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Article

Integration of Innovative Infrastructure and Logistics in the Cluster Specialization of Regions

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Abstract: This article examines the role of innovative infrastructure and logistics integration in the cluster specialization of regions. The study analyzes the impact of regional clusters on economic efficiency, innovation development, and competitiveness enhancement under the conditions of digital transformation. Particular attention is paid to the development of transport-logistics systems, innovation centers, industrial parks, and digital management platforms within regional cluster structures. The research also evaluates the mechanisms of improving intersectoral cooperation and strengthening regional economic integration. Based on the analysis, scientific and practical recommendations aimed at increasing the effectiveness of regional cluster specialization through innovative infrastructure and logistics integration are proposed.

Keywords: regional clusters, cluster specialization, innovative infrastructure, logistics integration, regional economy, competitiveness, digital transformation, innovation development, economic efficiency, regional integration.

1. Introduction

In the context of globalization and rapid digital transformation, ensuring sustainable regional economic development has become one of the key priorities of modern economic policy. In particular, the effective organization of regional cluster specialization through the integration of innovative infrastructure and logistics systems plays an important role in increasing regional competitiveness and economic efficiency. Today, many developed and developing countries are actively implementing cluster-based development models aimed at strengthening industrial cooperation, innovation activity, and interregional economic integration. Regional clusters represent geographically concentrated networks of interconnected enterprises, research institutions, infrastructure facilities, and service organizations operating within a specific sector or economic activity. Such integration contributes to the efficient use of regional resources, accelerates technological modernization, and creates favorable conditions for innovation diffusion. In this regard, innovative infrastructure and logistics systems are considered essential components of regional cluster development. Innovative infrastructure, including technology parks, innovation centers, business incubators, and digital platforms, provides opportunities for the commercialization of scientific achievements and the implementation of advanced technologies in production processes. At the same time, modern logistics systems ensure the effective movement of goods, services, information, and resources between cluster participants, thereby improving supply chain efficiency and reducing transaction costs. International experience

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demonstrates that the integration of innovative infrastructure and logistics significantly enhances the effectiveness of regional cluster specialization. Countries with developed cluster systems achieve higher levels of productivity, export potential, and investment attractiveness through advanced logistics networks and innovation-driven development strategies. Therefore, the study of mechanisms for integrating innovation and logistics into regional cluster specialization has both theoretical and practical importance. In Uzbekistan, large-scale reforms aimed at supporting regional economic development, industrial modernization, and cluster-based specialization are being implemented. However, several challenges remain, including insufficient innovation infrastructure, weak logistics connectivity, limited digital integration, and disparities in regional development. These issues highlight the necessity of improving mechanisms for the integration of innovative infrastructure and logistics within regional cluster systems. The main objective of this study is to analyze the role of innovative infrastructure and logistics integration in the cluster specialization of regions and to develop scientific and practical recommendations for improving regional economic efficiency and competitiveness.

2. Literature Review

Theoretical foundations of regional cluster specialization and its relationship with innovative infrastructure were initially developed by Michael Porter, who defined clusters as geographically concentrated groups of interconnected companies, suppliers, research institutions, and supporting organizations operating within a particular field. According to the author, cluster specialization enhances regional competitiveness, stimulates innovation, and increases productivity through cooperation and knowledge exchange [1]. Recent studies have expanded the concept of cluster specialization by emphasizing the role of innovation ecosystems and logistics integration in regional economic development. In particular, M.D. Parrilli highlights that modern cluster policy should be oriented toward smart specialization strategies, digital transformation, and innovation-driven growth. The author argues that the integration of innovative infrastructure into cluster systems significantly improves regional economic resilience and sustainable development [2]. The relationship between logistics systems and regional cluster efficiency has also become an important area of scientific research. A study conducted by S. Sheffi demonstrates that advanced logistics networks and supply chain integration contribute to reducing operational costs, improving regional connectivity, and accelerating industrial cooperation within clusters [3]. The research emphasizes that logistics infrastructure acts as a strategic component of regional competitiveness. In recent years, scholars have increasingly focused on the integration of digital technologies into regional cluster management. G. Christopoulos and R. Wintjes analyzed clusters as local innovation systems and concluded that innovation centers, digital platforms, and research institutions play a critical role in facilitating technological modernization and knowledge transfer [4]. According to the authors, regions with developed innovative infrastructure achieve higher levels of economic efficiency and innovation activity. The impact of innovation and logistics integration on regional development was also studied by Bao J. and Li Y. in the context of Chinese high-tech clusters. Their findings reveal that innovation-oriented logistics systems positively influence regional innovation capacity and industrial modernization [5]. The study further indicates that coordinated logistics and innovation policies strengthen regional specialization and export potential. Research conducted by Kiseleva O.N., Vasina A.V., and Sysoeva O.V. examined the implementation of cluster approaches in modern regional economies. The authors identified that the integration of transport-logistics systems with innovative infrastructure contributes to investment attractiveness, industrial diversification, and sustainable regional development [6]. Furthermore, contemporary studies underline the importance of digital logistics platforms, smart infrastructure, and interregional cooperation mechanisms in strengthening cluster specialization. However, despite the

growing number of studies in this field, issues related to the institutional mechanisms of integrating innovative infrastructure and logistics into regional clusters remain insufficiently explored. This indicates the necessity for further scientific research aimed at improving regional cluster specialization models under conditions of digital transformation and economic modernization.

3. Research Methodology

This study adopts a comprehensive scientific approach to examine the integration of innovative infrastructure and logistics in the cluster specialization of regions. Both general scientific and specific economic analysis methods were applied in the research process. The theoretical foundation of the study is based on scientific works of domestic and international scholars on regional clustering, innovative infrastructure, logistics systems, and regional economic development. On this basis, the conceptual relationship between innovative infrastructure, logistics integration, and cluster specialization was systematically analyzed. A systems approach was applied to examine regional clusters as integrated economic systems consisting of enterprises, research institutions, logistics centers, and innovation platforms. This approach allowed for the analysis of interconnections among cluster components and their collective impact on regional economic performance. In addition, statistical-economic analysis methods were used to assess the relationships between innovative infrastructure development, logistics efficiency, investment flows, and regional production indicators. This enabled the identification of key factors influencing the effectiveness of cluster specialization. A comparative analysis method was employed to examine international best practices in cluster development and to compare them with the current situation in Uzbekistan's regions. This made it possible to identify advanced approaches to integrating innovative infrastructure and logistics and to evaluate their applicability in national conditions. Grouping and generalization methods were also applied to classify regions based on their economic potential, logistics infrastructure development, and level of innovation activity. This facilitated the identification of priority directions for improving regional cluster policies. The information base of the study includes data from the State Statistics Committee of the Republic of Uzbekistan, reports from international organizations (such as the World Bank and OECD), scientific monographs, academic articles, and official regulatory documents. Based on the obtained results, scientific and practical recommendations were developed to enhance the integration of innovative infrastructure and logistics within the cluster specialization of regions, aiming to improve regional economic efficiency and competitiveness.

4. Result and Discussion

The integration of innovative infrastructure and logistics in regional cluster specialization is considered one of the key factors for improving economic efficiency. A modern cluster system requires not only cooperation between production enterprises, but also strong interaction among research centers, technology parks, business incubators, digital platforms, and transport-logistics networks. Innovative infrastructure contributes to the development and implementation of advanced technologies, improvement of product quality, and creation of high value-added goods, while logistics systems ensure the continuous and efficient movement of raw materials, production inputs, and finished products. In particular, the development of logistics centers, multimodal transport systems, and digital management platforms in regions significantly enhances cluster performance, operational speed, and export potential. Therefore, the integration of innovative infrastructure and logistics plays a strategic role in strengthening regional competitiveness, increasing investment attractiveness, and ensuring sustainable industrial specialization. In the modern global economy, the interconnection between regional clusters and advanced logistics infrastructure has become a fundamental driver of regional competitiveness and macroeconomic stability.

The development of logistics clusters goes far beyond the simple agglomeration of warehouses; in academic and practical discourse, they are viewed as complex ecosystems that ensure seamless integration of transport flows, information technologies, production capacities, and knowledge exchange processes. This synergy enables cluster participants to share critical resources, significantly reduce transaction costs, and implement innovative business models that would be impossible in isolation. From a theoretical perspective, logistics clusters optimize freight flows in regional supply chains by consolidating transport-logistics infrastructure and linking production enterprises with global markets. A fully developed innovative infrastructure system, including research institutes, specialized technology parks, technology transfer platforms, and venture financing institutions, can generate maximum economic efficiency only when deeply synchronized with the transport and logistics complex. International experience convincingly demonstrates that the Smart Supply Chain Management paradigm is based on end-to-end process automation, the implementation of Internet of Things (IoT), blockchain technologies, and advanced big data analytics. Within the Industry 4.0 framework, intelligent automation of production fundamentally transforms supply chain management by ensuring transparency at every stage—from raw material sourcing to final consumption—while enhancing quality control and minimizing risks through highly reliable blockchain-based systems. In the context of Uzbekistan, the formation of regional innovation ecosystems faces several structural disproportions. Studies of regional innovation systems show that regions are typically divided into three macro-groups: leaders with high innovation activity and strong economic potential; intermediate regions with moderate performance; and regions with relatively high economic potential but low innovation activity, where a clear structural gap exists between the real sector of the economy and innovation infrastructure. To overcome these imbalances and achieve successful integration into global markets, Uzbekistan has adopted the cluster approach as a core element of its industrial and agricultural policy, which requires comprehensive restructuring of logistics support systems. According to the Global Innovation Index 2024, Uzbekistan demonstrates above-average performance in Central and Southern Asia in categories such as institutions, human capital, and business development. The country's key strengths include entrepreneurship policies and culture (4th globally), gross capital formation (7th), and labor productivity growth (7th). However, in the "Cluster Development" indicator, Uzbekistan ranks only 30th, which indicates significant untapped potential for deeper cluster integration and improved logistics connectivity. Uzbekistan's integration into global value chains is objectively constrained by a key structural factor—its geographical location as a double-landlocked country. This geographical isolation significantly increases logistics and transportation costs in export-import operations, thereby limiting overall economic growth. The long distance to major seaports, combined with historically low levels of regional integration, makes access to major economic hubs in China and Western Europe more difficult. Heavy dependence on neighboring countries' transit infrastructure negatively affects the efficiency of supply chains, slows down operational processes, and leads to a substantial increase in the final cost of goods. Despite these fundamental challenges, Uzbekistan has achieved steady progress in improving its logistics performance over the past decade. In the World Bank's Logistics Performance Index (LPI), the country improved its ranking from 129th place in 2014 to 88th in 2023. This progress reflects the results of targeted reforms in both hard infrastructure development (road and terminal construction) and soft logistics improvements (customs digitalization and trade facilitation). However, according to the 2025 Asian Transport Observatory report, the transport sector—accounting for nearly 8% of GDP and employing around one million people—still lags behind the average productivity levels of the Asia-Pacific region, despite a threefold increase in labor productivity over the past thirty years. Infrastructure financing remains one of the most critical challenges. Rural road networks,

which serve about 90% of the population, are in a structurally degraded condition, with low operational quality and safety standards, making routine maintenance economically inefficient. Insufficient investment in regional and local roads leads to reduced reliability of transportation services and increased operational costs for logistics companies. The implementation of the Road Development Plan until 2030 requires approximately USD 2 billion annually, while actual expenditures in recent years have ranged between USD 500–700 million, creating an annual financing gap of around USD 1.5 billion. The situation is further aggravated by the fact that many road infrastructure facilities do not meet international safety standards: Uzbekistan ranks second among CIS countries in road traffic fatalities (164 per 100,000 vehicles), which is eight times higher than the European average. An additional barrier to cluster logistics development is the extremely low market share of domestic transport operators in international trade, particularly in the import segment. Analysis shows that in 2018 Uzbek carriers used only a small fraction of issued TIR carnets for imports (2,003 out of 23,180), while the market was largely dominated by foreign operators, mainly from Turkey. This indicates the presence of serious operational constraints, weak international competitiveness of local logistics firms, and an insufficiently modern vehicle fleet that fails to meet strict environmental and technical standards. Moreover, transport planning in the country has historically been focused predominantly on the physical expansion of road infrastructure, often at the expense of multimodal development and balanced regional investment distribution.

Table 1

Transport, Logistics and Innovation Development Indicators (International Comparison and Dynamics)

Indicator	Value / Ranking	Comparison / Dynamics
Logistics Performance Index (LPI) 2014	129th place	Initial position before major reforms
Logistics Performance Index (LPI) 2023	88th place	Improvement by 41 positions
Entrepreneurship policy and culture	4th globally	Global Innovation Index 2024
Cluster development level	30th globally	Global Innovation Index 2024
Annual investment need for roads	~USD 2.0 billion	Road Development Plan until 2030
Actual annual road expenditures	~USD 0.5 – 0.7 billion	Creates a funding gap of ~USD 1.5 billion
Road traffic fatalities (per 100,000 vehicles)	164 cases	~8 times higher than the European average
Road transport share in CO_2 emissions	98%	Asian Transport Observatory 2025

The table presents key indicators related to Uzbekistan's transport and logistics system, innovation environment, and infrastructure development based on international rankings and dynamic changes. It enables a comprehensive assessment of economic reforms, existing challenges, and development needs in a systemic manner. According to the data, the Logistics Performance Index (LPI) shows a significant improvement from 129th place in 2014 to 88th place in 2023, reflecting a positive shift of 41 positions. This progress demonstrates that reforms implemented in the transport and logistics sector have yielded tangible results and improved overall system efficiency. At the same time, Uzbekistan's strong performance in entrepreneurship policy and culture (4th globally)

and cluster development level (30th globally, Global Innovation Index 2024) indicates that the country is gradually forming an innovation-oriented economic model. These achievements reflect growing institutional capacity and increasing attention to cluster-based development strategies. However, several structural challenges remain in infrastructure development, particularly in the road sector. The annual investment requirement for road infrastructure is estimated at around USD 2 billion, while actual annual expenditures range between USD 0.5–0.7 billion, resulting in a substantial financing gap. This underinvestment limits infrastructure modernization and reduces logistics efficiency. In addition, road safety indicators remain a critical issue, with traffic fatalities reaching 164 cases per 100,000 vehicles—significantly higher than the European average. This highlights systemic weaknesses in transport infrastructure quality and safety management. Environmental impact is another important concern, as road transport accounts for approximately 98% of CO_2 emissions in the transport sector. This indicates the need for greener logistics solutions, including multimodal transport systems and environmentally sustainable technologies. Beyond infrastructure and logistics, Uzbekistan has implemented deep structural reforms in the agricultural sector to overcome economic isolation and increase export competitiveness. A key reform has been the transition from a state-controlled planning system to a private cluster-based model in cotton production. Historically, until 2017, the cotton sector was strictly controlled by the state and relied on large-scale mobilization of nearly two million workers, with forced labor accounting for up to 15% of the workforce. These systemic labor violations led to international criticism and the Cotton Campaign boycott of Uzbek cotton. In response, the government abolished state quotas and introduced cotton-textile clusters, which eliminated systemic forced and child labor and ultimately contributed to the lifting of the boycott in 2022. This reform represents a significant institutional transformation aligned with global labor standards. Furthermore, clusters are increasingly adopting advanced technologies such as drone-based agricultural management and biological pest control systems in response to stricter international environmental standards (e.g., EU Organic and Better Cotton certifications). The national program includes 650 laboratories focused on the production of beneficial insects (entomophages). To overcome logistical challenges in manual distribution, agricultural drones (UAVs) are being used to automate the precise release of biological agents across fields. Mechanization of harvesting logistics has also accelerated due to rising labor costs and labor shortages. The share of manual cotton picking has decreased from 80% to 70%, indicating a gradual shift toward mechanized harvesting. This process is supported by state leasing programs that provide access to cotton-harvesting machinery for clusters, improving operational efficiency and reducing dependency on manual labor. Overall, the analysis confirms that while Uzbekistan has made substantial progress in logistics performance and institutional reforms, further investment in infrastructure modernization, safety improvement, and green logistics is necessary to ensure sustainable cluster-based economic development. Integration into global commodity exchanges has been significantly strengthened through recent legislative reforms, linking domestic cotton pricing mechanisms to Intercontinental Exchange (ICE) futures. As a result, sales logistics now include regional exchange auctions where producers can engage in forward, futures, and spot contracts, thereby improving financial predictability and reducing market volatility. Despite production gains in the textile sector, Uzbekistan's integration into global supply chains remains constrained by macro-logistical bottlenecks. According to Better Work reports, the average road transport lead time to the European Union is approximately three weeks. This is relatively competitive compared to China, India, and Vietnam; however, it still lags behind Turkey and Morocco, which deliver goods to the EU within two weeks. Export shipments to the United States take around eight weeks due to multiple border crossings and long-distance maritime routing, which is one to two weeks longer than competing countries.

Cargo consolidation remains a critical challenge. The use of less-than-container-load (LCL) shipments instead of full-container-load (FCL) increases delivery time by 4–7 days at similar cost levels. Moreover, the competitiveness of Uzbek textile exports in the EU market is partially sustained through a 70% state subsidy on transportation costs. Without this subsidy, high freight rates caused by the country's geographical constraints would render exports economically unviable. The sector also suffers from weak vertical integration among small suppliers. The need to import accessories and textile components complicates supply chains, while international buyers increasingly prefer "one-stop-shop" suppliers capable of offering fully integrated production services. Uzbekistan's accession to the EU GSP+ preferential scheme in April 2021 partially mitigated these constraints by granting duty-free access to approximately 66% of tariff lines. The success of the cotton-textile cluster model has encouraged diversification into related industries such as leather-footwear and sericulture. In May 2024, Presidential Decree No. PQ-181 was adopted to elevate the development of leather, footwear, silk, and carpet industries to a new stage. The decree establishes specialized macro-clusters in Sharof Rashidov district of Jizzakh region and Ohangaron district of Tashkent region, aimed at deep processing of raw materials and production of high value-added finished goods. These industrial zones are designed with unprecedented incentives to attract foreign investment and integrate into global logistics networks. Industrial facilities are provided on lease or installment terms of up to seven years. Interest payments on foreign currency loans for equipment purchases are compensated by the Entrepreneurship Development Company JSC. To facilitate access to premium EU markets, special emphasis is placed on environmental logistics and ESG compliance. Approximately USD 40 million is being invested in modern wastewater treatment systems and infrastructure to meet strict environmental standards required by international brands. An innovative subsidy mechanism has been introduced to support direct integration into global value chains, reimbursing up to USD 30,000 per company for sourcing and logistics organization costs incurred by foreign brands establishing local production. Additional fiscal incentives include exemptions from property tax, land tax, and water usage fees until January 1, 2026. Uzbekistan's observer status in the Eurasian Economic Union (EAEU) further supports this development by facilitating customs procedures and improving access to member markets. Industrial clustering cannot function effectively without a strong digital backbone. In Uzbekistan, specialized technological parks are emerging as key drivers of digital logistics and innovation integration. Initially established as a software development incubator, IT Park Uzbekistan has rapidly evolved into a major innovation cluster accelerating logistics sector development. More than 600 logistics and freight-related companies are currently registered within the park, including global corporations such as DHL, Cisco, and Procter & Gamble. The park's attractiveness is driven by extensive tax incentives, including full exemption from corporate income tax, VAT, and social taxes (0% tax rate). Within the cluster, outsourcing integration improves supply chain coordination, dispatching systems, and inventory management efficiency. Companies benefit from a young and highly educated workforce, where 60% of the population is under 30 years old and the literacy rate reaches 99%. Foreign investors also highlight strong regulatory oversight and government initiatives in cybersecurity and fraud prevention. Strategic partnerships, including multibillion-dollar contracts with Boeing (worth over USD 8 billion), are strengthening Uzbekistan's position as an emerging aviation logistics hub. Parallel to this, the "Yashnobod" Innovation Technopark in Tashkent specializes in chemical technologies, biotechnology, materials science, robotics, and instrumentation engineering. The technopark is actively expanding international cooperation and became a full member of the Silk Road High-Tech Park Alliance in 2019, strengthening direct links with Chinese scientific institutions under the Belt and Road Initiative. It has also established cooperation with Iran's Pardis Technopark, including a joint startup

competition with a USD 2 million prize fund aimed at commercialization of innovations. Despite these achievements, significant digital disparities persist across the economy. Digitalization remains uneven, with small and medium enterprises (SMEs) significantly lagging behind large corporations in technology adoption. Only 26% of private companies maintain an official website, which is less than half of the regional average (63% in Europe and Central Asia). The use of advanced digital tools such as Customer Relationship Management (CRM) systems remains limited, with digitalization largely confined to basic distribution and procurement functions. Infrastructure constraints further slow the development of regional logistics ecosystems. While 2G and 3G networks cover most of the country, 4G access is limited to urban areas covering only 43% of the population. 5G deployment is still at a pilot stage due to high investment costs and lack of spectrum reform. Additional barriers for foreign investors include cybersecurity vulnerabilities and strict data localization requirements, which limit the adoption of global cloud-based logistics solutions and artificial intelligence technologies. Recognizing the constraints of being a landlocked country, Uzbekistan has launched a large-scale strategy to develop multimodal infrastructure, including a network of dry ports and logistics hubs. Currently, operational dry ports are located in Angren, Navoi, Tashkent, Termez, and Urgench. These facilities provide integrated services for container handling, storage, and customs clearance. Research indicates that terminals in Navoi and Tashkent already meet international logistics standards. To further enhance this infrastructure, a joint dry port development project with South Korea was launched in March 2024. The feasibility study is expected to be completed by September 2025. South Korea's expertise in port automation and warehouse management is expected to transform Uzbek terminals into high-tech logistics hubs fully integrated with industrial zones.

Table 2

Digital Technologies in the Transport and Logistics System and Their Impact on Clusters

Technological Initiative	Mechanism of Action / Integration	Expected Benefits for Clusters
eTIR System	Full transition from paper-based TIR carnets to digital documentation and secure data exchange between customs authorities of different countries	Elimination of paperwork bureaucracy, instant transit clearance for export shipments
TIR-EPD Platform	Submission of electronic pre-declarations before arrival at border crossing points	Activation of "green corridors," separation of low- and high-risk cargo flows, faster border processing
e-CMR System	Digital consignment note available and updated in real time across all stakeholders	Legal transparency, faster settlements between producers and transport operators
Dynamic Weigh-in-Motion (WIM)	Automatic weighing of freight vehicles in motion without stopping on highways	Elimination of traffic congestion, prevention of overloading, reduced road damage and maintenance costs

This table presents modern digital technologies being introduced in the transport and logistics sector, their mechanisms of operation, and the expected economic benefits

for industrial clusters. The table highlights the opportunities for increasing efficiency and reducing bureaucratic barriers through the digitalization of logistics processes.

The table shows that the eTIR system significantly speeds up transit processes by completely eliminating paper documents and enabling rapid information exchange between countries. The TIR-EPD platform, on the other hand, allows for electronic declarations to be submitted before goods arrive at the border, optimizing customs processes and creating “green corridors”. The e-CMR system also provides real-time control of cargo transportation processes, increasing legal transparency and accelerating settlements between the manufacturer and the carrier. Dynamic weighing (WIM) technology reduces road congestion and helps maintain infrastructure by measuring the weight of vehicles without stopping. In developing the architecture of Uzbek logistics clusters, it is advisable to rely on the advanced international experience, the example of which is the Dutch model. In European practice, clusters are considered not only as geographical concentrations of companies, but also as structured organizations (Cluster Organizations) that coordinate innovative projects, workforce training, and strategic cooperation. A fundamental example is the development of the Venlo logistics hub in the Netherlands. A local coalition of shippers, logistics providers, local governments, and agri-food sector enterprises managed to integrate the region into the Rotterdam corporate networks. Using the political concepts of "Greenport" and "Mainport", this coalition legitimized the priority economic development of the region on the basis of logistics. Academic research shows that in the Netherlands, the Mainport concept has undergone evolution: transport nodes have become full-fledged business generators. Economic function is being strengthened through the integration of transport infrastructure (airports, sea terminals, railways and roads, pipelines) and knowledge-building centers - "Brainports", as well as ICT (information and communication technologies) network nodes. In addition, the concept of Green Supply Chain Management (GSCM) is being actively implemented in the Rhine-Scheldt region. It covers five main areas: green shipping, ecological development of ports, green inland logistics, circular economy and knowledge exchange. Similar examples of the integration of industrial clusters with logistics are observed throughout Europe, for example, in the wood processing industrial park in Jekabpils (Latvia), where a private-public partnership ensures the growth of high-value-added production. For Uzbekistan, the application of the Dutch Mainport-Brainport model implies the need for synchronous development of “dry ports” (such as Navoi and Angren) with technoparks (such as IT Park and Yashnabad), which will create single ecosystems where the process of physical reloading of cargo is accompanied by high-tech data analysis, creation of new materials and development of logistics startups. Institutional reforms, macroeconomic forecasts and financing policy. The success of innovative infrastructure and logistics integration directly depends on the quality of the institutional environment. Despite high GDP growth rates (an average of 6-7% in the post-pandemic period) and stable macroeconomic indicators (gold and foreign exchange reserves at the level of 47.85 billion US dollars in March 2025), experts from the World Bank, IMF and OECD point to the need for deep structural reforms. Priority accompanying measures include: ensuring the rule of law and legal certainty, decriminalization and combating corruption, reducing informal employment, and implementing high labor standards. The close connection between political power and the economy, as well as the limited transparency of the privatization process of state-owned enterprises, pose risks for foreign investors. They are advised to carefully assess human rights compliance in order to minimize reputational risks. The main focus of the reforms planned for 2025–2026 is to prepare for accession to the World Trade Organization (WTO), scheduled for 2026. The legislation will be brought into line with WTO norms.

5. Conclusion

The conducted study shows that the integration of innovative infrastructure and logistics plays a decisive role in enhancing the efficiency of regional cluster development in Uzbekistan. The formation of cluster-based production systems has significantly contributed to increasing export potential, improving industrial specialization, and accelerating the transition toward a more innovation-oriented economy. At the same time, the analysis reveals that despite notable progress in logistics performance, digital transformation, and institutional reforms, several structural challenges remain. These include high transportation costs due to geographical constraints, insufficient logistics infrastructure, digital inequality among enterprises, and limited multimodal transport integration. The results confirm that further development of dry ports, smart logistics systems, and digital platforms is essential for improving Uzbekistan's position in global value chains. In addition, strengthening ESG principles, expanding innovation ecosystems, and supporting SME digitalization are critical factors for sustainable cluster growth. Overall, the study concludes that the synergy between innovative infrastructure and logistics integration is not only a key driver of regional competitiveness but also a strategic necessity for ensuring long-term economic resilience and sustainable development in Uzbekistan.

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