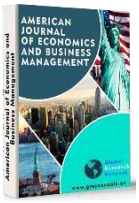

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Article

Harnessing Digitalization for Localization and Industrial Cooperation in Uzbekistan

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Abstract: The article focuses on examining how digitalization influences the localization of production processes and the growth of industrial cooperation in Uzbekistan. In the context of accelerated digital transformation of the global economy, digitalization is becoming a key tool for increasing technological independence, production efficiency, and integration into global value chains. Utilizing the statistical data of international organizations (World Bank, UN Comtrade, WIPO, ADB) by regrouping into technological groupings, conducted analysis has shown that between 2015 and 2023 Uzbekistan witnessed an increased share of medium- and high-tech industries, offering higher-value, capital-intensive, import and trade-able high-tech products, as well as an overview of the expansion of digital infrastructure between 2015–2023. And with the implementation of the state strategy "Digital Uzbekistan 2030", it contributes to building national digital ecosystems, development of technology parks, implementation of ERP systems, IoT and AI solutions to the industry. The study identifies three mechanisms through which digitalization impact: transaction costs reduction, production cost efficiency, and industrial cooperation effectiveness. It is concluded that digitalization is one of the factors in strengthening Uzbekistan's technological sovereignty and transitioning to an innovative economic growth model based on the synergy of digital technologies, localization, and industrial cooperation.

Keywords: Digital Economy, Industrial Policy, Production Localization, Industrial Cooperation, Regional Integration

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1. Introduction

Digitalization of the global economy is a leading driver of production system, international supply chain, and national industrial strategy transformation. Innovations in artificial intelligence, the Internet of Things (IoT), automation and big data processing are driving new types of industrial collaboration and altering the industrial composition of countries. Uzbekistan, in particular, sees digitalization as an instrument for speeding up industrial growth, enhancing localization efficiency, broadening industrial cooperation, and assimilating into global value chains. Both of these changes impact the price of transactions, requiring a higher price to be paid for new products, but they lower the price for existing products, and even though digitalization lowers transaction costs, it increases supply chain transparency and stimulates new creative solutions.

The digitalization of industry in emerging economies, including Uzbekistan, is becoming a key factor in strengthening technological independence and competitiveness [1]. The implementation of artificial intelligence (AI), the Internet of Things (IoT), big data,

and cloud solutions optimizes production processes, reduces costs, and increases the resilience of supply chains [2]. The study indicated that digitalization contributes to labor productivity growth and stimulates the creation of new forms of industrial cooperation [3].

The State Strategy "Digital Uzbekistan – 2030" is aimed, among other things, at integrating digital technologies into industry and developing information and communication technologies and infrastructure through comprehensive support for attracting foreign investment and local IT developers [4]. This will increase the localization level of the economy and reduces dependence on external suppliers. Additionally, digital ecosystems form a platform for effective cooperation between all market participants, especially in "B2B," "B2G," and "B2C" formats. Additionally, digitalization contributes to strengthening the skills of personnel and creating new competencies. Thus, digitalization serves not only as a tool for economic efficiency but also as the foundation for technological sovereignty and the expansion of production localization.

Digitalization lays the conceptual foundations for both digitalization and industrial cooperation. The digitalization of industry is considered a key direction of the Fourth Industrial Revolution (Industry 4.0) [5]. According to the concept of digital industrialization (UNIDO) [6], digital technologies are shaping a new paradigm for production organization, where networked interaction is created between enterprises, suppliers, and consumers. The result contributes to the formation of flexible production systems and accelerates the processes of localization and industrial cooperation.

From the perspective of neoinstitutional theory, digitalization reduces transaction costs (W. North) [7] and contributes to the formation of more transparent and efficient mechanisms of interaction between economic agents. In the context of global value chain theory (Gereffi, 2018) [8], digital transformation acts as a factor that strengthens the integration of developing countries into the international industrial division of labor.

2. Materials and Methods

The methodology of this article is considered to be a systemic-comparative analytical method, which includes qualitative and quantitative research methods aimed at identifying the characteristics of digitalization, localization of production and industrial cooperation in Uzbekistan. This research uses secondary statistical data of international and national databases such as the World Bank, UN Comtrade, WIPO, ADB and the Agency of Statistics of Uzbekistan for the period 2015–2024. Third, it provides trend and correlation analysis of the current status of digital infrastructure, the diversification of exports and the process of industrial modernization where a few dynamics are identified as key-potentials for progress. The research further embeds this conceptualisation within the neoinstitutional and global value chain theories to elucidate how digitilisation lowers transaction costs, increases coordination among the agents and drives industrial collaboration. This allowed to obtain empirical insights on how the practices of implementation of the “Digital Uzbekistan–2030” strategy and implementation of digital transformation programs in key industries, including mining, metallurgy, automotive and pharmaceutical have been formed. It also employs a case-based approach by citing experiences from NMMC, AMMC, and national technoparks for understanding ERP, IoT and AI adoption implications. A comparative analysis with practices at the international level allows one to more deeply understand the specific features of the development of digital industrialization processes in Uzbekistan. This cross-verifying of statistics and policy reports is also an example of data triangulation, ensuring reliability. The integrated approach leads to a comprehensive perspective of digital transformation and its role in technological sovereignty, production localization, and industrial cooperation, constituting the empirical basis for policy conclusions and recommendations developed from the article.

3. Results and Discussion

Uzbekistan shows a steady shift of its industrial sector towards a technological modernization from 2015 to 2024. The GDP growth rate of the country was recorded at 6.5% in 2024 making it one of the highest number over the past five years as claimed by the Agency of Statistics [9]. Industry's share in GDP rose from 25.3% to 26.4%, and manufacturing expanded 7.7%. Recognising rapid development in this area, the information and communication technology (ICT) sector grew by 24.7 per cent in 2024. Meanwhile, machinery and equipment accounted for 34.6% of overall imports, underscoring the urgency of boosting local sourcing of high-tech items. The increase in the share of small businesses in industrial production from 27% to 32.4% signals the successful assimilation of SMEs into industrial cooperation networks. Digital manufacturing systems, localization of the supply chain (both international and local), as well as ERP-platform-motivated, IoT, and Big Data-driven solutions, contributing to regularization of production and logistics, triggered this growth. The said changes were made possible via the widespread introduction of digital solutions in the financial and banking system and manufacturing enterprises), a network of modern production facilities, and expanding industrial cooperation between domestic and foreign companies.

Research by experts shows that by enabling the use of digital platforms and AI-based solutions in Central Asian industries, the speed of information exchange between sellers and buyers, as well as suppliers and consumers, has increased, transaction costs have decreased, and production has become more flexible. At the same time, digitalization has heightened global supply chain transparency, reinforcing the inter-linkages between various sectors and regions [10].

As for exports of high-tech goods, their growth in Uzbekistan was recorded as higher than global growth rates — from around US $1 billion in 2015 to US $2 billion in 2023 according to the UN Comtrade Database, with key items of export in this group being electronic components, pharmaceutical products, and machinery equipment [11]. The same trends were observed in the WIPO Statistics Database: world exports of high-tech goods, broken down into segments (WIPO, 2023a), grew in 2023 by 9.1% compared to 2022, the largest segments being electronics and IT components, integrated circuits and pharmaceuticals [12].

According to the 2024 Trade Data Monitor report, some of this is taking place in Central Asia where the share of high value-added exports is increasing (especially in engineering and logistics) [приложить цифру]. At overall the localisation and digitalization of the production in Uzbekistanhas helped to decrease the dependence on the imports, the employed population and the diversification of the structure of the industry.

The processes of industrial localization and localization of production in Uzbekistan are increasingly accompanied by the processes of digitalization, which acts as an effective catalyst for this. It boosts the connectivity between innovation, industry and jobs, thereby laying the foundations for the sustainable long-term growth of the national economy. Creation of national digital services like: Virtual Data Center, Co-location and BMS Server, and The Register of E-commerce Entities E-tijorat. The digitalization of public administration conducted through a wide range of tools including national systems such as "My-invoice," "My-basket," "My-uz," as well as a decentralized system of digital platforms (Single Portal of Interactive Public Services, Public Procurement Portal, Electronic Cooperation Portal), contributes to the formation of integrated supply chains and facilitates the access to information, public procurement, logistics, financial and technological resources for business.

According to research, Uzbekistan’s leading industries are ramping up their embrace of digital technologies to improve production, better localization and scale industrial cooperation.

Mining and metallurgical complexes, primarily Navoi Mining and Metallurgical Complex (NMMC) and Almalyk Mining and Metallurgical Complex (AMMC), are one of the largest implementers and consumers of digital solutions. These projects focus on increased extraction efficiency, minimized downtime, and digital supply chain management. The Digital Transformation Program NMMC (2023–2030) implemented in partnership with Boston Consulting Group is an exemplary case in point which aims at building a sustainable and resilient digital ecosystem and deliver above 20 management and manufacturing process digitalization projects [13]. In the same vein aims at a gradual transition toward 'digital economy by 2030' and AMMC has implemented an "Electronic Journal" as well as a major digitalization program covering 12 automation and modernization of production projects and 7 projects on IT infrastructure development [14][15]. It has reduced paper based document circulation by a staggering 70% and have added the level of operational transparency.

Automotive has always been a leader in localization, deploying digital systems to facilitate quality control and coordination across a broad supplier base. Advanced ERP systems have been implemented and solutions for logistics, procurement, and transport of raw materials/inputs, which has allowed quality management of locally supplied components as well as savings of up to USD 41 million.

Digitalisation in the pharma sector has become a mainstay to guarantee product quality, security and hasten the localisation of essential medicines. At the same time, the Presidential Decree of January 28, 2025, on measures to accelerate digital transformation in the pharmaceutical sector initiated the creation of innovation funds, the support of startups, and the advancement of production of biologically active years [16]. Digital tools are also central to the acceleration of certifications and standardization processes, such as WHO prequalification and GMP compliance, essential for local manufacturers aiming at international markets.

Research shows that countries with industrial digital ecosystems are speeding up the process of replacing imports and creating new industrial groups that use more local materials [17]. Additionally, the development of communication infrastructure and data centers enhances the competitiveness of regional manufacturing hubs. According to the Asian Development Bank [18], Uzbekistan's investment in digital infrastructure exceeded US $4 billion between 2019 and 2023, and the proportion of enterprises using automation systems and cloud services increased from 22% to 47%. Such processes are very closely related to the strict connection between the increase in the number of employed persons within the field of ICT, the number of which in the past five years has increased by over 60% and the emergence of a new type of digital employment.

That is why digitalization is transforming into an instrument with a strategic purpose of achieving technological sovereignty and industrial independence of Uzbekistan. It enables the shift from the resource economy model to the knowledge economy, escape the stagnation and create the innovation and the sustainable efficient production networks. Over time, digitalization of the industry can become one of the key aspects of Central Asian countries competitiveness growth and regional economic integration momentum, as well as increase participation in global technological and production chains.

For Uzbekistan, digitalization is becoming a key driver of growth in technological independence. In this context, localization and industrial cooperation allow for a reduction in import dependence, an increase in employment in the IT sector, mechanical engineering, electrical engineering, electronics, and logistics, and an enhancement of export diversification. The comprehensive use of digital technologies, including artificial intelligence and cloud computing, will strengthen production clusters and accelerate the country's integration into global innovation chains. Thus, digital modernization serves as a key mechanism for enhancing Uzbekistan's technological sovereignty and ensures the

transition to an innovative economic growth model based on the synergy of localization, digital technologies, and industrial cooperation.

The main mechanisms of digitalization's influence on localization and industrial cooperation processes are manifested in three key areas:

1. Reducing transaction costs. In the study "An Empirical Investigation into the Effects of the Digital Economy on Regional Integration in China" published in Sustainability (MDPI, 2024) [19], it was found that digital industrialization increases the level of regional integration and industrial cooperation: the regression coefficients were 0.24 for digital industrialization and 0.128 for industrial digitalization ($p < 0.01$). Similar effects can be achieved in Central Asian countries through digital logistics platforms and wider utilization of digital platform capabilities.
2. Increasing production efficiency. The integration of ERP systems, modern Internet of Things (IoT) technologies, artificial intelligence, and big data analytics allows for the optimization of resource management, improvement of product quality, and increased flexibility of production systems.
3. Improving the efficiency of industrial cooperation. Horizontal and vertical collaboration is enabled by digital platforms and manufacturing management systems. Digitalization also acts as a facilitator in enhancing supply chain integration which eventually strengthens supply chain performance as an integrated whole, revealed the study Digitalization and Supply Chain Integration: Toward a Sustainable Supply Chain Performance (Morocco).

Such processes of digital-industrial transformation can be vividly illustrated by new policy measures taken in Uzbekistan related to the implementation of the communicational environment for the Yashnabad and IT Park technoparks functioning as ex-territorial free zones, the methodological framework for assessment of localization and industrial cooperation efficiency, extensive introduction of integrated business process automation systems across industrial enterprises, including the phased introduction of the SAP ERP/CRM systems within the automotive sector. These initiatives have led to a marked increase in the share of domestically produced components in vehicles, illustrating the tangible outcomes of digitalization-driven industrial modernization [20].

At the same time, in the context of the transition to a digital economy, Central Asian countries face a complex stage of transformation – from partial informatization of individual production processes to comprehensive digitalization at the level of the entire production system. While digital transformation can be used as a means of modernization, it can also function as a systemic driver to enhance the efficiency and sustainability of the industrial sector.

The need to acquire detailed knowledge about how digital transformation and innovative enterprise are being developed is rising. Digital ecosystems, electronic platforms, and big data analytics tools provide opportunities to enhance interactions with suppliers, consumers, and collaborative partners. Therefore, one of the main lines of policy will be the policy of coherent combination of digital and traditional material basis of the enterprise, development of human capital and stimulation of creative activity of staff. These are the barriers that slow down the transformation, and that need specific government support measures. Thus, the task of government policy in this area is to improve the protection system, support innovative relationships and reduce the barriers related to corporate protectionism so as to ensure institutional environment favourable for increasing the scope and technological effectiveness of industry collaboration.

4. Conclusion

Digitalization is shown as a new strategic dimension for increasing the technological sovereignty and economic autonomy of Uzbekistan. Research suggests that the introduction of digital solutions to the industry stimulates the development of high-tech sectors, reduces transaction costs, and improves localization processes. The adoption of

the "Digital Uzbekistan 2030" strategy has already laid the institutional and infrastructural foundations for the establishment of the digital industrial ecosystem.

It is recommended to create artificial intelligence (AI), the Internet of Things (IoT), and digital twins in key sectors (industrial machinery, engineering, electronics, and pharmaceuticals) by setting up specialized "smart zones" and technology parks in order to effectively utilize the potential of digital technologies, expedite the transition to an innovative growth model, and provide a basis for the establishment of capable and innovation-oriented large-scale industrial development models (Waghmare et al. Roll Out National Policy On Digital Maturity Index For Business In Line With OECD And World Bank Standards Create human capital in the area of digital manufacturing, industrial analytics, and innovation management through educational programs. Details the establishment of a state platform for industrial stats and a digital map of supply chains, providing transparency and aligning cooperative links. The sweeping digitization of industry will enable Uzbekistan to strengthen the position of its own economy in global production networks and ensure long-term sustainable growth.

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