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Manufacturing outsourcing in the automotive industry in developed, developing, and transitional economies: A literature review with a focus on the Kyrgyz Republic

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Abstract. Manufacturing outsourcing in the automotive industry has become a widely adopted strategy in both developed and developing countries, driven by the need to enhance competitiveness, reduce costs, and improve production efficiency. The research niche of this article is the comparative analysis of outsourcing strategies in automotive manufacturing, with a focus on technological, economic, and regional differences. The purpose of the article is to examine the current state of manufacturing outsourcing in the automotive sector, identify key trends and challenges, and develop strategic recommendations aimed at optimising its implementation in various economic contexts. The research hypothesis assumes that outsourcing, when properly managed and adapted to local conditions, can act as a catalyst for technological advancement and investment attraction. The methodology involved analytical, statistical, functional, deductive, comparative, and classification methods, enabling a systematic review of literature and data from developed (Germany, USA, Japan) and developing countries (China, India, Kyrgyzstan). The most significant results include the identification of regional outsourcing strategies, technological trends such as digitalisation and e-knowledge systems, and the challenges related to quality, regulation, and risk management. The study concludes that manufacturing outsourcing is a strategic tool with considerable potential for economic growth and innovation, but it requires carefully tailored approaches, strategic partnerships, and strong quality control to ensure sustainable development and successful implementation across different national contexts.
Keywords: supply chain management, quality of services, global economy, industrial competitiveness, market requirements

Introduction

The study of the topic of manufacturing outsourcing in the automotive industry acquires undeniable importance in the modern context, as countries are actively seeking to diversify their economies and attract foreign investment. By developing this aspect, it is possible to effectively optimise production processes, increase competitiveness in global markets and create favourable conditions for the technological development of the automotive industry. In the context of rapidly changing global economic dynamics and active introduction of innovative technologies in automotive production, the study of this topic will provide not only important practical recommendations for enterprises, but also contribute to national development strategies, promoting sustainable economic growth and the establishment of Kyrgyzstan as a key participant in the global automotive industry.

The research problem concerns the identification of key political, economic, technological, and organisational factors that influence the successful implementation and optimisation of manufacturing outsourcing strategies in the automotive industry within both developed and developing countries.

Maadanbekova and Baygubatova (2021) argue that globalisation of production in the automotive industry is indispensable to ensure competitiveness. This study has not sufficiently addressed the impact of manufacturing outsourcing on job losses in countries where outsourcing takes place. According to Abduzhalieva and Tokhtyeva (2021), technology development and innovation requirements threaten conventional production models. Outsourcing is becoming not only a cost-cutting tool, but also an opportunity to bring innovative ideas through global partnerships. The study did not focus on socio-cultural aspects related to the adoption of innovations in different regions. Artykbaeva and Musaeva (2021) emphasise that outsourcing in developing countries is often associated with risks associated with political instability and changes in legislation. Companies must balance savings with risk management. Aspects related to the social responsibility of enterprises, including the impact on working conditions and social programmes in outsourcing countries, have not been examined in detail.

As noted by Amankulov et al. (2021), optimisation of global supply chains is important to reduce delivery time and costs. Automotive companies are actively seeking to diversify their suppliers and manufacturers. Cybersecurity in global supply chains, which can be critical for the automotive industry, has been understudied. Abdieva and Sydykova (2023) found that with the growing awareness of environmental problems there is a need to develop sustainable production models. The environmental impact of component transport and the efficiency of means of transport in global supply chains are under-researched. Shatmanov et al. (2021) emphasise that risk management in global supply chains requires a strategic approach. Car companies must recognise the potential threats and develop hybrid production

models to ensure stability. The study does not consider the risks associated with changes in customs laws and trade relations between countries, which could affect global supply chains.

In the context of the Kyrgyz automotive industry, manufacturing outsourcing presents unique opportunities and challenges shaped by the country's specific economic, political, and geographical landscape. Kyrgyzstan's strategic location in Central Asia offers a significant advantage, positioning it as a potential hub for automotive companies looking to access both European and Asian markets, thereby reducing logistics costs and enhancing supply chain efficiency. Additionally, the potential for lower labour costs and various economic incentives provided by the government to attract foreign investment can make the country an appealing destination for outsourcing. However, the industry faces challenges such as infrastructure limitations, political and economic instability, and a shortage of skilled labour, which could impact production quality and efficiency. Furthermore, navigating the regulatory environment and ensuring compliance with local laws can be complex, while cultural and language barriers may pose communication challenges. To capitalize on these opportunities and mitigate risks, it is crucial for Kyrgyzstan to invest in infrastructure development, workforce training, and create a stable and predictable business environment. By addressing these factors, Kyrgyzstan can enhance its attractiveness as an outsourcing destination, foster technological advancement, and establish itself as a key player in the global automotive industry.

The purpose of this study was to develop strategic recommendations aimed at optimising manufacturing outsourcing in the automotive industry to increase competitiveness and create favourable conditions for attracting large-scale foreign direct investment at the national level, particularly in auto component production and assembly infrastructure. The research questions:

1. What are the prevailing trends and strategic models of manufacturing outsourcing in the global automotive industry between 2018 and 2024?
2. How do outsourcing strategies differ between developed and developing countries in terms of cost efficiency, supplier integration, and technological readiness?
3. What are the strengths, weaknesses, opportunities, and threats associated with implementing outsourcing in Kyrgyzstan's automotive manufacturing sector?

Materials and Methods

This study applied a focused and integrative methodological framework combining three key approaches, each selected for its relevance in addressing the

multi-layered research objectives concerning the optimisation of manufacturing outsourcing in the automotive industry.

First, a systematic literature review was conducted to establish the current state of academic knowledge on manufacturing outsourcing in the global automotive sector. A structured search strategy was employed in two major bibliographic databases – Scopus and Web of Science – targeting peer-reviewed publications released between 2018 and 2024. Specific search terms included combinations of "automotive industry", "outsourcing", "supplier networks", "manufacturing strategy", and "competitive advantage". To ensure transparency and replicability, the review followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, enabling a clear protocol for identifying, screening, and including relevant literature (Payne and Needham, 2024). This approach facilitated the identification of key themes, recurring challenges, and emerging trends in global outsourcing practices (Payne and Needham, 2024).

Second, a comparative analysis was undertaken to examine how outsourcing strategies differ between developed and developing economies. Countries such as Germany, Japan, and the United States were selected as representatives of advanced industrial systems, while India, Brazil, and Kyrgyzstan were analysed as cases of emerging or transitional automotive sectors. The comparison focused on three core indicators: cost efficiency in production and logistics, depth of supplier integration within value chains, and levels of digitalisation readiness, particularly in relation to Industry 4.0 standards (Heo et al., 2007). The analysis drew on a combination of secondary data sources, including industrial performance reports, sector-specific competitiveness indices, and national economic statistics. This comparative perspective allowed for contextualising Kyrgyzstan's challenges and opportunities in light of global benchmarks.

Third, a SWOT analysis was conducted to assess the strategic viability of introducing or expanding manufacturing outsourcing within Kyrgyzstan's automotive sector. This component synthesised insights gained from the literature review and comparative analysis with country-specific data, including industrial development plans, policy documents, and reports from the Kyrgyz Ministry of Economy and private sector actors. The SWOT framework facilitated the structured identification of internal strengths (e.g., low labour costs, geographic proximity to regional markets) and weaknesses (e.g., limited infrastructure, technological gaps), as well as external opportunities (e.g., regional integration, foreign investment potential) and threats (e.g., political instability, global supply chain disruptions) that could influence the successful implementation of outsourcing strategies (Ciravegna et al., 2013).

Each of these methodological components contributed uniquely to forming a comprehensive and multidimensional understanding of manufacturing outsourcing. Together, they provided the empirical and analytical foundation for formulating strategic recommendations tailored to the specific industrial and institutional

conditions of Kyrgyzstan, while also contributing to the broader discourse on global supply chain optimisation in the automotive industry.

Results and Discussion

Manufacturing outsourcing in the automotive industry is a key strategic tool that is attracting increasing attention in a rapidly changing global economic environment. This strategy involves delegating certain production processes or functions to a third-party contractor to optimise resources, increase efficiency, and improve the competitiveness of enterprises. One of the key problems in the modern automotive industry is the need to improve production processes and attract investment for sustainable development of the industry (Jasiński et al., 2021). Manufacturing outsourcing acts as a strategy to help address these challenges. By delegating certain functions, such as component manufacturing or assembly, companies in the automotive industry can achieve a more flexible cost structure, reduce the time to market new products, and reduce overall costs. At the same time, it is also important to consider the potential risks associated with outsourcing, which emphasises the need to develop effective risk management strategies. International cooperation is also highlighted as a key factor in facilitating the transfer of advanced technologies and innovations to the automotive industry. However, despite this, it is important to consider the impact of outsourcing on the domestic labour market and employment.

Fan et al. (2022) identified that battery outsourcing is becoming a key strategic solution for electric vehicle manufacturers seeking to optimise production processes and ensure competitiveness in the market. The decision to outsource batteries is driven not only by the desire to reduce costs, but also by the desire to focus on core competences such as design, innovation, and marketing. An essential aspect is the product selection strategy of the electric vehicle manufacturer in battery outsourcing (Gritsuk et al., 2017). Manufacturers should carefully evaluate potential suppliers, considering their experience in high-tech battery production, technical characteristics, and their willingness to innovate and cooperate in developing new solutions. Choosing the right supplier also involves issues of sustainability of supply, ensuring high quality standards, and compliance with safety and environmental regulations. It is also important to consider the geographical localisation of the supplier to minimise logistics costs and ensure that batteries reach the production lines on time (Kryvoruchko et al., 2021).

By analysing the results obtained as well as the findings, the product selection strategy should also consider the long-term outlook, as batteries are crucial for the performance and durability of electric vehicles. Working with reliable and innovative battery suppliers can be a key competitive advantage for electric vehicle manufacturers in the rapidly evolving electric vehicle market (Tropina et al., 2014).

Among the functions realised in the corporate environment, production processes are of particular importance. Today's customer expectations include not only the requirement for stable and prompt deliveries, but also an urgent response to claims. Reporting on the progress of production processes is often delayed. Delays in identifying non-conformities result in increased costs to correct them. Recognising that human error cannot be entirely eliminated, even with advanced tools and techniques, underscores the need to train staff to remain vigilant and responsive to potential mistakes. To prevent the negative effects of supply disruptions and reduce operating costs, companies in the automotive industry often resort to outsourcing organisations (Sá et al., 2022). These companies employ qualified professionals with the necessary technical knowledge to ensure that tasks are completed to a high standard. Each outsourcing project includes three key components, presented in Figure 1.

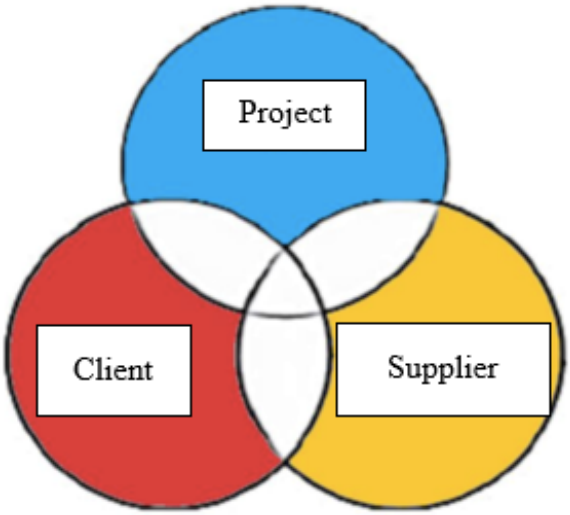

Fig. 1. Three integral elements of the outsourcing process
Source: compiled by authors

The idea of outsourcing management primarily involves the transfer of the necessary resources and inputs to perform the task, as well as the right to make the relevant decisions. The customer is the company transferring resources and factors (which serves as the basis for outsourcing a task), while the supplier is the organisation responsible for performing said task. A project encompasses a completed and clearly defined scope of work commissioned. The customer seeks prompt and quality service, while the supplier is interested in achieving substantial profits. The different objectives of both parties emphasise the importance of effective interaction between the customer and the supplier during contracting and negotiation phases, in

order to prevent potential breakdowns in cooperation, such as contract termination, financial losses, or disruption of the outsourcing arrangement.

Turning to the definition of Fabbe-Costes and Lechaptois (2022), the digitalisation of the automotive supply chain represents a significant stage of transformation in the modern industry. The adoption of digital technology has a substantial impact on every step of the process, from the production of components to the delivery of finished vehicles to the market. Digital technologies enable more efficient forecasting and planning of material and component requirements, helping to optimise inventory levels and reduce costs (Musayev et al., 2022). Big data analysis allows for a more accurate prediction of market demand and adaptation of production processes to current requirements. This increases flexibility and responsiveness to market changes, which is especially important in the dynamic automotive industry.

It is worth highlighting that there are also challenges in the way of digitalisation of the automotive supply chain. Cybersecurity, integrating novel technologies into existing processes, and ensuring that staff are trained to work with digital tools require careful consideration. However, successful digitalisation of the supply chain creates the potential to improve efficiency, reduce costs, and respond more accurately to the dynamic changes in the automotive industry. In today's environment, quality control becomes a vital component for optimising production processes (Tyagi et al., 2023). Effective use of production support tools and techniques can reduce the risk of incompatible components on the production line, which leads to a reduction in costs associated with additional staff and production. It also eliminates the need to train every employee.

As noted by Pakpienthakolphol and Jeżyna (2021), in the modern automotive sector, outsourcing of maintenance services is becoming an increasingly essential element of the strategy of enterprises. The key variables influencing the outsourcing decision in this area differ in the Asian and European contexts, which is of interest for comparative analysis. The Asian automotive sector, especially in countries with a high rate of industrialisation, has witnessed rapid technology adoption and emphasis on innovation. Maintenance service providers in Asia are embedded in a dynamic digital transformation, creating an environment for effective outsourcing. The key variables are access to technical competencies, flexibility to adapt to novel technologies, and the ability to scale quickly to meet growing demand. In the context of the European automotive sector, the prevailing bias is towards more conventional and standardised maintenance approaches (Dmytriiev et al., 2019). Here, the key variables may be not only economic efficiency, but also the strict quality and compliance standards that characterise the automotive markets in Europe. Regulation, environmental norms, and prominent safety standards become key aspects when choosing outsourcing partners (Kyurchev et al., 2024). This study confirms the results. The comparison of the dynamics of the impact of key variables on maintenance outsourcing emphasises the importance of considering cultural,

technological, and regulatory characteristics when developing outsourcing strategies in the automotive industry.

Production support means that employees can be involved in tasks according to the needs of client companies. They are trained according to the scope of work to be carried out, mastering health and safety standards and familiarising themselves with customer procedures. Another outsourced service is quality control and repairs carried out at the client's premises. These processes include part selection, quality control of manufactured components, part inspection on the production line, and finished product inspection. If the customer has its own procedures and internal guidelines, all work is carried out according to these rules. Other significant outsourcing services in the automotive industry are assembly and production work, which substantially reduces the cost of maintaining employees (Teipen and Mehl, 2021). Also widely used is the service of repackaging components and parts, which is carried out according to the customer's instructions as soon as they arrive. Service providers in the automotive industry provide a diverse range of services including:

- production support with the provision of qualified employees to work on production lines;
- alternative performance of production tasks in case of disruptions, such as assembly and sorting at the customer's premises;
- support production in the face of increased labour demand, providing flexibility to adapt to market demand;
- sorting parts and packaging before they are sent to the production lines;
- providing forklift trucks with operators for warehouses and production lines;
- repackaging and product packaging services;
- repair work, including maintenance and cleaning of equipment.

Outsourcing agreements between businesses and suppliers provide end-to-end solutions for the entire supply chain, resulting in economic benefits. In developed countries such as Germany, USA, and Japan, manufacturing outsourcing strategies in the automotive industry act as a valuable tool to achieve a variety of strategic goals (Krzywdzinski, 2021). These companies are actively outsourcing to reduce costs, improve production efficiency, and focus on core competencies. One of the major benefits of outsourcing for automotive companies in developed countries is cost savings. Specialised contractors can often provide certain services or components at a lower cost than if these tasks were performed in-house. This frees up resources for more strategic and innovative initiatives. Outsourcing allows companies in the automotive industry to utilise their resources more efficiently and focus on core competencies (Panchenko et al., 2021). For instance, the production of certain components or subsystems can be outsourced to specialised suppliers, freeing the company from having to manufacture multiple parts and allowing it to focus on new technology development, design, and marketing.

To contextualise the potential of manufacturing outsourcing in Kyrgyzstan's automotive industry, it is essential to consider existing national experiences – both successful and limited – in applying outsourcing strategies within industrial operations. While the automotive sector in Kyrgyzstan remains in an early stage of development compared to regional neighbours, several examples from adjacent manufacturing sectors provide insight into the current state of outsourcing practices in the country.

One notable example is the Dastan Engineering Company, originally focused on defence and mechanical equipment, which in recent years has adopted elements of outsourcing to expand into precision metalworking for civilian automotive components. Through collaboration with external engineering firms in Kazakhstan and Russia, Dastan has outsourced certain machining processes while retaining control over final assembly and quality inspection domestically. This hybrid model has enabled the company to reduce costs and maintain production continuity amid supply chain disruptions (Turienzo and Lampón, 2022).

Another relevant case is AsiaAvtoBishkek, a former joint venture with Kazakhstan's Asia Auto Group, which aimed to establish an automotive assembly plant in the Chui region. Although the project received initial investment commitments and aimed to outsource parts procurement from regional suppliers, the project ultimately stalled due to regulatory uncertainty and lack of sustained infrastructure support. This experience illustrates that while outsourcing can offer strategic advantages, its success in Kyrgyzstan remains highly dependent on the broader institutional environment, including predictable investment legislation and logistical capacity (Ikome et al., 2022).

These examples show that while Kyrgyz companies have begun integrating outsourcing into their industrial models, the outcomes are mixed. Successful cases tend to rely on carefully selected partnerships and partial outsourcing of non-core functions, whereas larger-scale or capital-intensive outsourcing strategies have faced obstacles in the form of weak institutional frameworks and underdeveloped industrial infrastructure. Consequently, the Kyrgyz automotive sector's adoption of outsourcing as a strategic tool will likely depend on targeted policy reforms, enhanced investment security, and the gradual development of a specialised supplier base.

According to Felser (2022), the impact of digital technologies on sourcing strategies in the German automotive industry represents a key factor in the transformation of the industry in the era of digitalisation. These technologies have a significant impact on all stages of the supply chain, from raw material production to the delivery of finished vehicles to the market. One of the key aspects of this impact is improved efficiency and transparency in supply chain processes through the adoption of digital platforms and data analytics technologies. The application of digital technologies, such as artificial intelligence systems and big data analytics,

enables more accurate forecasting of material and parts requirements, which optimises inventory management and reduces the risks associated with shortages or overstock (Lutsenko et al., 2019). It also promotes greater flexibility in responding to changes in market demand, which is particularly important in a dynamic automotive market. However, the adoption of digital technology also brings challenges such as cybersecurity issues and the need to train staff to work with novel technologies. Balancing digital transformation and data security is an essential aspect of sourcing strategies in the German automotive industry.

Globalisation also plays a vital important role in the use of outsourcing in the automotive industry in developed countries (Panchenko et al., 2024). Companies seek to enhance their ability to access new markets by collaborating with local partners who participate in production processes or by outsourcing specific tasks to regional suppliers, thereby enabling the customisation of products to meet concrete local requirements. This allows companies to better meet the needs of the global market and diversify their customer base. One of the major benefits of outsourcing for automotive companies in developed countries is cost savings. Specialised contractors can often provide certain services or components at a lower cost than if these tasks were performed in-house. This frees up resources for more strategic and innovative initiatives. A notable example is BMW, which has outsourced the production of various non-core components – such as wire harnesses and interior fittings – to suppliers in Eastern Europe and North Africa. This strategy has enabled the company to streamline operations, reduce labour costs, and concentrate on high-value activities such as design, digitalisation, and electric vehicle development. Outsourcing thus allows companies in the automotive industry to utilise their resources more efficiently and focus on core competencies. For instance, the production of certain components or subsystems can be outsourced to specialised suppliers, freeing the company from having to manufacture multiple parts and allowing it to focus on new technology development, design, and marketing.

However, despite the many advantages, there are also challenges to the use of outsourcing in the automotive industry in developed countries. Quality control, supply chain management, and ensuring compliance with safety standards are becoming critical aspects. Companies must choose their suppliers carefully and manage their supplier relationships effectively to minimise risk. Outsourcing in the automotive industry in developed countries acts as a strategy focused on cost optimisation, efficiency improvement, and access to new markets (Kubiczek et al., 2024). This approach is becoming a key element in the global strategies of companies aiming to stay competitive in a rapidly changing economic environment.

In developing countries such as China, India, and Brazil, manufacturing outsourcing in the automotive industry acts not only as a strategic tool, but also as a powerful means of stimulating economic growth and technological development (Teipen and Mehl, 2021). The undeniable benefits, such as lower costs, increased

efficiency and access to global markets, make this approach highly attractive to countries seeking to strengthen their position in the global automotive industry. One of the key factors that make manufacturing outsourcing attractive to developing countries is the ability to attract foreign investment. Large automotive companies from developed countries looking for favourable conditions for production are actively seeking partners in these countries. This creates new jobs, promotes infrastructure development, and attracts technology and knowledge to the region. Technological development is also a significant aspect supported by manufacturing outsourcing. When companies move production to developing countries, they often adopt novel technologies and production methods, which contributes to modernisation and technological advance in these regions (Kiurchev et al., 2023). This can create a favourable environment for the development of local innovation and technological competences.

Despite all the potential benefits, manufacturing outsourcing in developing countries also faces serious challenges (Ikome et al., 2022). An unstable political and economic environment can create unpredictable business conditions. Changes in legislation, political crises and financial instability can be serious obstacles to the successful implementation of an outsourcing strategy. Quality and management challenges are also faced by manufacturing outsourcing companies in developing countries. In some cases, a gap in management standards and practices can lead to inadequate process control and loss of product quality. The need for strict supply management and maintaining high production standards become important factors for the successful implementation of this strategy. Manufacturing outsourcing in the automotive industry in developing countries provides unique opportunities for economic growth and technological development. To achieve these benefits, it is necessary to balance advantages with challenges, considering the specificities of each region and developing strategies that promote sustainable and mutually beneficial cooperation.

In addition to the general challenges faced by developing countries – such as political uncertainty, infrastructural limitations, and gaps in regulatory enforcement – Kyrgyzstan contends with several specific constraints that shape its ability to implement manufacturing outsourcing strategies effectively. Political instability, marked by frequent changes in government and policy unpredictability, undermines investor confidence and deters long-term commitments from foreign automotive firms. Moreover, the limited availability of a technically skilled workforce presents a major obstacle, especially in sectors such as automotive component production that require specialised knowledge and adherence to strict quality standards. The underdevelopment of vocational education and technical training further compounds this issue. Additionally, logistical inefficiencies and insufficient integration into global supply chains restrict Kyrgyz firms' ability to engage in time-sensitive outsourcing contracts. These structural weaknesses highlight the necessity for targeted policy

reforms, including education and training initiatives, legal guarantees for foreign investors, and infrastructure upgrades, if Kyrgyzstan is to position itself as a viable outsourcing hub within the automotive industry.

In the Kyrgyz context, the development of manufacturing outsourcing in the automotive industry represents a promising strategy that can become a driver of economic growth and technological development. There are many favourable factors that provide the potential for successful implementation of this strategy in the country. Kyrgyzstan's geographical location is a considerable advantage. Located in the centre of Eurasia, Kyrgyzstan is a strategic partner for automotive companies looking to expand their operations. Proximity to key markets and transport routes can ensure efficient supply chain management and reduce logistics costs. This could make the country an attractive investment destination, especially for companies interested in developing auto component manufacturing and assembly lines. A vital factor is Kyrgyzstan's desire to attract foreign investment. The country is actively developing its investment policies and creating a favourable environment for foreign enterprises. Attracting automotive companies through manufacturing outsourcing can be not only a source of investment but also a way to transfer technology and knowledge to local industry.

However, there are challenges to the successful implementation of manufacturing outsourcing in Kyrgyzstan that need to be carefully considered. Stability of the business environment and predictability of legislation are becoming fundamental elements. Security of investment and the ability to effectively manage business processes will be crucial factors in attracting and retaining foreign companies. The issue of labour qualification is also important. The successful implementation of manufacturing outsourcing requires skilled professionals who can meet the ambitious standards of the automotive industry. The development of the education system and training of personnel are becoming key aspects of the successful implementation of this strategy. Production outsourcing provides Kyrgyzstan with unique opportunities for the development of the automotive industry. A country's ability to capitalise on its advantages such as geographical location and appetite for investment will play a crucial role in shaping its position in the global automotive industry.

The future of manufacturing outsourcing in the automotive industry promises to be dynamic and largely driven by several key trends that reflect changes in the technological landscape, economic environment, and policy environment (Turienzo and Lampón, 2022). A major trend will be innovation in technology, especially in the context of autonomous and electric vehicles. Advances in autonomous technologies can lead to changes in manufacturing processes, requiring more complex integrations and testing. Electrification of the vehicle fleet will also require adaptation of production lines and competences in battery production (Kyurchev et al., 2023). In this context, companies can turn to outsourcing to bring in experts and resources specialised in these new areas. The global economic situation will also influence

trends in manufacturing outsourcing. Shifts in global trade, exchange rates and tariffs can change the outsourcing landscape, forcing companies to rethink their strategies (Gutarevych et al., 2020). For example, instability in the economy may encourage companies to seek more flexible and adaptive production models, which may include more outsourcing. Political stability and changes in international relations will also play a leading role in the future of manufacturing outsourcing. The introduction of new tariffs, changes in customs regulations and labour laws may affect the attractiveness of different regions for outsourcing. Companies will have to consider these factors when making strategic decisions regarding the location of their production facilities.

Gumiel et al. (2022) identified that the implementation of e-knowledge system in the conventional automotive supplier industry represents a major step in the evolution from mechanical engineering to mechatronics. This process is associated with the introduction of modern information and communication technologies to optimise production, improve efficiency, and increase the competitiveness of enterprises. E-knowledge systems enable substantial amounts of information to be collected, analysed, and transformed to facilitate more accurate and faster decision-making at all stages of production. This means that businesses in the automotive industry can better forecast needs, manage inventory, optimise supply processes, and reduce costs. Overall, the implementation of e-knowledge system in the automotive industry is a strategic step to help modernise and improve production efficiency, which opens new horizons for the development of the industry. Apart from promising trends, the future of manufacturing outsourcing will also be challenged. Increasing technological complexity can mean that companies are faced with the need to maintain control over more sensitive production processes internally. There may also be challenges in data security, supply chain management, and quality compliance upon transition to novel technologies.

Schade et al. (2022) demonstrate that the future of the automotive sector will be inseparably linked to a range of significant trends and challenges that are already beginning to shape its landscape. One of the key areas of focus is the transition to electric and more sustainable technologies. Increasingly more attention is being paid to the development and deployment of electric vehicles, as well as technologies that reduce the environmental impact of the automotive industry. On the other hand, the automotive sector is also facing challenges in the field of autonomous vehicles, where advances in artificial intelligence and automation offer new perspectives in creating safe and efficient transport solutions (Vodovozov et al., 2021). These technological changes will not only require automotive companies to adapt technically, but also to change their business models. The study focuses on the strategic choices associated solely with outsourcing production processes to third-party organisations, noting the explicit exclusion of the possibility of outsourcing production processes from foreign manufacturers.

The outsourcing of manufacturing processes can come with a range of benefits, such as potentially reducing operating costs and freeing up internal resources for more strategic tasks. However, despite these advantages, consideration of the option of outsourcing production processes from foreign manufacturers was purposely excluded. This strategic exclusion is driven by the need to maintain control and uniqueness of internal manufacturing processes. Internal controls help to ensure prominent product quality, compliance with standards and flexibility to respond to internal changes. Not accepting outsourcing from foreign manufacturers also emphasises the strategic importance of maintaining technological independence and intellectual property (Kubiczek and Hadasik, 2021). This approach aims to emphasise the importance of a strategic decision precisely in the context of outsourcing production processes, stressing particular attention to internal control, quality, and uniqueness. However, the future of the automotive sector will be driven by innovations in electric vehicles, autonomous technology, and a paradigm shift in vehicle usage, which will require companies to be flexible, adapt quickly, and find sustainable solutions to create a sustainable and competitive automotive economy.

Manufacturing outsourcing in the automotive industry is a relevant and important topic, especially in the context of developed and developing countries. This approach to operations management is becoming increasingly common, emphasising the need for flexible strategies and efficiency in modern business. In developed countries, where quality standards and technological innovation are prominent, manufacturing outsourcing can provide companies with considerable advantages. These companies can focus on the high-tech and research aspects of production, shifting more standard and resource-intensive tasks to specialised outsourcing organisations. This helps to improve competitiveness, accelerate innovation and reduce the time to market for new products. In developing countries, manufacturing outsourcing can play a vital role in stimulating economic growth and attracting foreign investment. Providing services in the global automotive industry market can be an effective mechanism to raise employment and maintain stable economic development. In this case, countries can use manufacturing outsourcing as a strategic tool to expand their industrial base. However, despite the positives, there are also challenges associated with manufacturing outsourcing in the automotive industry. One of the main aspects is the need for strict quality control, safety standards, and legal compliance in the different countries where outsourcing takes place. In addition, questions arise regarding data privacy and security, especially when technology information is shared with third parties.

In conclusion, manufacturing outsourcing in the automotive industry has its distinct advantages and challenges. This approach can help optimise business processes, improve competitiveness, and economic growth in both developed and developing countries. It is important that companies carefully assess their needs,

choose the right outsourcing partners, and effectively manage all aspects of this strategic decision.

Conclusions

This study has demonstrated that manufacturing outsourcing in the automotive industry functions as a vital strategic mechanism for enhancing operational efficiency, fostering technological development, and expanding market access for companies in both developed and developing economies. Outsourcing facilitates the reallocation of internal resources toward high-value activities, such as research, design, and innovation, while allowing external partners to handle labour-intensive or standardised production functions. In developed countries, the practice supports cost rationalisation and the concentration of core competencies, enabling firms to respond swiftly to the dynamic requirements of global competition. In contrast, in developing nations, including Kyrgyzstan, outsourcing represents an important driver of industrialisation, technological transfer, and employment generation – provided that institutional, infrastructural, and labour market constraints are adequately addressed.

The comparative analysis confirmed that developed and developing countries differ in their approach to outsourcing strategies. While the former prioritises innovation, quality assurance, and integration into complex global value chains, the latter focus on cost advantages and foreign direct investment attraction. Kyrgyzstan's experience, as examined through both historical cases and SWOT analysis, reveals that successful outsourcing initiatives depend on a combination of stable regulatory environments, skilled labour development, and infrastructure readiness. Without these, even promising outsourcing ventures may falter due to unpredictability, coordination challenges, or misalignment with international standards.

For Kyrgyzstan, the findings point to a set of actionable strategic recommendations: enhance vocational and technical education to meet industry standards, improve logistical infrastructure and digital connectivity, and establish clear legal protections for investors. Policy initiatives should also support the gradual development of a specialised automotive supplier ecosystem capable of integrating into regional and global production networks.

In sum, manufacturing outsourcing in the automotive industry presents not only a practical method of addressing cost and efficiency challenges but also a transformative pathway for economic diversification and innovation. By balancing the benefits and risks of outsourcing and aligning national capabilities with global industry trends, both developed and developing countries – including Kyrgyzstan – can position themselves for sustainable and inclusive growth in the evolving landscape of global automotive manufacturing.

BIBLIOGRAPHY

[1] Abdieva, A.I., Sydykova, Zh. 2023. Some aspects of sustainable development of the Kyrgyz Republic. International Journal of Humanities and Sciences, 1(76), 147-153. https://doi.org/10.24412/2500-1000-2023-1-1-147-153.

[2] Abduzhalieva, E.D., Tokhtyeva, Z.Kh. 2021. Greening the economy of large businesses in the Kyrgyz Republic: Realities and prospects. Society, 20(1), 28-31. https://s.siteapi.org/e8b7766e0f729d6/docs/k2lgf5v9dfkw88w48s0sgwwckowkk4.

[3] Amankulov, M.A., Azhekbarov, K.A., Maratov, A.M. 2021. Development of the transport and logistics potential of road transport of the Kyrgyz Republic, taking into account interstate integration. Entrepreneur's Guide, 14(4), 126-135. http://dx.doi.org/10.24182/2073-9885-2021-14-4-126-135.

[4] Artykbaeva, G.Sh., Musaeva, V.A. 2021. Outsourcing as one of the modern forms of business organization in Kyrgyzstan. Eurasian Scientific Association, 76(6-4), 271-274. https://www.elibrary.ru/item.asp?id.

[5] Ciravegna, L., Pilkington, A., Romano, P. 2013. Outsourcing practices in automotive supply networks: an exploratory study of full-service vehicle suppliers. *International Journal of Production Research*, 51(4), 1120-1130. https://doi.org/10.1080/00207543.2012.746797.

[6] Dmytriiev, I.A., Shevchenko, I.Yu., Kudryavtsev, V.M., Lushnikova, O.M., Zhytnik, T.S. 2019. The world experience and a unified model for government regulation of development of the automotive industry. Public Policy and Administration, 18(3), 46-58. https://doi.org/10.5755/j01.ppaa.18.3.24720.

[7] Fabbe-Costes, N., Lechaptois, L. 2022. Automotive supply chain digitalization: Lessons and perspectives. In: B.L. MacCarthy, D. Ivanov (Eds.), The Digital Supply Chain, pp. 289-308. Amsterdam: Elsevier. https://doi.org/10.1016/B978-0-323-91614-1.00017-4.

[8] Fan, Z.P., Chen, Z., Zhao, X. 2022. Battery outsourcing decision and product choice strategy of an electric vehicle manufacturer. International Transactions in Operational Research, 29(3), 1943-1969. https://doi.org/10.1111/itor.12814.

[9] Felser, K.C. 2022. The impact of digital technologies on IT sourcing strategies in the German automotive industry. In: M.G. Wynn (Ed.), Handbook of Research on Digital Transformation, Industry Use Cases, and the Impact of Disruptive Technologies, 383-408. Hershey: IGI Global. https://doi.org/10.4018/978-1-7998-7712-7.ch020.

[10] Gritsuk, I., Volkov, V., Mateichyk, V., Gutarevych, Y., Tsiuman, M., Goridko, N. 2017. The evaluation of vehicle fuel consumption and harmful emission using the heating system in a driving cycle. SAE International Journal of Fuels and Lubricants, 10(1), 236-248. https://doi.org/10.4271/2017-26-0364.

[11] Gumiel, J.Á., Mabe, J., Jiménez, J., Barruetabeña, J. 2022. Introducing the electronic knowledge framework into the traditional automotive suppliers' industry: From mechanical engineering to mechatronics. Businesses, 2(2), 273-289. https://doi.org/10.3390/businesses2020018.

[12] Gutarevych, Y., Mateichyk, V., Matijošius, J., Rimkus, A., Gritsuk, I., Syrota, O., Shuba, Y. 2020. Improving fuel economy of spark ignition engines applying the combined method of power regulation. Energies, 13(5), 1076. https://doi.org/10.3390/en13051076.

[13] Heo, M.-K., Kim, Y. J., Kim, M.-S. 2007. Outsourcing and performance of inbound logistics for the automobile industry. Journal of International Logistics and Trade, 5(2), 83-101. http://dx.doi.org/10.24006/jilt.2007.5.2.83.

[14] Ikome, J.M., Laseinde, O.T., Katumba, M.G.K. 2022. The future of the automotive manufacturing industry in developing nations: A case study of its sustainability based on South Africa's paradigm. Procedia Computer Science, 200, 1165-1173. https://doi.org/10.1016/j.procs.2022.01.316.

[15] Jasiński, D., Meredith, J., Kirwan, K. 2021. Sustainable development model for measuring and managing sustainability in the automotive sector. Sustainable Development, 29(6), 1123-1137. https://doi.org/10.1002/sd.2207.

[16] Kiurchev, S., Abdullo, M.A., Vlasenko, T., Prasol, S., Verkholantseva, V. 2023. Automated control of the gear profile for the gerotor hydraulic machine. In: L.D. Cecco (Ed.), Lecture Notes in Mechanical Engineering, 32-43. Cham: Springer. https://doi.org/10.1007/978-3-031-16651-8_4.

[17] Kryvoruchko, O., Dmytriiev, I., Poyasnik, G., Shevchenko, I., Levchenko, I. 2021. Transport and logistics services as a component of the transport complex and their quality management. Problems and Prospects of Development of the Road Transport Complex: Financing, Management, Innovation, Quality, Safety – Integrated Approach, 1, 42-62. https://doi.org/10.15587/978-617-7319-45-9.CH4.

[18] Krzywdzinski, M. 2021. Automation approaches in the automotive industry: Germany, Japan and the USA in comparison. International Journal of Automotive Technology and Management, 21(3), 180-199. https://ideas.repec.org/a/ids/ijatma/v21y2021i3p180-199.html.

[19] Kubiczek, J., Hadasik, B. 2021. Segmentation of passenger electric cars market in Poland. World Electric Vehicle Journal, 12(1), 1-20. https://doi.org/10.3390/wevj12010023.

[20] Kubiczek, J., Hadasik, B., Krawczyńska, D., Przedworska, K., Madarász, E.Z., Ryczko, A. 2024. Perspective of created value in consumer choice: comparison of economic and ecological dimensions. SAGE Open, 14(1). https://doi.org/10.1177/21582440241238516.

[21] Kyurchev, V., Kiurchev, S., Rezvaya, K., Fatyeyev, A., Głowacki, S. 2024. Assessing the reliability of a mathematical model of working processes occurring in a hydraulic drive. In: L.D. Cecco (Ed.), Lecture Notes in Mechanical Engineering, 281-292. Cham: Springer. https://doi.org/10.1007/978-3-031-63720-9_24.

[22] Kyurchev, V., Kiurchev, S., Rezvaya, K., Pastushenko, A., Głowacki, S. 2023. Experimental evaluation of the impact of the diametral clearance on output characteristics of a planetary hydraulic motor. In: L.D. Cecco (Ed.), Lecture Notes in Mechanical Engineering, 84-94. Cham: Springer. https://doi.org/10.1007/978-3-031-32774-2_9.

[23] Lutsenko, I., Dmytriiev, I., Avanesova, N., Semenyshyna, I., Rozhnenko, Z., Danileyko, O. 2019. A method to form control over queuing systems taking into consideration the probabilistic character of demand. Eastern-European Journal of Enterprise Technologies, 1(3-97), 28-36. https://doi.org/10.15587/1729-4061.2019.157201.

[24] Maadanbekova, M.Zh., Baygubatova, N.M. 2021. The current state of investment activity of enterprises with foreign investments in the Kyrgyz Republic. Eurasian Scientific Association, 71(1-4), 256-260.

[25] Musayev, J., Zhauyt, A., Bahtiyar, B., Kibitova, R., Kazhet, K., Kussyov, A., Kabylkarim, A. 2022. Analysis of dynamic instability of the wheel set of a railway vehicle using the method of generalized hill determinants. Vibroengineering Procedia, 41, 186-190. https://doi.org/10.21595/vp.2022.22491.

[26] Pakpienthakolphol, C., Jeżyna, B. 2021. Key variables influencing maintenance services outsourcing in the automotive sector – Comparing Asian and European dynamics. Global Journal of Entrepreneurship and Management, 2(2), 17-29. https://doi.org/10.57585/GJEM.021.008.

[27] Panchenko, A., Voloshina, A., Fatyeyev, A., Rezvaya, K., Mudryk, K. 2024. Changing the output characteristics of a planetary hydraulic motor. In: L.D. Cecco (Ed.), Lecture Notes in Mechanical Engineering, 304-313. Cham: Springer. https://doi.org/10.1007/978-3-031-63720-9_26.

[28] Panchenko, A., Voloshina, A., Luzan, P., Panchenko, I., Volkov, S. 2021. Kinematics of motion of rotors of an orbital hydraulic machine. IOP Conference Series: Materials Science and Engineering, 1021(1), 012045. https://doi.org/10.1088/1757-899X/1021/1/012045.

[29] Payne, S., Needham, C. 2024. The purpose of outsourcing for automotive manufacturing managers. Open Journal of Business and Management, 12(5), 3284-3325. https://doi.org/10.4236/ojbm.2024.125165.

[30] Sá, S., Pinto Ferreira, L., Silva, F.J.G., Sá, J.C., Pereira, M.T.R., Santos, G. 2022. The importance of subcontracting and its relationship with lean philosophy in automotive industry. International Journal of Industrial Engineering and Management, 13(3), 186-193. https://ijiemjournal.uns.ac.rs/images/journal/volume13/IJIEM_311.pdf.

[31] Schade, W., Haug, I., Berthold, D. 2022. The future of the automotive sector: Emerging battery value chains in Europe. Brussels: ETUI Aisbl.

[32] Shatmanov, O.T., Esenaliev, T.B., Duyshebaev, S.S. 2021. To the question of passenger transportation in the Kyrgyz Republic. International Journal of Applied and Fundamental Research, 4, 68-73. https://s.applied-research.ru/pdf/2021/4/13206.pdf.

[33] Teipen, C., Mehl, F. 2021. Global value chains and industrial relations in the Global South: Social upgrading paths in different industries. Journal of Labor and Society, 24(1), 214-236. https://doi.org/10.1163/24714607-20212008.

[34] Tropina, A.A., Kuzmenko, A.P., Marasov, S.V., Vilchinsky, D.V. 2014. Ignition system based on the nanosecond pulsed discharge. IEEE Transactions on Plasma Science, 42(12), 3881-3885. https://doi.org/10.1109/TPS.2014.2339654.

[35] Turienzo, J., Lampón, J.F. 2022. New mobility technologies as incentive to location decisions: Relocation strategy in the automotive industry. Kybernetes, 52(11), 5444-5459. https://doi.org/10.1108/k-03-2022-0317.

[36] Tyagi, T., Kumar, S., Malik, A.K., Vashisth, V., 2023. A novel neuro-optimization techniques for inventory models in manufacturing sectors. Journal of Computational and Cognitive Engineering, 2(3), 204-209. https://doi.org/10.47852/bonviewJCCE2202184.

[37] Vodovozov, E.N., Dmytriiev, I.A., Dmytriieva, O.I., Spitsyna, N.V., Mykolaiets, A.P. 2021. Peculiarities and directions of interaction of stakeholders at transport enterprises. Estudios de Economia Aplicada, 39(6), 1-10. https://doi.org/10.25115/eea.v39i6.5144.