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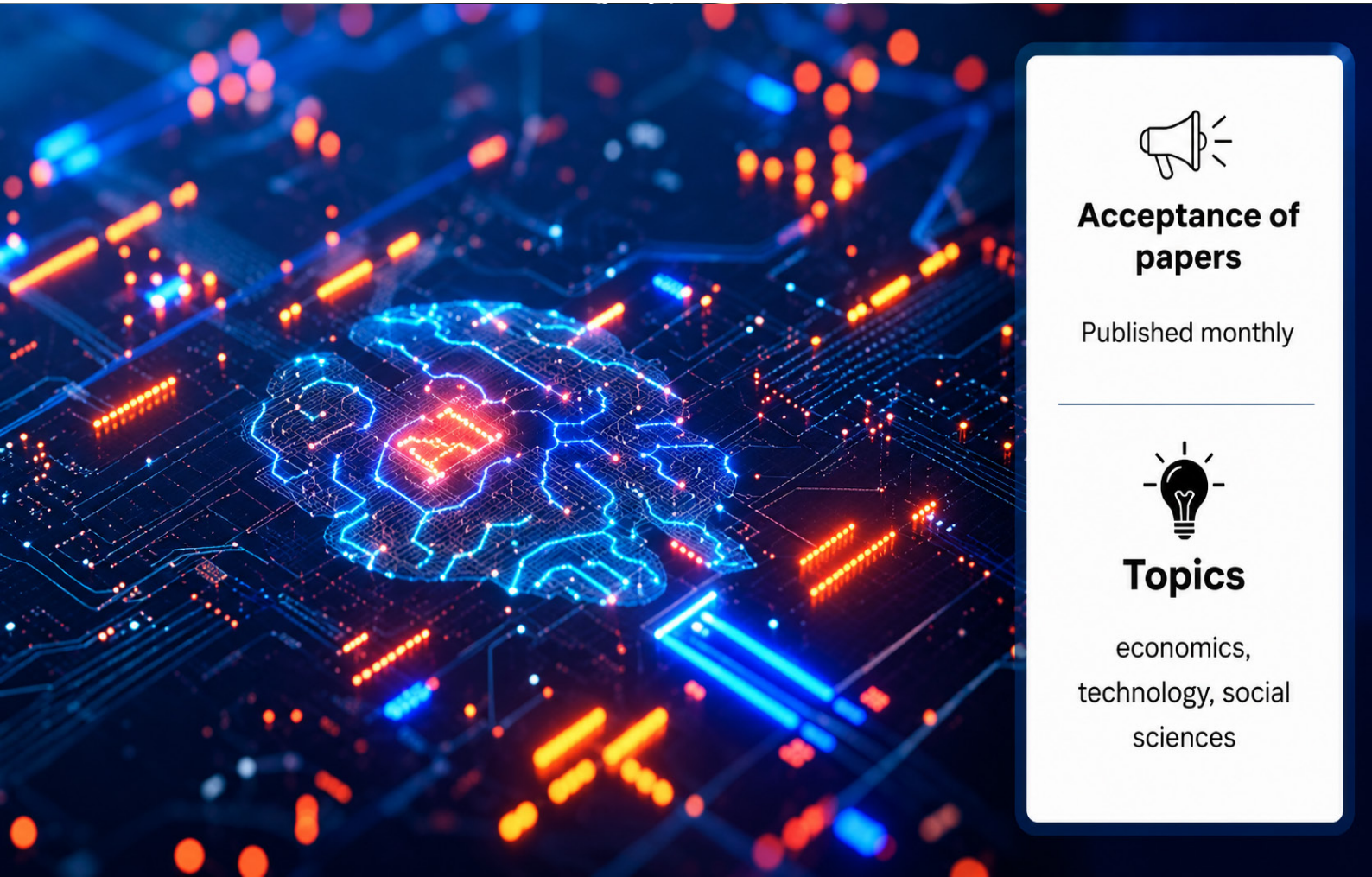

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TECHNOLOGICAL AND DIGITAL DIVERSIFICATION IN INDUSTRIAL ENTERPRISES: DIRECTIONS FOR ADAPTING FOREIGN EXPERIENCES TO THE CONDITIONS OF UZBEKISTAN

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Abstract: This article analyzes modern technological and digital directions of production diversification in the automotive industry. The study examines the interrelationships between product portfolio expansion, platform-based and modular production, electrification, digital transformation, the software-defined vehicle concept, supplier cooperation, and geographical diversification. The experiences of the automotive industries of Japan, Germany, and China are comparatively analyzed, identifying differences in their product and technology portfolios, cooperation models, digital ecosystems, and approaches to shaping value chains. Based on the analysis, the study substantiates the need to adapt foreign experience to Uzbekistan's automotive industry rather than directly replicate it, through the use of common platforms and modules, the involvement of local component manufacturers in new technological directions, the gradual adoption of electric and digital transport solutions, and the deepening of industrial cooperation.

Keywords: automotive industry, technological diversification, digital transformation, platform-based production, modular production, electric vehicle, software-defined vehicle, cooperation, value chain, foreign experience.

Annotatsiya: Ushbu maqolada avtomobil sanoatida ishlab chiqarishni diversifikatsiyalashning zamonaviy texnologik va raqamli yo'nalishlari tahlil qilinadi. Tadqiqotda mahsulot portfelini kengaytirish, platformaviy va modulli ishlab chiqarish, elektrlashtirish, raqamli transformatsiya, software-defined vehicle konsepsiyasi, yetkazib beruvchilar kooperatsiyasi va geografik diversifikatsiyaning o'zaro bog'liqligi yoritilgan. Yaponiya, Germaniya va Xitoy avtomobil sanoati tajribasi qiyosiy tahlil qilinib, ularning mahsulot-texnologiya portfeli, kooperatsion modeli, raqamli ekotizimi va qiymat zanjirini shakllantirishdagi farqli jihatlari aniqlangan. Tahlil asosida xorijiy tajribani to'g'ridan-to'g'ri ko'chirish emas, balki umumiy platformalar va modullardan foydalanish, mahalliy komponent ishlab chiqaruvchilarni yangi texnologik yo'nalishlarga jalb etish, elektr va raqamli transport yechimlarini bosqichma-bosqich o'zlashtirish hamda ishlab chiqarish kooperatsiyasini chuqurlashtirish orqali O'zbekiston avtomobil sanoatiga moslashtirish zarurligi asoslangan.

Kalit so'zlar: avtomobil sanoati, texnologik diversifikatsiya, raqamli transformatsiya, platformaviy ishlab chiqarish, modulli ishlab chiqarish, elektromobil, software-defined vehicle, kooperatsiya, qiymat zanjiri, xorijiy tajriba.

Аннотация: В статье анализируются современные технологические и цифровые направления диверсификации производства в автомобильной промышленности. В исследовании раскрыта взаимосвязь между расширением продуктового портфеля, платформенным и модульным производством, электрификацией, цифровой трансформацией, концепцией программно-определяемого автомобиля (software-defined vehicle), кооперацией с поставщиками и географической диверсификацией. Проведён сравнительный анализ опыта автомобильной промышленности Японии, Германии и Китая, выявлены различия в их продуктово-технологических портфелях, кооперационных моделях, цифровых экосистемах и подходах к формированию цепочек создания стоимости. На основе анализа обоснована необходимость адаптации зарубежного опыта к автомобильной промышленности Узбекистана, а не его прямого копирования, посредством использования общих платформ и модулей, привлечения местных производителей компонентов к новым технологическим направлениям, поэтапного освоения электрических и цифровых транспортных решений, а также углубления производственной кооперации.

Ключевые слова: автомобильная промышленность, технологическая диверсификация, цифровая трансформация, платформенное производство, модульное производство, электромобиль, программно-определяемый автомобиль, кооперация, цепочка создания стоимости, зарубежный опыт.

INTRODUCTION

Modern automotive industry is entering a more complex stage of transformation than simply expanding the scale of product manufacturing. Electrification, digitalization, automation, robotics, modular and platform-based manufacturing, intelligent management systems, and data-driven technologies are rapidly advancing across

the industry. As a result, an automotive manufacturer is evolving from an entity that merely produces finished products into the center of a multi-level technological ecosystem that brings together component manufacturers, software developers, engineering companies, research centers, and logistics operators.

These changes are also broadening the scope of diversification. Today, diversification is no longer limited to introducing new models into production; it also encompasses the integration of new components, electronic systems, energy solutions, digital services, technological competencies, and new markets into the production system. Under such conditions, enterprises that are highly dependent on a narrow product range or a single technological platform face limitations in adapting to market demand and technological changes.

The aim of this article is to systematize modern approaches to technological and digital diversification in the automotive industry, conduct a comparative assessment of the experiences of Japan, Germany, and China, and identify the elements of these approaches that can be adapted to Uzbekistan's automotive industry.

REVIEW OF LITERATURE ON THE SUBJECT

The modern interpretation of diversification in the automotive industry is characterized by the integration of the product portfolio, production architecture, technological platforms, and cooperative networks. In scientific and practical approaches, platform-based manufacturing is regarded as a means of producing several product types using a common structural and technological base. The modular approach, in turn, enhances configuration flexibility through the use of standardized functional blocks, simplifies the assembly process, and reduces the time required to introduce new models.

The experience of the Japanese automotive industry is distinguished by a multi-technology product portfolio, platform-based and modular manufacturing, and deep supplier cooperation. The Mobility DX approach presented in the dissertation identifies software-defined vehicles, artificial intelligence, automated control, data utilization, and digital services as new areas of competition. This model is aimed at transforming the traditional OEM–supplier system into a broader innovation ecosystem encompassing startups, universities, and research centers.

In Germany's experience, electrification, supplier transformation, and the transition to a software-defined automotive ecosystem emerge as the main directions. Enterprises traditionally specializing in mechanical components are being compelled to acquire new competencies for electric powertrains, electronics, and connected and automated vehicles. This process extends diversification beyond the OEM enterprise and requires the transformation of Tier-1 and Tier-2 suppliers, engineering companies, and small businesses as well.

The Chinese automotive industry model is based on developing electric vehicles, batteries, electronics, software, and export markets within a unified industrial ecosystem. Vertical integration, the production of strategic components within the domestic value chain, intelligent connected vehicle technologies, over-the-air (OTA) updates, and geographical diversification are the key features of this model. In this regard, international experiences make it possible to interpret automotive diversification not as the development of an individual product, but as a process of reshaping the entire value creation system.

RESEARCH METHODOLOGY

The research methodology was based on a systems approach, comparative analysis, logical generalization, and institutional-technological comparison methods. The main sources of the analysis were the modern diversification approaches systematized in Section 1.3 of the dissertation, as well as the experiences of the automotive industries of Japan, Germany, and China.

In evaluating foreign experiences, the degree of product and technological diversification, the scale of adoption of electric vehicles and next-generation transportation technologies, platform-based and modular manufacturing practices, supplier networks, domestic value chains, export and geographical expansion, and the state's industrial and innovation policy were adopted as the main criteria. In adapting the results to the conditions of Uzbekistan, the principle of identifying elements compatible with the local production base, component cooperation, and technological potential was applied, rather than directly replicating foreign models.

ANALYSIS AND RESULTS

In the dissertation, the diversification of production in the modern automotive industry is systematized into four interrelated areas: product portfolio-based diversification, platform-based manufacturing, modular manufacturing, and technological diversification. These areas are not separate strategies but rather constituent elements of a diversified production ecosystem (Table 1).

Table 1. Economic Content of Modern Diversification Approaches in the Automotive Industry[1]

Approach	Main content	Expected outcome
Product portfolio-based diversification	Expanding the model range and developing new segments and related products	Expanding market coverage and revenue sources
Platform-based manufacturing	Producing multiple models on a single structural and technological platform	Reducing structural duplication and costs
Modular manufacturing	Using standard modules and functional blocks across multiple products	Increasing flexibility and accelerating the introduction of new models
Technological diversification	Electric vehicles, digitalization, automation, robotics, and intelligent control	Enhancing innovation capacity and long-term technological competitiveness

If the product portfolio determines the market orientation, platform-based manufacturing establishes the common technical foundation for creating this portfolio. Modularity strengthens the operational flexibility of production, while technological diversification creates new areas of development through electrification, digitalization, and intelligent control. Therefore, effective diversification requires the simultaneous coordination of market, product, technology, and production architecture.

The Japanese model represents the multi-technology dimension of this integration. It involves the parallel development of various technologies, such as HEV, PHEV, BEV, and FCEV, the use of common platforms and standardized components, deep cooperation between OEM enterprises and Tier-1 and Tier-2 suppliers, and the integration of SDV and Mobility DX approaches with the digital services ecosystem (Figure 1).

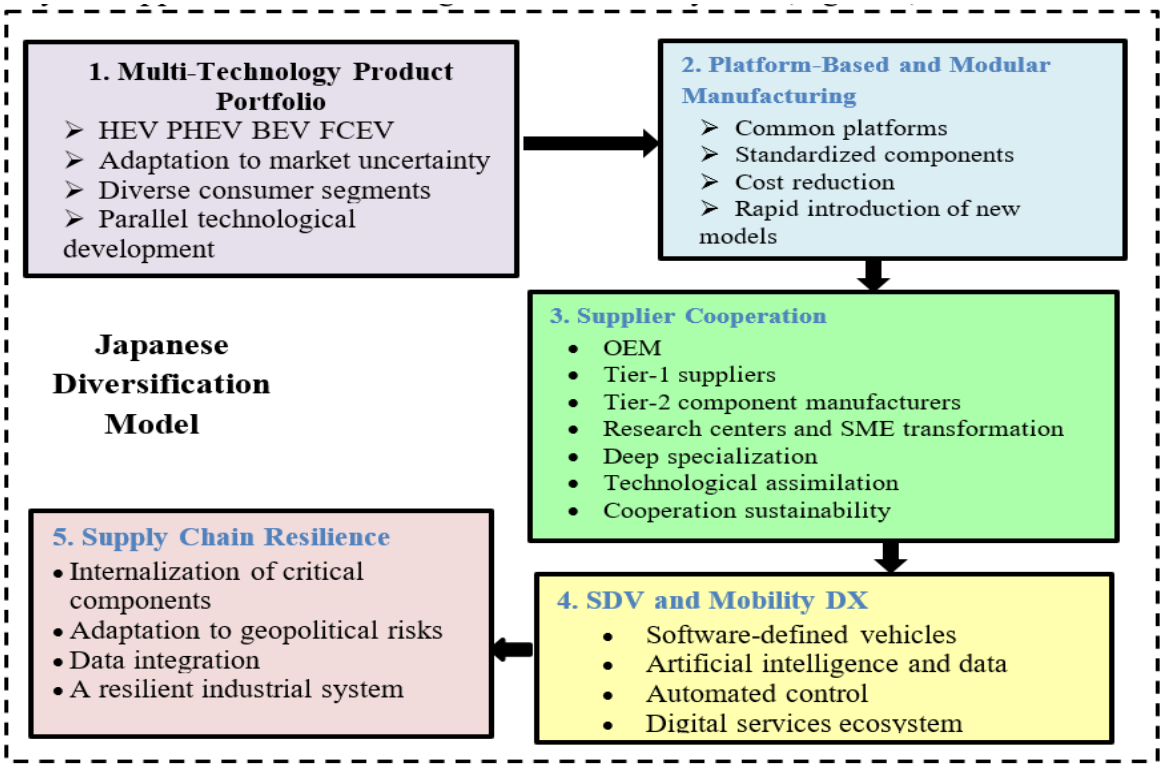

Figure 1. Diversification Experience in the Japanese Automotive Industry[2]

The significance of Japan's experience for Uzbekistan lies in avoiding dependence on a single technological direction in diversification, expanding platform-based and modular capabilities within the existing production base, developing new technological competencies among component manufacturers, and gradually strengthening the integration between digital services and production.

In the German model, the transition toward electrification and a software-defined vehicle ecosystem is occurring alongside the transformation of the supplier network. The dissertation notes that electric passenger vehicle production in Germany reached 1.67 million units in 2025, accounting for 40% of total passenger vehicle

1 Source: Author's own work.
2 Source: Author's own work.

production. It also links software platforms and open cooperation to the potential for reducing maintenance costs and shortening time-to-market.

The Chinese model combines product and technological electrification with vertical integration, domestic value chains, digital diversification, geographical diversification, and inter-ecosystem integration. Alongside vehicle assembly, the development of batteries, electric powertrains, power electronics, software, and intelligent connected vehicle technologies within a unified system can be observed (Table 2).

Table 2. Comparative Characteristics of Diversification Models in the Automotive Industries of Japan, Germany, and China[3]

Country	Priority diversification model	Main mechanisms	Aspects adaptable to Uzbekistan
Japan	Multi-technology and cooperative model	HEV/PHEV/BEV/FCEV, platforms, modules, OEM–Tier cooperation, SDV, Mobility DX	Multi-technology portfolio, supplier competencies, digital cooperation
Germany	Electrification and software ecosystem	EVs, supplier transformation, Connected Car, SDV, open innovation	Development of electric components, electronics, software control, and engineering services
China	Vertically integrated ecosystem	EVs, batteries, electric powertrains, power electronics, ICV, OTA, exports, and overseas production	Deepening the domestic value chain, digital and geographical diversification

Comparative analysis shows that the common feature of all three models is their interpretation of diversification not as a simple expansion of the product range, but as a process of transforming the production, technology, and cooperation systems. The difference lies in their priority mechanisms: Japan relies more heavily on a multi-technology portfolio and cooperation, Germany on electrification and the software ecosystem, and China on vertical integration and the domestic value chain.

The most appropriate approach for Uzbekistan's automotive industry is not to replicate a single foreign model, but to combine their effective elements. In this regard, it is advisable to pursue the following directions: first, increasing production flexibility through the use of common platforms and standardized modules; second, involving local component manufacturers in electric powertrains, electronics, and digital control systems; third, developing new competencies in software, data, and digital services; and fourth, deepening the domestic value chain alongside expanding exports and entering new geographical markets.

CONCLUSIONS AND SUGGESTIONS

First, in the modern automotive industry, diversification has evolved from expanding the product range to reshaping the technological and production ecosystem. The product portfolio, platform-based manufacturing, modularity, and technological diversification function as a single, mutually complementary system.

Second, Japan's experience demonstrates the effectiveness of a multi-technology product portfolio, platform-based and modular manufacturing, and deep cooperation. While the German model relies on upgrading supplier competencies through electrification and the software-defined vehicle ecosystem, the Chinese model combines vertical integration, domestic value chains, and digital and geographical diversification.

Third, directly transferring foreign experiences to the conditions of Uzbekistan is not advisable. It is necessary to adapt their effective elements to the local production base, cooperation opportunities, and technological potential. In this regard, common platforms and modules, a domestic component base, electric and digital transport solutions, and production cooperation should be prioritized.

REFERENCES:

1. International Energy Agency. Global EV Outlook 2026: Manufacturing and Trade. Paris: IEA, 2026.
2. Ministry of Economy, Trade and Industry of Japan. Automobile Industry and Mobility DX Strategy materials.
3. Verband der Automobilindustrie (VDA). German automotive industry materials on electrification and software-defined vehicles, 2026.
4. International Organization of Motor Vehicle Manufacturers (OICA). World Motor Vehicle Production Statistics and Reports.
5. Maxmudov Shoxruxbek Asror O'g'li SANOAT KORXONALARIDA ISHLAB CHIQARISH RISKLARINI BOSHQARISH JARAYONLARINI MAMLAKAT IQTISODIYOTIGA TA'SIRINI BAHOLASH MASALALARI // Raqamli iqtisodiyot

3 Source: Author's own work.

(Цифровая экономика). 2025. №10. URL: https://cyberleninka.ru/article/n/sanoat-korxonalarida-ishlab-chiqarish-risklarini-boshqarish-jarayonlarini-mamlakat-iqtisodiyotiga-ta-sirini-baholash-masalalari
6. Valijonov, N., & Makhmudov, S. (2025). YOUTH LEADERSHIP: AS A FACTOR IN INCREASING SOCIAL ACTIVITY. Modern Science and Research, 4(5), 55–57. Retrieved from https://inlibrary.uz/index.php/science-research/article/view/86927
7. Makhmudov Shokhrukhbek Asror Ugli, & Rakhimberdiev Khatamboy Dilshodjon Ugli. (2023). THE ROLE OF THE COPPER CLUSTER IN THE INNOVATIVE DEVELOPMENT OF ELECTRICAL ENGINEERING ENTERPRISES. International Journal Of Management And Economics Fundamental, 3(04), 24–31. https://doi.org/10.37547/ijmef/Volume03Issue04-04
8. Maxmudov, S. (2025). RISKNI SUG'URTALASH ORQALI KORXONA FAOLIYATINI OPTIMALLASHTIRISH. GREEN ECONOMY AND DEVELOPMENT, 3(10). https://doi.org/10.5281/zenodo.17518791
9. Makhmudov, S. (2025). Directions for Optimizing The Activities of Textile Enterprises Through Risk Management. American Journal of Economics and Business Management, 8(11), 5447–5453. https://doi.org/10.31150/ajebm.v8i11.4148
10. Maxmudov, Shoxruxbek. "Riskni Sug'urtalash Orqali Korxona Faoliyatini Optimallashtirish." Green Economy and Development, vol. 3, no. 10, 1 Oct. 2025, doi:10.5281/zenodo.17518791.
11. Maxmudov Shoxruxbek Asror O'g'li SANOAT KORXONALARIDA ISHLAB CHIQARISH RISKLARINI BOSHQARISH JARAYONLARINI MAMLAKAT IQTISODIYOTIGA TA'SIRINI BAHOLASH MASALALARI // Raqamli iqtisodiyot (Цифровая экономика). 2025. №10. URL: https://cyberleninka.ru/article/n/sanoat-korxonalarida-ishlab-chiqarish-risklarini-boshqarish-jarayonlarini-mamlakat-iqtisodiyotiga-ta-sirini-baholash-masalalari
12. Sh. A. Makhmudov, "Sanoat korxonalarida ishlab chiqarish risklarini boshqarish jarayonlarini mamlakat iqtisodiyotiga ta'sirini baholash masalalari," Raqamli iqtisodiyot (Цифровая экономика), no. 10, 2025. [Online]. Available: https://cyberleninka.ru/article/n/sanoat-korxonalarida-ishlab-chiqarish-risklarini-boshqarish-jarayonlarini-mamlakat-iqtisodiyotiga-ta-sirini-baholash-masalalari

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