cars; combustion engines will, however, continue to dominate for some more time.²⁰

The production of hybrid and electric cars is still a big unknown from the point of view of future production locations. High production costs could give advantage to locations with lower labour costs, but the fact that this type of production is likely to be quite different, involving the use of new technologies and the corresponding need for qualified workforce, could mean that the production will be trans-

²⁰ According to a KPMG survey, up to 76% of leading representatives of the car industry stated in 2017 that they expect that the production of internal combustion engines would still dominate in 2025.

ferred to locations with more highly qualified workforce or it could mean re-industrialisation, i. e. return of carmakers to their home countries. Besides their high price, a wider use of electric cars is hindered also by the lack of charging station infrastructure and by the still very long charging time.²¹

Environmental as well as **financial and 'green' motivations may lead to reducing the demand for acquiring and/or for personal ownership of the means of transport.** Car-sharing is cited as the likely trend in the upcoming years by as many as 33% of representatives of the automotive industry in eastern Europe (KPMG 2017). **It is thus possible to expect a reduction in the production of cars,** which could directly impact the Slovak automotive industry.

After the **relocations** of production from advanced economies, affected western European or U.S. regions experienced a rise in structural unemployment and the shift of workforce to service jobs. **But the poorer working conditions in the service sector lead to precariousness and to the efforts at returning industrial production to these locations.** These tendencies give rise to reflections about economic protectionism, which could mean higher import tariffs and lower demand for imported goods; this could have a negative impact on integrated periphery countries such as Slovakia. The next chapter will therefore discuss the consequences of all the above changes for working conditions of people employed in the automotive industry in Slovakia.

5.5 THE FUTURE OF WORKERS IN THE AUTOMOTIVE INDUSTRY IN SLOVAKIA

This section presents four possible scenarios for the development of the automotive industry in Slovakia with regard to the integration of companies in global production chains and implications for working conditions and social dialogue. Based on these scenarios, recommendations are offered for the creation of public policies and for trade union actions.

Scenarios of the development of the automotive industry in Slovakia from the perspective of the future of work

The scenarios are built on the recommendation to engage in higher value-added activities according to Figure 1 in Chapter One. Since **quantitative** assessments of individual scenarios would require collection of detailed data and interviews with relevant organisations and representatives of the automotive industry, the state and the workers, the scenarios are developed on the basis of key **qualitative** attributes of work transformations that will result from the introduction of new technologies.²² The advent of new technologies is considered

as the exogenous factor. Conversely, as the endogenous factor is considered the **action of relevant actors** in line with the conceptual framework of this chapter:

- companies (multinational corporations) and their localisation decisions
- public sector and its foreign capital strategies as well as its research, development and education promotion policies (the role of state institutions and of self-governing authorities)
- trade unions and their representation of workers' interests
- All four scenarios proceed from the 'zero option', i. e. maintenance of the status quo, and three development options are then proposed: 1. transition to higher value-added activities, 2. maintenance of the production function of the location which is able to adapt to new production procedures, 3. departure of foreign capital and the need for economic restructuring. An overview of the scenarios is given in Table 4 below.

SCENARIO 1: PRESERVATION OF THE STATUS QUO IN THE APPROACH BY THE STATE, COMPANIES AND TRADE UNIONS

This scenario is based on the current analysis of the automotive industry in Slovakia and on the finding that the industry is integrated in global production networks in a dependent position, with the dominant position of foreign capital and with lower value-added activities. In this situation, Slovakia will cease to be interesting from the perspective of **business companies'** investment considerations because of its growing labour costs and workforce structure (future qualification requirements will differ from the present-day qualification requirements). **The public sector** will not create favourable conditions for the upgrading of local companies and will not provide sufficient incentives for keeping the existing investments or attracting new ones. **Trade unions** will continue to concentrate more on improving workers' standard of living through wage rises and less on workers' training and information about the forthcoming changes connected with new technologies. Slovakia will cease to be an attractive location even for production activities, and new investments will be gradually redirected to other locations. Investment outflow will not necessarily take place all of a sudden and could extend over several decades, thus creating the space for implementing strategies on a different orientation of the Slovak economy (see Scenario 4).

SCENARIO 2: SUCCESSFUL INTEGRATION IN HIGHER VALUE-ADDED ACTIVITIES (FUNCTIONAL UPGRADING)

Under this scenario, localisation of R&D and other higher value-added activities is more substantial, and domestic business entities are also capable of creating higher value added and thus become integrated in global production networks. In this scenario, the **public sector** successfully initiates changes in the system of education so as to meet the needs of the fourth industrial revolution, and successful cooperation between schools and employers has been probably launched. Employee participation in lifelong learning has also increased.

²¹ According to a 2017 KPMG survey, 61% of respondents in the automotive industry agree that electric cars may be threatened by insufficient infrastructure.

²² For example, a study on development scenarios in the textile industry in the UK took its five authors one year to be completed; they consider its application to other industries to be very challenging (Allwood et al. 2008)

Table 4

Possible scenarios of the development of the automotive industry in Slovakia and the roles of actors

SCENARIO	MANIFESTATIONS	PUBLIC SECTOR STRATEGY	COMPANY STRATEGY	TRADE UNION STRATEGY
Status quo	Relocation of production and of other activities, reduction of production capacities , departure of automotive industry	Requires reactive approach by changing investment promotion strategies and education support	Search for locations with cheap labour	Unchanged (pressure on wage growth dominates)
Successful integration in higher value-added activities (functional upgrading)	Localisation of R&D, design, coordination activities of MNCs	Education system reform, lifelong learning of employees, promoting higher value-added investment	Interest in localising R&D in the region (stimulated e. g. by lower costs of skilled workers and especially their adequate qualification), cooperation with schools	Ability to unionise also highly skilled workers, supporting workers' training, protecting working conditions in digitalised and automated working environment
Maintaining mainly production activities (process and product upgrading)	Automation and digitalisation of processes, sophisticated production using new technologies	Education system reform, lifelong learning of workers	Investing in new production processes and capacities, cooperation with schools	Supporting workers' training, protecting working conditions in digitalised and automated working environment
Intersectoral upgrading (specialisation to a different sector)	Development of other sectors (ideally those with higher value-added)	Developing economic diversification strategies (cluster support). Promoting higher value-added investment in other sectors, supporting local innovative firms	Ability to innovate and succeed in global competition	Supporting innovation and education promotion policies

Source: Drawn up by the author

However, this scenario also foresees a decline in the number of low-skilled jobs and an increase in the demand for qualified positions.

SCENARIO 3: MAINTENANCE OF ACTIVITIES MAINLY IN THE PRODUCTION (PROCESS AND PRODUCT UPGRADING)

Under this scenario, Slovakia would maintain its competitiveness especially in the car production and would specialise in manufacturing and logistics activities in GPNs. This would imply the maintenance of the major part of its low value-added production capacities, and the continued polarisation of work positions, i. e. increased demand for highly qualified positions and reduction in the number of middle and low-skilled positions.

In terms of public policies, both the above scenarios call for a successful implementation of changes in the education system, especially in cooperation with the employers so that they can find the knowledge and the skills they require on the labour market. A large part of the workforce will have to adapt to new qualification requirements, while others will be likely to move to the service sector with low value added and poorer working conditions.

SCENARIO 4: REORIENTATION OF THE SLOVAK ECONOMY TO A DIFFERENT, RELATED SECTOR, DERIVING COMPETITIVE ADVANTAGE FROM SPECIALISATION (INTERSECTORAL UPGRADING)

Intersectoral upgrading means a shift to the production in a related sector with higher value added, in which also higher value-added activities such as research and development, product design and marketing, are at least partly localised in Slovakia. For the automotive industry, this could mean specialisation in the development of alternative powertrains (for instance, development and manufacturing of fast-charging car batteries). This scenario is probably the most difficult to implement because it involves adoption, in cooperation with other actors, of a targeted public policy strategy needed to achieve the change, which also involves risky investment in product development.

All the above scenarios foresee a decline in the number of low-skilled jobs combined with further reduction of value added of these jobs. In contrast, the demand for highly qualified workers capable of handling complex tasks will increase and will create the need for workers' retraining and for changes in the education system.

Recommendations

It follows from the above scenarios that a deeper integration of Slovakia in the production networks of automotive industry through one of the forms of upgrading is conditional on changes in the system of education and retraining. Workers who will not be able to upgrade their skill level will move to the service sector with lower wages and poorer working conditions. Thus, the better prepared the workforce is, the more successful is the integration.

Public policies should therefore focus on:

- supporting cooperation of employers with secondary schools and universities (inclusion of dual education also in higher education programmes)
- supporting cooperation between private and public entities aimed at creating innovations, including the provision of financial support for and investment in risky development of new products (supporting applied research by setting up research centres in which universities will cooperate with private companies)
- improving the quality of education in order to make the most talented students stay at home and not leave abroad
- supporting the arrival of highly skilled workforce from abroad
- supporting higher value-added foreign investment that will create jobs, primarily for highly qualified workers (investment incentives, suitable composition of the workforce)
- supporting lifelong learning of workers
- examination of development scenarios and forecasting the **behaviour of foreign capital** established in Slovakia (only qualified decisions on to whom and how the state should provide support in order to achieve maximum synergic effects can contribute to location upgrading)

In this connection, **trade unions and social dialogue** in Slovakia will be confronted with the following challenges:

- trade unions will have to place greater emphasis on upgrading workers' qualifications **and on promoting lifelong learning** in order to enable workers to be retrained to more sophisticated jobs, as a prevention of structural unemployment, both at company and national level
- at national level, trade unions should support public policies that will lead to increasing the qualification level and the wage level of workers
- to ensure effective protection of working conditions, it will be important for the trade unions to get to know and understand new processes connected with new technologies and their impact on working conditions (e. g. training courses, study of the impact on Slovak workers, etc.).
- trade unions must participate in the discussions on public policies concerning investment promotion and education support by, for instance, taking active part in addressing these issues in the committees and working

groups which draw up government and regional strategies and other documents

- trade unions should look for the ways of unionising also workers in highly qualified positions whose share in the production is expected to grow in case of successful upgrading of companies
- further outsourcing and the associated flexibility of work will make it even more difficult to unionise workers at company level. Trade unions should prepare for this possibility by, for instance, shifting their sectoral focus to representation by professions and/or by labour market positions (the needs of flexible workers will vary depending on whether they will work in the positions requiring low or higher qualification)

5.6 RECOMMENDATIONS FOR RESEARCH

A number of questions and ideas have emerged in the exploration of this theme, not only for policy-making but also for research. The most important themes for research into the future of the automotive industry in Slovakia are the following:

- Although, based on the study of available literature, the anticipated impact of digitalisation and automation on work and the degree of its implementation in Slovakia was presented in Chapter 5.5, **mapping out the actual impact of new technologies on working conditions at company level** would certainly help to better understand the future of workers in the industry. The author had the opportunity to conduct similar research in Czechia where the automotive is also a very important sector. One of the conclusions was that a majority of 'new technologies' of digitalisation and automation are to a certain extent already being deployed by companies, often without providing employee representatives a more detailed information about these technologies and their impact on workers. **This knowledge gap was the most pronounced in non-manual positions. The knowledge of the actual situation, as regards trade unions and company management initiatives designed to involve trade unions in digitalisation trends and workers' retraining, is therefore an important basis for the formulation of future recommendations concerning employment options in the automotive industry.**
- This study gives only **marginal attention to the impact of labour migration which, however, would deserve special attention in the context of the upcoming digital revolution.** The arrival of highly qualified foreign workers could, under certain conditions, supplement qualified local workforce and thus contribute to fulfilling the prerequisites for the creation of higher value-added jobs; in contrast, the arrival of low-skilled workers who may become redundant in a few years' time could raise a number of questions in relation to working conditions and to the work future of local workers as well as of low skilled workers from abroad.

- Research into the **impact of public policies on labour demand and supply** deserves special attention, mainly because of the possibilities of public administration to exert significant influence on the future of workers by means of the system of education and investment incentives.

5.7 CONCLUSION

As shown in this study, the Slovak automotive industry is characterised by extreme dominance of production, i. e. the lowest value-added component of the production chain; new technologies will even further reduce the added value of human work. Moreover, introduction of new technologies (mainly robotization and automation) will cause low-skilled job reduction and labour market polarisation, even without accounting for the influence of other development factors. This means that the number of job opportunities for blue-collar workers will fall, and so will the value added of their work and their wages.

For production plants, new technologies represent mainly the opportunity to perform higher value-added activities and remain competitive through increasing the effectiveness of their production processes. At the same time, they provide the opportunity to safeguard employment in the industry, especially in more highly qualified positions. The development of the automotive industry will depend, besides the activities of production companies themselves, also on the institutional environment, i. e. the system of education, including lifelong learning, support for science and research, and support for the policy of creating higher value-added positions. Given the fact that Slovakia has been lagging behind over a long term especially in the first two areas, its position at the threshold of the digital revolution is very unfavourable.

The Smart Industry Strategy for Slovakia recently adopted by the Government partly addresses this situation, but the implementation of changes in the system of education is a long-distance race, and no short-term results can be expected.

The present study represents an attempt at drawing a picture of the future of the automotive industry from the perspective of local institutional actors and their possible contribution to upgrading the companies based in Slovakia and operating in global automotive production networks. The various versions of positive scenarios, which envisage successful industrial upgrading, emphasise mainly the need to adopt targeted strategies on the provision of public support for accumulation of know-how and its transfer from the industry to local actors. Also, on the workers' side, broader participation in lifelong learning and readiness to accept changes will be required. Trade unions' role will mostly include work on the protection of employees and their working conditions from negative consequences of new technologies. The unionisation of workers and the continuation of social dialogue will be even more difficult than today and trade unions will have to modify their own strategies to the level of workers' representation.

Much will also depend on the changes in parent companies' localisation strategies and on the global developments which, for the time being, are a big unknown. This means that even if the actors in Slovakia will endeavour to create the necessary prerequisites for upgrading within the Fourth Industrial Revolution, this will not necessarily guarantee the safeguarding of the automotive industry in Slovakia or improvement of its position in global production networks. The diversification of the economy and the effort to engage in high value-added activities should thus be the ambition of not only the automotive industry but of all sectors.

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6

AUTOMOTIVE INDUSTRY, WHICH WAY? Global trends, peripheral perspectives

ȘTEFAN GUGA

6.1 INTRODUCTION

Halfway through the last decade, the automotive industry in Romania seemed to be facing the same fate as so many other industrial branches in which the state had channelled massive investments before 1990. In 2002, when vehicle production had decreased to 61% of the 1997 production, when it had reached the absolute historical peak of the pre-Logan period (109 thousand units). The number of employees had had a much less sinuous trend, and it decreased by no less than 66% between 1990 and 2004. The automotive exports had decreased dramatically, from 5% of the total exports of goods in 1990 to 1.8% in 2000. Dacia, the largest car manufacturer in the country and the most important company in the sector basically did not export anything anymore, but still dominated an internal market which experienced steep decline due to the dramatic socioeconomic situation left behind by the Romanian Democratic Convention government. At the time, the benefits of its privatisation were at least uncertain, and after less than half a decade after the take-over by Renault, the company in Mioveni had halved its workforce. The factory in Craiova was facing even more dire times, as the mother-company Daewoo Motors disappeared following the Asian financial crisis of the late '90s, while ARO became yet another victim of the post-privatisation plunder. Finally, the suppliers sector, which had seen tremendous development due to the policy focused on maximising the local integration of the automotive manufacturing, had an uncertain future, to say the least, and the privatisation of Dacia gave a handle to the voices which pointed out the fundamental inadequacy of local suppliers to the 21st century industrial and market realities.

Back to present, things look completely different. Today, the automotive industry amounts for about 6% of the total gross value added in the competitive economy, for 3.7% of the total employees in the economy and for 13.5% of the total exports of Romania.²³ In the meantime, car and parts manu-

facturing became the most important industry of the country and one of the main pillars of the national economy, a fact strongly confirmed by post-crisis developments. Apart from the two large car and engine manufacturers, dozens of international suppliers developed operations in Romania, producing a wide range of components and sub-assemblies - from electrical wiring to gearboxes. The supply industry includes more than two hundred production units with at least 100 employees, and large wiring producers (Leoni, Dräxlmaier) have factories which rival in size car manufacturing factories. Currently, more than 90% of the automotive industry employees work for multinational corporations, which hold a similar share in the total value added of the sector. Comparatively, in 2003 almost two thirds of the employees worked for companies which had mainly domestic capital and amounted for almost half of the total value added.

Such more or less spectacular developments within the automotive industry during the last decade and a half reflect to a large extent the overall transformation of the Romanian economy due to its increasing integration within the EU economic landscape. With the EU accession, Romania benefited from a geographical expansion of the value chains of the Western European automotive industry towards the East. Direct foreign investments boomed, foreign capital became dominant, and production turned quickly and massively towards exports. However, the cost of such fulminant development is by no means low, and the Romanian economy became more and more dependent on the cyclic and highly competitive environment of the Western European automotive industry. From this perspective, the Romanian landscape is already very well shaped: a limited domestic market which matters less and less in the economic equation of industrial operations; a clearly limited industrial structure with mainly manual assembly activities, and limited research-development functions; minimal influence on the strategic decisions of the multinational corporations and, therefore, heightened competitiveness pressure on employees and on the state.

This is not specific for Romania, but it is a common feature for all EU Member States of Central and Eastern Europe (CEE),

²³ If we include rubber products and only consider exports of goods, in 2017 the automotive industry covered no less than 19.7% of the total exports.

where economic growth in the past decades has meant increased dependence on Western European companies, markets and countries – hence the description of such countries as “dependent market economies”.²⁴ This is probably most obvious in the automotive sector, as the governments in the region developed special policies to attract foreign industrial investments, which, in time, required increasing financial and investment incentives.²⁵ The repositioning of CEE countries at the periphery of the new European production chains has intensified competition between these peripheral countries to attract and maintain foreign investments which have quickly become their main economic growth driver. In case of Romania, we also see some competition from Morocco, which turned into a new periphery of the European automotive industry due to the massive investments in recent years, especially by French companies. Since the competitiveness of the periphery consists mainly in low direct costs²⁶ – more specifically, since we are speaking mainly of manual assembly work, it consists mainly in low labour costs – the pressure of this competition has been and still is mainly taken by workers. The combined effects of the increased labour demand determined by the massive foreign investment flows and of the decreased labour supply determined by the massive migration flows for work purposes has led to a shortage of cheap skilled workforce which has cyclic peaks: the first peak occurred before the financial crisis, in 2007–2008; the second peak, after the overall economic recovery became obvious at European level (since 2015 to date). This labour market “straining” is a typical phenomenon for dependent market economies, and it is not specific for Romania either. In the absence of another major economic crisis, the labour market situation poses a crucial dilemma for the automotive industry in Romania or, more specifically, for its development from 2000 on. Will the cheap labour shortage be able to push wages high enough to put an end to the mass migration of the active population? Will companies agree to raise wages or will they try to find different solutions? In case of the latter option, do we speak of local solutions, or should we expect migration of capital to cheaper locations? Will the state give up on investment policies focused on cost reduction for companies and will the state do something to overcome the vicious circle of dependent growth? Generally speaking, is the cheap labour shortage a barrier serious enough to push Romania and the neighbouring countries to move beyond the current growth model based on low costs?

These are extremely relevant medium- and long-term questions for the automotive industry in Romania and even for the economy of the country as a whole. Future developments will depend on the power dynamics between capital, labour and state, at local and – why not? – European levels. However, for

the automotive industry, things are now more complex than ever and there aren't just few observers who insist that, on medium- and long-term, the ongoing technological and regulatory developments will deeply change the operation of the entire automotive ecosystem – from manufacturing to sales and to the daily use of vehicles. The opportunities and the threats are triggered by three such trends: (1) Engine electrification and the decline of internal combustion engines; (2) Development of autonomous and connected vehicles; and (3) Advancement of digitisation or the beginning of the so-called Industry 4.0. The challenges are undoubtedly global and target all the large markets and regional industries worldwide. After making a full recovery from the financial crises at the end of the last decade, the European automotive industry is facing more and more strict environmental regulations which make the combustion engine technology less viable, and the need to finance and implement massive investments in order to keep up with this unusually fast technological development and to maintain its competitive advantages on both domestic and foreign markets. Obviously, such transformations will not bypass the Romanian market and automotive industry, whose existence depends on the wider European context.

Consequently, in Romania, these global challenges overlap those challenges specific to dependent market economies in the Central and Eastern Europe. This is not a trite matter, even though the avalanche of scenarios and plans on technological change highlight how inescapable, profound and complete they are. The issue of automotive industry and markets in peripheral countries is no longer discussed as such, under the implicit assumption that the change process is relatively consistent as intensity and implications. However, a less shallow look will show us that things are not that simple for the industry in Romania which, because it manufactures certain types of products and no others, is going to face certain issues (or opportunities) which are specific to its role in the geographical division of labour in the European automotive industry (and not others). Therefore, any discussion on the potential impact of the global transformations in the automotive industry should take into account the significant differences between the markets and the industries of countries peripheral to the large automotive regions, among them Europe.²⁷

This report tackles the overlaps of the global technological transformations and of the specific issues of the peripheral automotive industry from Romania's perspective. The goal is not to develop yet another set of futuristic scenarios, but rather to take stock of the current situation and to identify trends which may already be expected and concrete vulnerabilities for the automotive industry in Romania. The first two sections examine the development of the automotive industry in Romania due to the increasing integration with the European market and production chains, first by presenting a comparative discussion on the situation in Romania against

²⁴ See Andreas Nölke and Arjan Vliegenthart, “Enlarging the varieties of capitalism: The emergence of dependent market economies in East Central Europe”, *World Politics*, 2009, vol. 61, nr. 4, p. 670–702.

²⁵ For an overall regional analysis, see Petr Pavlínek, *Dependent Growth: Foreign investment and the development of the automotive industry in East-Central Europe*, 2017, Cham: Springer.

²⁶ Istvan Egresi, “Foreign direct investment in a recent entrant to the EU: The case of the automotive industry in Romania.” *Eurasian Geography and Economics*, 2007, vol 48, nr. 6, p.748–764.

²⁷ On the regionalisation of the automotive industry, see Jorge Carrillo, Yannick Lung and Rob van Tulder (editors), *Cars, carriers of regionalism?*, 2004, New York: Palgrave Macmillan.

the European background and then by a detailed analysis of the market and of the industrial structure in Romania. The third section presents the trends expected to reshape the global automotive industry in the next decades: engine electrification, development of autonomous and connected vehicles and digitisation. The last section tackles these issues from the particular perspective of the automotive industry in Romania.

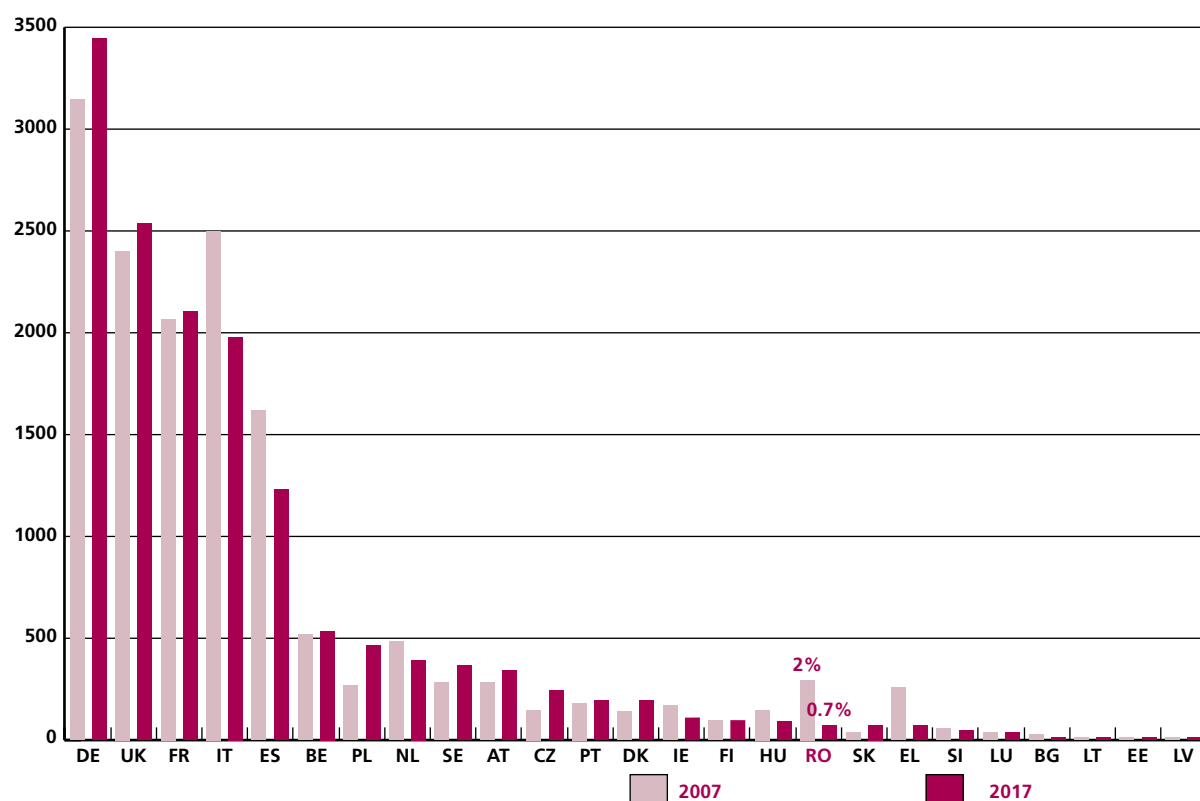
6.2 THE AUTOMOTIVE INDUSTRY IN ROMANIA AGAINST THE EUROPEAN BACKGROUND

The European automotive market was deeply affected by the crisis at the end of 2000s, with a real recovery felt only in 2015. In 2017, vehicle registration was still 2.9% lower than in 2007, and the early 2018 already announced a significant slow-down in the positive dynamics of the past years, consequently, the end of the post-crisis recovery period. The demand for new cars seems to remain limited to about 15.5 million per year, which indeed suggests that the last crisis had a long-term structural impact on the European automotive market. However, the impact did not have a unitary distribution, as the markets in the large Western European countries (Germany, UK, France) registered more or less important net increases in the past decade (Figure 1). At the same time, South European markets (Italy, Spain, Greece) collapsed, which does not come as a surprise given the still difficult economic situation in these countries. Romania, Bulgaria and

Hungary are the Central and Eastern European countries where the demand decreased between 2007–2017, as opposed to Slovakia, the Czech Republic and especially Poland, which report important increases for this period. The impact of the crisis and of the austerity measures was especially strong in Romania, where the 67% decrease was just slightly lower than the decrease in Greece (68.5%). The weakness of the automotive market in Romania is even more spectacular as the macroeconomic development of the country has been constantly among the best in the EU for several years.

With 3.8% of the EU population, in 2017 Romania accounted for only 0.7% of the European new vehicle registrations, compared to 2% in 2007. Comparatively, Poland moved from 1.9% of the European market in 2007 to 3.2% in 2017 (with about 7.4% of the EU population). From this viewpoint, Romania is no exception today, arguably it was exceptional before the crisis, when the number of new vehicle registrations seems to exceed by far the purchasing power of the population. The correction caused by the crisis and by austerity seems to have repositioned the automotive market in Romania in the European order determined by a close correlation between the purchasing power of the population and the demand for vehicles. Even though in theory the Romanian market has huge potential – a relatively large population and a low number of vehicles per thousand inhabitants (only 329 in 2016, compared to the European average of 587) – in reality, the very low purchasing power of the Romanian population compared to most other European countries makes the

Figure 1
European automotive market, 2007 vs. 2017. New vehicles registrations (thousands)



Data source: ACEA

Figure 2

Registrations per one thousand inhabitants and GDP per capita against the EU purchasing power, 2017

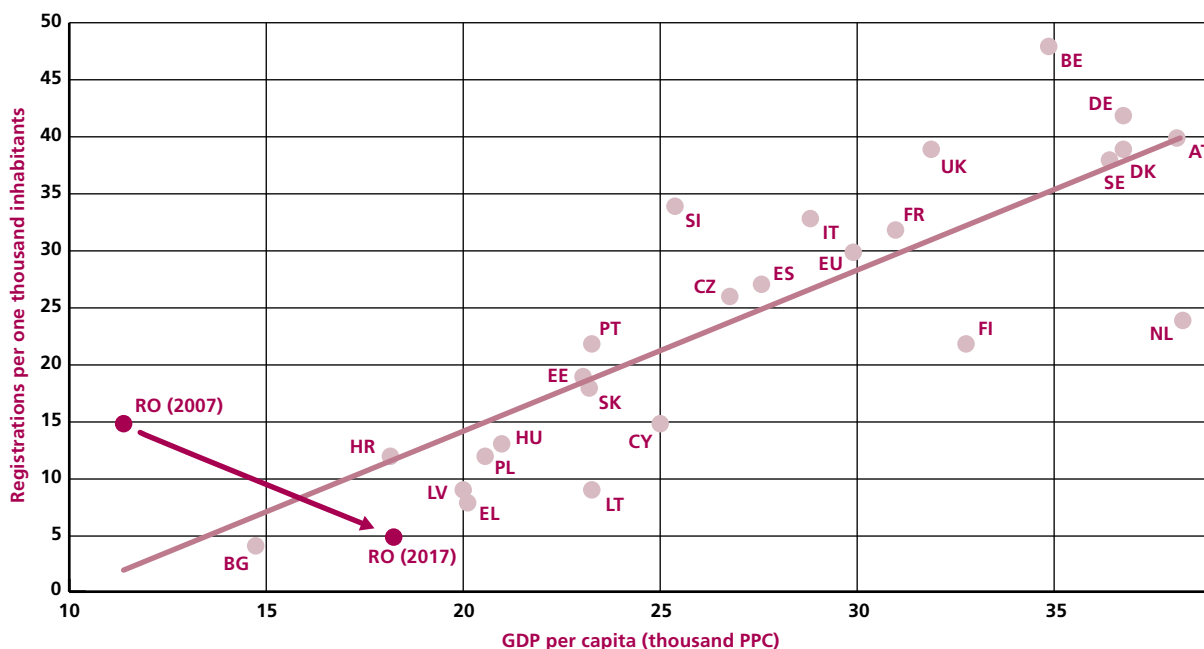
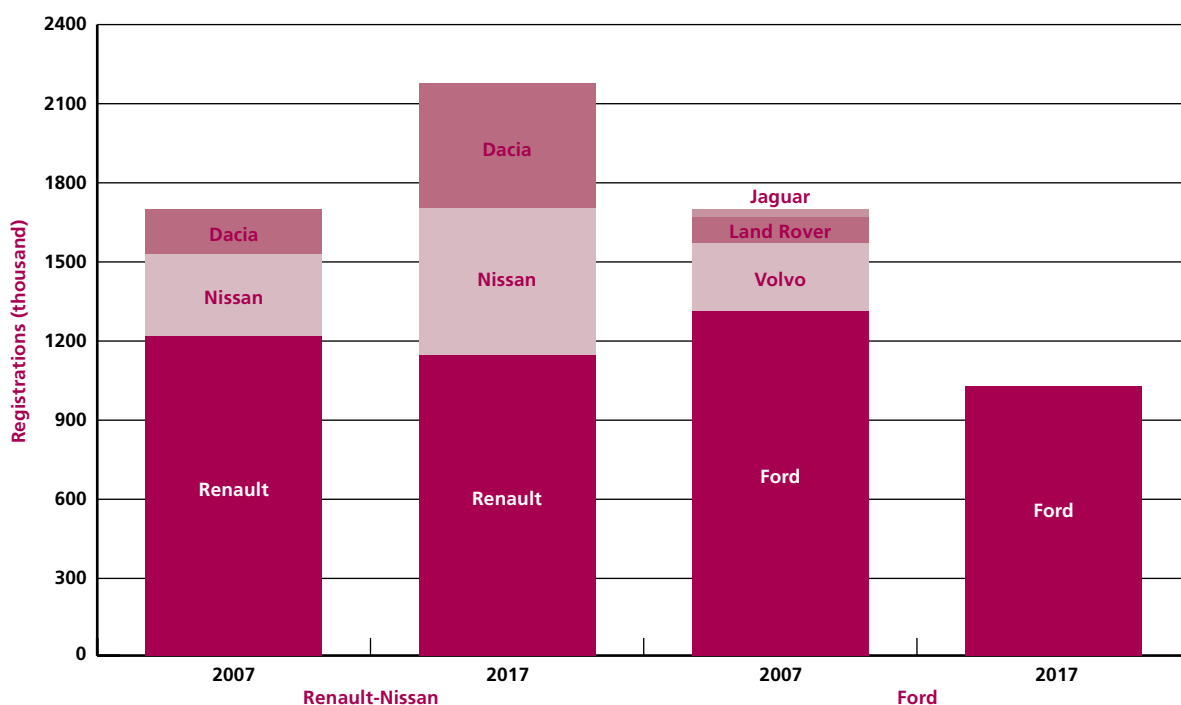


Figure 3

Vehicles registrations for the main brands of the Renault. Nissan Alliance and for Ford Europe in EU+EFTA, 2007 vs. 2017



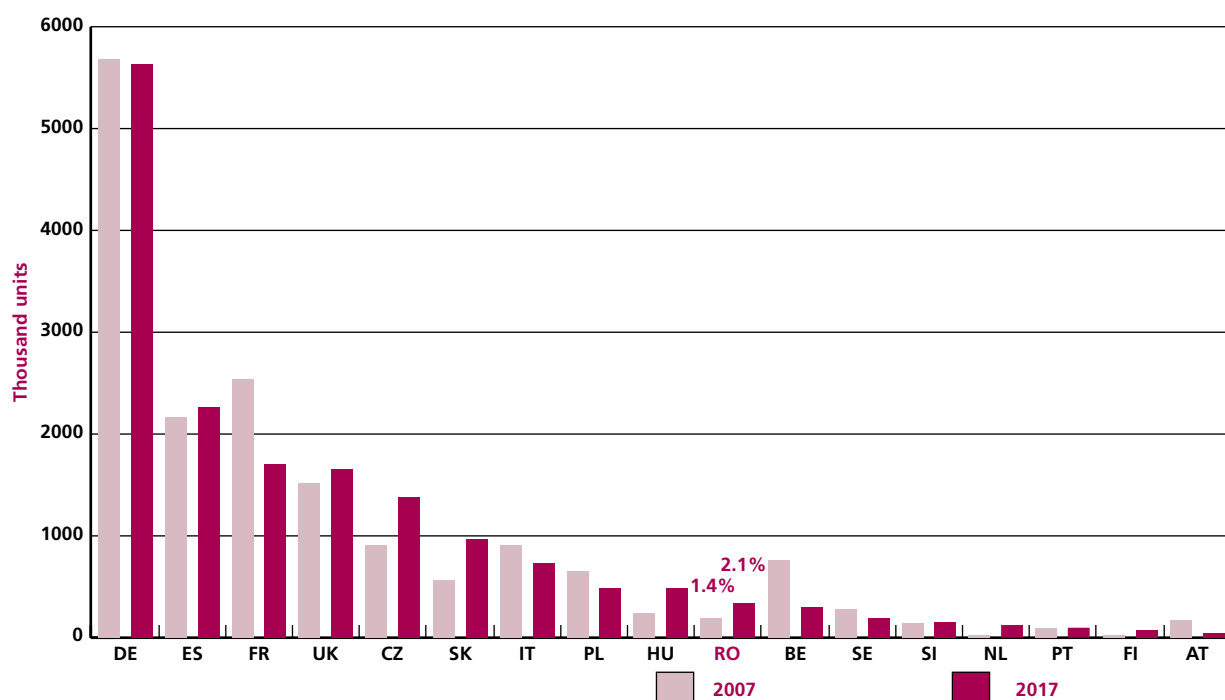
Data source: ACEA

automotive market in Romania quite insignificant in the overall European dynamics, from all perspectives (absolute figures, share in total European market or in terms of population size).

As regards manufacturers, we see winners and losers in the European market in the last decade. In very general terms,

German and French companies gained, while Japanese and Italian manufacturers have seen decreases in sales. Also, Korean manufacturers (Hyundai-Kia group) significantly strengthened their position in the market, largely due to the development of a very strong SUV (sport utility vehicles) portfolio. The general trend of the market was diversification and polarisation, and the increase in socioeconomic inequalities

Figure 4
Automotive production in the EU, 2007 vs. 2017



Data source: OICA

caused by the crisis boosted the demand for more expensive vehicles – SUVs, premium brands and models – while also fuelling the demand for cheap vehicles. The same happened in Romania, where currently we note a much stronger increase in the SUV and small cars sales compared to the increase for other segments.²⁸ *Industrial activities in Romania benefitted directly from the increased demand for SUVs, and currently both Dacia and Ford factories assembly mainly vehicles in this category. The Duster manufactured in Mioveni had a significant contribution to the increase by 28% in vehicle registrations for the Renault-Nissan Alliance between 2007 and 2017 (Figure 3), and Nissan SUVs also proved very popular. Even though Ford has not given up (yet) on the European market, developments are in line with the dramatic decrease in the presence of the American manufacturers on the European market; basically, Ford is the only of the Big Three still mass manufacturing and selling vehicles in Europe according to its own strategy.*²⁹

In terms of production, the comparison between countries indicates quite different developments from the market (Figure 4), with the strongest contrast noted in Romania (67% market decrease, with 54% production increase between

2007 and 2017). The fact that Romania ranked among the top ten vehicle manufacturers at European level was duly noted by the media and by businesses across the country. However, with 359 thousand vehicles manufactured in 2017, Romania is lagging behind the other CEE important vehicle manufacturers: Hungary (502 thousand), Poland (515 thousand), Slovakia (1 million), the Czech Republic (1.4 million). No less than 5 CEE countries are currently among the top 10 vehicle manufacturers in Europe, compared to three in 2007 (the Czech Republic, Slovakia, Poland). More important, in 2017 almost a quarter of the European vehicle production (23.3%) happened in CEE, compared to 16.7% in 2007 and to only 8.5% in 2000. The IHS Markit forecasts of September 2018 indicate an increase by 10–20% in the vehicle production in CEE by 2024, compared to 1.4% at most in Western Europe. Therefore, the trend to relocate manufacturing from West to East may well continue, as so far France, Belgium, Italy and even Germany have lost production volume to the Eastern countries. Due to the Brexit, UK may also lose production capacities as a result of investments being re-channelled to the East.

Due to the investment wave in the CEE automotive industry, production increased much faster than demand in these countries, while in some cases – such as Romania – the trends show precisely the opposite. Except for Poland, where the number of vehicle registrations is close to the number of vehicles assembled (1:1 production-registration ratio in 2017, compared to 2:4 in 2007 – see Table 1), the production volume is 10.4 bigger than the market in Slovakia, 5.2 bigger in the Czech Republic, 4.3 bigger in Hungary and 3.4 bigger in Romania. The most significant increase in this ratio occurred in Romania and Hungary, but Romania is the only country

²⁸ See APIA, press release: The automotive market in Romania continues the positive trend registered in 2018 reaching new extremes” 18 October 2018, available online at http://www.apia.ro/wp-content/uploads/2018/10/Comunicat_piata_auto_Septembrie-2018.pdf. According to ACEA data, SUVs accounted for 29% of all vehicle registrations at European level in 2017, compared to only 8% in 2007.

²⁹ General Motors abandoned the European market when Opel/Vauxhall was sold to PSA. Chrysler is controlled by the Fiat Group, and the FCA Group is the result of the 2014 merger between the two companies.

Table 1
Production vs. registration of new vehicles in EU

	2007	2017	
DE	1.8	1.6	-0.2
ES	1.4	1.9	0.5
FR	1.2	0.8	-0.4
UK	0.6	0.7	0.0
CZ	5.3	5.2	-0.1
SK	9.6	10.4	0.9
IT	0.4	0.4	0.0
PL	2.4	1.1	1.3
HU	1.7	4.3	2.6
RO	0.7	3.4	2.7
BE	1.5	0.6	-0.9
SE	1.0	0.6	-0.4
SI	2.5	3.0	0.6
NL	0.1	0.4	0.3
PT	0.7	0.6	-0.1
FI	0.2	0.8	0.6
AT	0.7	0.2	-0.4

Figure 5
Automotive trade balance in European countries



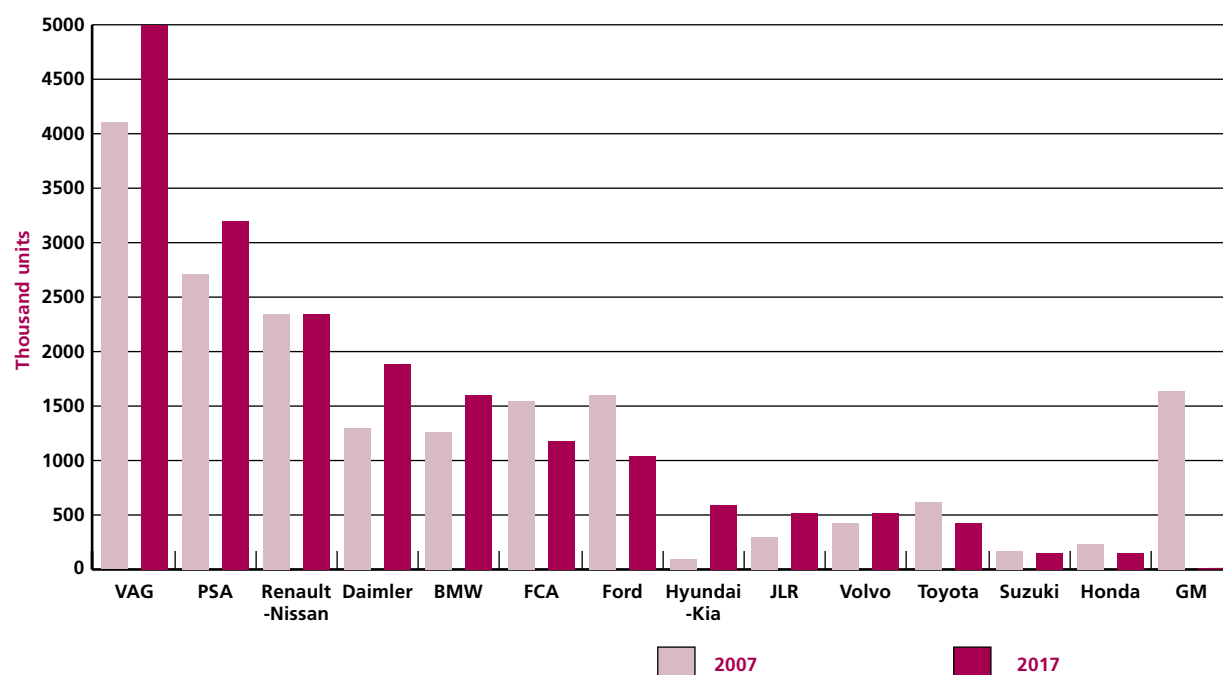
Data source: Eurostat

which showed a strong reversal, from production lower than the market to production highly exceeding the market. Mention should be made that such developments had a strong positive impact on the automotive trade balance in the CEE countries; together with Germany and Spain, they remain the only EU Member States with positive automotive trade balance (Figure 5). Despite shifting from deficit to trade surplus, with net exports of EUR 1 billion in 2017, Romania's performance is much lower than in the case of the Czech Republic

(14.9 billion), Slovakia (11.9 billion) and Hungary (4.8 billion). This is largely due to the relatively low export prices for vehicles manufactured in Romania and, implicitly, to more expensive imports than the local production.³⁰

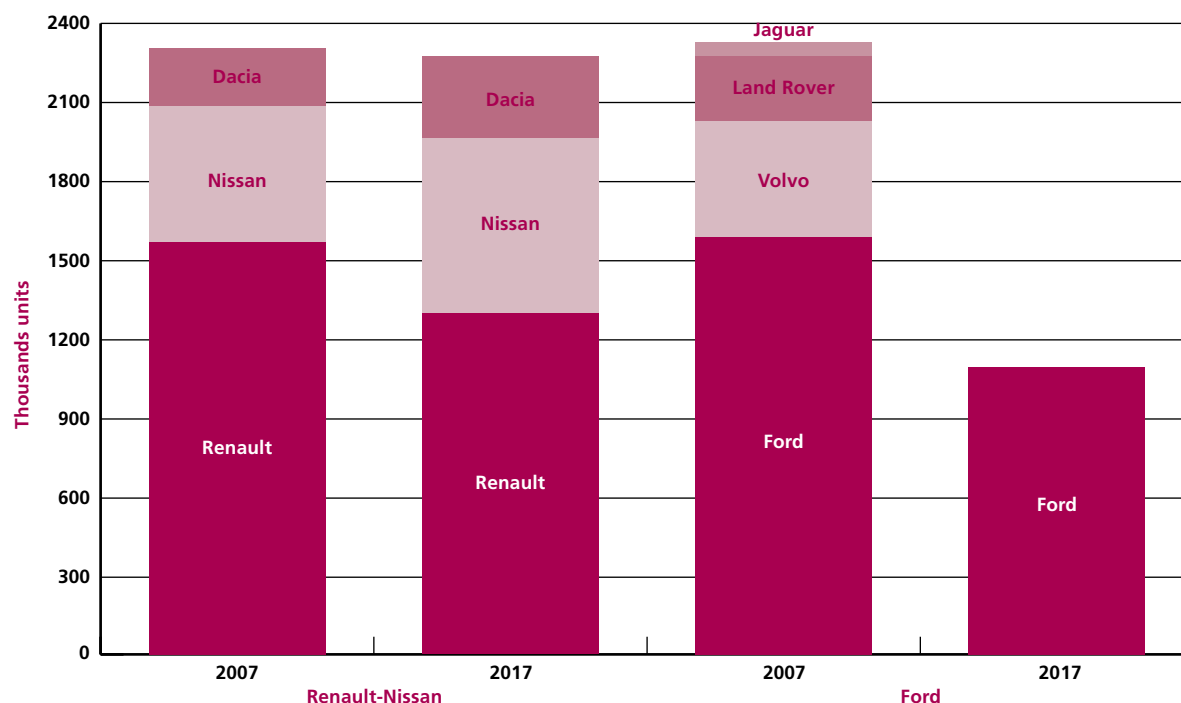
³⁰ To illustrate this point, in 2017 the trade surplus per unit manufactured was only EUR 2892 in Romania, compared to EUR 5494 in Spain, EUR 9604 in Hungary, EUR 10552 in the Czech Republic, EUR 11890 in Slovakia and EUR 16280 in Germany.

Figure 6
Vehicle production per strategic groups in the EU, 2007 vs. 2017



Data source: IHS Markit

Figure 7
Vehicles production of the main brands of the Renault-Nissan Alliance and Ford Europa in EU, 2007 vs. 2017

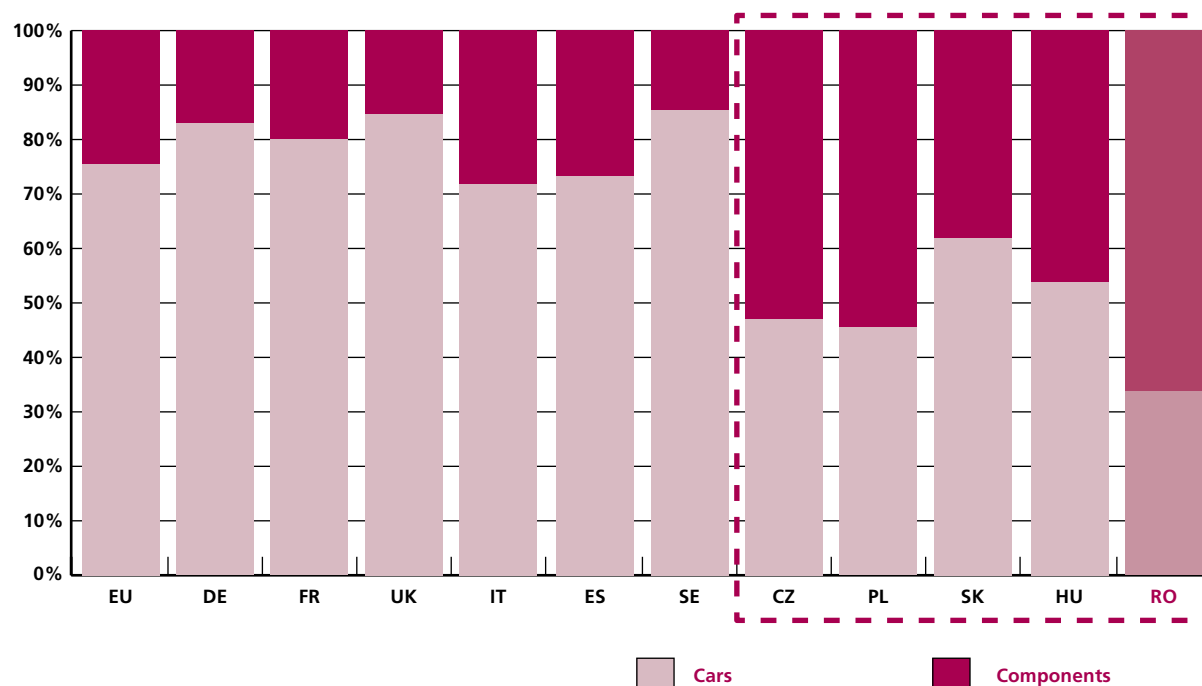


Data source: IHS Markit

By strategic groups, data on production indicate major headway of the German industry, VAG reaching almost 5 million vehicles manufactured in 2017 (Figure 6) or 26.4% of the total European production (compared to 21.6% in 2007). Having benefitted from the polarisation of the European

market and from growing exports to China, premium German manufacturers (Daimler, BMW) produce currently more vehicles than some traditional groups such as Fiat (FCA). However, the manufacturers present in Romania have not benefitted from this positive export dynamics like the Ger-

Figure 8
Breakdown of turnover in the European automotive industry, 2016



Data source: Eurostat

man leaders (Figure 7). Actually, Ford cut down production according to sales, along with large American manufacturers who scaled down their European activities, culminating with the complete withdrawal of General Motors in 2017 after selling Opel/Vauxhall to the French group PSA. Even though in 2017 Renault-Nissan Alliance manufactured in Europe a number of vehicles equivalent to the volumes of 2007 (2.3 million), the European production - sales ratio decreased from 1.9 to 1.6, hence increasing dependence on already saturated European markets. The Mioveni production in 2017 accounted for no less than 13.8% of the total European production of the Alliance, compared to 9.7% in 2007. IHS Markit forecasts indicate that the Mioveni factory will maintain this position within the Alliance and, in case of better use of existing capacities, there will be an increase of the share of the Craiova factory in the total European Ford production from 5% currently to 15% in 2025.³¹

As basically all research on the topic indicate, Central and Eastern Europe became an important location for the automotive industry due to the low labour costs and to the incentives provided by the countries in the region (favourable tax regimes, investments subsidised by various state-aid schemes).³² The competitive advantage of the low costs determined the pathway for the entire automotive industry in the region, as the multinational corporations' plans targeted

less innovation and technological development and more assembly activities, which take large volumes of manual labour. From the entire automotive production chain, CEE countries proved especially attractive for the automotive components industry, and the share of automotive components manufacturing in the total turnover of the automotive industry is much higher in CEE compared to the EU average and to the Western countries – e.g., 53.5% in the Czech Republic and 54.5% in Poland, compared to 16% in the UK and to 20.1% in France (Figure 8).³³ By far the highest share of automotive components manufacturing turnover in the total automotive industry is recorded in Romania – 66.3%, almost four times higher than in Germany. The disparity is even more visible in terms of employment (Figure 9), where Romania ranks first, with suppliers covering no less than 89% of the total employment in the automotive industry, compared to the European average of 49.5% and to only 32% in Germany.

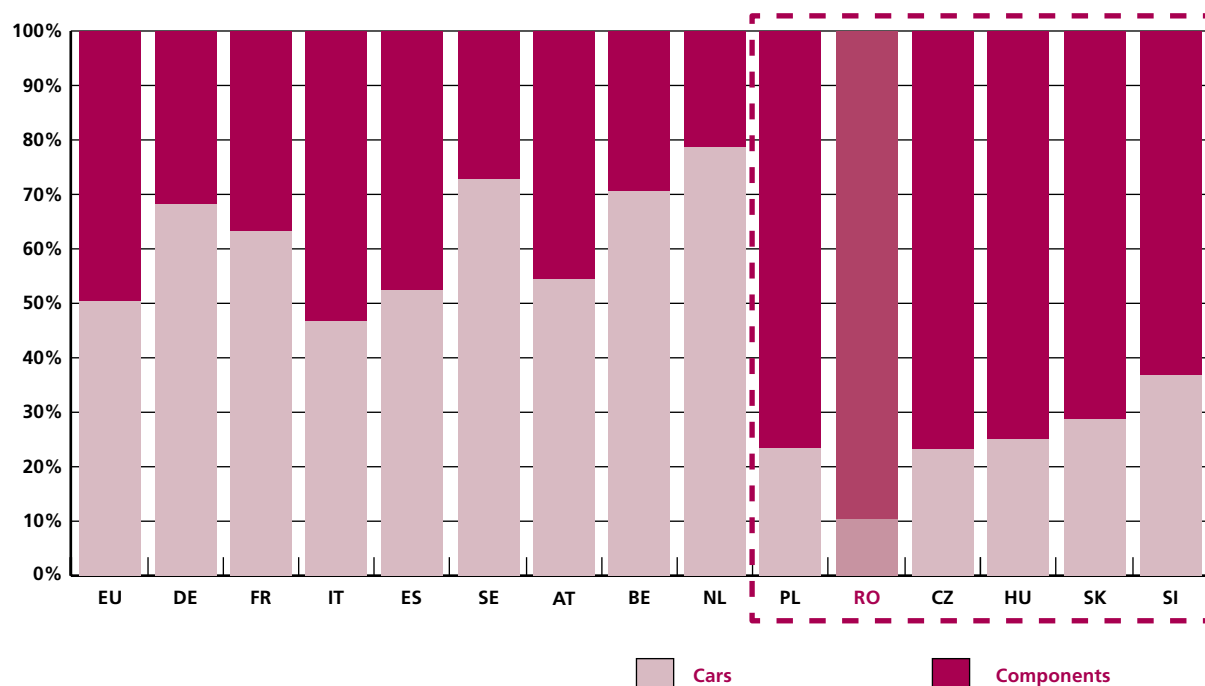
Because it absorbs much more workforce, the size of the CEE automotive components industry makes the automotive industries of these countries among the most important employers at national level, which explains why the number of employees in the automotive industry in Romania is higher than in countries such as Italy, UK or Spain (Figure 10). If we look only at the automotive components industry (Figure 11), the number of employees in Romania ranks second in Europe, after Germany, and is much higher than in countries like Italy, France or Spain, where the volumes of vehicles assembled are, nevertheless, much higher.

³¹ In terms of actual production, estimates show that Craiova factory will remain the smallest of the 4 Ford factories in Europe, Mioveni is the fourth biggest factory of the 18 European factories of the Renault-Nissan Alliance.

³² E.g., Deloitte, „Central Eastern Europe as a focal point of the automotive Industry”, 2016.

³³ For 2016. Mention should be made that these figures assume that engines and gearboxes manufacturing is not usually considered included in the automotive components industry.

Figure 9
Employment structure in the European automotive industry, 2016



Data source: Eurostat

Figure 10
Employment in the European automotive industry, 2007 vs. 2016

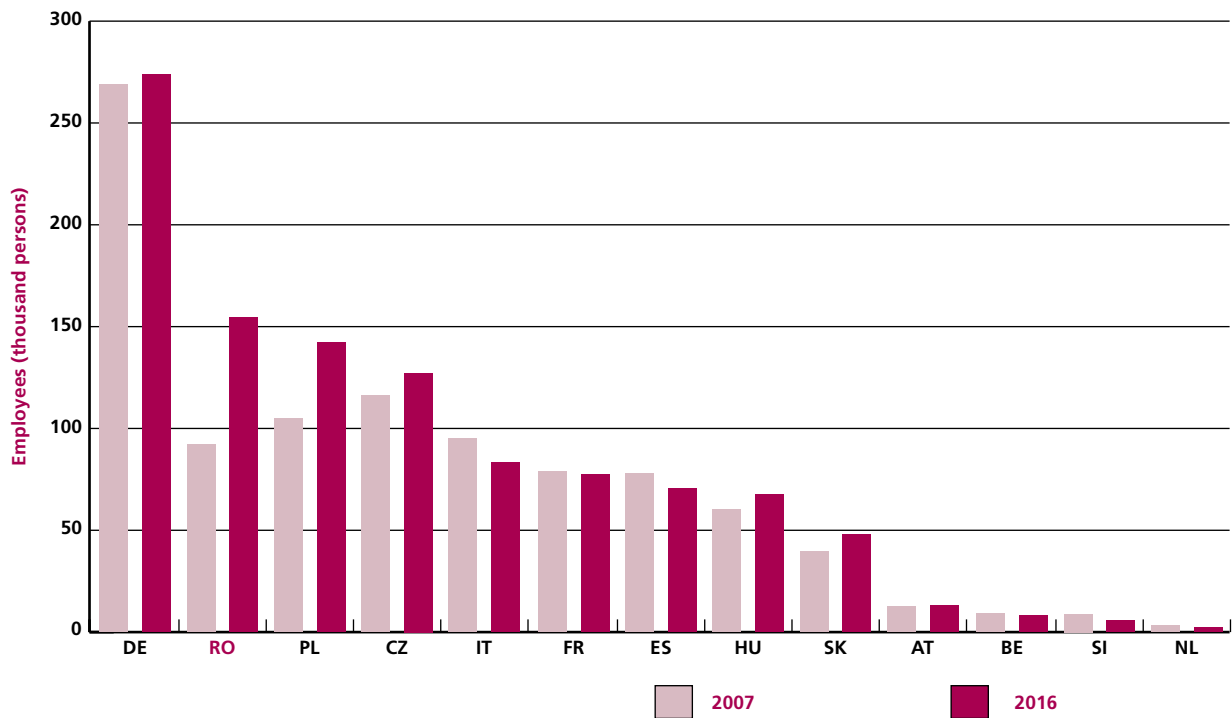


Data source: Eurostat

The major importance of the automotive components industry in CEE countries clearly shows the dominant trigger of industrial development in these countries: integration in transnational production chains of Western European companies. The automotive components industry in countries like Romania has long exceeded the volumes demanded by the local

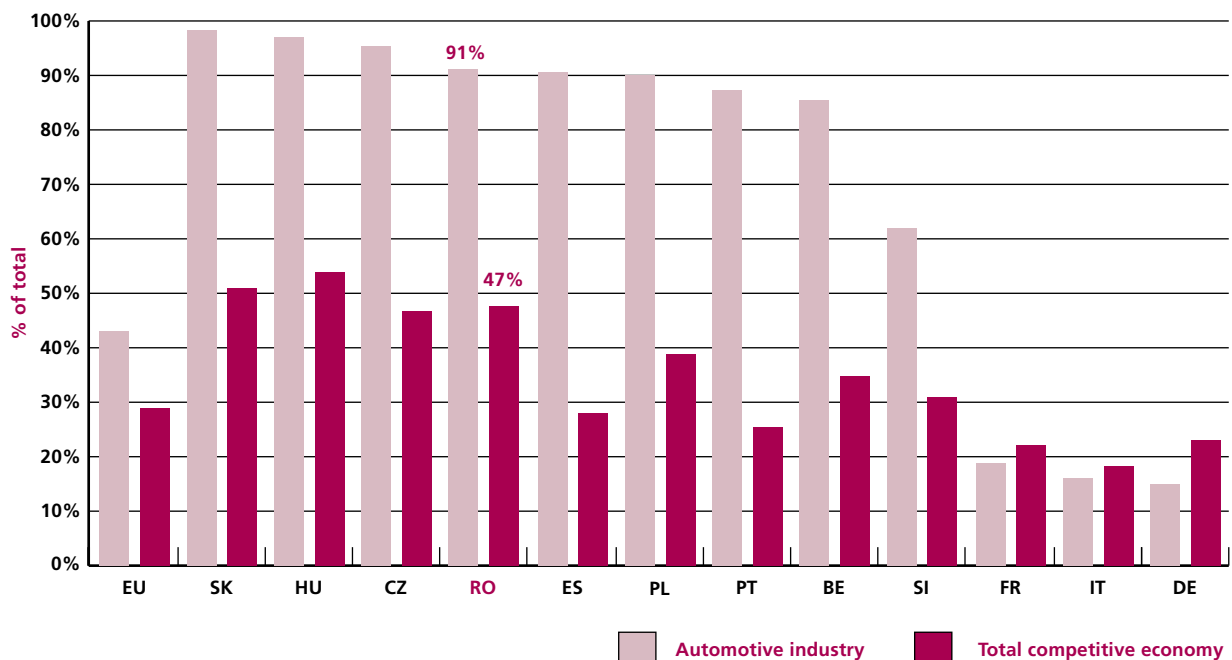
car manufacturers, and the activity of the latter is often limited to assembling lower models than those manufactured in Western countries. Even factories with very high levels of local integration (like Dacia and Škoda) depend vastly on the research-development activities and on the strategic decisions made by the group, outside the countries where the

Figure 11
Employment in the automotive components industry in Europe, 2008 vs. 2016



Data source: Eurostat

Figure 12
Turnover of majority foreign-owned companies in the automotive industry and in the competitive economy in Europe, 2015



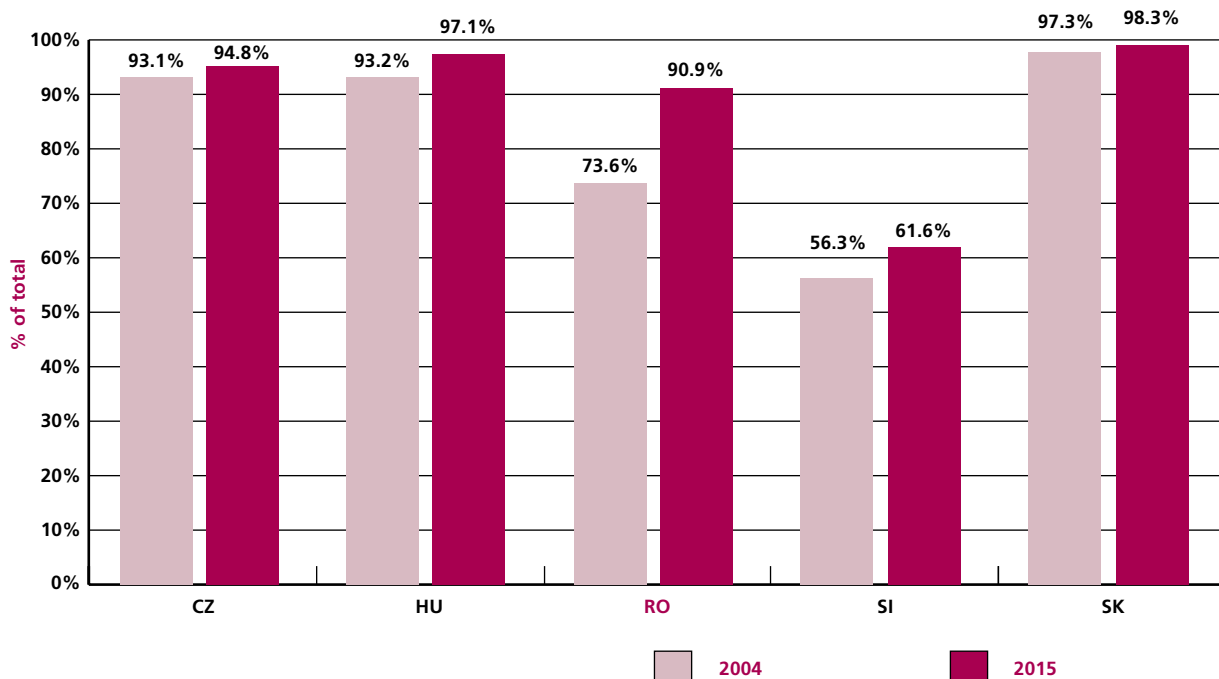
Data source: Eurostat

actual vehicle manufacturing happens. In fact, foreign control over the CEE automotive industries is absolute: more than 90% of the turnover of these industries is made by mostly foreign-owned companies, exceeding by far the average of the competitive market, controlled about 50% by foreign capital (Figure 12). There is huge difference when compared

to the Western countries (in 2015, only 14% of the turnover in the German automotive industry belonged to foreign-owned companies), even though the automotive industry in the South EU is also controlled by foreign capital. With 91% of the automotive turnover made by the local branches of the multinational corporations, Romania is no exception

Figure 13

Turnover of majority foreign-owned companies in total automotive industry in CEE countries, 2004 vs. 2015



Data source: Eurostat

from this rule, even though things were quite different in the mid-2000s (Figure 13).³⁴ Hence, the dependant development of the automotive industry in Romania occurred mostly during the last decade, and not in the 2000s, as it happened with the other dependant market economies in the region.

Against the European background, the automotive industry in Romania is in line with the dominant trends on the continent in the last decade and a half:

- The demand for new vehicles was structurally affected by the crisis and by the ensuing austerity, and currently the market in Romania is a minor market at European level;
- However, Romania benefitted fully from the polarisation of the European market, especially from the increasing attractiveness of cheap cars and SUVs, and currently the production in Romania exceeds by far the domestic market;
- Just like everywhere in the Central and Eastern Europe, the much faster growth of production compared to the domestic market in Romania triggered positive dynamics of the automotive trade balance, even though the relatively low export prices of the vehicles manufactured in Romania trigger a much lower business performance than in countries like the Czech Republic, Slovakia and Hungary;
- While Renault-Nissan fully capitalised on the market developments (more SUVs and cheap cars), including with Dacia, Ford sales and production go along the more general lines of American manufacturers to limit European activities, even though this does not seem to have a strong impact on the factory in Craiova yet.
- Just like in the Czech Republic, Slovakia, Hungary or Poland, the industry in Romania depends very much on foreign demand and is vastly controlled by the capital originating from the same Western European countries;
- The automotive components industry exceeded by far the needs of the local vehicle production, and the increase is determined by the integration in the production chains of the Western multinational corporations;
- The low labour cost and the relatively large share of the automotive components manufacturing lead to unusually large numbers of employees in the automotive industry, which is obvious especially for the automotive components industry; in the last decade, Romania registered by far the highest increase in Europe in terms of employment in the automotive components industry, exceeding all other countries in the number of employees, with the important exception of Germany.

6.3 DEPENDANT DEVELOPMENT OF THE AUTOMOTIVE INDUSTRY IN ROMANIA

The comparison between the developments in terms of production and new vehicle registration (Figure 14) shows the dramatic shift of the automotive industry in Romania, from a focus on the domestic market to the current virtually total

³⁴ Slovenia is the only country in the region where foreign control over the automotive industry is less dominant. In fact, unlike the Visegrád countries and Romania, Slovenia did not follow the dependant market economy model.

Figure 14
Production and sales of new vehicles in Romania (thousand units)

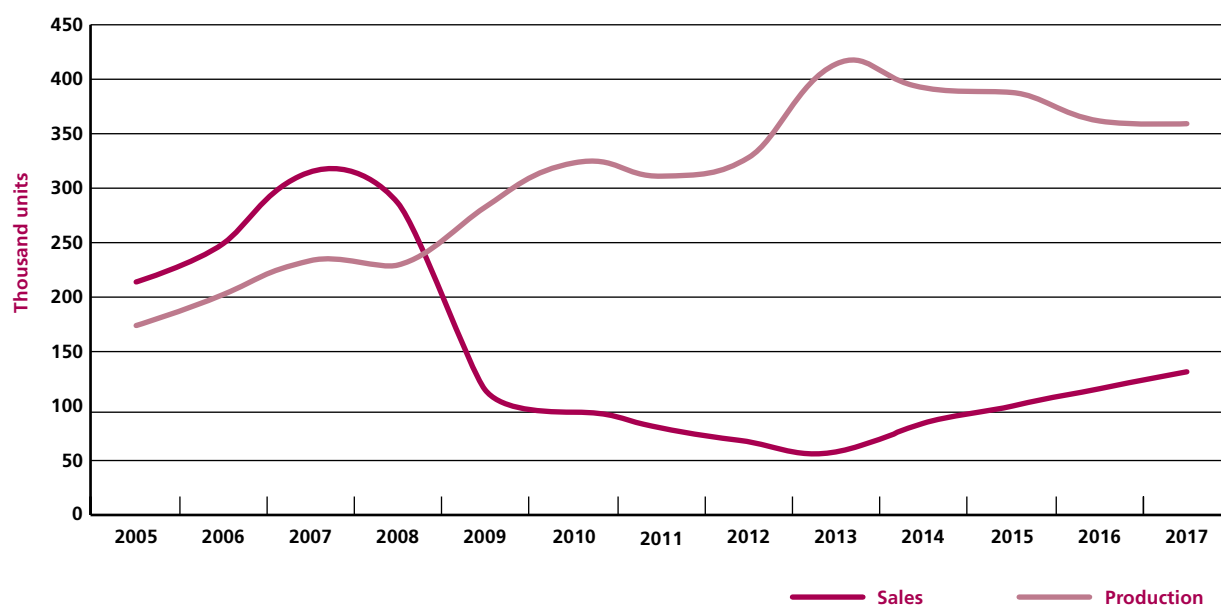
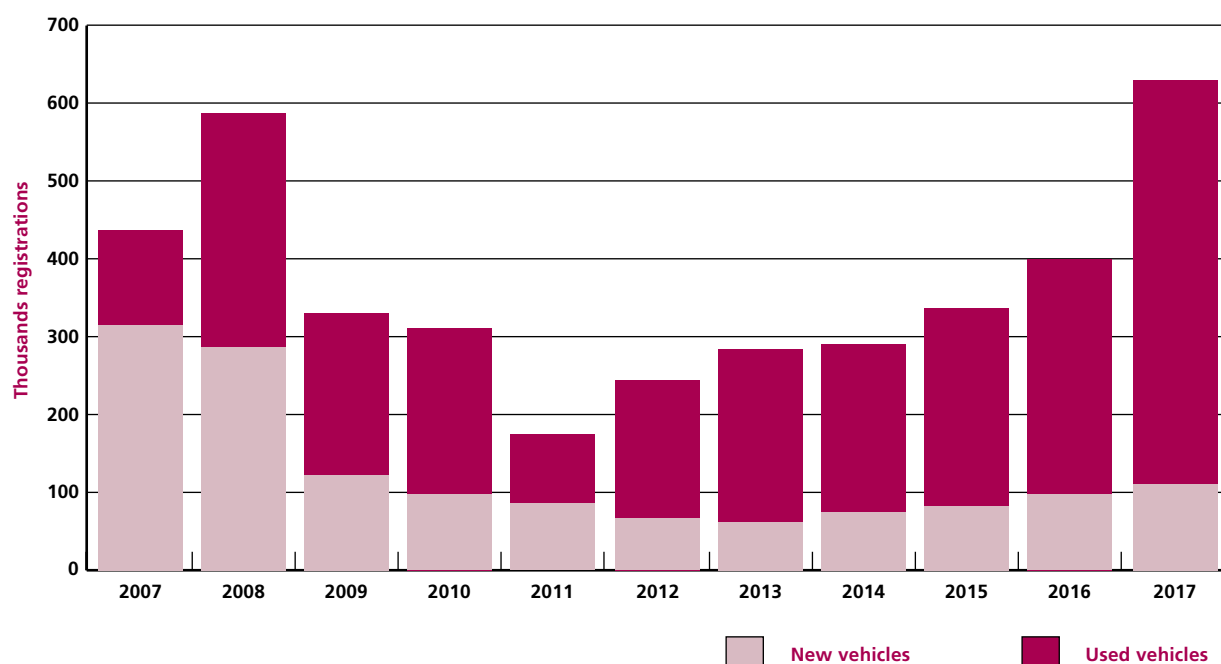


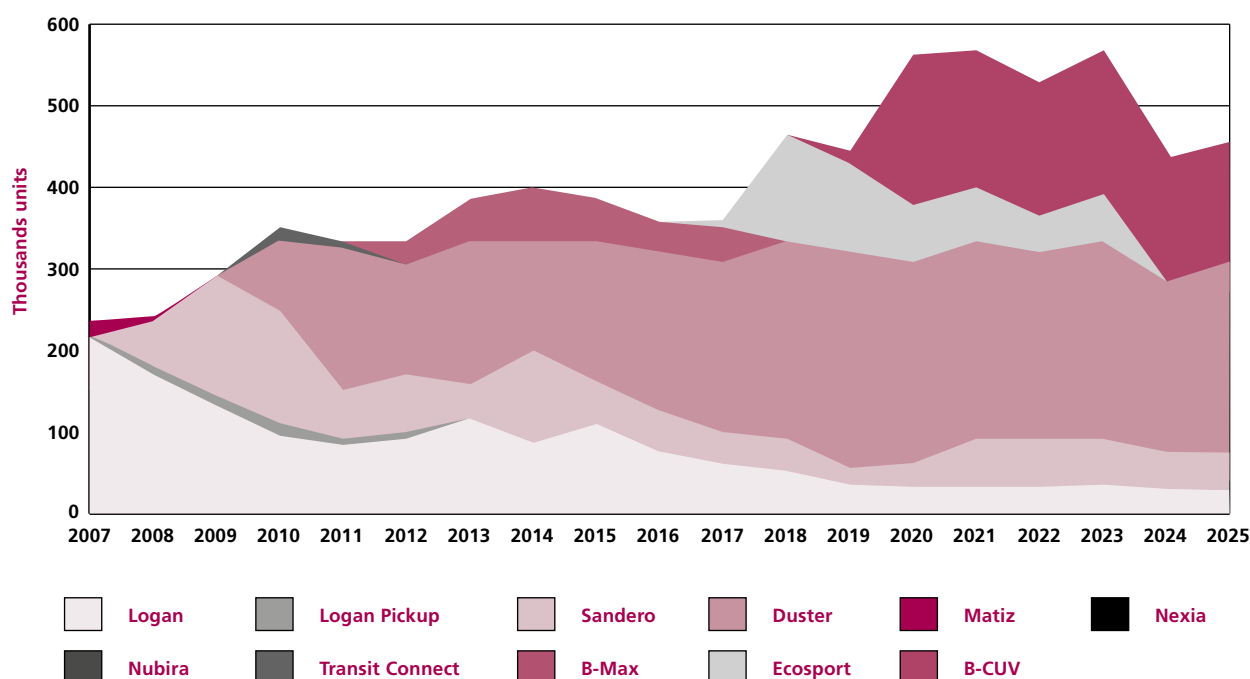
Figure 15
New road vehicle registrations for passenger transport



domination of exports. From the peak of 312 thousand new vehicles sold in 2017, the Romanian market plummeted to less than 58 thousand in 2013, then slowly increased to 130 thousand in 2017. During the same period, production increased from 234 thousand units to 359 thousand in 2017, with an absolute peak of 411 thousand in 2013, just when the market had collapsed at an unprecedented level since the early 2000s. In the period of 2008–2013, the sales on the local market of the main domestic manufacturer, Automobile Dacia, decreased from 50% to 10% of the production.

In response to the market fall, already visible in 2008, the government strengthened the measures to enhance the demand for new cars – a vehicle scrappage scheme (“Rabla” Programme) and the vehicle tax, with its various forms (first registration tax, pollution tax, environmental tax, etc.). The goal of these measures was to remove from the roads and reduce sales of second-hand vehicles, mostly imported, which in 2008 amounted for more than half of the road vehicle market in Romania (Figure 15). At least in terms of limiting second-hand vehicle sales, the vehicle tax was definitely

Figure 16
Vehicle production in Romania, 2007–2017 and forecasts for 2018–2025



Data source: IHS Markit

successful and, combined with the crisis effects, it generated a decrease in second-hand car sales from 301 thousand in 2008 to only 95 thousand in 2011. From 2012, the second-hand vehicle market had much more positive dynamics than the new vehicles market, and in 2016 the sales exceeded the previous record of 2008. The strong effect of taxation was felt only after the vehicle tax (the environmental tax) was removed in February 2017, and the second-hand vehicle sales boosted from 301 thousand to 521 thousand in only one year.

Already present at a global level, the polarisation of the automotive market impacted Romania as well, where the increase of income inequalities was very swift after the crisis. The SUV sales had a much better evolution than sedan sales (see also the previous section), and premium brands (BMW, Mercedes, etc.) maintained a very good market share – about 10% of the new vehicle registrations.³⁵ The same premium brands accounted for more than 25% of the second-hand vehicles market in 2017, and German brands (premium plus Opel, Volkswagen) accounted for no less than 65% of this market, compared to 23% of the new vehicles market. The polarisation of the automotive market in Romania is obvious not so much in the large share of premium vehicles registration, but in the dramatic difference between the new vehicle market and the second-hand vehicles market. As we noted in the previous section, with the lowest rate of car ownership in Europe and with one of the oldest fleets (average age of a vehicle registered in Romania was 16.2 years old in 2016,

when only two other European countries – Lithuania and Poland – had older fleets). The extremely slow recovery of the new vehicles market and the sudden boost of the second-hand vehicles market after the taxation was removed highlight once more that this situation is an effect of the very low purchasing power of the population compared to the large automotive markets in Western Europe. Another evidence is that the measures to limit second-hand vehicle sales did not boost the new vehicle sales, but rather reduced the total market.

As regards the industry, such developments determined by the crisis and by the ensuing austerity accelerated a shift finalised at the end of the 2000s in the other CEE countries with developed automotive industries. More specifically, the market collapse eliminated any opportunity for the Romanian market to become interesting for the Western automotive manufacturers, and the image of low-cost manufacturing location for export has become more and more relevant. Unlike the '90s, when investments targeted entry on a market still having huge potential and customs protection (which was a very important aspect in the decisions made by Daewoo and Renault to take over the factories from Craiova and Mioveni), the crisis at the end of the 2000s marked a complete shift to investments looking for cheap labour for exports.

No wonder, then, that Dacia thrived despite the dramatic situation of the local market and that Ford Romania finally started mass production in 2017, regardless the relative standstill of the domestic sales (Figure 16). For both factories, we note an obvious specialisation in SUVs manufacturing, a trend even more visible once a new crossover class B model will be launched in 2019 in Craiova. According to IHS forecasts, in

³⁵ For 2017 and 2016. Calculated according to data made available by the Directorate for Driving Licences and Vehicle Registration of the Ministry of Internal Affairs.

Figure 17
Automotive industry turnover in Romania

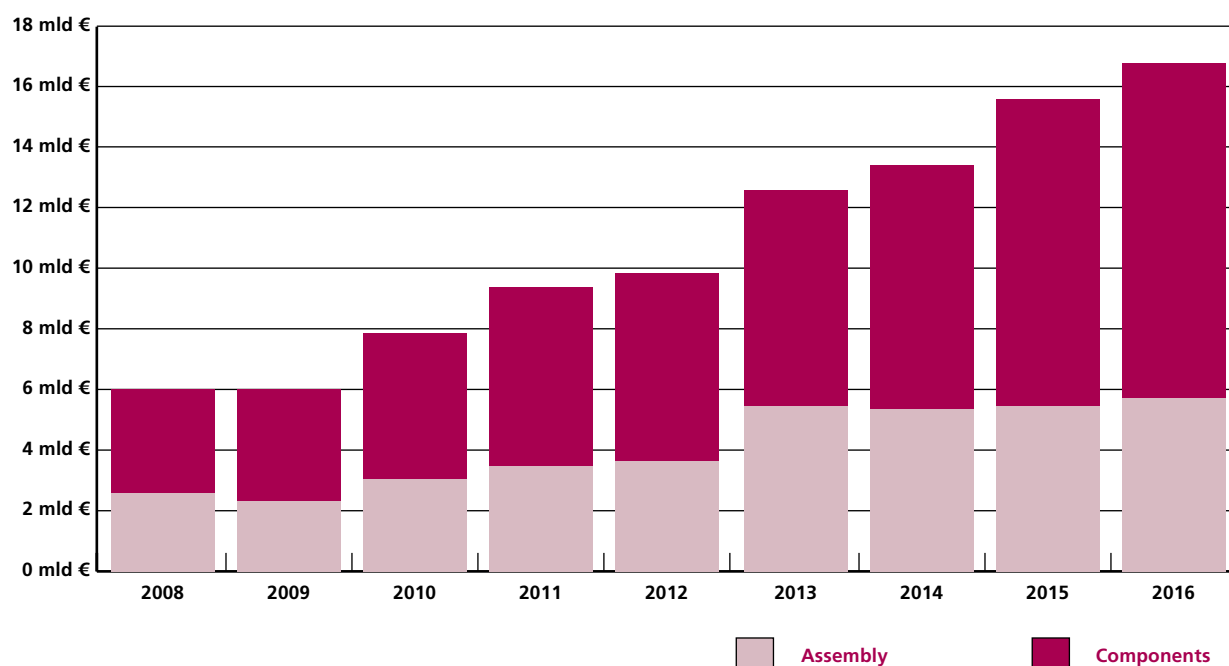
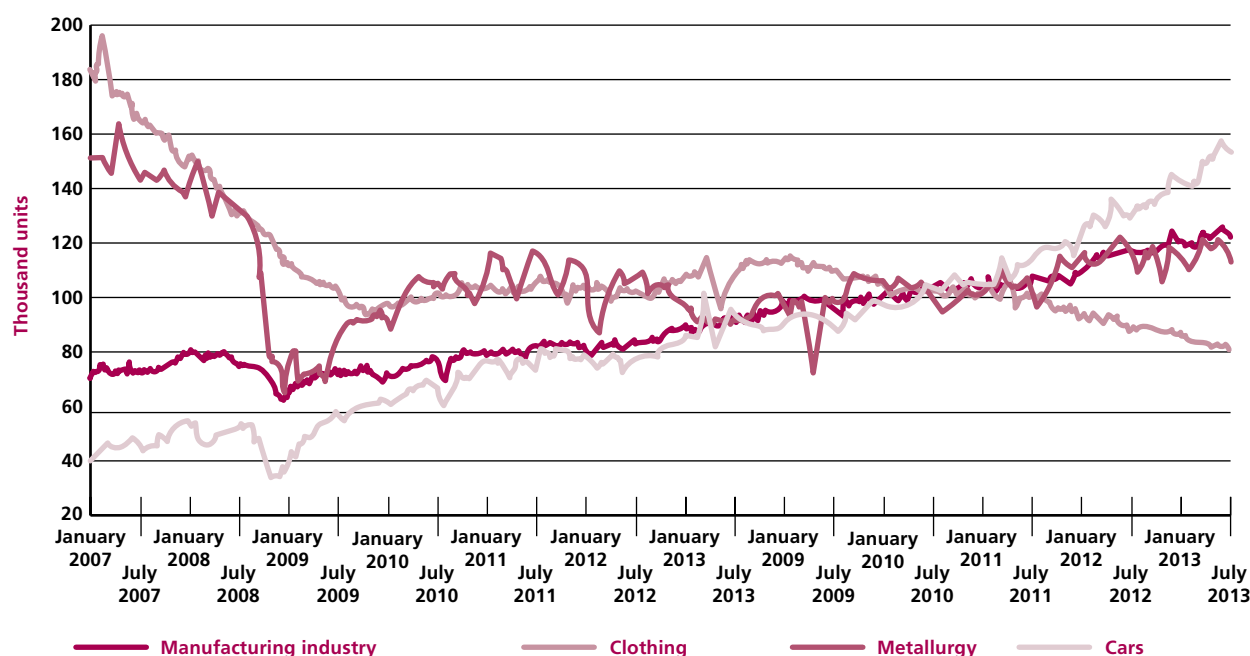


Figure 18
Industrial production indicators, January 2007 – July 2018 (baseline year 2015)



2019 Duster will account for no less than 79% of the Mioveni factory production, compared to 51% in 2011. Cheaper models – Logan, Sandero – will still be manufactured mostly in Morocco, by the Tanger factory. Meanwhile, Ford already announced increased use of the manufacturing capacities of Craiova factory, and the move of the Ecosport model manufacturing from India is a response to the increased SUV demand in Europe. For the total industry, IHS forecasts a pro-

duction peak of 570 thousand vehicles in 2023 which, compared to the 2017 figures, would mean that volumes from Hungary and Poland are exceeded. More realistic, according to IHS forecasts, Romania will maintain its position in the European automotive production ranking, as the 45% increase by 2023 is not sufficient to take over the neighbouring countries, with forecasts projecting a 68% increase for Hungary and a 20% increase for Poland for the same period.

Figure 19
Value-added and number of employees in the automotive industry (% of total manufacturing industry)



The most important issues for the future of vehicle manufacturing in Romania depend on the capacity to attract another manufacturer, on reaching high capacity use rates for the factory in Craiova and, according to various voices in the public space, on maintaining the competitiveness of the Romanian industry in the European market. As we will see, this last issue is a rather theoretical one, as the industry in Romania is still highly competitive in the investment model based on low labour costs. As regards the chances to attract a third manufacturer, they seem unlikely, since Hungary and Slovakia have been far more attractive so far. Finally, the full use of Ford capacities will depend on demand development in Europe, on the strategy of the American group for Europe (recently, General Motors demonstrated that withdrawal is not at all impossible) and, as we will see, on technological developments. Even though this last element is not likely to impact on the final vehicle production, both factories are also large combustion engine manufacturers and a steep decline of combustion engines in Europe may lead to a significant decrease of Dacia and Ford operations in Romania.

Although crucial and highly visible, the vehicle assembly activity has long ceased to be the main development driver for the automotive industry in Romania, which is still valid even if we think only of the local automotive components production strictly for Dacia and Ford operations in Romania. Since 2008, the total turnover of the automotive components industry exceeded by 25% the turnover of the assembly industry (Figure 17), reaching record values in 2016, when the automotive components industry turnover was double the assembly industry turnover. Although Dacia and Ford factories are large enough to bring Romania in the top ten vehicle

manufacturers in the EU, Romania's positioning on the European automotive industry map is largely due to the automotive components industry which in the past years has exceeded the assembly industry against all criteria (turnover, exports, number of employees, etc.). The spectacular growth of the automotive components industry, which was fuelled, not blocked by the effects of the crisis at the end of the 2000s is to a great extent responsible for the shift in Romania's industrial profile (Figure 18), from an important light industry and metallurgical manufacturer (textiles) into a landmark of the European automotive industry. In many ways, actually, the post-crisis growth of the manufacturing industry as a whole may be entirely attributed to the growth of the automotive components sector, as in 2016 its turnover represented 14.7% of the total manufacturing industry, compared to only 5.4% in 2008.³⁶ The entire automotive industry (automotive components plus assembly) generated 20.3% of the total value-added in the manufacturing industry in 2016, an increase from 11% in 2007 (Figure 19); in terms of employment, the automotive industry accounted for 14.6% of the employees in the manufacturing industry in 2016, compared to only 7.2% in 2007. In short, in the past ten years the automotive industry has become the largest and the most important industrial sector and one of the vital sectors of the Romanian economy. Given the decline (or the standstill) of other large industrial sectors (Figure 18), it is most likely that the

³⁶ Overall, in 2016 the turnover of the automotive industry accounted for 22.2% of the turnover of the manufacturing industry, compared to 9.3% in 2008. Compared to the entire competitive economy, in 2016 the automotive industry accounted for 6.2%, compared to 2.3% in 2008.

Figure 20
Foreign trade in automotive goods (road vehicles + tyres), 200–2018

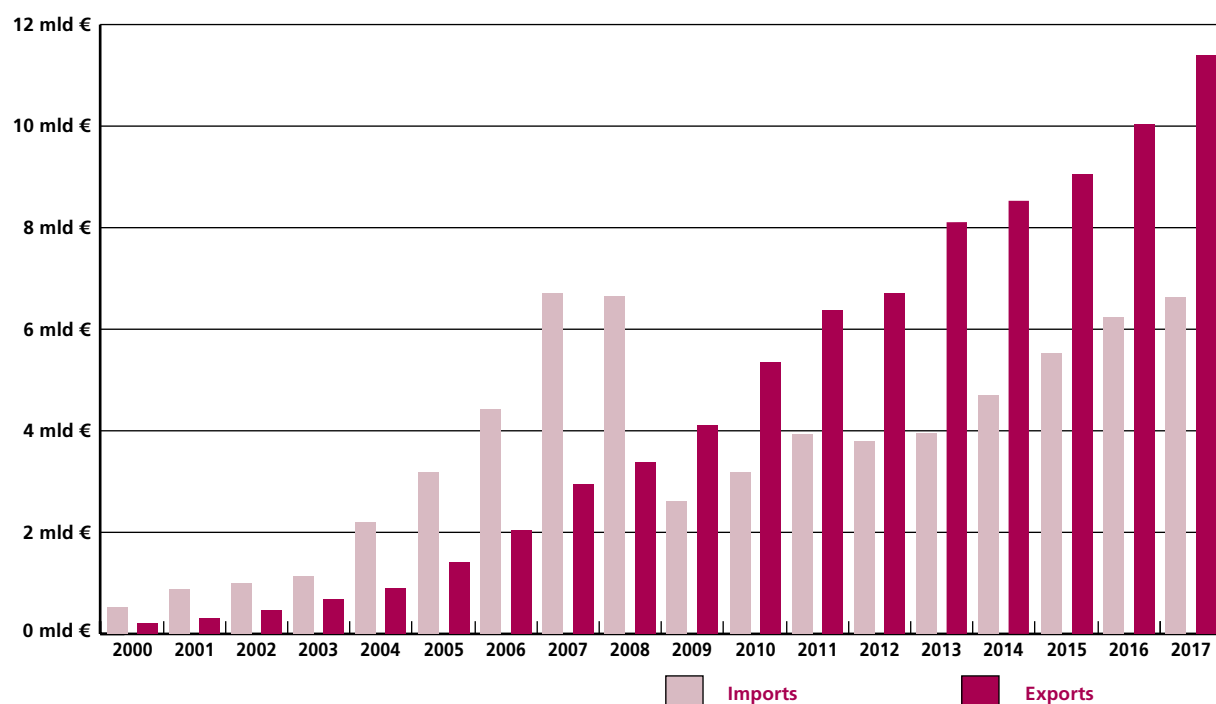


Figure 21
Trade balance for automotive goods, 2004–2017 (million dollars)



economic importance of the automotive industry – especially of the automotive components industry – will further increase.

As we already pointed out, the automotive industry in Romania is mainly export-oriented, regardless whether we speak of vehicles or components. Even though, historically, Dacia's privatisation was a vital boost for the automotive components industry, even before the crisis it no longer produced mainly

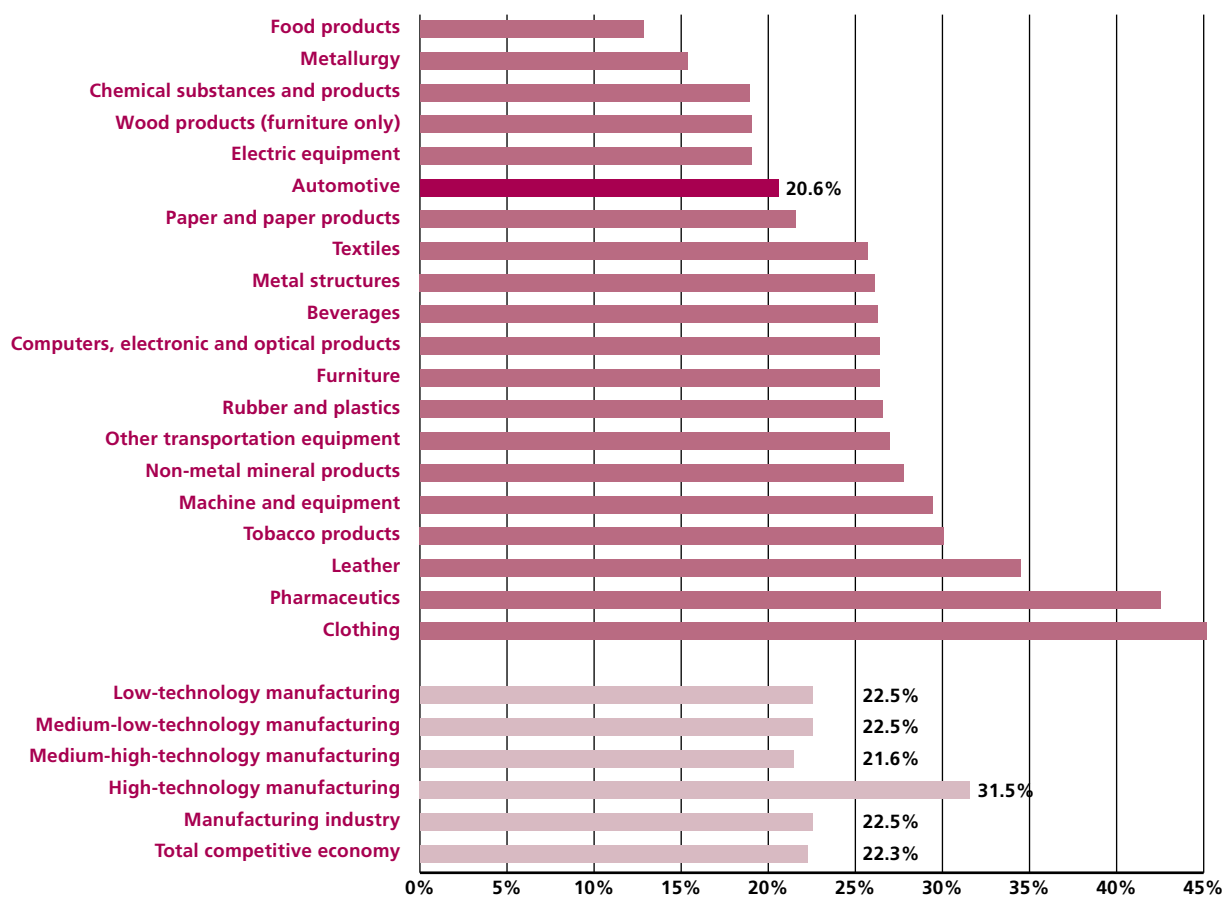
for the vehicle manufacturers in Romania. Automotive exports started growing since 2005, after Dacia Logan was launched, but the truly abrupt growth occurred only after the crisis, when the entire industry focused on foreign demand (Figure 20), reaching EUR 11.4 billion in 2017 – almost four times the values of 2007.³⁷ According to NIS data, the auto-

³⁷ These figures include tyres.

Figure 22
Value-added in the automotive industry (% of turnover)



Figure 23
Value-added in the manufacturing industry, 2016 (% of turnover)



motive industry accounts for one fifth of the total value of exports of goods for Romania.

The export growth had a crucial contribution to the improvement of the automotive trade balance, from EUR 3.75 billion deficit in 2017 to EUR 4.74 billion surplus in 2017. Obviously, the imports dynamics represented another major contribution, and the crisis had an immediate impact on this, with a decrease of no less than 60% only in 2009 (Figure 20). In 2017 the total value of automotive imports had not reached the record levels recorded in 2007 and 2008, but this will very likely happen in 2018. However, the visible increase in imports starting from 2014 does not indicate a simple return to the pre-crisis situation, as the structure of imports has changed significantly since.

First, we should separate vehicles from components, as the trade balance is very different for the two (Figure 21). The slight comeback of the new vehicle market and the massive increase in vehicle imports in the last period have led to an ongoing decrease of the trade surplus for vehicles starting from 2013. However, if we look strictly at the trade relations with Germany (the most important trading partner and the most important European country in terms of automotive industry and market), Romania actually registers a deficit for road vehicles, albeit significantly lower than before the crisis. Obviously, the poorer situation compared to Germany is due to the major importance of the German brands on the automotive market in Romania, regardless whether we speak of new or second-hand vehicles. Therefore, on the one hand, Germany became an important destination for vehicles manufactured in Romania (exports tripled between 2007 and 2017) but, on the other hand, Romania became an important market for vehicles exported by Germany, especially for second-hand vehicles. In the near future, the increase in the Ford production might be absorbed by the sharp increase of second-hand vehicles import, with the removal of tax restrictions and if good macroeconomic situation is maintained.

For the automotive components industry, there is a completely different picture, as the total trade surplus exceeded four billion dollars in 2017 (Figure 21). The surplus with Germany accounted for more than 50% of the total surplus, indicating profound integration of the automotive components industry in Romania in the German production chains. The key question however is how this integration occurs or, more specifically, to what extent this integration comes along with increased economic dependence on foreign markets and industrial strategies ad, implicitly, with limited future development opportunities. Indeed, all data indicate that in Romania the automotive components industry consists mostly in manual operations involving automotive components assembly or imported raw materials. Even though they absorbed a lot of workforce in the past years, on medium and long-term these activities cannot guarantee a balanced socioeconomic development, as they fundamentally depend on maintaining labour costs as low as possible. From a certain point, the consistent increase in labour costs (regardless whether it is prompted by workforce depletion) is no longer compatible with this type of industrial activities, and the result is either a

blockage of socioeconomic growth or transition to more complex industrial activities which depend less on the low labour cost. The future of the automotive industry in Romania and – in fact, of the entire economy – depends on the solution to this issue.

The fact that automotive industrial activities in Romania have a low level of complexity and consist mainly in manufacturing of intermediary goods from imported parts and raw materials is obviously visible in the similar evolution of exports (+16% per year on average between 2007 and 2017) and imports (+11% per year on average between 2007 and 2017) of automotive components. The increase in the imports of components is not explained by the increase in the activity of vehicle manufacturing factories, which have a pretty high local integration level anyway. A more realistic explanation is the dependence of automotive components industry in Romania on imports of raw materials and parts. This is also visible in the share of the value-added in the turnover, which decreased from 29.4% in 2008 to 21.9% in 2015 for the automotive components industry (Figure 22). More simply, although the sales revenues of automotive companies in Romania increased significantly, the share of such revenues which actually remained in Romania decreased.³⁸ Interestingly, we note a similar evolution of the value-added in the rest of the automotive industry, despite the increase of the Duster share (a more expensive and more complex vehicle than the rest of the Dacia range) in the production of the Mioveni factory. In terms of value-added margin, the automotive industry fares worse than most manufacturing industry sectors, below the average values of the manufacturing industry and of the competitive economy and far from the high-tech industries (Figure 23). Thus, the real economic impact of the automotive industry may be greatly overrated if we look only at its gross size (in terms of turnover, exports or number of employees). Here is another reason why the growth of the automotive industry in Romania to a level exceeding countries like Italy or Spain in terms of number of employees has a much lower impact on the socioeconomic growth.

Another reason, much more important, is related to the type of industrial activities in Romania – more specifically to the type of products manufactured. We already know that the vehicles assembled in Romania have relatively low prices. It is also the case of the automotive components industry, which specialises in low value-added products, like automotive wiring. In 2017, Romania was by far the largest European wiring manufacturer, with a total production amounting for EUR 2.56 billion, compared to only EUR 850 million for the second ranking Poland (table 2). Of all large manufacturers, Romania has registered by far the highest growth in the last decade, while the trend for the Western countries is fast decrease.

³⁸ Combined with a slower increase in imports than in exports, the decrease of the value-added share in the turnover might suggest either a stronger local integration of the production chains upstream, either a more and more important share of the assembly of simple products, made of components and raw materials which are not classified as automotive products. The second assumption is more likely, especially if we consider the types of goods exported by Romania - wiring, for example, does not require complex components.

Table 2
Wiring production in Europe

	Total production value in 2017 (billion EUR)	Increase compared to 2007	Average price per unit manufactured in 2017
RO	2.56	+89.5%	12.5 €
PL	0.85	+37.0%	11.2 €
SK	0.80	+69.7%	24.1 €
CZ	0.76	-8.7%	19.4 €
DE	0.71	-36.5%	17.2 €
ES	0.49	-2.3%	18.1 €
AT	0.43	-10.1%	7.5 €
FR	0.29	-57.5%	81.2 €
HU	0.20	-54.9%	12.6 €
IT	0.17	-16.3%	12.3 €
PT	0.15	-52.5%	4.9 €
UK	0.11	-52.3%	52.6 €
FI	0.02	-84.1%	43.5 €

Data source: Eurostat

Currently, Romania's wiring production amounts for more than 30% of the total European value, while quantitatively Romania only manufactures 35% of the total units manufactured in Europe. Mention should be made that the price per kilo of Romanian products (EUR 12.5 on average) is significantly lower than in countries with large vehicle production both from Western Europe (Germany, Spain, UK), and from Central and Eastern Europe (Slovakia, the Czech Republic). In other words, it is not only that Romania specialises in low complexity products, but even these are sold for low prices by the companies in Romania, which means low value-added registered in the country and, implicitly, apparently low financial productivity, low wages and tax revenues etc.

Given Romania's position as an absolute leader in wiring manufacturing at European level, it is not surprising that wiring accounts for more than one fifth of the total automotive components exports of the country (Figure 24). Perhaps more interesting is the comparison between wiring exports and gearbox exports, whose value increased exponentially in the past years, mostly due to the two Daimler factories in Alba County. In 2017, Romania's gearbox exports were the highest in Europe, after Germany and France, but accounted for only 8% of the total gearbox exports of the EU countries, compared to 57% in the case of Germany.³⁹ Only three large gearbox factories (the two Daimler factories and the Mechanical Factory in Mioveni) and approximately five thousand employees in total⁴⁰ generate exports equivalent to three quarters of the total value of dozens of wiring factories with tens of thousands of employees. However, the latter are the rule and they fully reflect how the industry in Romania was integrated in the European automotive production chains (especially in the German production chains). In this division of labour, Romania still has the task to process, mostly manually,

cheap products of low value-added, while their profitable manufacturing in Western countries is incompatible with the pricing policy in the automotive market.

Within the limits of this industrial profile, Romania proved – and still proves – extremely competitive. The matter of competitiveness is crucial for the Central and Eastern European dependant market economies, where foreign capital basically dominates all strategic sectors. As regards the automotive industry, there are two vital factors for the attractiveness of these countries for foreign investments: low costs and proximity to Western customers. The latter is extremely important and explains to a large extent why, for example, Bulgaria does not have an automotive industry, while this industry is highly developed in Romania and is developing fast in Serbia. As we pointed out already, initially, investments targeted countries with high potential and some vehicle manufacturing tradition, while costs and location became more and more important later on. As a general rule for the automotive components industry (to comply with the requirements of the “just in time” principle), the road distance should take approximately one day, which makes Serbia more attractive than Bulgaria and the Western part of Region more attractive than any other region in the country.

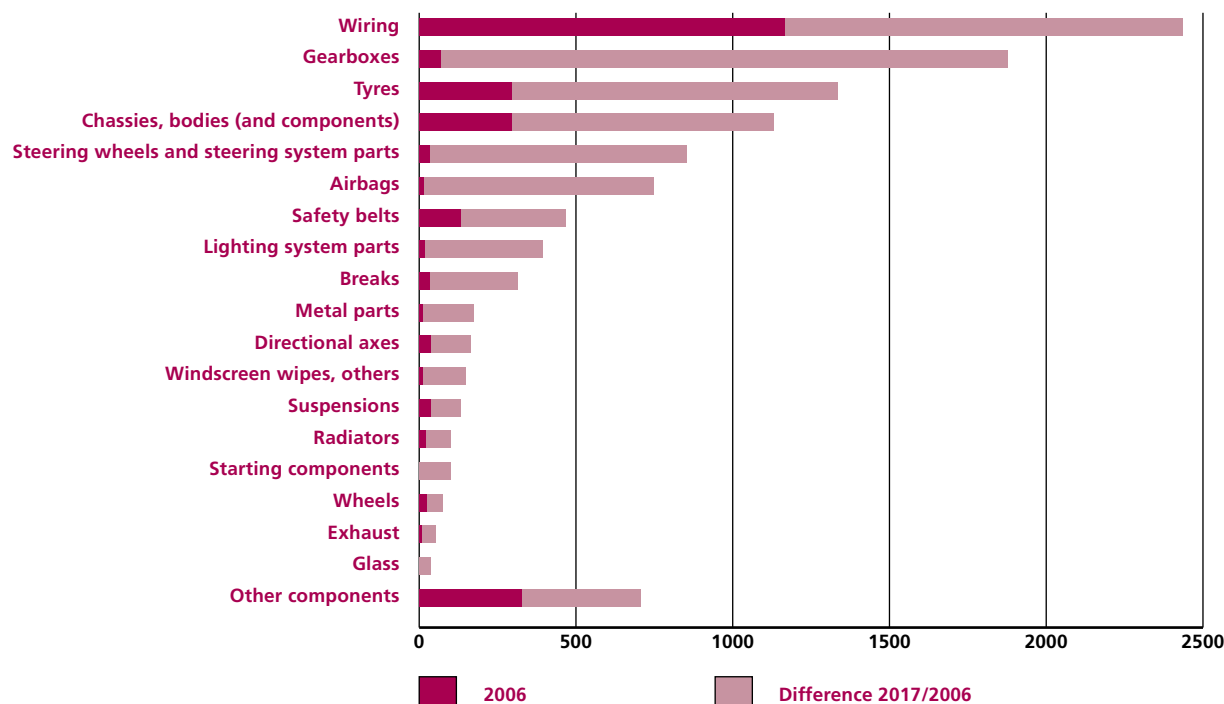
As regards costs, labour holds a key role, but for companies the total cost is of the essence, and this may increase with distance, for example, or may decrease, in certain circumstances. The governments of dependant market economies (Romania, but also Hungary, Slovakia, the Czech Republic or Poland) have facilitated directly and significantly the total cost reduction for automotive companies using state-aid schemes which specifically targeted this industry.

In Romania, between 2007 and 2016, the automotive industry received EUR 411 million through state-aid schemes, amounting for more than half of the total funds of these schemes (table 3). Consequently, state-aid financed 28.8% of the investments of the beneficiary companies. In return of

³⁹ Figures include exports within and outside EU.

⁴⁰ The Daimler factories total less than 3000 employees, and Dacia Mechanical Factory has about 3800 employees, but they also manufacture engines and chassis.

Figure 24

Exports of vehicle components per types of products 2006 and 2007 (hundreds of millions of Euros)

Data source: Eurostat

Table 3

State-aid granted to automotive companies, 2007–2016

	State-aid (million €)	% of investments financed	Jobs created (company commitment)
Pirelli	91.8	23.7%	2,034
Renault	87.4	30.3%	1,147
Bosch	82.5	34.6%	2,390
Star Assembly (Daimler)	37.4	15.7%	510
Delphi	24.8	50%	526
Federal Mogul	16	46.9%	1,819
Continental	14.6	38%	367
Leoni	20	39.6%	527
Rombat	8	41.4%	108
Yazaki	6.8	62.1%	830
Valeo	6.6	41.4%	464
Dräxlmaier	5.2	16.3%	989
TRW (ZF)	4.7	34.9%	1,160
Hendrickson	3.1	48.3%	58
Faurecia	1.6	36.4%	352
Total	410.6	28.8%	13,281

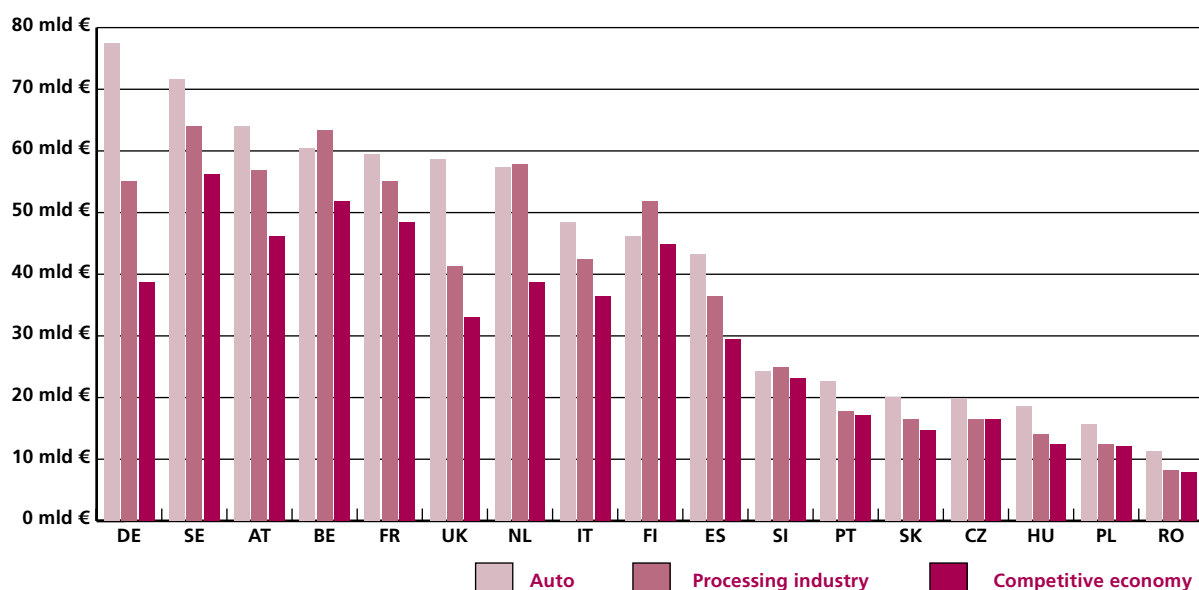
Data source: Ministry of Finance

such funding, the companies committed to create new jobs, and the total of 13,3 thousand represents more than one fifth of the new jobs in the automotive industry between 2008 and 2016. Most large employers in the automotive industry in Romania benefitted from at least one state-aid scheme.

Even though there were significant state subsidies supporting foreign investments, eventually the low labour cost has been

and remains the main competitive advantage of Romania when we speak of integration in the European production chains. Although there are more and more voices warning on the alleged danger of substantial wage increases, among European countries with a developed automotive industry, Romania still has by far the lowest labour costs (Figure 25), far away from Poland (+34% compared to Romania), Hungary (+60% compared to Romania), the Czech Republic (+72% compared to Romania) or Slovakia (+74% compared to Ro-

Figure 25
Average costs per employee per year, 2016



mania). The differences compared to Western countries are undoubtedly huge: the cost per automotive employee is on average 6.6 higher in Germany and 5.1 higher in France than in Romania. It is interesting to note that the ratio between labour costs in the automotive industry and those in the manufacturing industry or in the total competitive economy is much lower in Romania than in virtually all Western countries, where labour in the automotive industry is significantly more expensive than in the total manufacturing industry or in the competitive economy. We should also note that in Romania the cost per employee in the manufacturing industry is practically equal to the cost per total competitive economy – something unimaginable in Western countries. Anyway, the costs in Romania are by far the lowest, and there is sufficient room for manoeuvre for substantial increases on short- and even medium-term, without a significant impact on Romania's competitiveness in terms of low costs.

This last statement is also supported by the fact that the share of labour costs in the value-added generated in the automotive industry has remained constant or even tends to decrease in the case of assembly industry. In other words, the wage increases in the past years have been completely covered by productivity increases, and they changed nothing in the distribution of value-added between labour and capital in the automotive industry in Romania. Despite growing and stronger warnings by employers, the increase in the labour costs is not so much a problem, but a solution to the real issue some companies are already facing, an issue which may acutely impact the entire industry in the future. This is the *cheap* labour shortage, determined by the combination of growing demand by foreign companies and lower supply due to demographic developments and especially to the massive migration for work abroad.

This issue is felt more strongly by the automotive industry than by other sectors of economy, for at least two reasons.

First, the increase in employment in the automotive industry has been much stronger in the automotive industry than in other sectors of economy, especially compared to the manufacturing industry. In 2017, the total number of employees in the automotive industry had exceeded 180 thousand, compared to less than 100 thousand in 2009. Currently, the automotive industry accounts for about 3.7% of the total employees in Romania (compared to 2.1% in 2009) and for no less than 15.3% of the total employees in the manufacturing industry (compared to 8.9% in 2009). In other words, the labour demand is higher in the automotive industry than in other sectors, mostly due to the fast growth of the automotive components sector. Secondly, the very strong geographical concentration of the automotive industry exacerbates the issue of cheap labour shortage, practically a non-existent issue in areas without a strong industry. The proximity of the final customers makes automotive investments focus predominantly in the west and the centre regions of the country, with four counties (Arad, Argeş, Sibiu and Timiş) cumulating half of the workforce in the automotive industry in Romania. The issue of cheap labour shortage is especially acute in Banat and in counties like Braşov and Sibiu, where employment in the automotive industry accounts for an impressive share in the total employment (map 1). These are also the areas investors have focused on during the past years, more specifically, component manufacturers which have very little to do with the factories in Craiova or Mioveni.

The reaction of companies to the cheap labour shortage was twofold. On the one hand, involvement in a real media campaign to prevent wage increases, with regular employers' public interventions ever since the first signs of change in the labour market occurred about two years ago. We include here threats to relocate activities from Romania to even cheaper peripheries like Morocco, Serbia or even Ukraine. On the other hand, additional pressure on human resources departments to constantly recruit large numbers of people to

Map 1
Employees in the car industry, 2016 (% total wages of employees)



Data source: Syndex. Only employees from companies with more than 100 employees are taken into account

cover the increasing labour turnover, combined with moderate wage increases – which, as we have seen, did not change in any way the status quo at European level or for Romania's economy. The state reaction to the cheap labour shortage was also twofold. On the one hand, the increase in the minimum wage and in public wages, hoping that the market will then automatically regulate the wage level in the private sector. On the other hand, the adoption of punitive measures (against people who prefer to rely solely on social benefits, for example) aimed at channelling the alleged cheap labour reserves to the private sector and improve at least temporarily the labour market situation in favour of the employers – in other words, to reduce the cheap labour shortage, without a truly significant increase in labour costs.

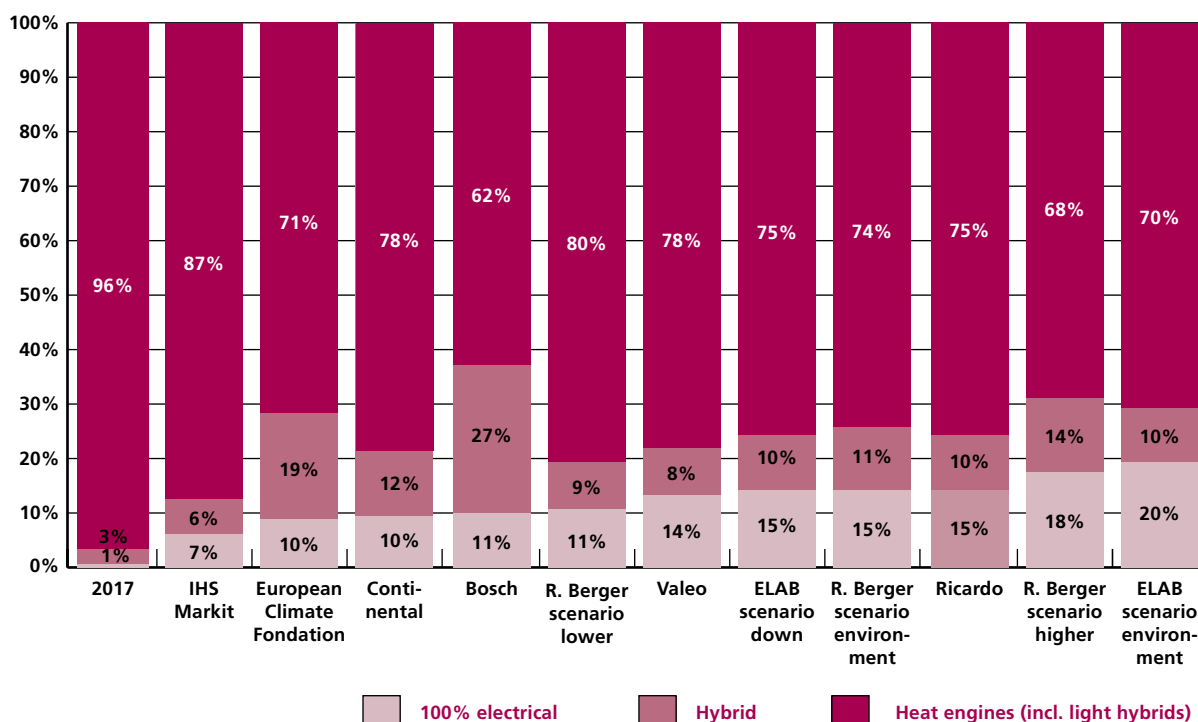
The cheap labour shortage is not specific to Romania.⁴¹ One may argue this is truly a syndrome of the Central and Eastern European dependant market economies, as more and more capital migrates East and more and more workforce migrates West. At least in view of this latter mechanism, the situation in Romania is extreme, as the migration for work abroad reaches very high levels. However, the risks are completely different than those mentioned currently – relocation of ex-

isting production capacities and blockage of potential investments. As regards the relocation of existing production capacities, we should highlight that the wages dynamics in Romania does not occur against a regional background of wage stagnation, but in a very dynamic context, and the increases in Romania are in line with the developments in the other Central and Eastern European countries. Moving investments in even cheaper countries is an extremely costly process and, anyway, it is only a short-term solution for employers, as the investment waves in other peripheral economies inevitably will generate the same cheap labour shortage phenomena. In turn, blocking potential investments cannot pose a threat unless we speak of investments looking for the lowest labour costs possible, thus repeating the vicious circle the Romanian economy seems to be already in. As regards the automotive industry, we should wonder how much investment in wiring factories could still be attracted, given the already huge concentration of the European wiring production in Romania.

Risks are rather related to the current standstill in the stage of relative underdevelopment, by maintaining the current industrial profile: low value-added operations, low technology and low wages. As it became obvious lately, on short- and possibly even on medium-term, there is sufficient room for manoeuvre for maintaining this industrial profile with moderate wage increases. However, in a not very distant future, Romania must choose between maintaining the current industrial

⁴¹ See, for example, the case of Slovakia. Petr Pavlínek, "Whose success? The state-foreign capital nexus and the development of the automotive industry in Slovakia", *European Urban and Regional Studies*, 2016, vol. 23, nr. 4, p. 571–593.

Figure 26

Forecasts on electric cars market share in 2025

profile and increasing manufacturing complexity, and the level of social and economic development; the first option will only make current matters worse. This is a key question for the automotive industry in Romania, first of all due to its major role in the economy of the country and second, due to the current situation of the global automotive industry.

The likely technological revolution in the automotive industry will obviously touch Romania as well, but the impact will be filtered by the manner of integration in the European production chains or, in other words, by the peripheral industrial profile described in this section. Electric and autonomous vehicles will have a major impact on Western European automotive markets, but how will things change in a market such as Romania, where the low purchasing power overwhelmingly favours cheap and especially second-hand vehicles? Given the pressure these new technologies will place on vehicle prices, how will the two factories in Romania cope, as they manufacture low price vehicles? If the technological changes will have the forecasted major impact on the automotive supplier industry, what can we say of the supplier industry in Romania, given its current specialisation? Finally, will these changes bring about more opportunities or more threats to the major role played by the automotive industry for Romania's economy and, especially, labour market? Obviously, these questions are not a priority now for the actors in the local industry, as they rather focus on matters related to costs and cheap labour shortage. However, they will become more and more important, and certain assumptions on future developments may be advanced even now. But, before discussing the potential impact of the global technological changes on a peripheral industry, we should understand these changes.

6.4 GLOBAL TRENDS: ELECTRIC CARS, AUTONOMOUS AND CONNECTED CARS, DIGITISATION

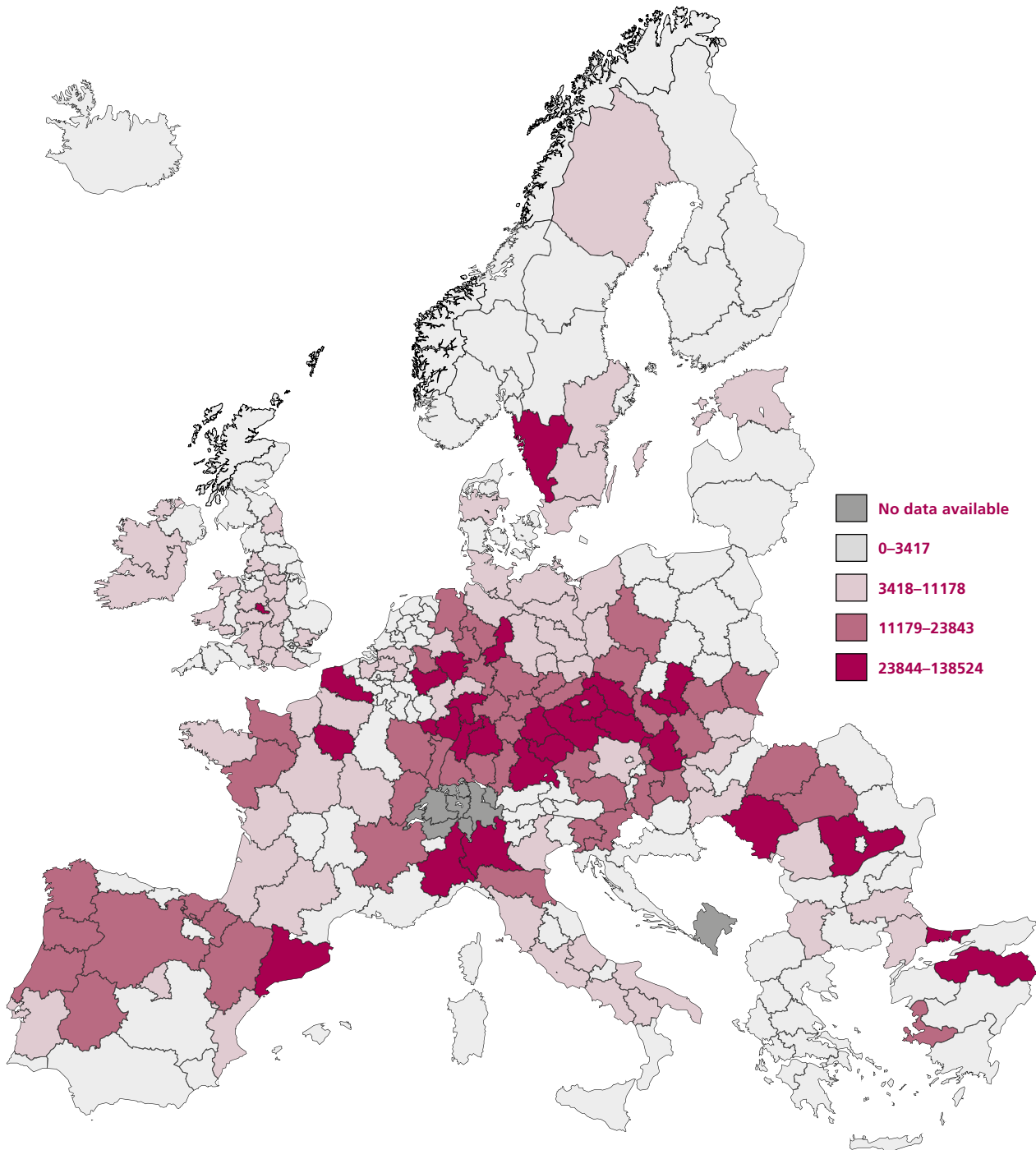
The recovery of the European automotive industry after the crisis at the end of the last decade did not mean the return to stability but, on the contrary, it was accompanied by multiple more or less pessimistic scenarios on the long-term future of the industry. There is more and more talk of a possible radical reconfiguration of the entire automotive ecosystem, from vehicle manufacturing to vehicle use and to the place of the vehicle in daily life. Three crucial technological innovations underpin this potential automotive revolution: electric vehicles, autonomous and connected vehicles and the digitisation of the entire value chain of the industry. Each of them is expected to produce an important impact on companies, on labour and, more generally, on how the automotive industry operates.

Electric vehicles

Given the position of the automotive industry in the European economy, the European Commission highlighted the importance of fast transition to the "new industrial age"⁴², to maintain the technological advance the European manufacturers still have on foreign markets (especially in China) and to protect the European market from the entry of foreign companies (again, especially Chinese companies) which are currently making massive investments in the development of new automotive technologies. The European Commission

⁴² European Commission, GEAR 2030. Final Report – 2017, p. 8.

Map 2

Employees in the automotive industry at regional level – total wages of employees

Data source: DG Growth cluster mapping tool.

estimates that the global electric vehicles market will reach 339 billion dollars by 2030, while the autonomous vehicles market will reach 273 billion. Given the already low profitability in Europe, the risk is considered major if the European industry fails to capture as much as possible from this technological potential. Against this background, the European environmental regulations may be considered actually beneficial for the industry, as they force European manufacturers to innovate and adapt in advance to the emissions reduction need, which will become global in the next two decades. By 2050, the European Commission estimates that the automo-

tive market in Europe will be completely electrified, which means that all new vehicles sold will be pure electric vehicles – battery electric vehicles, without combustion engines; similarly, for the Chinese market and, with time, for all other big markets worldwide.

However, forecasts for the next three decades seem much easier to draft than scenarios on the next decade. As proof, there are numerous rather different estimates of the market share of electric cars, ranging from 7 to 20% for all-electric vehicles until 2025 and from 6 to 27% for hybrid vehicles

Table 4

Impact of electric vehicles market share increase on employment in 2030, by sector and depending on the CO₂ emissions reduction

Sector of activity	CO ₂ emissions reduction target						
	Current situation	20%	30% cars / 25% commercial vehicles	40%	20%	30% cars / 25% commercial vehicles	40%
	Jobs (thousand)	Change (thousand)			Change (%)		
Petroleum refining	151	0	-1	-1	-0.2%	-0.3%	-0.5%
Automotive industry	2,454	0	-3	-12	0.0%	-0.1%	-0.5%
Rubber and plastics products	1,776	+5	+5	+7	+0.3%	+0.3%	+0.4%
Metals	4,288	+5	+5	+5	+0.1%	+0.1%	+0.1%
Electrical equipment	2,451	+5	+7	+12	+0.2%	+0.3%	+0.5%
Electricity, gas, water, etc.	2,852	+2	+2	+5	+0.1%	+0.1%	+0.2%
Other sectors	200,427	+3	+3	+69	0.0%	0.0%	0.0%
TOTAL	230,209	+20	+18	+86	+0.01%	+0.01%	+0.04%

Data source: European Commission, *Impact assessment accompanying the document Proposal for a Regulation of the European Parliament and of the Council setting emission performance standards for new passenger cars and for new light commercial vehicles as part of the Union's integrated approach to reduce CO₂ emissions from light duty vehicles and amending Regulation (EC) No 715/2007 (recast)*, 2017, p.95.

(Figure 26). This diversity is due to the persistence of several crucial unknown factors in determining the manner and the pace of the transition towards an electric automotive market. The main issue is the battery cost which currently does not allow for viable mass sales of electric cars, and the charging infrastructure, which requires investments of billion dollars, especially from governments. Although all analysts indicate that battery price will become dramatically cheaper due to technology developments and that the charging infrastructure will become more and more accessible, there is no agreement on when they will enable mass replacement of combustion engines. Until then, it is expected that hybrid vehicles (which include both a combustion engine and an electric engine) should serve as a catalyst for the transition to pure electric vehicles. Besides the increase in hybrid vehicles, the decline of diesel vehicles - which dominated the market until recently and which had been considered as the European answer to the environmental sustainability issue, before the recent scandals – is a sure fact.

When it comes to production, there are even more uncertainties than those related to the market. It is true that electrification will impact only a part of the industry, the part related to the propulsion systems (engines and transmission), but the change seems radical here. The most visible change will consist in the actual disappearance of the internal combustion engine and of the gearbox and in their replacement by a system consisting in a battery and an electric engine, most likely with transmission included. As the production of engines and gearboxes is usually not outsourced, there will be major impact on automotive manufacturers. The same will happen with the entire supply chain for engines and gearboxes. First of all, it is very likely that battery manufacturers will become the most important automotive suppliers – in some cases, more than 40% of the total value of a pure electric car is

currently attributed to the battery manufacturer.⁴³ We should take into account the fact that battery manufacturers are new actors in the automotive industry, and the traditional suppliers do not have the necessary technical capacities to manufacture these components. Secondly, quite many components which are currently considered essential in the production chain of combustion engines – the tank and the fuel pump, the exhaust system, the clutch, the emission control system, the air or oil filters and the combustion engine components (valves, crankshafts, camshafts etc.) – will no longer be needed, while other completely new components – converters, inverters, distribution modules, charging modules, cooling modules – will replace them.

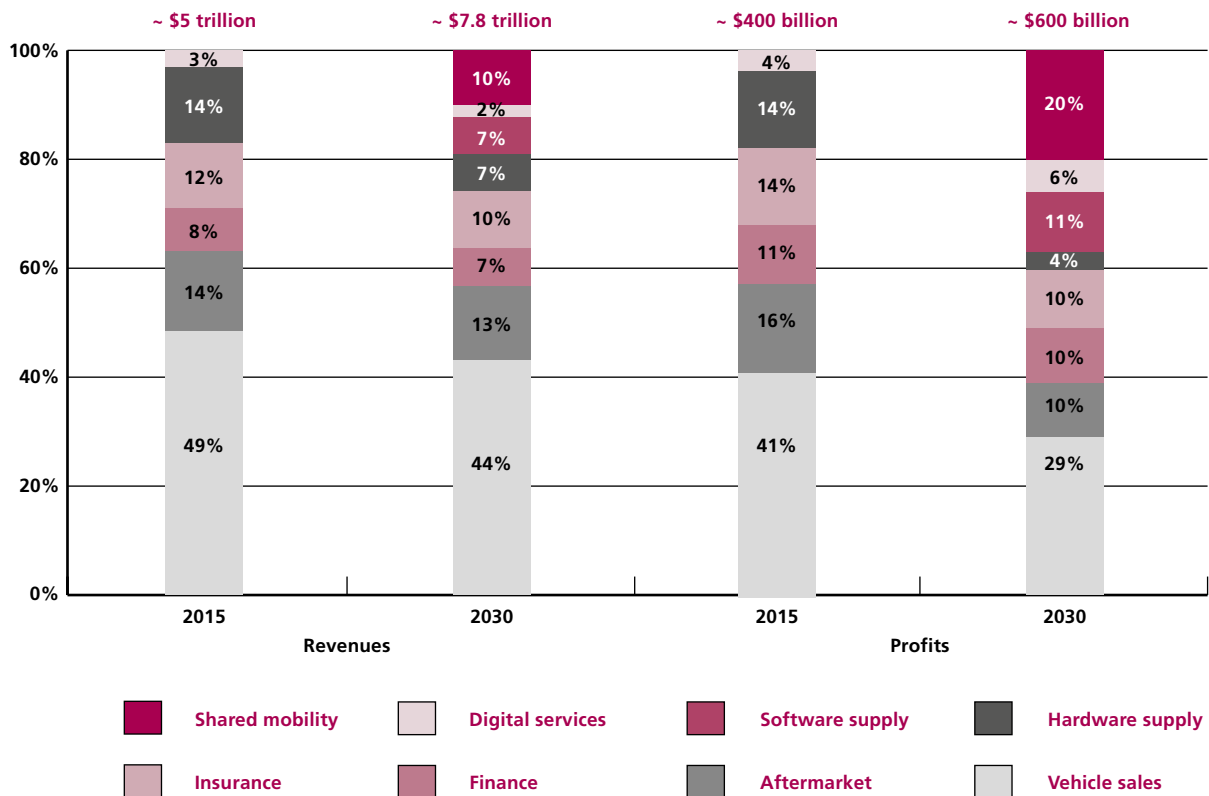
As already mentioned, considering the impact of this transition on the most technologized part of the European automotive industry, one of the major concerns is the loss of competitiveness of the European industry to China, which already seems to have occurred in case of battery manufacturing. Another important concern is the impact on employment, as a substantial share of the automotive industry employees are currently employed for manufacturing combustion engines, gearboxes and components. The pessimistic scenarios indicate hundreds of thousands of jobs lost only in Germany, especially in the automotive industry, but also in the manufacturing industries providing raw materials and components for traditional propulsion systems.⁴⁴ The impact would be

⁴³ It is the case of Chevrolet Bolt, for which LG manufactures 56% of the total content of the car, with 42% only the battery. See UBS. *UBS Evidence lab electric car teardown – Disruption ahead?*, 2017.

⁴⁴ Green Car Congress, „ifo Institute study projects ban on combustion engines in 2030 would affect 600K jobs in German manufacturing“, 2017, available online at: <https://www.greencarcongress.com/2017/07/ifo-institute-study-projects-ban-on-combustion-engines-in-2030-would-affect-600k-jobs-in-german-manu.html>.

Figure 27

Revenues and profitability in the automotive industry worldwide, 2015 vs. 2030



Data source: PWC, Connected car report 2016: Opportunities, risk, and turmoil on the road to autonomous vehicles, 2016

especially visible in the few regions where most of the European automotive industry employees are concentrated, among them, the West region of Romania (see map 2).⁴⁵ In turn, optimistic scenarios show a completely different story, according to which the transition to electric vehicles would create hundreds of thousands of jobs in the European economy, especially in those sectors which would indirectly benefit from funds made available by the collapse of the oil demand. Some of these scenarios maintain that employment in the European automotive industry may increase by up to 8% if export levels are maintained and if Europe manages to build a battery industry.⁴⁶

As if ignoring all these more or less extreme projections, the official forecasts of the European Commission are very modest, with completely negligible changes in total employment by 2030 – but positive, nevertheless: from +0.01 to +0.04%, depending on the road vehicle carbon emission reduction target (table 4). We may say the same for the automotive industry, where a decrease in employment by 0.5% at the most

by 2030 seems to be a very minor threat compared to the typically cyclical problems of this industry.

However, these purely quantitative scenarios may be misleading. Obviously, in terms of figures, the current employment levels in the automotive industry may be maintained during the transition to electric vehicles, but the employment content will very likely change significantly. Mechanical engineering will lose more and more ground to electric and electronic engineering and to the expertise in electrochemistry needed in battery manufacturing. Meanwhile, the hybrid engine development will require investments both in electric and in combustion technologies, which will actually increase the complexity of engine design and manufacturing operations. It is expected that on short- and medium-term employment in research and development will become more and more important in the total automotive employment due to the need to develop electric technologies and to improve combustion engines, which, one way or another, will still be present in the market for many years. Regardless whether batteries will become mass production in Europe or not, there is very little chance that automotive manufacturers and their traditional suppliers become battery manufacturers.

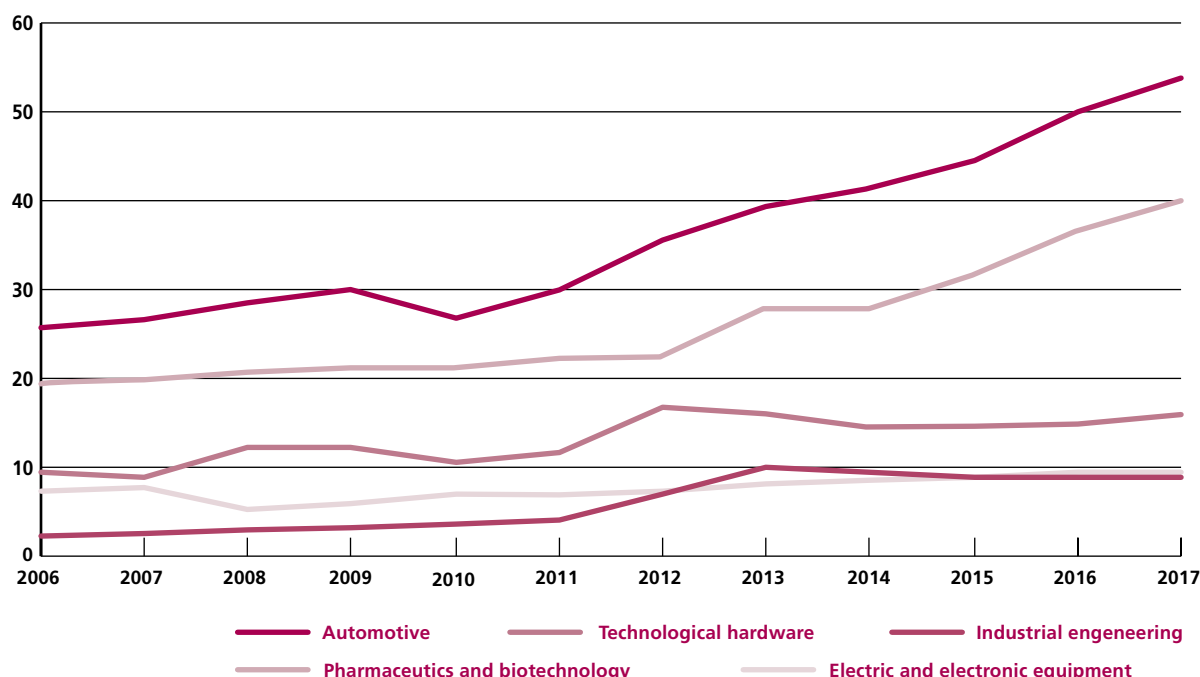
Autonomous and connected cars

Even in scenarios depicting the strongest impact of vehicle electrification, the basics of the automotive industry remain the same, which is not at all valid for scenarios on the impact

⁴⁵ FTI Intelligence, *Impact of electrically chargeable vehicles on jobs and growth in the EU. Particular focus on the EU automotive manufacturing and value chain*, 2018.

⁴⁶ Transport & Environment. 2017. How will electric vehicle transition impact EU jobs? Available online at <https://www.transportenvironment.org/publications/how-will-electric-vehicle-transition-impact-eu-jobs>.

Figure 28
Research-development expenditure at European level



Data source: The Eu Industrial R&D Scoreboard. Only the first 1000 campaigns are taken into account, depending on the size of the investment in R&D

of autonomous and connected vehicles. As regards connectivity as such – vehicle capacity to communicate with the environment, with other vehicles and with users or other objects – the transitions is largely completed; a PWC study indicates that more than 89% of the new vehicles were connected and 100% will be by 2022.⁴⁷ Obviously, technologies will evolve from current technologies – infotainment, GPS, parking assistance systems – to more and more complex human-vehicle interfaces using augmented reality displays. They will also become universal – moving from premium range innovations to integral parts of the standard package for class A, B or C cars. The generalisation of connected vehicles will generate more and more data on vehicles and especially on users, which may be used for industrial and commercial purposes by manufacturers, suppliers or by third parties. All these innovations already stretched the boundaries of the value chain of the automotive industry towards software and data management, activities that both traditional manufacturers and suppliers seem to prefer to develop in-house, to a great extent in order to limit the opportunities to entry the market for extremely strong competitors such as the IT giants.

Connectivity will reshape the value chain of the automotive industry, introducing revenue sources (software, digital services, shared mobility) which are much more dynamic than the traditional ones (vehicle sales, aftermarket, finance and insurance) and much more profitable, which is very important, given the low profitability in the European market. Ac-

cording to certain estimates, in 2030 these new activities will cumulate about 20% of the total revenues and almost 40% of the total profits in the automotive industry (Figure 27). Consequently, there is growing concern that the industry is shifting towards service delivery, in which case vehicle manufacturing and selling – the main activity of automotive companies today – would become just an auxiliary activity. Undoubtedly, no actor in the industry can afford to ignore these changes or to leave the competitors bother about them.

However, the change may be much more significant, especially due to the autonomous vehicles, which represent the technological climax in vehicle connectivity. Even though really autonomous cars will not hit the streets in the next ten years, assisted driving and partial autonomy are already realities for premium models and will become integrated in the standard packages of the lower price cars. The highest risk for the automotive industry is the proliferation of autonomous shared mobility and the replacement, with time, of the standard human driving vehicles owned by individual users by self-driving vehicles which are not property of the users, but are owned by shared mobility services providers. In a scenario where the entire automotive market is seized by such “robo-taxis”, PWC estimates a fleet downsize by up to 14% of the current level and sales cutdowns (and, implicitly, production cutdowns) to half.⁴⁸ Another scenario foresees an extreme polarisation of the market, where vehicles with aes-

⁴⁷ PWC, *The 2017 Strategy& digital auto report*, 2017, p. 8, available online at: <https://www.strategyand.pwc.com/reports/fast-and-furious>.

⁴⁸ The steeper decrease in the car fleet than in sales would be due to a more intensive vehicle use, hence the need to replace them faster. See PWC, *Five trends transforming the automotive industry*, 2018, available online at: <https://www.pwc.com/gx/en/industries/automotive/publications/easycy.html>.

thetic functions would become a niche premium product, while the vast majority of the market would be covered by cheap, featureless, purely functional vehicles.⁴⁹ In such a scenario, the current business model of mass manufacturers – from Dacia to Volkswagen – would prove completely inadequate to the market realities.

Connected and autonomous vehicles are object to the most extreme and futuristic scenarios on the future of the automotive industry. Nevertheless, there is huge uncertainty, and it is impossible to establish by any degree of accuracy how realistic they are. What is certain is that traditional manufacturers and suppliers invest massively in these technologies, competing with IT giants and with the new mobility services providers, like Uber, and with countless start-ups. Together with engine electrification, the connected and autonomous vehicle technology gave a major boost to automotive companies' investments in research and development, which doubled in Europe between 2010 and 2017 (from 27 to 54 billion euro annually), strengthening the leading position of the automotive industry among other sectors (Figure 28). In the past three years, investments in research and development on autonomous vehicles and electric vehicles reached 180 billion dollars worldwide, and Volkswagen, the largest company in the automotive industry, announced investments of 86 billion dollars by 2022.⁵⁰

There are massive risks attached to such investments, especially due to the major uncertainties on the future market and industry configuration and to the likelihood that traditional manufacturers lose ground to new-comers, which sometimes may be much more experienced in hardware and software development or delivery of services than automotive companies. Moreover, the automotive industry must maintain a high level of operational investments, and sensitiveness to the cyclical movements of the economy may quickly bring in crisis companies investing billions in technologies which will pay off in a decade at best.

As regards employment, the short- and medium-term impact of autonomous and connected vehicles development is certainly positive, as investments in research-development by automotive manufacturers and suppliers require personnel specialised in hardware and especially in software development. The impact on employment in manufacturing will only be felt if shared mobility increases sufficiently to threaten the domination of individual mobility – which cannot become a reality earlier than the end of the 2020s. Even so, in case the traditional actors in the automotive industry manage to set off new-comers, the existing scenarios indicate a minor decrease (-1.8%) in employment in the automotive industry by 2025, even though more than 10% of the employees would

be IT specialists in charge with the new mobility services (compared to 0% in 2015).⁵¹ Just like in the case of electric cars, quantitative stability may hide a major qualitative shift in employment in the automotive industry in the next decade.

Production chain digitisation

The third major technological trend which might be said to pose a fundamental threat to the operation of the automotive industry is the general advance of digitisation. If manufacturing as such is not among the important topics for debate on electric cars or on connected and autonomous cars, in the case of digitisation the manufacturing process takes the lead role. In the automotive industry, the transition to the so-called "Industry 4.0" (another way of speaking of digitisation and automation) is well underway, but the change is nowhere near as revolutionary as autonomous and connected vehicles or even electric vehicles may become. In the most futuristic scenarios, digitisation would fully impact on the entire production chain, from logistics to sales, leading eventually to a quasi-total automation, enabling loss reduction (dead time, inefficient use of production capacities etc.) and almost perfect adjustment to customer needs and to the ever-changing market trends. Digital technologies would enable accurate coordination of suppliers and manufacturers, manufacturing data generation would enable flaw reduction and a generalisation of the predictive maintenance of equipment, and artificial intelligence and the new sensor generations would enable the development of robots capable of replacing a significant part of the employee manual work. In the automotive industry, these are not new ideas, they actually underpin the flexible production paradigm (just-in-time, lean), which has dominated the industry since the 1980s.

The matter of workforce is central for digitisation, and the supporters of "digital factories" maintain that it solves the historical issue of the labour intensive work, linked with expensive and "inflexible" production systems.⁵² A lower labour costs share in total expenditure is one of the main goals of digitisation, contributing to a total cost decrease by up to 20%. According to Roland Berger estimates, "digital factories" could display 10–20% decreases in the production costs, 10–20% decreases in logistics costs, 30–50% decreases in stocks, 10–20% decreases in quality assurance costs, 60–70% decreases in complexity costs and 10–20% decreases in maintenance costs.⁵³ Regardless how substantial cost reduction due to digitisation might actually be, the necessary investments to achieve such goals require billions euro, which means additional pressure on the actors in the industry. According to the most radical scenarios, the worker on the future digital factory will only be indirectly productive; in other words, the workers will no longer use their hands and

⁴⁹ Roland Berger, *Automotive 4.0: a disruption and new reality in the US?*, 2015, available online at https://www.rolandberger.com/en/Publications/pub_automotive_4_0.html.

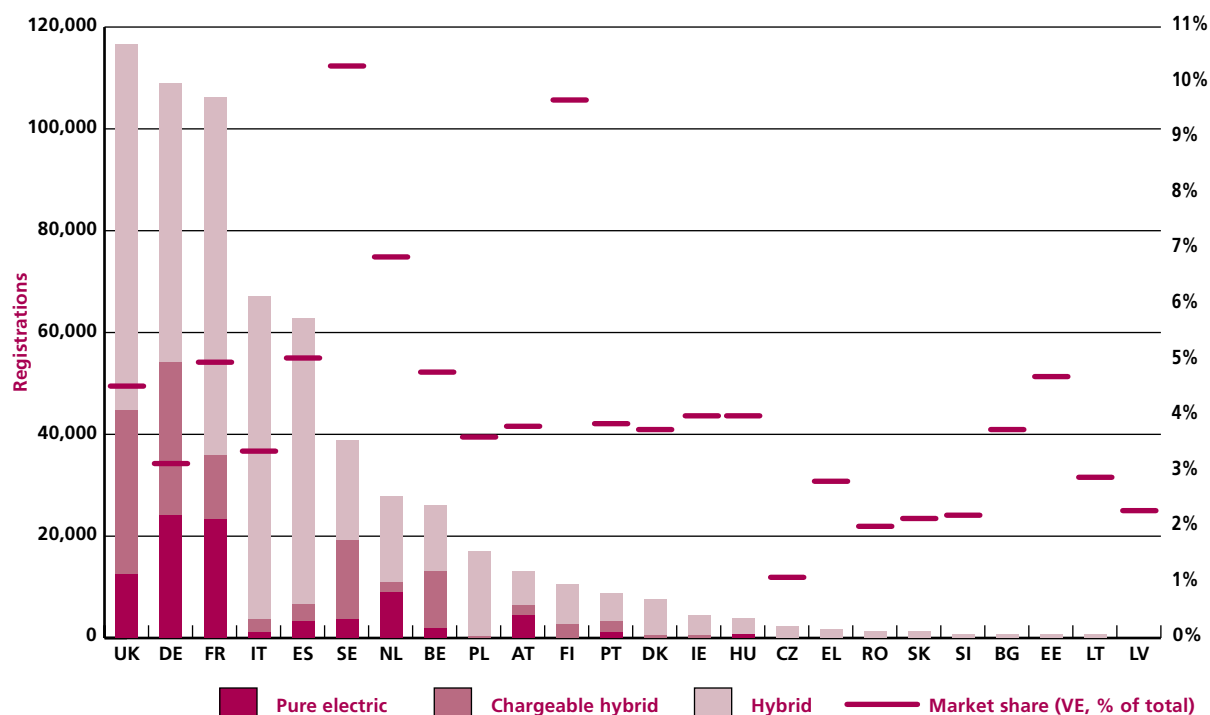
⁵⁰ Deloitte, *The future of mobility. How transportation technology and social trends are creating a new business ecosystem*, 2018, available online at: <https://www2.deloitte.com/insights/us/en/focus/future-of-mobility/transportation-technology.html>.

⁵¹ Deloitte, *The future of the automotive value chain: 2025 and beyond*, 2017, available online at: <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/consumer-business/us-auto-the-future-of-the-automotive-value-chain.pdf>.

⁵² Roland Berger, *Digital factories: the time to capitalize on digital factories is now*, 2016, p.3, disponible online la adresa: https://www.rolandberger.com/en/Publications/pub_digital_factories.html.

⁵³ Ibid, p. 7.

Figure 29
Electric car market in Europe, 2017



Data source: ACEA

mechanical or electric tools, and the traditional assembly, adjustment or correction tasks will be replaced by robot-supervision tasks – and not directly, but by using tablets or laptops. Unlike the other two major technological changes, digitisation can only lower employment levels in the automotive industry, but similarly to electric and autonomous and connected vehicles, it will tend to transform the contents of the industrial work, it will require new skills and will replace to a significant extent old skills.

6.5 PERIPHERAL PERSPECTIVES: THE IMPACT ON THE AUTOMOTIVE INDUSTRY IN ROMANIA

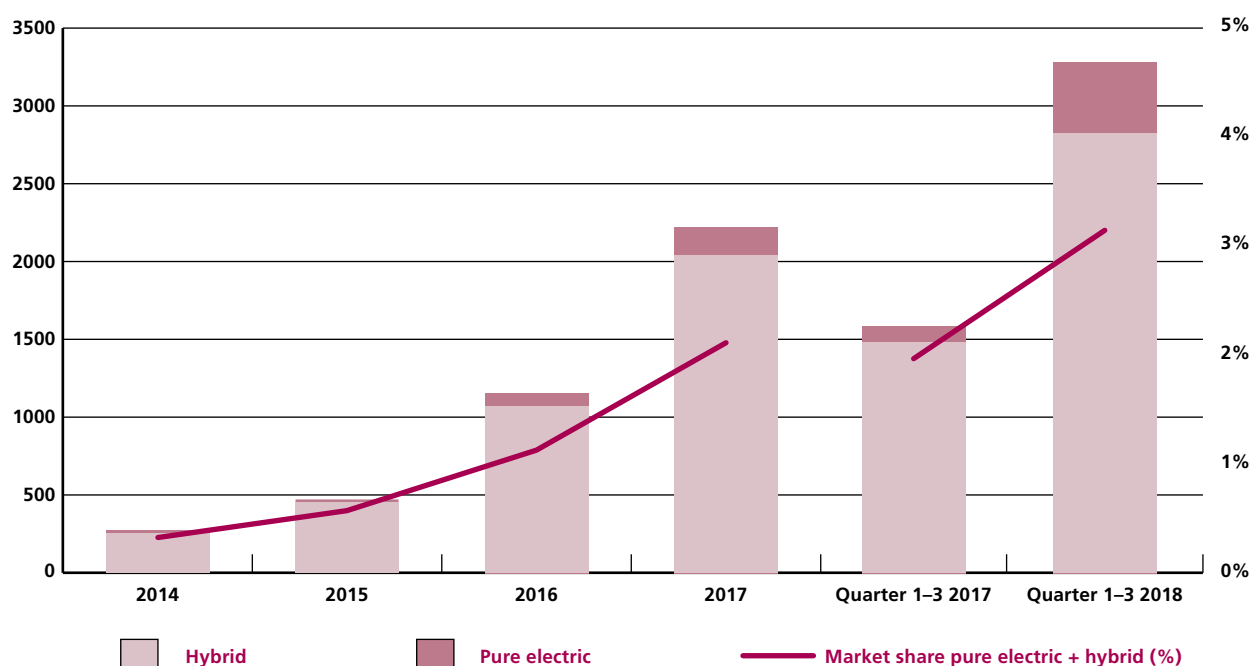
Electric cars: a delayed transition, though already underway

The effervescence of scenarios on the future of the automotive industry does not leave much room for understanding the differentiated impact these changes will have from one region to another or even from one country to another, depending on position of their markets and industries in the global automotive ecosystem. Conversely, there is abundant talk about momentous, homogeneous and consistent changes, which seems even more relevant for Europe, where there are common regulations for the EU Member States and where domestic markets and industries are strongly interconnected. If in some cases they highlight, for example, possible growth disparities for electric car markets in developing countries, there is very little interest for how these transformations will impact on the European periphery. Even though the situation may become more balanced in the long-term –

if, for example, the European Commission's forecasts on a completely electrified new vehicle market by 2050 – it is very likely that the transition will look very different in the East compared to the West, considering the divergent dynamics of the markets and the differentiated integration in the production chains at European level. Just like in the previous sections, we may discuss possible transformations for Romania starting from the impact on the market, on the industrial structure and on employment.

Given the overall weakness of the automotive market in Romania, it is not surprising that Romania simply does not matter in the European electric vehicle market (Figure 29), with electric vehicle registrations (pure electric and plug-in hybrids) in Romania accounting in 2017 for only 0.2% of the European total (compared to 0.7% for all new vehicles). Even though the developments may seem spectacular as percentages (pure electric cars registrations increased almost four times in Romania in the first quarters of 2018 compared to the same period of the previous year, recording the highest increase in Europe – Figure 30), the market share for electric cars is among the lowest: 2.1% compared to 4.3% the European average for total electric cars (pure electric and plug-in hybrids); 0.2% compared to 0.6%, the European average for pure electric cars. Only 468 pure electric cars were registered in Romania during the first nine months of 2018, compared to 867 in Hungary and almost 25 thousand in Germany. The situation is somewhat better for hybrid cars (plug-in and non-plug-in hybrids), but not much: 2812 registrations in Romania during the first three quarters of 2018, compared to 4144 in Hungary and almost 72 thousand in Germany.

Figure 30
Electric car registrations in Romania



Data source: ACEA

Obviously, the Romanian electric vehicle market is minor compared to the European perspective also because the entire market is much below most other domestic markets of the continent. The obstacles are the same everywhere – price and availability of charging infrastructure – but they have a stronger impact in Romania than in Western EU countries. The still very high price of electric cars is a much bigger issue in a country where the purchasing power is very low. In response to this problem, the government adopted generous measures to foster electric vehicles sales, as the car scrappage programme “Rabla Plus” provides subsidies in amount of RON 45 thousand to purchase a new pure electric car and RON 20 thousand to purchase a hybrid car. About one quarter of the electric car sales in 2017 (540 vehicles of a total of 2227) were supported by this programme, compared to only 4% in 2016 (45 vehicle of a total of 1163), when incentives amounted for only RON 20 thousand for a pure electric car and RON 5 thousand for a hybrid vehicle. If we add the fact that electric vehicles are tax-exempt, currently, Romania provides the most favourable package of incentives for purchasing electric vehicles.⁵⁴ However, the demand remains low, explained by the very high price of electric vehicles, even with the state subsidy – for example, the price of a BMW i3, which is the most popular electric model in the Romanian market, with a market share of 20%, may exceed EUR 40 thousand.

Generally, it is assumed that this issue of high prices will solve by itself once the manufacturing costs and especially the bat-

tery costs will drop enough so that the final price of the electric vehicles becomes comparable with the price of combustion engine vehicles. But even when Western countries reach this turning point, the costs will still be relatively high in Romania, and the current situation, when second-hand cars are preferred to new cars for price reasons, will remain unchanged. Moreover, since electrification will lower the resale value of combustion engine cars in the Western markets, we can expect even an increase in the second-hand car market in Romania, electric cars remaining in the upper new car market share. The electric car market in Romania cannot develop according to forecasts for Western markets without a significant limitation of second-hand car sales, which may only be achieved either by restrictions or by an increase in the purchasing power of the population. But efficient restrictions would be extremely unpopular, fact already proven by the last decade controversies on the vehicle tax.

Besides high costs, infrastructure is an even greater limitation in Romania than in most other European countries. According to the European Observatory on Alternative Fuels, in 2018 there were only 117 recharging points accessible to the public in Romania, with the second lowest average in Europe per 100 km of road, after Greece (table 5). As mentioned in the government strategy on alternative fuels, the infrastructure installed so far is largely “due to the private sector”.⁵⁵ To com-

⁵⁴ To compare measures adopted by EU countries, see ACEA, „Overview: tax incentives for electric vehicles in the EU”, 2018, available online at: <https://www.acea.be/publications/article/overview-of-incentives-for-buying-electric-vehicles>.

⁵⁵ See Annex to the Government Decision no. 87/2018 approving the Strategy for the National Policy Framework for the alternative fossil fuels market development in the transport sector and for installing relevant infrastructure in Romania and setting-up the Interministerial Steering Committee for alternative fuel market development, published in the Official Journal 225bis of 13 March 2018.

Table 5
Electric vehicle charging infrastructure in Europe, 2018

	Recharging points			Charging positions per 100 km of roads
	Total	Normal power (≤ 22 kW)	High power (> 22 kW)	
NL	36962	36010	952	26.7
DE	26162	22314	3848	11.4
FR	24770	22507	2263	2.3
UK	18158	14160	3998	4.3
NO	11535	9000	2535	12.2
SE	5833	3026	2807	2.7
ES	5111	4312	799	0.8
AT	4128	3429	699	3.3
IT	3436	2829	607	1.3
DK	2616	2124	492	3.5
BE	1858	1493	365	1.2
PT	1578	1322	256	11
IE	1046	837	209	1.1
FI	973	706	267	1.2
CZ	769	573	196	0.6
LU	744	734	10	25.8
PL	682	470	212	0.2
HU	580	500	80	0.3
SI	535	385	150	1.4
HR	510	422	88	1.9
SK	505	347	158	0.9
EE	390	193	197	0.7
LV	296	73	223	0.4
LT	151	69	82	0.2
RO	117	95	22	0.1
BG	108	63	45	0.5
MT	97	97	0	4.1
EL	50	40	10	0.04
CY	36	36	0	0.4
EU	149736	128166	21570	3

Data source: European Alternative Fuels Observatory, The European Union Road Federation

ply with the European rules, the government assumed in this strategy an objective of 19,5 thousand recharging points accessible to the public by 2025, of which about 2250 should be directly financed by the Environmental Fund Administration, 1260 should be financed by the local governments budgets and the rest by the private sector (big trading companies, real estate developers, owners' associations, fossil fuel traders), and the last category should benefit from various "encouraging" measures to be adopted by authorities. Although it seems ambitious⁵⁶, even if the objectives are fully achieved, in 2025 Romania will have fewer recharging points accessible to the public for 100 km of roads than the Netherlands had in 2017 (22.9 compared to 26.7). Moreover, if Romania intends to have 19,5 recharging points in eight years,

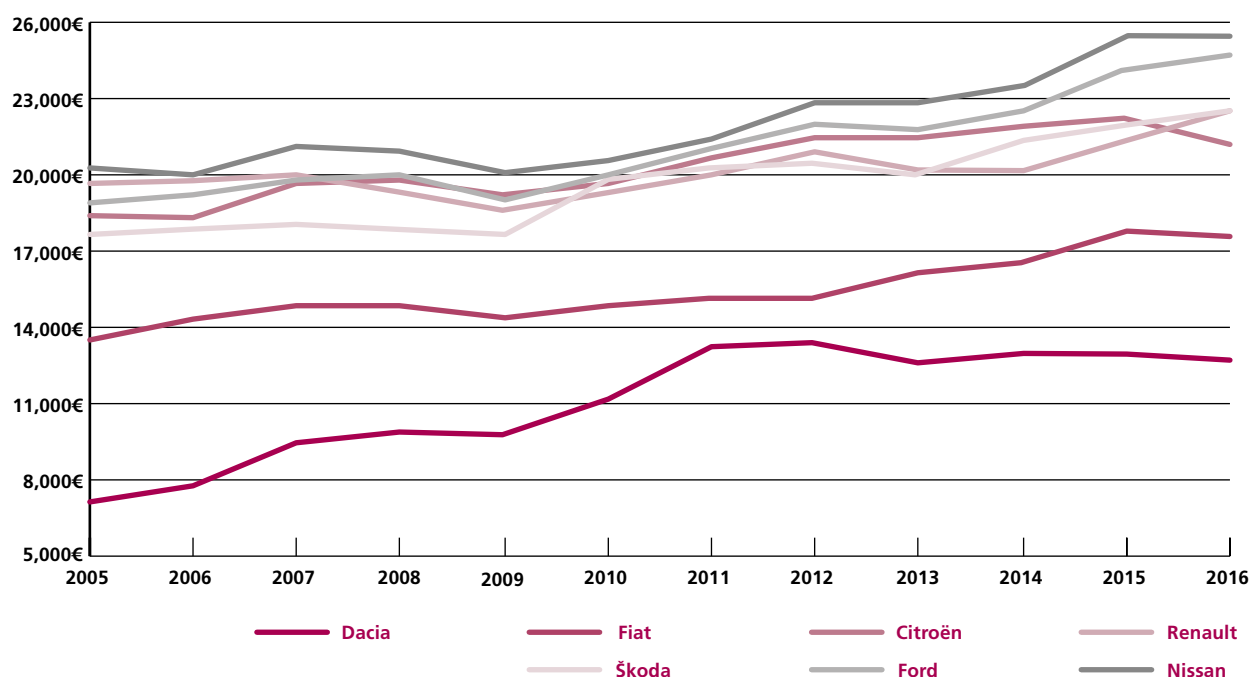
in the Netherlands their number increased by 21 thousand in just three years (2015–2017).⁵⁷ Consequently, it is expected that the electric car market should evolve much more slowly in Romania and should be limited to areas where infrastructure investments concentrate (large urban agglomerations and most important road connections).

The evolution of the vehicle production cannot match the market evolution, at least if we consider the fact that only a small share of the vehicles assembled in Romania are sold on the domestic market, most being exported to Western markets. Therefore, we can expect that electric vehicles production in Romania should increase as their market share increases abroad, regardless how delayed the transition is in the

⁵⁶ Previous versions of the document mentioned much more modest objectives – only 1000 charging points by 2020.

⁵⁷ See *Electric transport in the Netherlands. Highlights 2017*, p. 42, available online at: <https://www.rvo.nl/sites/default/files/2018/04/Highlights%20EV%202017%20English.pdf>.

Figure 31
Average vehicle selling price in EU, 2005–2016 (selected brands)



Romanian market. However, things are not that simple, precisely because Romania manufactures cheap vehicles, which are not a priority when it comes to electrification and which will be electrified only when the costs with the new technology will decrease enough to allow for an acceptable level of profitability in the absence of government incentives.

Even though currently such a level is expected to be reached by mid-2020s, the transition might be longer, at least for Dacia, because the battery costs should drop much more to maintain the considerably lower price of the Dacia brand, compared to all European competitors (Figure 31). Indeed, it is very likely that the first electrified Dacia models will continue to take over some engineering elements and components from older Renault models, which would mean that Dacia models will be electrified some years after standard Renault models. On the other hand, the Renault strategy involves the fast development of a cheap electrified model for the Chinese market, which might further underpin the electrification of Dacia models. Renault management set very ambitious objectives until 2022: 20 electric models, of which 8 pure electric vehicles; 60% of the European range will be electrified “at the best cost”; and electric options for all key market segments.⁵⁸ Even though the forecasts on sales for the “Global Access” models, including Dacia, expect increases from 1.2 million in 2016 to 2 million in 2022, the company strategy is reserved with regards to the introduction of electric versions for this range, and company officials in Romania indicated that such an option is not open yet due to cost

reasons.⁵⁹ In turn, Ford announced massive investments of 11 billion dollars for launching 24 hybrid models and 16 pure electric models by 2022, including SUV and crossover models, possibly similar to those manufactured in Craiova.

There are very few public details on such plans, which means that any attempt to identify precisely when the factories in Romania will start mass production of electric vehicles is purely speculative. Again, most likely this will happen later than in the case of Renault and Ford factories from Western Europe, and the foreign demand for internal combustion engine vehicles manufactured at Mioveni and Craiova will maintain until the entry into force of radical measures to limit the sales of combustion engine vehicles.⁶⁰ Indeed, according to IHS forecasts, Romania will not start manufacturing full hybrid vehicles until 2025, in the Mioveni factory. But the transition has already started, which is visible in the gradual removal of classical combustion engine vehicles and their replacement by stop/start system, currently an almost completed process.⁶¹ IHS estimates that light hybrid vehicles production would start in 2020 at Craiova and in 2023 at Mioveni.⁶² In total, forecasts show that the share of hybrid

⁵⁸ See the strategy *Drive the future* for 2017–2022, available online at http://event2.media.renault.com/061017/conferences/externe/player_en_vod3.html

⁵⁹ See the interview with Yves Caracatzanis at the beginning of this year, available online at: https://adevarul.ro/locale/pitesti/interviu-yvescaracatzanis-director-general-dacia-daca-nu-mentinem-competitivitatea-uzineide-mioveni-punem-mare-pericol-viitorul-1_5a7e-ae30df52022f7562e0b6/index.html

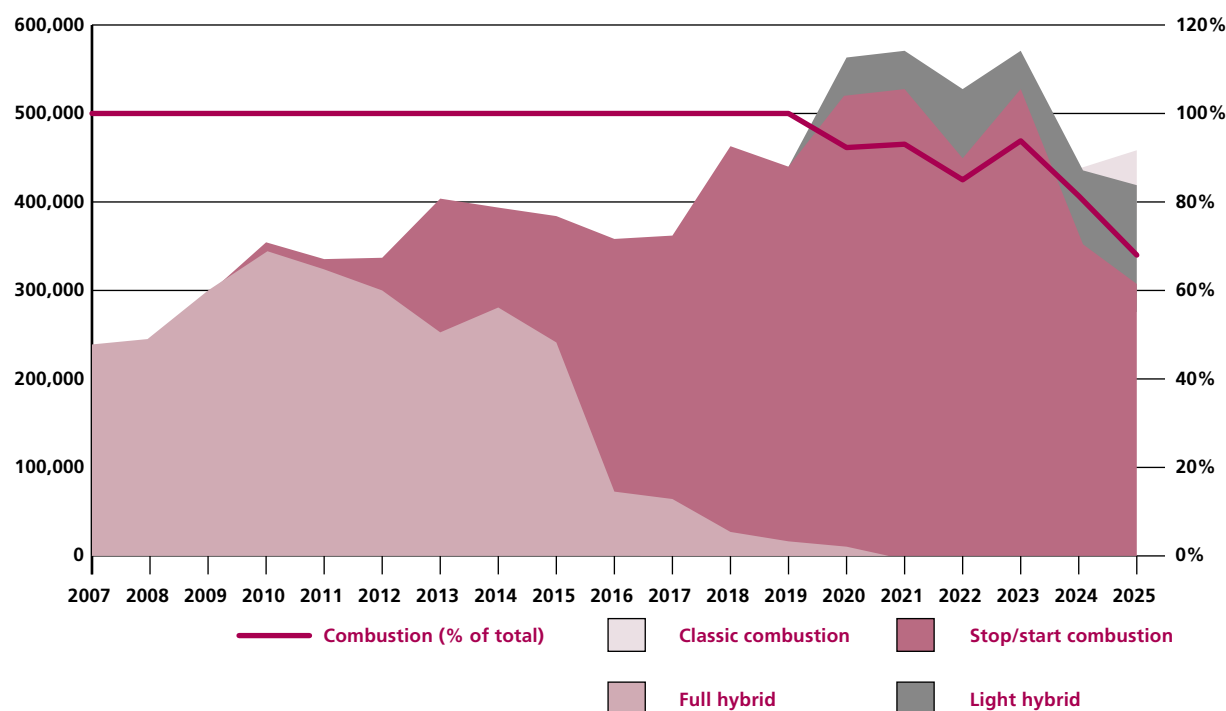
⁶⁰ The ban on internal combustion engine vehicles was announced by some European cities, like Paris, but not earlier than 2030.

⁶¹ The stop/start technology automatically shuts down the engine when the vehicle is idle and instantly restarts the engine when necessary.

⁶² Light hybrid vehicles include an electric motor which supplements the internal combustion engine, but the car cannot function only with the electric motor, as in the case of full hybrid vehicles.

Figure 32

Vehicle production by type of propulsion system, 2007–2017 and forecasts for 2018–2025



vehicles (light and full hybrid) in the total production of the two factories will reach approximately 32% in 2025. Consequently, even though electrification will wait in case of vehicle manufacturing in Romania, the transition is already underway. Another relevant indicator for this trend is the decline in diesel engines, which is expected to happen in Romania as well starting from 2018, when IHS estimates a share of 44% of diesel vehicles in the total production, compared to 50% in 2017. By 2025, IHS forecasts indicate a decrease in diesel vehicles to only 6% of the total production of the two factories. Just like we see currently everywhere in Europe, petrol vehicles stand to gain most on the short-term, even though the accelerated decline of the diesel technology is a major catalyst of the transition to electric vehicles.

Therefore, the most likely assumption is that on short- and medium-term the two automotive factories in Romania will not be negatively impacted by electrification, but they will actually boost their operations with the commencement of hybrid vehicles production, which are significantly more complex than the classical internal combustion engines. However, on the long-term, engine and gearbox assembly operations will gradually decrease, and considering the current situation, there will be about ten thousand direct job losses.⁶³ Obviously, we are speaking of a transformation which might last even three decades, but the loss for the automotive industry in Romania would be significant, because engines and gearbox-

es are among the most valuable components manufactured locally and have a vital role in the foreign trade in automotive goods. In this case we may also see a boost in activity on short- and especially on medium-term, but as internal combustion vehicle components become mass products more and more sensitive to cost variations the engine and gearbox production may move even more from West to East to benefit from low labour costs and from the use of newer and more efficient production capacities. This is true for all components in the value chain of the internal combustion engine vehicles.

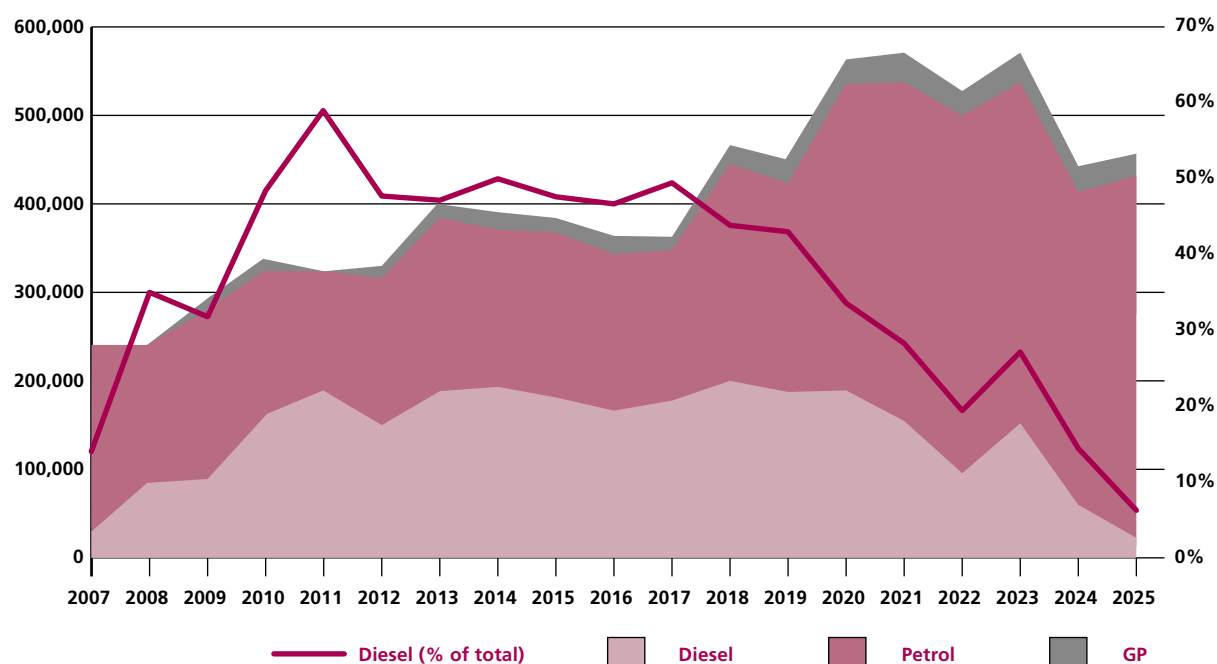
Currently, vehicle electrification should not have a major impact on most existing suppliers in Romania. Romania is an important wiring manufacturer, including wiring for internal combustion engines, but the transition to electric cars does not entail a reduction in the wiring needs or wiring simplification, as is the case with the mechanical components of the engine. On the contrary, with the transition to autonomous and connected vehicles, the wiring content may increase significantly. Similarly, the production of tyres, bodywork, wheels, safety elements (safety belts, airbags), lighting components etc. (see Figure 32) should not be affected, either positively or negatively, by the replacement of internal combustion engines with electric systems. From the important automotive manufacturers in Romania, UBS estimates that only Schaeffler, Faurecia and Delphi are relatively vulnerable, while others like Lear, Autoliv, or Hella will not face problems caused by the technological changes.

Autonomous and connected cars: low costs (dis)advantage

A closer look actually shows that the new technological trends may bring about important growth potential for cer-

⁶³ Industry sources highlight that electric motor manufacturing (without the battery) requires 80% or even 90% less workforce than internal combustion engines. See FTI Intelligence, *Impact of electrically chargeable vehicles on jobs and growth in the EU. Particular focus on the EU automotive manufacturing and value chain*, 2018, p. 11.

Figure 33
Vehicle production by type of fuel, 2007–2017 and forecasts for 2018–2025



Data source: IHS Markit

tain suppliers. The most important supplier and the biggest automotive company in Romania in terms of number of employees, Continental, estimates significant growth due to the development of electric vehicles, of connectivity and of autonomous driving, as this market open to suppliers should increase by 30% by 2025, while the traditional products market would increase by only 1% per year.⁶⁴ In 2025, Continental estimates that the new technologies will have 15% share from a market of more than EUR 1.25 trillion, compared to less than 3% now. The company is already adjusting to the new trends, and the objective is that sensors and software should amount for 70% of the portfolio by 2025. Continental content in a pure electric car is four times more numerous than in a petrol internal combustion engine car, as the engine management systems (injectors, ECU, pumps), the exhaust systems, or the turbocompressor are replaced by electronic power management systems, charging systems, battery management systems, converters and cooling components. As regards autonomous cars, they need different types of cameras, radar and LIDAR systems and ultrasonic sensors. In order to reach these objectives and to respond on time to the market transformation, the Continental group increased its capital expenditure from EUR 1 billion in 2012 to approximately 1.8 billion in 2017, with increase forecasts for 2018 as well. Also, research and development expenditure increased from EUR 1.5 billion in 2012 to approximately 2.7 billion in 2017 and will continue to increase at least until 2019. Thus, the spectacular increase in research-development expenditure in the European automotive industry (Figure 33) is very visible in company strategies.

By definition, a dependent economy such as Romania could not have a very intensive research-development activity, as investments focus on manufacturing. The comparison at European level seems to confirm this assumption, as the automotive companies in Romania channel relatively little resource to research-development activities: overall, only 3.2% of the value-added and 1.3% of the employees, compared to 27.1% of the value-added and 11.2% of the employees in Germany (figures for 2015 – Figure 34). From this perspective, there is obvious contrast between CEE countries and Western European countries, but there are significant differences between Central and Eastern Europe dependant economies as well (Figure 35). With only EUR 103 million investments in research-development in the manufacturing industry in 2015, Romania is far away from all other CEE countries: expenditure in the Czech Republic is 9 times higher, in Poland 8.4 times, in Hungary 4.4 times and in Slovakia 1.9 times. Things are somewhat more favourable for Romania if we look only at the automotive industry, where expenditure increased visibly between 2013 and 2015, from EUR 40 million to EUR 91 million, exceeding Slovakia, but still lagging behind the Czech Republic (expenditure 2.9 higher), Poland (expenditure 1.8 higher) and Hungary (expenditure 1.3 higher). It should be noted that the research-development expenditure of the automotive industry in Romania represents a very large share of the research-development expenditure of the entire manufacturing industry, and from this perspective the automotive industry domination is much more obvious in Romania than in all other CEE countries with important automotive industries.

⁶⁴ Continental, “CES 2018 — Driving the future of Mobility. Strategy Presentation”, 2018.

According to NIS data, in the research-development expenditure in the automotive industry in Romania in 2016 accounted for 67% of the total research-development expenditure in

Figure 34

Research-development expenditure and personnel in the European automotive industry, 2015



Data source: Eurostat

Figure 35

Research-development expenditure in CEE countries, in the automotive industry and in total manufacturing industry

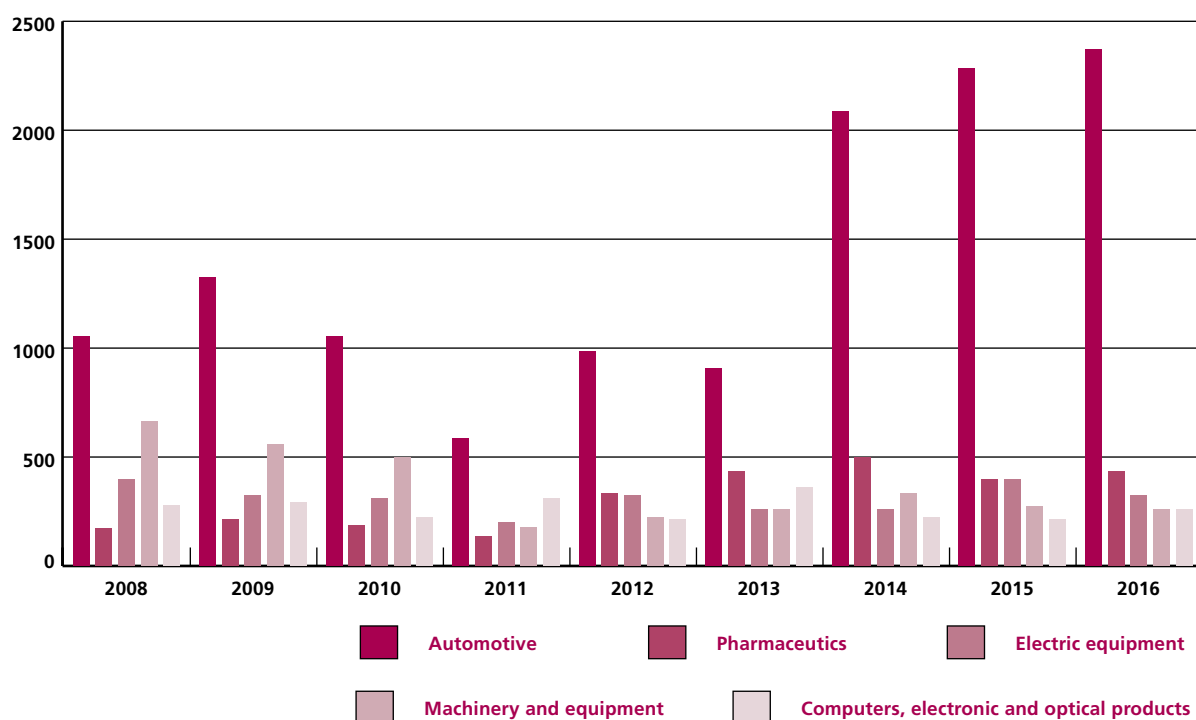


Data source: Eurostat

the manufacturing industry and for 25% of the total research-development expenditure in the economy, compared to 26% and 12%, respectively, in 2008. There was a similar increase in employment: In 2016, 52% of the employees in research-development activities in the manufacturing industry and 22% of the total in the economy worked in the automotive industry, compared to 21% and 9%, respectively, in

2008. The increase is spectacular, especially in view of the standstill and even decrease in the research-development activities in most other important branches of the manufacturing industry (Figure 36). Indeed, besides Renault's engineering division (Renault Technologie Roumanie, with more than 2000 total employees), many suppliers already adopted or announced plans to invest in important research-develop-

Figure 36

Employees in research-development activities in the manufacturing industry in Romania

Data source: Eurostat

ment operations in Romania: Continental (four locations, about 6000 employees), Autoliv (three locations, about 1000 employees), Hella (two locations, about 800 employees), Bosch (one location, about 300 employees). Also, many automotive companies (Kromberg & Schubert, Schaeffler, TRW etc.) made small research-development investments, with less than two-hundred employees.

As one may notice, a significant share of these activities is not reflected in the official NIS statistics, as they are classified either as manufacturing activities or as research-development activities in other fields. Most often it is the case of pure engineering activities, especially software and hardware engineering for autonomous and connected vehicles. The development of advanced driver-assistance systems (ADAS), for example, is an important objective for the research-development activities of companies like Continental, Autoliv or Porsche in Romania. As discussed in the previous section, the connected and autonomous vehicle technology pushed automotive manufacturers and suppliers beyond the traditional boundaries of the industry, towards hardware and software development specific to the IT sector. Moreover, digitisation has provided an important boost for suppliers providing automation and streamlining solutions for logistics and industrial processes, and these activities show a significant increase in Romania as well. Thus, although it is difficult to estimate accurately, an important share of the IT development sector in the past years is due to the substantial investments in the European automotive industry. It is expected that this development will continue, since the necessary investments in research-development in the automotive industry will continue to be very high and keeping in mind, again, the low labour

costs in Romania. However, all these do not change the overall picture, and there are still huge differences compared to Western countries.

Similarly, with the production of vehicles and components, which focuses mainly on exports, the technologies developed in Romania will not be available too soon for vehicles manufactured in Romania. As we already discussed in detail, electrification will lag behind more or less significantly compared to production in Western Europe, and the same will happen with the connected and autonomous vehicle technology, even though a low-cost brand like Dacia already provides customers connectivity elements. Developments are also slow in the mobility services market, although local startups (Clever Tech, Star Taxi App) are successful in big cities and despite the presence in the market of companies like Uber, Taxify or BlaBlaCar. Despite the statements made by some of these companies, the mobility services market in Romania remains relatively limited, especially in geographic terms.⁶⁵ *Except for Daimler which purchased Clever Tech in 2017, the big European manufacturers have not yet entered the Romanian market as mobility services providers, and there is no intention announced so far. As demonstrated by the conflict between Bucharest Municipality City Hall and the two local companies providing taxi apps, local authorities would not be*

⁶⁵ In spring this year, Uber representatives announced that they reached one million users. See Vezi „Americani de la Uber au ajuns la 1 milion de utilizatori în România” [The Americans from Uber reached 1 million users in Romania], *Ziarul financiar*, 24 May 2018, available online at: <https://www.zf.ro/business-hi-tech/americani-de-la-uber-au-ajuns-la-1-milion-de-utilizatori-in-romania-17228712>.

necessarily open to the development of a mobility services market.

Digitisation of manufacturing: “factory of the future” and cheap labour

As regards the third major technological change – digitisation of manufacturing – the costs are also important and will delay any major transformation announced by the scenarios discussed in the previous session. This time, it is rather the ratio between often very high costs of the necessary investments for automation and the comparatively still very low labour cost in Romania. For the automotive industry in Romania this is a structural asymmetry, and it is very visible with many important companies, like Automobile Dacia. Although the Western Europe the idea of a completely automated factory seems futuristic, but not completely impossible, the future plans for the Mioveni factory involve only 20% automation, from less than 10% three years ago.⁶⁶ Obviously, certain changes which are not very expensive will be implemented – if they are not already implemented – but it is hard to believe that the Mioveni factory will soon become a “factory of the future”, as the Renault Group officials envisage it.⁶⁷ Automation is always balanced by the labour cost, and from this perspective, Romania, with relatively very low labour costs and with significant new investments, advanced from an organisational perspective, can only be a priority in exceptional circumstances.

Another reason why digitalisation of manufacturing is difficult in the near future in Romania is related to the very specialisation in certain types of products. In case of wiring, for example, currently manufacturing processes are very difficult, if not impossible to automate, and this is the main reason why such manufacturing is not financially viable in countries with high labour costs. The automation solution can only have a limited potential in case of wiring factories, and relocation in countries with even lower labour costs (like Serbia) is much more likely.

Therefore, beyond certain more or less incremental changes, large-scale digitisation of industrial operations of automotive manufacturers and suppliers in Romania is currently a rather purely theoretical option. Instead, “the factory of the future” in Romania will continue using plenty of cheap labour, as long as it is still available.

⁶⁶ Bogdan Alecu, “Robotizarea de la Dacia” [*Dacia Robotisation*], *Business Magazin*, 29 December 2015, available online at: <https://www.businessmagazin.ro/analize/transporturi/robotizarea-de-la-dacia-14929207>. We should also keep in mind that, overall, the automotive industry is among the most automated economic sectors. Mention should be made that the gradual increase in the level of automation did not lead to a decrease in the number of employees.

⁶⁷ About team leaders using tablets for their tasks and the Renault vision on the “factory of the future”, see <https://group.renault.com/en/news/blog-renault/digital-technology-makes-decision-making-easier-at-plants/>. Logistics operators also use tablets and there are efforts to facilitate predictive maintenance. See “How industry uses Big Data to fine-tune manufacturing, logistics”, *AutoNews Europe*, 22 August 2018, available online at: <http://europe.autonews.com/article/20180822/COPY/308249994>.

6.6 CONCLUSIONS

Although it seems to have made a full recovery after the crisis at the end of the past decade, today’s European automotive industry looks completely different from the industry ten years ago. The two major trends – market polarisation, enhanced by austerity and by increased inequalities, and the geographical reconfiguration of the production chains, as investments were channelled to low labour costs countries – have a strong impact in Romania as well, nowadays a country with a minor market and an increasingly stronger industry. The automotive industry has become the most important industry of the country; currently, it manufactures mainly for exporting purposes and it is almost fully controlled by foreign capital. In order to benefit from the low labour costs in Romania, automotive manufacturers and suppliers invested in highly manual processes, with low complexity and technologization levels. Integrated more and more profoundly in the European automotive production chains, Romania serves mainly as an assembly platform for products designed in and for Western countries, while the industrial actors and authorities in Romania are mostly left without any control on the industrial operations. These are typical characteristics for dependant market economies shaped in the past decades in the Central and Eastern Europe therefore, this is not only characteristic for Romania, but also for the Czech Republic, Poland, Slovakia or Hungary. The issue of cheap labour shortage all these countries are facing is just as typical, and this is an unavoidable weakness of dependant development at the EU periphery.

Another reason why the positive developments of the European automotive industry trigger less enthusiasm than during other cyclical growth periods is the trifold threat of technological change. In the not-too-distant future, engine electrification, connectivity and autonomous driving technology, as well as the production chain digitisation seem to lead to fundamental changes in the operation of the entire automotive ecosystem – not only in the industry as such, but also in the user-vehicle relation. The risk that such scenarios might come true already pushed manufacturers and suppliers to invest massively in these technologies, to maintain at least their positions in the European and international markets. All these are encouraged by European authorities who appreciate that the automotive industry is about to enter a new era, due to environmental regulations and technological developments. Even though there is some consensus that radical change is unavoidable on the long-term, there are significant uncertainties as to the manner and the pace of this transition. The concerns with the economic sustainability of the industry are obviously reflected in employment, and here we see a clash between pessimistic scenarios, with millions of jobs lost in the EU, and optimistic scenarios, projecting huge benefits for the labour market as a whole and, possibly, even for the automotive industry.

If we attempt to understand the impact of technological transformations on the automotive industry in a peripheral country like Romania, the abstract nature of the various futuristic scenarios on the global industry is rather an obstacle.

An analysis on the current status quo indicates that, most likely, technological transition will be delayed in Romania, with a potentially positive impact on the economic activity and on employment, at least on short and medium-term. Somewhat ironically, it is the very peripheral position of the automotive industry from Romania in the European production chains that will protect it temporarily from these transformations which will first impact the production of engines and gearboxes – technologically complex operations which have a relatively low importance in Romania. More generally, Romania's economy dependence cannot allow for the development of a robust market for electric cars or for advanced connectivity and autonomy solutions in the near future, because the low purchasing power of the population will not be able to cope with the high prices of such products too soon. The digitisation of the production chain will not happen either according to the fast pace described by scenarios on the "factories of the future", since a decrease in the manual work in the manufacturing processes cannot be a priority in a country with very low labour costs. Obviously, change happens already, but relatively minor: some hundreds electric cars sold every year, some mobility services providers present in big cities or some indirectly productive workers use tablets. A much more important development is the trend that Romania becomes a location for the development of new technologies, as the boost in the research-development activities in the European automotive industry is visible in Romania as well, including in the growth of the IT sector. However, such developments do not mean a shift in the low labour cost as-

sembly paradigm, on the contrary, it merely strengthens the dependence of the automotive industry in Romania.

Therefore, low labour costs are still considered the main competitive advantage in attracting automotive investments. The recent wage increases only meant a minor decrease in the still huge wage gaps between Romania and Western countries. The poor sustainability of the automotive industry development in Romania is already visible, and the most obvious symptom is the cheap labour shortage. In the absence of a major economic crisis, this issue will become more and more acute, especially because neither companies nor the government seem to be willing to tackle the causes. Therefore, we may expect the current vicious circle to make industrial development unreliable in the future, in view of the current principles of complexity and low costs – and then, acceptable profitability of manual assembly activities will be actually incompatible with sufficient wage increases to ensure the necessary workforce. Although there are significant debates over this scenario, a real blockage seems quite far. On the other hand, as we noted, low labour costs are a significant barrier with immediate consequences for the development of a market for electric vehicles or for connected and autonomous vehicles, as well as for the technological progress of the vehicle and components manufacturing industry in Romania. In view of the opportunities made available today by the technological developments in the automotive industry, Romania may only have substantial and sustainable benefits by overcoming the low-cost paradigm.

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ABOUT THE AUTHORS

Jan Drahokoupil is a senior researcher at the European Trade Union Institute (ETUI) where he coordinates research on digitalization and the future of work. Jan also directs projects related to multinational corporations and foreign direct investment.

Michal Pícl is economist, he graduated from the Faculty of Economy of the Czech University of Agriculture in Prague and pursues his PhD at the Faculty of Business Administration of the University of Economics in Prague where he works on minimum wage, foreign direct investment and social policy. From 2009 to 2013 he worked at the Agency for business support and investment CzechInvest and at the Ministry of Education and Sports, from 2014 to 2017 at the Office of the Government of the Czech Republic, from 2015 to 2017 as Head of the Department of Analysis and Informations.

Dr. Zoltán Pogátsa is head of department and university professor at the Sopron University, Faculty of Economics Lámfalussy Sándor

Monika Martišková pursues her PhD at the Faculty of Social Geography and Regional Development at the Charles University in Prague. In her research she concentrates on the role of social dialogue in the automotive industry in the context of global value chains. Since 2011, she is affiliated with the Central European Labour Studies Institute and works on projects on labour market and social dialogue, the role of the social dialogue actors and their strategies in private and public sphere in Czechia and Slovakia.

Ştefan Guga is consultant with Syndex Romania, he holds a PhD in Sociology and Social Anthropology from the Central European University, Budapest.

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Responsible:
Anne Seyfferth | anne.seyfferth@fesprag.cz
Tel.: +420 224 947 076 | Fax: +420 224 948 091
www.fesprag.cz | www.facebook.com/FESPrag

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THE FUTURE OF EMPLOYMENT IN THE CAR SECTOR

Four country perspectives from Central and Eastern Europe



The automotive industry is facing a rapid transformation caused by a number of mega trends: climate change and stricter CO2 emission standards, digitalization and automation as well as changing concepts of mobility due to urbanization and new digital technologies. European car manufacturers are under increasing pressure to remain competitive in the global market.



In 2018, FES Prague initiated a regional project on the future of employment in the automotive industry in Czechia, Slovakia, Hungary, and Romania. In all of these countries the automotive industry presents a key industrial sector with high numbers of employment. The output are four country studies that are presented in this publication. All four studies assess the impact of the transformation on employment and identify key challenges for policy makers and workers' representatives. It also includes a short comparative analysis that highlights country-specific characteristics and common trends.



The shift towards e-mobility, for instance, will most likely benefit the countries in a short- to medium-term perspective because they will keep the production of conventional vehicles with combustion engines. In the long run however, they run the risk of decreasing productivity and out-dated technology. This will cost jobs and undermine the sustainability of wage increases. Hence, relevant stakeholders need to prepare for these changes on a political and on the company level. The four country studies give insights into these developments and recommendations what potential action strategies could look like.

Further information on this topic can be found here:

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