Gabriella Tabajdi

THE ACTIVITIES OF INTERNATIONAL FIRMS IN THE TRANSFORMING EUROPEAN AUTOMOTIVE INDUSTRY IN THE 2017-2023 PERIOD WITH A CENTRAL AND EASTERN EUROPEAN FOCUS

Theses of Doctoral Dissertation

Szeged, 2025

UNIVERSITY OF SZEGED

FACULTY OF ECONOMICS AND BUSINESS ADMINISTRATION

DOCTORAL SCHOOL OF ECONOMICS

Gabriella Tabajdi

THE ACTIVITIES OF INTERNATIONAL FIRMS IN THE TRANSFORMING EUROPEAN AUTOMOTIVE INDUSTRY IN THE 2017-2023 PERIOD WITH A CENTRAL AND EASTERN EUROPEAN FOCUS

Theses of Doctoral Dissertation

Supervisors

Dr. habil. Anita Pelle

Associate professor

University of Szeged

Faculty of Economics and Business Administration

Dr. Eszter Megyeri

Assistant professor

University of Szeged

Faculty of Economics and Business Administration

Szeged, 2025

Table of Contents

1. Relevance of the topic

The research topic of the dissertation is the examination of the international operations of international automotive companies operating in the internal market of the European Union, doing so various corporate measures. The automotive industry[1], which functions within global value chains[2], is one of the fastest-growing industries, a significant employer and investor, and one of the most important industrial sectors in the EU. The European automotive industry traditionally plays an important role in development and production due to its high technology needs. The automotive industry is a significant innovator and has influential investment capacity (Vosta – Kocourek, 2016). The automotive industry accounts for 7% of the EU's GDP, those employed in the automotive industry make up 8.3% of the EU's industrial employment and the entire automotive industry employs 6.6% of the EU's employment. Furthermore, the EU is responsible for 20% of the world's car production (Pavlínek, 2020).

In recent years, the European automotive industry has undergone significant transformations. Firstly, since the late 1990s, there has been a shift from the old member states towards Central and Eastern Europe[3] (Pavlínek, 2020). This geographic restructuring of the European automotive industry and the continuous catch-up of the Central and Eastern European region were defining for many years, transformed industrial production (Pavlínek, 2015). At the same time, the 21st century brought even more substantial changes with the shift towards digitalisation and low-emission drive systems, mainly towards electrification, which can be regarded as megatrends in the automotive industry (Delanote et al., 2022; Grieveson et al., 2021; Pavlínek, 2023). While other global trends related to the industry can also be identified, the automotive industry and international management are most influenced by digitalisation, robotics and automation related to it, and sustainability, particularly electromobility (Grieveson et al., 2021; Luo, 2021). Aside from the obvious impacts on product solutions, both digitalisation and electrification significantly influence the production map of the European automotive industry. These trends shape the companies' organisation of international activities, their development, investment and location decisions, and the determinants considered when making those decisions (Grieveson et al., 2021; Pavlínek, 2023). New, digital solutions used in

[1] For the definition of the automotive industry, based on Rechnitzer et al. (2017), we relied on the Eurostat NACE Rev. 2 nomenclature, specifically the C29 category: Manufacture of motor vehicles, trailers, and semi-trailers. This includes the manufacturing of passenger and freight vehicles, trailers and semi-trailers, as well as motor vehicle parts and accessories (Eurostat, 2008).

[2] In case of global value chains different company activities are carried out in several geographic locations (Gereffi - Fernandez-Stark, 2016).

[3] Central and Eastern European countries refer to the 11 countries that joined the EU in 2004 and later (Farkas, 2022). These are Estonia, Latvia, Lithuania, Poland, Hungary, Slovakia, Czech Republic, Slovenia, Romania, Bulgaria, and Croatia. However, the countries in the region do not equally participate in the automotive industry.

production are first introduced by car manufacturers in Western Europe, but automotive companies increasingly invest in the modernisation of their Southern and Central and Eastern European factories as well (Drahokoupil, 2020). Electric vehicles also trigger significant investments in research and development as well as new production facilities or the conversion of existing ones (Brown et al, 2021; Delanote et al., 2022). This affects not only Western Europe, but also Central and Eastern Europe to the extent that plants in the region are being transformed (Delanote et al., 2022), or the production of internal combustion engine vehicles are being relocated from Western Europe to the region, while Western units are being retooled for electric car production (Gerőcs – Pinkasz, 2019). Furthermore, many battery producers invest in Central and Eastern Europe and start their European operations here (Delanote et al., 2022).

Since the second half of the 2010s, black swan events[4] have also affected the European automotive industry. Although these are not megatrends, and their impact and scope differ from those of megatrends, they still force alternative corporate decisions and shape digitalisation and electrification efforts. On the one hand, the United Kingdom's exit from the EU, Brexit, had serious consequences for European economies. Over the years the British car industry had grown to be one of the EU's most significant car manufacturers, becoming deeply integrated to European and global value and supply chains. EU membership greatly contributed to the success of British car industry, but Brexit and the surrounding uncertainties posed challenges for the British automotive industry in recent years (SMMT, 2019). Another black swan event influencing the European automotive industry is the COVID-19 pandemic. The pandemic affected European countries and industries, including the automotive industry, but the specific effects are not entirely clear. On the one hand, the pandemic undoubtedly disrupted the balanced functioning of global value chains (Černá et al., 2022). On the other hand, it gave further momentum to the already traceable megatrends both in the core EU member states and in Central and Eastern Europe (Antalóczy – Sass, 2021; Simonazzi et al., 2020). Beyond the direct effects, COVID-19 indirectly determined the operation of the automotive industry for years through the global semiconductor shortage (Černá et al., 2022), which brought additional difficulties such as supply shortages, investment pressure and production decisions (Ramani et al., 2022).

[4] Black swan events are events that are unpredictable, occur from time to time and have a large impact (Nafday, 2009).

2. Research objectives and research outline

Global trends and their impacts on the international strategies, operations, and activities of automotive companies are becoming increasingly prominent in the understanding of global value chains and international division of labour. Based on the changes that have taken place in the automotive industry over the last decade, the research serves two goals. The primary goal of the dissertation is to explore and analyse the changes caused by megatrends and recent black swan events, both generally in the automotive industry, and specifically in the European automotive industry, with the particular focus on the modifications occurring in the regional and international operations and organisation of firm activities. A further goal is to answer what position East-Central Europe occupies in the transforming European automotive industry. In addition to the literature overview, we also examine the decisions of international companies. Moreover, the objective of the empirical research applying the method of content analysis on a sample of company announcements, is to provide a detailed and fact-based insight into the influence of digitalisation, electrification, Brexit and the COVID-19 pandemic on the automotive industry and industry decisions within the framework of a comprehensive industry study. This allows for a more detailed, real-world perspective based on actual corporate activities, examining the responses to megatrends and recent black swan events. We offer a framework for evaluating and assessing automotive strategies. Related to our research goals, the following research questions emerge: (1) How are the ongoing automotive megatrends (digitalisation and electrification) shaping the strategies, operations, and organisation of activities of international companies in Europe's automotive industry? (2) What impact have recent black swan events (COVID-19, Brexit) had on Europe's automotive industry? (3) What position does Central and Eastern Europe occupy in the transforming European automotive industry?

In the research first theories and trends of internationalisation and location choice are presented: traditional theories of internationalisation, theories of foreign direct investment, location theories and theories of global value chains. Then the research's industry environment is elaborated, with an emphasis on the general presentation of megatrends and black swan events in the automotive industry, and an overview of the situation of the European and in particular Central and Eastern European automotive industry in the 21st century. After that, we focus on the detailed description of methodology (content analysis and coding) and the outline of empirical research framework. Chapter 5 summarises the empirical results where various corporate decisions are examined on a topic-specific basis. Chapter 6 presents our

main conclusions and findings and Chapter 7 gives a summary of the dissertation.

3. Theoretical background

The theoretical background of the dissertation is based on theories within the field of international business, including the theories of internationalisation, multinational corporations, foreign direct investment (FDI), corporate location determinants, and global value chain theories.

One of the first defining theories regarding the internationalisation of companies is Raymond Vernon's (1966) **product life cycle theory**, which states that every product goes through different development stages (introduction, growth, maturity, and decline), and the geographic division of labour of production may vary depending on the product's life cycle. According to the **Uppsala model**, developed by Johanson and Vahlne (1977), companies gradually begin operations in new countries by utilising knowledge accumulated from foreign activities and markets. Internationalisation is seen as a gradual learning, path-dependent process where a company's international expansion pattern depends on its previous international experiences and knowledge. Based on the Uppsala model and its criticisms, the **Casino-model** perspective of internationalisation emerged, stating that companies start their internationalisation after securing a strong domestic market position. However, unlike the stages model, once the fixed costs of acquiring organisational routines and managerial capabilities associated with internationalisation have been incurred, the cost of creating a new sales subsidiary becomes insignificant (Hakanson – Kappen, 2017). According to **network theories**, companies operate in complex networks, relying on internationally dispersed but interconnected units embedded in various local networks. Through developing relationships and business interactions with foreign actors, companies can expand their business internationally (Johanson - Vahlne, 2009).

Theories of multinational corporations are based on Hymer's (1976) **theory of monopolistic advantages**, which states that in order for a company to enter a foreign market, it must possess internal, transferable advantages that create quasi-monopolistic opportunities in competition with local firms. The **internalisation theory**, associated with Buckley and Casson (1976), Rugman (1981), and Hennart (1986), explains why a company can control an intangible, knowledge-based, firm-specific asset (Rugman, 1981; 2010), and also offers insights into the reasons for foreign direct investment (FDI) (Somogyi, 2011). According to the **transaction cost theory**, multinational corporations seek to overcome the transaction costs associated with cross-border coordination of production. This theory examines which

activities should be kept within the company and which should be outsourced, acquired through market transactions, or offshored (Hennart, 1986; Williamson, 1981). The **eclectic paradigm** seeks to explain the extent and pattern of international production, i.e., the production undertaken by multinational corporations financed by foreign direct investment. The OLI framework identifies three types of advantages: ownership, location, and internalisation advantages (Dunning, 1977; 1979). According to the **resource-based view**, foreign market entry strategies are influenced by the resources and capabilities of the foreign company and the multinational corporation, and their absence can limit the company's internationalisation opportunities (Peng, 2001). The concept of the **global factory** suggests that multinational corporations rely on their location and ownership advantages to maximise profits, but this does not necessarily involve the internalisation of activities. On the contrary, these companies increasingly outsource or offshore their activities (Buckley, 2009).

The internationalisation of companies is closely related to **FDI** (foreign direct investment) between countries, as large corporations cannot sustain their international market shares in the long term without international production and consequently, international investments. Thus, FDI is a key factor in international expansions and investments (Czakó, 2010b; Gál – Juhász, 2016). Company motivations to engage in FDI depends on its type. Dunning (1993) identified four types of FDI: market-oriented, resource-based, efficiency-seeking, and strategic asset-seeking (Dunning – Lundan, 2008). **Location theories** explain when, where, and why companies expand abroad and choose certain regions over others (Mesquita, 2016).

Global value chains consist of intercompany networks that span across borders and are necessary to bring a product or service to market (Bamber et al., 2017). Within these chains, companies carry out specific value-adding activities in countries that are most suitable for them (Czakó, 2016). Research on global value chains places a significant emphasis on value chain governance, i.e., how lead (typically multinational) firms and their suppliers organise their geographically dispersed activities (Gereffi, 2019a; Sinkovics – Sinkovics, 2019), as well as on economic upgrading in value chains, that is, the shift from lower to higher value-added activities in global value chains (Gereffi, 2019b).

4. Hypotheses

Based on the review of existing literature we formulated the following hypotheses.

H1: Both digitalisation and electrification, as the two main megatrends in the automotive industry, influence the strategic direction, development and investment and related location and relocation decisions of European automotive industry players. These decisions shape the organisation of the European automotive value chain.

In the 21st century, businesses' strategies, investment and production decisions are primarily determined by electrification and digitalisation (Delanote et al., 2022; Grieveson et al., 2021; Pavlínek, 2023). This is also true for the European automotive industry, especially considering that in certain areas –battery manufacturing, autonomous vehicles– Europe is lagging behind the USA, China or South Korea (Brown et al., 2021; Túry, 2021). To close this gap and remain a key player in the global automotive industry, as well as to meet changing consumer demands, the EU's automotive industry must take series of complex, innovation-driven, strategic steps (Riemensperger – Pfannes, 2020; Slačík, 2022).

Overall, the megatrends are transforming global automotive value chains, reducing barriers to corporate advancements in technologically advanced regions and impacting the organisation of multinational companies' activities. These trends could also have political and geopolitical consequences that alter the power dynamics within global value chains (Kano et al., 2020; Saittakari et al., 2023).

H2: Megatrends contribute to the formation of company collaborations and enhance their role in the European automotive industry.

High R&D costs, harder-to-obtain knowledge and in many cases, the lack of capabilities all point to the fact that few car manufacturers can thrive in the global competition on their own, which increasingly includes companies from outside the traditional industry (Simonazzi et al., 2021). Due to the possibility of synergies, cost sharing and supply ensuring, the role of partnerships becomes more valuable, which impacts the organisation of international production, investments and even locations (Delanote et al., 2022; Túry, 2018).

The complex structure of batteries and the required specialised knowledge may result in battery suppliers gaining strong positions in the automotive global value chain, changing its power structure (Ramos – Ruiz-Gálvez, 2024). Battery manufacturers are increasingly becoming Tier1 suppliers and production integrators (Harrison, 2021).

H3: In addition to the megatrends, black swan events -both Brexit and the COVID-19 pandemic- had significant impacts on the investment, relocation and operational production decisions of European automotive players.

Over the years, the British automotive industry integrated into European value chains (SMMT, 2019), which was disrupted by Brexit. Since 2016, fewer cars and parts have been produced in the UK, which could have served as inputs for manufacturers in other EU countries. Brexit also impacted the level of automotive investments. As a result of the withdrawal, possibility of relocation intensified, as production for export to the EU from the UK was no longer necessarily profitable (Bailey – Rajic, 2022). The COVID-19 pandemic also hampered production with factory shutdowns and capacity reductions in 2020, leading to the lowest production levels in Europe in the past two decades (de Vet et al., 2021). Moreover, automotive investments also declined (Grieveson et al., 2021). In fact, as a result of the pandemic, medium- and long-term projects sensitive to supply chain lengths and labour costs could be backshored to Europe from more distant locations (Antalóczy – Sass, 2021).

H4: Amid the changes, Central and Eastern Europe's automotive industry continues to play a strategic role in the value chains of the European automotive industry.

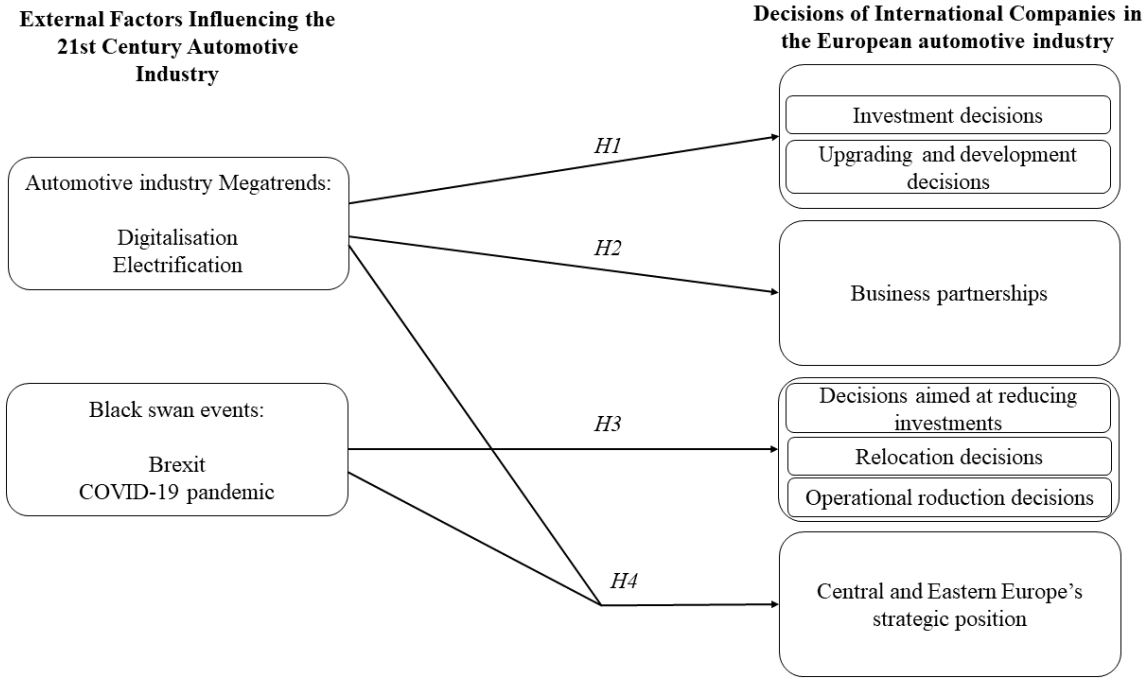
Technological changes are also altering country-specific advantages. The importance of labour cost is diminishing which threatens the competitive advantage of countries that traditionally relied on wage differentials to attract FDI and industrial activities (Bamber et al., 2017). This could make it more difficult for regions far from innovation centres to participate in global value chains (Kano et al., 2020).

Although electrification and digitalisation may reduce the appeal based on low labour costs in the Central and Eastern European region (Drahokoupil, 2020) as electric vehicle production and automation inherently require less labour (Szalavetz, 2021). Nevertheless, the region may remain an attractive location for investment. The reason behind this is partly battery manufacturing; to meet increasing market demands ensure supply and consider cost factors, battery manufacturers are interested in establishing European manufacturing units, for which Central and Eastern Europe offers suitable locations (Grieveson et al., 2021; Túry, 2019). Additionally, the region has strong automotive traditions and industry connections (Delanote et al., 2022), as well as a solid education system, with many graduates in STEM subjects (Svoboda et al., 2020).

To conduct the empirical research and answer our hypotheses, we developed a research model examining the external factors influencing the 21st-century automotive industry. The

model analyses how these factors impact the international operations of companies and various corporate decisions as dependent variables (Figure 1). Electrification, Digitalisation, Brexit, and COVID-19 influence the automotive industry both globally and regionally, affecting its strategic direction and the global organisation of activities. However, the impact of these events does not manifest in the same way for all automotive players, and they may motivate or force different decisions. Our model captures these dynamics. On the one hand, we examine the impact of megatrends, with particular focus on how digitalisation and electrification shape companies' development and investment decisions, as well as the related location or potential relocation decisions in Europe. Through this research, we also explore how megatrends influence corporate collaborations. We analyse the effects of Brexit and the COVID-19 pandemic alongside three types of decisions: investments, particularly their reduction, relocation, and operational production decisions. Finally, we investigate how the megatrends' and black swan events' European automotive industry influence affect the strategic role of Central and Eastern Europe.

Figure 1. Research model

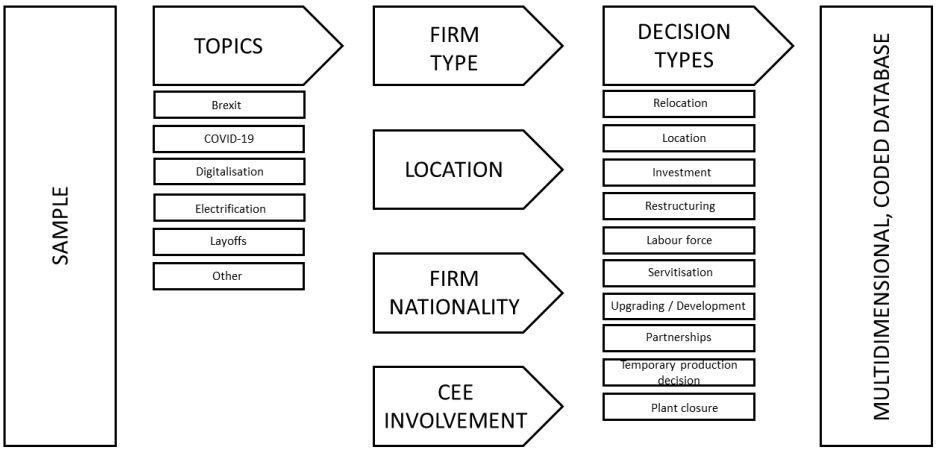


Source: own compilation

5. Research methodology

As part of the research, literature findings are compared with the results of the empirical research. Using the method of content analysis, we built our own database, which contains various company announcements related to the automotive industry. This method helps us understanding specific phenomena and uncovering country differences related to the analysed changes (Doz, 2011; Géring, 2017). The methodology allows for theory testing (Krippendorff, 2004) and the verification of the effects of megatrends and black swan events. Through content analysis, we can also gain company-specific insights, enabling objective data collection based on corporate announcements and official statements important. This is important for uncovering companies' intensions, strategies and responses for the included global trends. The data covers the period between January 1, 2017 and December 31, 2023. The sources of our database include public announcements and press conferences of companies, and news entries from international and Hungarian business news portals (international: Reuters, Bloomberg, Automotive News Europe; Hungarian: Portfolio, HVG). During the data collection process, we specifically searched for news related to the automotive industry, with a particular focus on company announcements and less emphasis on measures taken by countries. Geographically we focused on Europe, especially the European Union, but our database sporadically contains announcements related to other locations too (e.g. China or the United States).

Figure 2. The coding framework of business decisions in the European automotive industry



Source: own compilation

The database contains 1682 items related to the European automotive industry. The

inputs are provided by information regarding various events, originating from both car manufacturers and suppliers. Our applied research method is quantitative descriptive analysis of the coded database of qualitative inputs. The large volume of qualitative input was processed with coding. The codes were defined using a combination of deductive and inductive coding. After reviewing the literature, we defined codes (deductive coding) (Linneberg – Korsgaard, 2019), which, based on supporting theories, were thought to be essential to include in the analytical framework. After becoming more familiar with the data, additional codes were inductively incorporated into our coding framework (Elliott, 2015). The sample was coded along multiple dimensions in a coding scheme that aligns with the data set (Figure 2).

During the coding process, we first categorised each item into main categories. The main categories were defined as follows:

- **Brexit**: announcements related to the United Kingdom's withdrawal from the European Union;
- **COVID-19**: pandemic-induced announcements including news related to global semiconductor shortage;
- **Digitalisation**: news related to the application of digital technologies and digital products;
- **Electrification**: corporate announcements related to the transition to electric vehicles;
- **Layoffs**: major layoff news concerning workforce and human resources;
- **Other**: announcements relevant to the automotive industry, but not related to any of the previously listed topics.

Affected location was a separate code. This refers to the location influenced by the business announcement, whether it is a single country, a region, the European Union or even the globe. In the latter case regardless of the geographical location, most of the locations and subsidiaries of all industry players are affected. We also included basic company-specific codes in our coding framework, such as the manufacturer's place of origin and whether it was an OEM (original equipment manufacturer) or a supplier. After setting up the general codes, we also coded our database alongside various decision types. The following business decision codes were established:

- **Relocation**: transfer of production elsewhere;
- **Location**: new location; usually associated with an investment decision;
- **Investment**: investment in a new site or research centre or in the development of existing

ones, investment in the transformation of product range and production; investment decisions rarely have a negative effect, i.e. they refer to the postponement of investments or, where applicable, the withdrawal of decisions;

- **Restructuring**: transformation of work processes, business processes, product range;
- **Labour force**: partly layoff announcements, partly news about other changes affecting the workforce, such as trainings and education;
- **Servitisation**: servitisation of industry, enhancing industrial production and products with services;
- **Upgrading / Development**: developments in the automotive industry;
- **Partnerships**: partnership agreements, corporate collaborations between automotive companies or between automotive and non-automotive industry players;
- **Temporary production decision**: temporary production decisions manifesting in the reduction of production or in the temporary halt of production;
- **Plant closure:** permanent factory closure.

Once we created our codes and coding framework, we examined each of the 1682 elements in the sample one by one along the established system, and then made conclusions through their detailed analysis.

6. Theses and main research findings

As a result of our detailed literature review and empirical research, we have drawn four main conclusions.

Thesis 1: In the 2020s, the direction of European automotive industry strategies, as well as development and investment decisions, are primarily motivated by electrification and secondarily by digitalization, often complementing and reinforcing each other.

In the empirical research, the most frequently occurring megatrends related decision types are developments and investments. Conversely, development, investment and location decisions appeared specifically emerged in connection with digitalisation and electrification. 97.38% of development decisions, 85.34% of investment decisions and 82.26% of location decisions were made in relation to megatrends. On the other hand, regarding digitalisation, 30.17% of decisions focused on development and 19.27% on investment; in the case of electrification, 27.23% of entries were related to development and 26.22% to investment; 23.61% of announcements affecting both megatrends could be linked to developments and 28.24% to investments. This indicates that during their development and investment activities, European automotive industry players often simultaneously consider both the preparation for

the digital age and the transition to electric vehicles. Therefore, on the one hand *development, investment and location decisions in the European automotive industry are driven by digitalisation and electrification, and both digitalisation and electrification are most prominently manifested in Europe's automotive sector through developments and investments. On the other hand, the most significant influence on the European automotive development and investment efforts comes from electrification.* All of this shapes companies' strategies and operations, leading to a general shift in focus. New technologies (e.g. electric and autonomous cars, smart factories) come to the forefront in products and production processes. Among the value chain activities, R&D is becoming increasingly important, along with the establishment of new development and technology centres. When organising activities globally and regionally, megatrends are becoming more defining, although with differences within the EU. European automotive industry actors mostly keep their higher-value-added digitalisation and electrification development and investment activities in core countries. This is true for location decisions too but with a more balanced distribution between the core and the periphery (Western and Central and Eastern Europe). The latter is mainly due to new investments in electric vehicle factories and electric battery plants, as well as newly established development centres but to a lesser extent.

Our empirical results are in consistent with the findings in the literature. Digitalisation and electrification indeed have a significant impact on the automotive industry (Brown et al., 2021; Mihet-Popa – Saponara, 2018). The megatrends demand product innovations (Demeter, 2020), investments in new technologies, competencies, research and development and infrastructure (Cabigiosu – Zirpoli, 2018; Szalavetz, 2022). They require the creation of new product plants or the transformation of existing ones (Baldassare et al., 2017; Casper – Sundin, 2020). At the same time, these changes do not appear uniformly within Europe (Bernhart et al., 2021; Drahokoupil, 2020), reflecting the value chain specialisations within the European automotive industry. Although factories located in peripheral areas are also being developed, the widespread application of new technology solutions mostly characterise the units located in core countries (Drahokoupil, 2020; Delanote et al., 2022). This also means that the megatrends favour process and product upgrading in the quasi-hierarchical automotive value chains, but opportunities for functional upgrading remain limited to certain regions (Gerőcs – Pinkasz, 2019; Pavlínek – Zenka, 2011). Thus, within the value chain, the traditional geographic distribution of tasks and functions persists, according to which subsidiaries operating in the semi-periphery or in the periphery carry out lower value-added, typically assembly activities, while multinational companies in core countries perform higher value-added and more

specialised functions (Pavlínek, 2020; Szalavetz, 2017), maintaining the global value chain asymmetries (Baldwin – Lopez-Gonzalez, 2015).

Thesis 2: In the European automotive industry, digitalisation and electrification have amplified the demand for the development of corporate collaborations, often extending beyond the industry's traditional boundaries. Due to digitalisation partnerships between automotive and technology companies are becoming increasingly common, while electrification has strengthened cooperation between automobile and battery manufacturers.

The effects of megatrends are not only reflected in developments and investments; these activities are often carried out in the form of partnerships. Based on our empirical research, corporate collaborations are significant both for digitalisation and electrification, 22.43% of digitalisation and 14.55% of electrification decisions targeted partnerships. Moreover, megatrends motivated the vast majority of partnerships included in the sample, with 94.73% of the partnership decisions being influenced by megatrends. These collaborations include partnerships between car manufacturers, suppliers working with one another, or often between OEMs and suppliers. In case of both megatrends, corporate collaborations were mostly joint decisions made by OEMs and suppliers. Digital transformation promotes cooperation between automotive companies and IT firms to better exploit development and investment opportunities. Many technology companies work with multiple car manufacturers simultaneously, but automotive firms also often form partnerships with several IT companies at once. As a result, technology companies are increasingly present in Europe's automotive industry. *Digitalisation in the automotive industry has amplified the demand for the development of company collaborations, especially between automotive companies and those originally operating in the IT sector*. Regarding electrification, car manufacturers most often partner with one another to capitalise on synergies and share the costs of electrification-related developments and investments. In many cases, corporate collaborations have been established between automotive players and battery manufacturers to ensure battery supply or for joint R&D purposes. Nearly 40% of electrification partnership decisions were made between automotive and battery industry actors. *Therefore, the transition to electric cars triggers collaborations between car manufacturers and battery producers*.

These results are in consistent with previous research. With automotive digitalisation, technology companies are increasingly present in the automotive industry (Brown et al., 2021; Luo, 2022) and in many cases, collaborate with OEMs to share the costs and risks arising from

knowledge exchange and attainment and the development of more advanced technologies (Simonazzi et al., 2020). Regarding electrification, most car manufacturers establish commercial or partnership agreements with battery cell manufacturers, sometimes create joint ventures with battery producers or invest in such companies (Delanote et al., 2022; Gerőcs – Pinkasz, 2019; Túry, 2021). Due to new entrants and the emergence of new technologies, the global automotive value chains are transforming, where the role of technology and battery firms is becoming increasingly significant (Dutt et al., 2020; Molnár et al., 2020). As a result, the added value in these value chains is also growing (Szalavetz, 2021). The growing role of collaborations illustrates that companies operate in complex networks (Johanson – Vahlne, 2009), while they are also increasingly externalising parts of their activities as global factories (Buckley, 2009). This allows them to focus on their core activities while accessing resources through alliances (Luo, 2021; Peng, 2001).

Thesis 3: Black swan events have had varying impacts on the European automotive industry. While Brexit primarily brought about structural changes in the automotive industry of the United Kingdom, the COVID-19 pandemic had implication across the entire automotive industry of the EU, but it only temporarily hindered the activities of industry players.

Based on our empirical research it is clear that black swan events, Brexit and the COVID-19 pandemic had distinctive implications for the European automotive industry. On the one hand, differences can be observed in geographical coverage. In the empirical research, locations affected by Brexit rarely include any countries outside the United Kingdom. This implies that *the British automotive industry suffered more from Brexit than the EU*. In contrast, regarding the COVID-19 pandemic, many decisions were global or affected the entire EU, but our database also includes entries on a national level for all major European countries with a significant automotive industry too. Furthermore, there are differences in the number and proportion of elements included in the analysis for the two black swan events. While announcements related to the COVID-19 pandemic form the second largest group in the entire sample, Brexit-related entries in the database were the fewest after the Russian-Ukrainian conflict.

Significant differences can also be observed regarding the decisions made. Most of the decisions related to the COVID-19 pandemic were temporary production decisions, primarily involving temporary shutdowns, reopenings and restarts, or production volume reductions. In fact, this type of decision occurred mainly in connection with the pandemic, 80.16% of all

temporary production decisions were linked to COVID-19, as well as the resulting global supply and value chain issues and the global semiconductor shortage. The latter had a significantly greater impact on the automotive industry than measures aimed at reducing the severity of the pandemic. More than half (53.46%) of COVID-19 related announcements in the sample were linked to the shortage of microchips. *Therefore, the COVID-19 pandemic primarily affected the European automotive industry through disruption in global supply and value chains, culminating in the semiconductor crisis*. Investment and development decisions were also made due to the pandemic. These were investments in digitalisation and electrification, often through efforts to overcome the semiconductor shortage, thus megatrends can be seen as a way of dealing with the losses caused by COVID-19. *The COVID-19 crisis therefore only temporarily hindered the investment and development activities of automotive firms. To recover quicker from the difficulties caused by the pandemic, the focus of automotive industry players was directed towards both solving operational problems and making strategic advancements and investments*. Relocation decisions as a result of the pandemic appeared in negligible numbers and proportions, thus production reshoring and regionalisation aimed at shortening the value chains were not typical in the sample.

In contrast, the most common decision type due to Brexit was relocation, accounting for 19.54% of Brexit-related decisions, and more than half of all relocation decisions were related to Brexit. Relocation announcements were made due to the unstable situation arising from Brexit; companies in several instances moved production to another EU country to continue to serve the EU's internal market smoothly and without additional costs. In this context, 17.5% of all plant closures were linked to Brexit. The United Kingdom also lost valuable automotive investments, and uncertainties surrounding Brexit significantly reduced the country's attractiveness. However, some automotive manufacturers invested in their British subsidiaries despite these circumstances, mainly targeting the production of electric cars. Overall, the *British car industry suffered from the political and economic uncertainties caused by Brexit*, to the extent that these led to lost investments and companies leaving the country.

When comparing our results with the views in the literature, we get a mixed picture. On one hand, the disruptions caused by COVID-19 indeed broke global supply and value chains, causing severe supply disruptions in the European automotive industry, which operates in a just-in-time system (Éltető, 2020; Herrero, 2020), forcing temporary plant closures and significant production volume reductions (Černá et al., 2022; Humphrey – Lechowski, 2020), with the semiconductor shortage exacerbating these effects (Cserháti et al., 2021). On the other hand, the stability of ship supply chains has indeed come to the forefront in the EU (Ciani –

Nardo, 2022; Russo et al., 2022), with efforts to increase high-end chip production and build European semiconductor factories (Boranova et al., 2022; Huitema, 2021). However, opinions in the literature are divided on the shortening of value chains. Some argue that the pandemic intensified regionalisation trends (Pananond et al., 2020), and companies launched programs to shorten supply and value chains (Grieveson et al., 2021). Others claim that during the pandemic years, there were few tangible signs of this in the EU's automotive industry (Černá et al., 2022). Our empirical research supports the latter statement. However, it is undeniable that the pandemic highlighted the fragility of international automotive production networks (Pananond et al., 2020). The political uncertainty surrounding Brexit indeed made it difficult for automotive players to operate (SMMT, 2019), the UK's automotive industry lost investments, and increased burdens led to production relocations (Bailey – Rajic, 2022), but we cannot speak of massive relocations, production or capital withdrawals, or plant closures. Nevertheless, Brexit highlighted: the significance of trade agreements (Amador – Cabral, 2014) in participation in global or even more so in regional value chains, the importance of political stability in corporate FDI, location and relocation decisions (Kim – Aguilera, 206), and the role of regional and international trade and investment agreements (Czakó, 2010b) and how these influence country-specific advantages.

Thesis 4: The automotive industry of Central and Eastern Europe has remained an attractive investment and development location even amidst rapidly changing and uncertain times caused by megatrends and black swan events. However, investments and developments often aimed at lower value-added production.

The significance of Central and Eastern Europe in the European automotive industry is undeniable, as evidenced by the empirical research: a quarter of the entries in the entire sample were related to the countries of the region, and Central and Eastern Europe was the preferred location for certain business decision types. 63.44% of all location decisions, 56.72% of workforce-related decisions, and 44.77% of investment decisions had a Central and Eastern European focus. On the other hand, partnership (7.73%), servitisation (13.33%) and development (28%) decisions were less connected to the region. This signals a certain duality regarding the region's role.

Megatrends are undoubtedly present in Central and Eastern Europe, although the region cannot be considered the centre of European digitalisation and electrification, the technological transformation taking place here is not negligible. Automotive companies develop and invest in their subsidiaries operating in the region. In some cases, automotive firms set up development

centres, thus establishing R&D activities in Central Eastern Europe by building upon the synergies they have with local companies and institutions and on the availability of skilled labour. This serves as an opportunity for upgrading. Additionally, *Central and Eastern Europe is an attractive location for automotive investments related to electric mobility*. More than half (51.41%) of the location decisions associated with electrification are connected to the region, particularly due to battery production. Nearly 60% of location decisions in Central and Eastern Europe aimed at establishing electric battery factories. Examining the location, investment and development decisions related to electrification reveals *the multifaceted role of Central Eastern Europe: some countries excel in battery production, others are increasingly focused on electric vehicle production, but internal combustion engine manufacturing is still taking place in the region*. These trends create opportunities opportunities for upgrading, but since the production of internal combustion engines and batteries involve lower added value activities, these upgrading prospects are limited. Furthermore, investments and developments come from foreign-owned multinational companies. Overall, since *only a small portion of the digitalisation and electrification-related development and investment decisions involve Central and Eastern Europe, the duality in the division of labour in the European automotive industry persists:* higher value-added activities are taking place in the West, while lower value-added, production-related activities are happening in the East.

In response to the COVID-19 pandemic, the region reacted similarly to the EU as a whole, but parallel to the megatrends, a number of developments, investments and the establishment of new factories took place in Central Eastern Europe. These are not related to digitalisation nor to the transition to electric mobility, but are nevertheless significant for the countries of the region, as they demonstrate that Central and Eastern Europe remains an attractive investment destination for the automotive industry. At the same time, these investments often involved lower value-added activities; subsequently their contribution to the competitiveness of the region's automotive industry is questionable.

Our results mostly reflect the findings of the literature. Over the years, Central and Eastern Europe has become a significant automotive production hub (Pavlínek, 2020)- The countries of the region have become integrated into global automotive value chains as assembly centres (Adarov – Stehrer, 2020) through FDI, which has created a dependency on external technology (Gál – Juhász, 2016). As a result of megatrends, the possibility of production backshoring from the region has arisen due to decreasing labour intensity, which could also mean a decline in the role of labour costs as a location factor (Szalavetz – Somosi, 2019). This cannot be confirmed by our empirical research. On the other hand, automotive players are

investing in the modernisation of their subsidiaries in the region (Éltető et al., 2022), and with new technologies, some less intensive R&D functions are gradually moving from Western Europe to the region (Pavlínek, 2023). Another defining phenomenon in Central and Eastern Europe in terms of electrification is the attraction of FDI to electric vehicle manufacturing, as well as battery and cell manufacturing, which, however, involves assembly activities (Delanote et al., 2022; Pavlínek, 2023). Therefore, traditional determinants such as geographical location, EU membership, labour costs, and investment incentives remain significant in location decisions (Dunning, 1979; Majocchi – Strange, 2007). Megatrends enable product and process upgrading in the region, but these have not been coupled with a better position within the value chain or capturing higher value (Dindial et al., 2020; Gereffi, 2019b).

7. Conclusions

The purpose of this research was to present the changes caused by megatrends and recent black swan events, both in general for the automotive industry and specifically for the automotive industry of the European Union. Another objective was to examine the position of Central and Eastern Europe in the transforming European automotive industry. To achieve these, in addition to reviewing relevant literature, we also analysed the decisions of international companies to provide a detailed and fact-based picture on the impact of digitalisation, electrification, Brexit and the COVID-19 pandemic on the automotive industry and industry decisions.

The results show that in the 2010s and 2020s, the automotive industry undergoes significant changes, with megatrends being the most defining. These changes fundamentally transform industrial relationships, manufacturing processes, corporate strategies, consumer demands and global value chains (Grieveson et al., 2021; Pavlínek, 2023). The megatrends require developments and investments from the industry players. These are reflected in product development (Niestadt – Bjørnåvold, 2019; Rechnitzer, 2019), changing production processes (Bonneau et al., 2017; Mihet-Popa – Saponara, 2018) and the transformation of business processes (Simonazzi et al., 2020). Another trend is the strengthening of business collaborations, often with actors outside the traditional automotive industry (Delanote et al., 2022; Simonazzi et al. 2020).

The changes provide opportunities for product-based, process-based, functional or even intersectoral upgrading (Szalavetz, 2021). The EU remains an attractive destination for automotive investments driven by megatrends; however, due to new technologies new location

decision determinants may arise (Černá et al., 2022; Strange – Zucchella, 2017). Yet, opportunities differ across Europe (Drahokoupil, 2020). The European automotive industry is still characterised by duality (Gerőcs – Pinkasz, 2019): in Western Europe companies specialise in product development, technological innovations and R&D (Pavlínek, 2020; 2023; Guzik et al., 2020), while in Central and Eastern Europe assembly still dominates the automotive industry. Thus, in the region upgrading is limited and even successful upgrading does not necessarily correspond to better global value chain positions or higher value capturing (Dindial et al., 2020; Gereffi, 2019b). To leverage upgrading potentials, the region must invest in education and R&D infrastructure.

Our research contributes to a deeper understanding of the theories from multiple scientific fields. In international business, understanding how companies operate in an international environment and how they organise their international activities has received significant attention in the recent decades (Czakó, 2010a). Global value chains contribute to understand these phenomena. The automotive industry is a typical example of sectors operating in global value chains, where companies expand across national borders and peripheral locations become key players in their internationalisation strategies (Humphrey – Memedovic, 2003; Özatağan, 2011). Our research contributes to the scientific discourse on global value chains by uncovering how these are shaped by megatrends and black swan events of the 21st century. Megatrends are transforming global automotive value chains and are impacting multinational companies' international labour organization and location decisions (Kano et al., 2020; Saittakari et al., 2023). The growing role of technology companies and battery manufacturers disrupts the traditional hierarchical structure of automotive value chains. Within Europe, megatrends do not change the centre-periphery structure of division of labour. However Central and Eastern Europe's automotive industry highlights the validity of criticism of upgrading. Black swan events, specifically the pandemic brought supply disruptions and highlighted the fragility of the fragmented global production (Pananond et al., 2020). Our research also enabled the testing of FDI and location decision theories, showing that traditional determinants remain important. Furthermore, our research adds to the understanding of certain international political economy issues like the theory of dependent market economies or the international division of labour (Farkas, 2011;Nölke – Vliegenthart, 2009). The automotive industry of Central and Eastern Europe is FDI-driven, generating a dependence on transnational firms' actions (Gál – Juhász, 2016). This dependence has not changed due to the new trends, it simply seems to have shifted towards vulnerability to Asian capital in certain countries.

8. Limitations and future research directions

The limitations of the research include that the global directions of automotive industry changes are mentioned only briefly, even though the megatrends do not originate from Europe. Similarly, the EU's strategies and regulations shaping the industry were only touched upon. Sectors supporting digitalisation and other automotive industry shaping trends like various trade wars, were excluded from the analysis. The main limitation of the empirical research is the lack of representativeness and completeness of the sample. Government decisions and other policy measures, especially those related to COVID-19 with a direct or indirect effect on the automotive sector were out of scope of this research which has been a deliberate decision on our behalf. The sample mostly included OEMs, while suppliers are less presented which might have distorted our results. As we have been monitoring international and Hungarian sources, we may have missed announcements only available in other national languages and/or sources of information. The analysis of news portal articles may have also introduced biases. Last but not least, even though we aimed for objectivity, the empirical research may be limited by a certain degree of inevitable subjectivity.

Regarding possible directions for future research, the established database could be further expanded to include government decisions and further policy measures targeting the European automotive industry, as well as extending the geographical coverage to Asia and America. Representativeness can be increased by incorporating new sources from multiple countries. Additionally, the Russian-Ukrainian conflict was only mentioned in the empirical analysis, a more comprehensive study, especially its effects on the automotive industry through the energy market, could be a valuable area for future research. Furthermore, examining the dynamics between parent companies and subsidiaries, differentiating their decisions, as well as a detailed analysis of supplier relationships, the effects of the slowed down shift in electric transition, and the impact of European protective tariffs, would also be worthwhile for future investigation. By delving deeper into business decisions, company case studies supplemented with interviews or surveys, could be conducted to analyse how megatrends and black swan effect specifically affected automotive players.

Literature used in the theses book

Antalóczy, K. – Sass, M. (2021): Körkérdés: Minden bizonytalan, de nincs visszatérés. *Külgazdaság*, 65(1-2): 4-8. https://doi.org/10.47630/KULG.2021.65.1-2.4

Bailey, D. – Rajic, I. (2022): *Manufacturing after Brexit*. UK in a Changing Europe Report, UK in a Changing Europe, London, United Kingdom, Available online: https://ukandeu.ac.uk/reports/manufacturing-after-brexit/ Downloaded: 11th October 2023.

Baldwin, R. – Lopez-Gonzalez, J. (2015): Supply-chain Trade: A Portrait of Global Patterns and Several Testable Hypotheses. *The World Economy*, 38(11): 1682–1721. https://doi.org/10.1111/twec.12189

Bamber, P. – Brun, L. – Frederick, S. – Gereffi, G. (2017*): Global Value Chains and Economic Development*. Joint Project between GCCV and KIET, Global Value Chains Centre and Korean Institute for Industrial Economics and Trade, Available online: https://www.globalvaluechains.org/cggclisting/chapter-1-global-value-chains-and-economic-development/ Downloaded: 24th September 2024.

Brown, D. – Flickenschild, M. – Mazzi, C. – Gasparotti, A. – Panagiotidou, Z. – Dingemanse, J. –Bratzel, S. (2021): *The Future of the EU Automotive Sector*. Publication for the committee on Industry, Research and Energy, Policy Department for Economic, Scientific and Quality of Life Policies, European Parliament, Luxembourg, Available online: https://www.europarl.europa.eu/RegData/etudes/STUD/2021/695457/IPOL_STU(2021)695457_EN.pdf Downloaded: 28th November 2023.

Buckley, P.J. – Casson, M. (1976): *The future of multinational enterprise*. Macmillen, London, United Kingdom

Buckley, P. J. (2009): The impact of the global factory on economic development. *Journal of World Business*, 44(2): 131-143. https://doi.org/10.1016/j.jwb.2008.05.003

Cabigiosu, A. – Zirpoli, F. (2018): Digitalization in the Italian Auto Industry. *SYMPHONYA Emerging Issues in Management*, 2018(2): 158–169. https://doi.org/10.4468/2018.2.12cabigiosu.zirpoli

Černá, I. - Éltető, A. - Folfas, P. - Kuźnar, A. - Křenková, E. - Mináriк, M. - Przeździecka, E. - Szalavetz, A. - Túry, G. - Zábojník, S. (2022): *GVCs in Central Europe — A Perspective of the Automotive Sector after COVID-19*. Bratislava: Vydavateľstvo Ekonóm. Available online: https://gvcsv4.euba.sk/images/PDF/monograph.pdf Downloaded: 8th March 2023.

Czakó, E. (2010a): A nemzetközi üzleti gazdaságtan mint elméleti háttér. In Czakó, E. – Reszegi, L. (eds.): *Nemzetközi vállalatgazdaságtan*, Alinea Kiadó, Budapest, Hungary 31-63. ISBN 978-963-9659-47-6

Czakó, E. (2010b): A külpiacra lépés. In Czakó, E. – Reszegi, L. (szerk): *Nemzetközi vállalatgazdaságtan*, Alinea Kiadó, Budapest, Hungary 141-170. ISBN 978-963-9659-47-6

Czakó, E. (2016): *A globális értékláncok - elméleti alapok és számbavételi lehetőségek. Fejezetek a nemzetközi üzleti gazdaságtanból 7*. 163. sz Műhelytanulmány, Budapesti Corvinus Egyetem, Budapest, Hungary, ISSN: 1786-3031.

Cserháti, I. – Keresztély, T. – Takács, T. (2021): Versenyképesség és foglalkoztatás az autóiparban. *KÖZ-GAZDASÁG*, 16(1): 27–38.

de Vet, J.M. – Nigohosyan, D. - Núñez Ferrer, J. – Gross, A.-K., Kuehl, S. – Flickenschild, M. (2021): *Impacts of the COVID-19 pandemic on EU industries*. European Parliament Study IPOL STU2021662903, European Parliament, Brussels, Belgium, Available online: https://www.europarl.europa.eu/thinktank/en/document/IPOL_STU(2021)662903 Downloaded: 13th May 2022.

Delanote, J. – Ferrazzi, M. - Hanzl-Weiß, D. – Kolev, A. – Locci, A. – Petti, S. – Ruckert, D. – Schanz, J. – Slacik, T. – Stanimirovic, M. – Stehrer, R. – Weiss, C. –Wuggenig, M. – Ghodsi, M. (2022): *Recharging the batteries: How the electric vehicle revolution is affecting Central, Eastern and South-Eastern Europe*. EIB, wiiw, OeNB Research Paper, EIB Economics Department, Vienna Institute for International Economic Studies (wiiw), Austrian National Bank (OeNB)

Dindial, M. – Clegg, J. – Voss, H. (2020): Between a rock and a hard place: A critique of economic upgrading in global value chains. *Global Strategy Journal*, 10(3): 473-495. https://doi.org/10.1002/gsj.1382

Drahokoupil, J. (2020): Introduction: Digitalisation and automotive production networks in Europe. In Drahokoupil, J. (ed.): *The challenge of digital transformation in the automotive industry: Jobs, upgrading and the prospects for development*, ETUI aisbl, European Trade Union Institute, Brussels, Belgium, 7-22.

Dunning, J. H. (1979): Explaining changing pattern of international production: in defence of eclectic theory. *Oxford Bulletin of Economics and Statistics*, 41(4): 269–296.

Dunning, J. H. (1993): *Multinational enterprise and the global economy*. Pearson Education Publisher, Boston, USA

Dunning, J. H., – Lundan, S. M. (2008): Institutions and the OLI Paradigm of the Multinational Enterprise. *Asia Pacific Journal of Management*, 25(4): 573–593. https://doi.org/10.1007/s10490-007-9074-z

Dutt, D. – Natarajan, V. – Wilson, A. – Robinson, R. (2020): Steering into Industry 4.0 in the automotive sector. In Kaji, J. – Saini, K. – Khan, A. – Gangopadhyay, N. – George, A. – Bhat, R. – Devan, P. (eds.): *Industry 4.0 in automotive: Digitizing the end-to-end automotive value chain*, Deloitte Insights, London UK, 7–10. Available online: https://www.deloitte.com/content/dam/assets-shared/legacy/docs/insights/2022/DI_Automotive-News-Supplement.pdf Downloaded: 12th November 2023.

Elliott, V. (2015): Thinking about the Coding Process in Qualitative Data Analysis. *The Qualitative Report*, 23(1): 2850-2861. https://doi.org/10.46743/2160-3715/2018.3560

Éltető, A. – Sass, M. – Götz, M. (2022): The dependent Industry 4.0 development path of the Visegrád countries. *Intersections East European Journal of Society and Politics*, 8(3): 147-168. https://doi.org/10.17356/ieejsp.v8i3.980

Eurostat (2008): *NACE Rev. 2 - Statistical classification of economic activities*. Eurostat, Luxemburg, Luxemburg. Available online: https://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/ks-ra-07-015 Downloaded: 25th September 2024.

Farkas, B. (2011): The Central and Eastern European model of capitalism. *Post-Communist Economies*, 23(1): 15–34. https://doi.org/10.1080/14631377.2011.546972

Farkas, B. (2022): Kapitalista átalakulás és változó geopolitikai erőtér: Kelet-Közép-Európa három évtizede. *Korunk*, 33(3): 6-13.

Gál, Z. – Juhász, B. (2016): A vállalatok nemzetköziesedésének vizsgálata Kelet-Közép-Európában makrogazdasági módszerekkel. *Vezetéstudomány*, 47(8): 26–39. https://doi.org/10.14267/VEZTUD.2016.08.03

Gereffi, G. – Fernandez-Stark, K. (2016): *Global Value Chain Analysis: A Primer 2nd Edition*. Technical Report for the Center on Globalization, Governance & Competitiveness, DUKE Centre for International Development, Durham, USA, Available online: https://dukespace.lib.duke.edu/items/e8010f4b-90c9-4835-bc54-16422bb7efb6 Downloaded: 22nd May 2020.

Gereffi, G. (2019a): Global value chains and international development policy: Bringing firms, networks and policy-engaged scholarship back in. *Journal of International Business Policy*, 2(3): 195-210. https://doi.org/10.1057/s42214-019-00028-7

Gereffi, G. (2019b): Economic upgrading in global value cahins. In Ponte, S. - Gereffi, G. - Raj-Reichert, G. (eds.): *Handbook on global value chains*. Edward Elgar, Cheltenham, United Kingdom, 240-255. https://doi.org/10.4337/9781788113779

Géring, Zs. (2017): Kevert szövegelemzési módszertan alkalmazása gazdasági és társadalmi jelenségek vizsgálatához – online CSR kommunikáció vizsgálata tartalomelemzéssel és diskurzuselemzéssel. *Vezetéstudomány*, 48(4): 55–66. https://doi.org/10.14267/VEZTUD.2017.04.08

Gerőcs, T. – Pinkasz, A. (2019): Relocation, standardization and vertical specialization: Core–periphery relations in the European automotive value chain. *Society and Economy*, 41(2): 171-192. https://doi.org/10.1556/204.2019.001

Grieveson, R. – Bykova, A. – Hanzl-Weiss, D. – Hunya, G. – Korpar, N. – Podkaminer, L. – Stehrer, R. – Stöllinger, R. (2021): *Avoiding a Trap and Embracing the Megatrends: Proposals for a New Growth Model in EU-CEE*. wiiw Research Report No 458. The Vienna Institute for International Economic Studies, Vienna, Austria

Hakanson, L. – Kappen, P. (2017): The 'Casino Model' of internationalization: An alternative Uppsala paradigm. *Journal of International Business Studies*. 48(9): 1103–1113. https://doi.org/10.1057/s41267-017-0113-9

Harrison, D. (2021): *Electric Vehicle Battery Supply Chain Analysis. How Battery Demand and Production are Reshaping the Automotive Industry*. Automotive from Ultima Media, Automotive Logistics and Automotive Manufacturing Solutions Riport, Ultima Media, London, United Kingdom, Available online: https://www.automotivelogistics.media/battery-supply-chain/electric-vehicle-battery-supply-chain-analysis-2021-how-lithium-ion-battery-demand-and-production-are-reshaping-the-automotive-industry/41924.article Downloaded: 20th April 2023.

Hennart, J.-F. (1986): What is Internalization. *Weltwirtschaftliches Archiv*, 122(4) 791–804. https://doi.org/10.1007/BF02707861

Herrero, A. G. (2020): *The impact of "Novel Coronavirus Pneumonia" on global value chain*. AFCA Working Paper No. WP/2020-04/70. Asian Financial Cooperation Association. Beijing, China, Available online: http://www.afca-asia.org/Portal.do?method=detailView&returnChannelID=231&contentID=603 Downloaded: 15th August 2022.

Huitema, E.-M. (2021): *Chip shortage: auto industry calls for more EU-made semiconductors*. ACEA Messages from the Director General, European Automobile Manufacturers' Association, Brussels, Belgium. Available online: https://www.acea.auto/message-dg/chip-shortage-auto-industry-calls-for-more-eu-made-semiconductors/ Downloaded: 19th November 2022.

Humphrey, J. – Memedovic, O. (2003): *The Global Automotive Industry Value Chain: What Prospects for Upgrading by Developing Countries*. UNIDO Sectorial Studies Series Working Paper, United Nations Industrial Development Organization, Vienna, Austria Available online: https://ssrn.com/abstract=424560 Downloaded: 24th September 2024.

Hymer, S. H. (1976): *The International Operations of National Firms: A Study of Foreign Direct Investment*. MIT Press, Cambridge, USA

Johanson, J. – Vahlne, J. E. (1977): The internationalization process of the firm-a model of knowledge development and increasing foreign market commitments. *Journal of International Business Studies*, 8(1): 23–32.

Johanson, J. – Vahlne, J. E. (2009): The Uppsala internationalization process model revisited: From liability of foreignness to liability of outsidership. *Journal of International Business Studies*, 40(9): 1411–1431. https://doi.org/10.1057/jibs.2009.24

Kano, L. – Tsang, E. W. K. – Yeung, H. W.-c. (2020): Global value chains: A review of the multidisciplinary literature. *Journal of International Business Studies*, 51(4): 577-622. https://doi.org/10.1057/s41267-020-00304-2

Kim, J. U. – Aguilera, R. V. (2016): Foreign Location Choice: Review and Extensions. *International Journal of Management Reviews*, 18(2): 133–159. https://doi.org/10.1111/ijmr.12064

Linneberg, M. S. – Korsgaard, S. (2019): Coding qualitative data: a synthesis quiding the novice. *Qualitative Research Journal*, 19(3): 259-270. https://doi.org/10.1108/QRJ-12-2018-0012

Luo, Y. (2021): New OLI advantages in digital globalization. *International Business Review*, 30(9): 101797. https://doi.org/10.1016/j.ibusrev.2021.101797

Mesquita, L. F. (2016): Location and the global advantage of firms. *Global Strategy Journal*, 6(1):3–12. https://doi.org/10.1002/gsj.1107

Mihet-Popa, L. – Saponara, S. (2018): Toward Green Vehicles Digitalization for the Next Generation of Connected and Electrified Transport Systems. *Energies*, 11(11): 3214–3238. https://doi.org/10.3390/en11113124

Molnár, E. – Kozma, G. – Mészáros, M. – Kiss, É. (2020): Upgrading and the geography of the Hungarian automotive industry in the context of the fourth industrial revolution. *Hungarian Geographical Bulletin*, 69(2): 137–155. https://doi.org/10.15201/hungeobull.69.2.4

Nafday, A. M. (2009): Strategies for Managing the Consequences of Black Swan Events. *Leadership and Management in Engineering*, 9(4): 191–197. https://doi.org/10.1061/(ASCE)LM.1943-5630.0000036

Nölke, A. – Vliegenhart, A. (2009): Enlarging the Varieties of Capitalism: The Emergence of Dependent Market Economies in East Central Europe. *World Politics*, 61(4): 670-702. https://doi.org/10.1017/S0043887109990098

Özatağan, G. (2011): Dynamics of Value Chain Governance: Increasing Supplier Competence and Changing Power Relations in the Periphery of Automotive Production—Evidence from Bursa, Turkey. *European Planning Studies*, 19(1): 77-95. https://doi.org/10.1080/09654313.2011.530393

Pananond, P. – Gereffi, G. – Pedersen, T. (2020): An integrative typology of global strategy and global value chains: The management and organization of cross-border activities. *Global Strategy Journal*, 10(3): 421-443. https://doi.org/10.1002/gsj.1388

Pavlínek, P. (2020): Restructuring and internationalization of the European automotive industry. *Journal of Economic Geography*, 20(2020): 509-541. https://doi.org/10.1093/jeg/lby070

Pavlínek, P. (2023): Transition of the automotive industry towards electric vehicle production in the east European integrated periphery. *Empirica*, 50(2023): 35-73. https://doi.org/10.1007/s10663-022-09554-9

Peng, M. W. (2001): The resource-based view and international business. *Journal of Management*, 27(6): 803–829. https://doi.org/10.1016/S0149-2063(01)00124-6

Ramani, V. – Ghosh, D. – Sodhi, M.S (2022): Understanding systemic disruption from the Covid-19-induced semiconductor shortage for the auto industry. *Omega*, 113(2022): 102720 https://doi.org/10.1016/j.omega.2022.102720 Rugman, A. M. (1981): A Test of Internalization Theory. *Managerial and Decision Economics*, 2(4): 211–219. https://doi.org/10.1002/mde.4090020402

Ramos, M. R. – Ruiz-Gálvez, M. E. (2024): The transformation of the automotive industry toward electrification and its impact on global value chains: Inter-plant competition, employment, and supply chains. *European Research on Management and Business Economics*, 30(1): 100242. https://doi.org/10.1016/j.iedeen.2024.100242

Rechnitzer, J. – Hausmann, R. – Tóth, T. (2017): A magyar autóipar helyzete nemzetközi tükörben. *Hitelintézeti Szemle*, 16(1): 119–142.

Rechnitzer, J. (2019): A járműipar kihívásainak társadalmi és gazdasági dimenziói. *Tér Gazdaság Ember*, 7(1): 13–31.

Riemensperger, F. – Pfannes, P. (2020): *Tomorrow's Global Market Leaders New industry ecosystems — Rethinking value chains.* Accenture Top500 Study Germany, Accenture, Dublin, Ireland

Rugman, A. M. (1981): A Test of Internalization Theory. *Managerial and Decision Economics*, 2(4): 211–219. https://doi.org/10.1002/mde.4090020402

Rugman, A. M. (2010): Reconciling Internalization Theory and the Eclectic Paradigm. *Multinational Business Review*, 18(2): 1–12. https://doi.org/10.1108/1525383X201000007

Russo, M. – Alboni, F. – Sanginés, J.C. – De Domenico, M. – Mangioni, G. – Righi, S. – Simonazzi, A. (2022): *The Changing Shape of the World Automobile Industry: A Multilayer Network Analysis of International Trade in Components and Parts*. Ineteconomics Working Paper No. 173, Institute for New Economic Thinking, New York, USA, Available online: https://www.ineteconomics.org/uploads/papers/WP_173-Simonazzi-et-al.pdf Downloaded: 20th January 2023.

Saittakari, I. – Ritvala, T. – Piekkari, R. – Kähäri, P. – Moisio, S. – Hanell, T. – Beugelsdijk, S. (2023): A review of location, politics, and the multinational corporation: Bringing political geography into international business. *Journal of International Business Studies*, 54(6): 969–995. https://doi.org/10.1057/s41267-023-00601-6

Simonazzi, A. – Sanginés, J. C. – Russo, M. (2020): *The Future of the Automotive Industry: Dangerous Challenges or New Life for a Saturated Market*?. Intereconomics Working Paper No. 141. Institute for New Economic Thinking

Sinkovics, N., - Sinkovics, R. R. (2019): International business and global value chains. In Ponte, S. - Gereffi, G. - Raj-Reichert, G. (eds.): *Handbook on global value chains*. Edward Elgar, Cheltenham, United Kingdom, 417-431. https://doi.org/10.4337/9781788113779

Slačík, T. (2022): *The e-motion of car manufacturing in CESEE: the road ahead*. Focus on European integration Q3/2022. Oesterreichische Nationalbank, Vienna, Austria

SMMT (2019): *UK Automotive*. SMMT Brexit Briefing July 2019, Society of Motor Manufacturers and Traders, London, United Kingdom

Strange R. – Zucchella, A. (2017): Industry 4.0, global value chains and international business. *Multinational Business Review*, 25(3): 174–184. https://doi.org/10.1108/MBR-05-2017-0028

Svoboda, D. – Tschiesner, A. – Freund, H. – Jánoskúti, L. – Kadocsa, A. – Bartók, É. (2020): *Rethinking European Automotive Competitiveness: The R&D CEE opportunity*. McKinsey and Company Report, Budapest, Hungary, Available online: https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/rethinking-european-automotive-competitiveness-the-r-and-d-cee-opportunity Downloaded: 14th August 2022.

Szalavetz, A. – Somosi, S. (2019): Ipar 4.0-technológiák és a magyarországi fejlődés-felzárkózás hajtóerőinek megváltozása – gazdaságpolitikai tanulságok. *Külgazdaság*, 63(3-4): 66-93.

Szalavetz, A. (2017): Upgrading and Value Capture in Global Value Chains in Hungary: More Complex than What the Smile Curve Suggests. In Szent-Iványi, B. (ed.): *Foreign Direct Investment in Central and Eastern Europe: Post-crisis Perspectives*, Palgrave Macmillan, Cham, Svájc, 127–150.

Szalavetz, A. (2021): Digitális átalakulás és a feldolgozóipari értékláncok új szereplői. *Külgazdaság*, 65(1-2): 137-149. http://doi.org/10.47630/KULG.2021.65.1-2.137

Túry, G. (2018): Consequences of Technological Changes In The Automotive Industry – Perspectives Of The Central European Region As Part Of The Global Value Chains. *Global Economic Observer*, 6(2): 82-94.

Túry, G. (2021): *Electric Vehicle Revolution – Position of the Japanese Automotive Suppliers in Central Europe*. KRTK VGI Working Paper No. 265. Magyar Tudományos Akadémia Közgazdaság- és Regionális Tudományi Kutatóközpont Világgazdasági Intézet, Budapest, Hungary

Vernon, R. (1966): International Investment and International Trade in the Product Cycle. *The Quarterly Journal of Economics*, 80(2): 190–207.

Vosta, M. – Kocourek, A. (2017): Competitiveness of the European Automobile Industry in the Global Context. *Politics in Central Europe*, 13(1): 69-86. https://doi.org/10.1515/pce-2016-0023

Williamson, O. E. (1981): The Economics of Organization: The Transaction Cost Approach. *American Journal of Sociology*, 87(3): 548–577.

Publications related to the dissertation

1. Book chapters

Pelle, A. – Tabajdi, G. (2023): The Role of Manufacturing in the Central and Eastern European Countries in the Various Periods from Transition to Mature EU Membership. In Ricz, J. – Gerőcs, T. (szerk.): *The Political Economy of Emerging Markets and Alternative Development Paths*, Palgrave Macmillan, Cham, Svájc. https://doi.org/10.1007/978-3-031-20702-0_6

Tabajdi, G. – Végh, M. Z. (2021): The global and the Eurozone crises and their effects on Central and Eastern Europe's economic performance. In Arató, K. – Koller, B. – Pelle, A. (szerk): *The Political Economy of the Eurozone in Central and Eastern Europe: Why In, Why Out?*. Routledge, London UK. ISBN 9781032034676

2. Journal articles

Megyeri, E. – Pelle, A. – Tabajdi, G. (2023): The realities of EU industrial policies analysed through automotive value chain dynamics. *Society and Economy*, 45(3): 250-269. https://doi.org/10.1556/204.2023.00005

Pelle, A. – Sass, M. – Tabajdi, G. (2020): European Integration and Industrial Actors' Location and Investment Decisions in the CEE Automotive Industry. *Economia e Lavoro*, 54(1): 31-44. https://doi.org/10.7384/97664:y:2020:i:1:p:31-44

Pelle, A. – Sass, M. – Tabajdi, G. (2021): Integráció és digitalizáció a kelet-közép-európai autóiparban. *Külgazdaság*, 65(5-6): 79-90. https://doi.org/10.47630/KULG.2021.65.5-6.79

Pelle, A. – Tabajdi, G. (2021): Covid-19 and transformational megatrends in the European automotive industry: Evidence from business decisions with a Central and Eastern European focus. *Entrepreneurial Business and Economics Review*, 9(4): 19-33. https://doi.org/10.15678/EBER.2021.090402

3. Conference publications

Megyeri, E. – Tabajdi, G. (2024): Recollecting, reusing and recycling: The objectives and impacts of EU legislation on the battery value chain. In Dujak, D. (szerk.): *Proceedings of the 24th International Scientific Conference Business Logistics in Modern Management*, Osijek, Croatia. 91-109.

Sass, M. – Tabajdi, G. (2023): Automotive outward FDI from the Visegrad countries and Austria. In Hlavatý, I, (szerk): *Central and Eastern Europe in the Changing Business Environment: Proceedings*. (2023), 225-235. ISBN:9788022550642

Megyeri, E. – Tabajdi, G. (2020): Testing the importance of 4th Industrial Revolution characteristics in the Hungarian environment Comparison of SMEs' and Business students' perception. In Udvari, B. (szerk.): *Proceedings of the 4th Central European PhD Workshop on Technological Change and Development*, Szeged, Hungary. 61-78.