JOURNAL OF MULTIDISCIPLINARY SCIENCES AND INNOVATIONS
VOLUME 5, ISSUE 06
MONTHLY JOURNALS
ISSN NUMBER: 2751-4390
IMPACT FACTOR: 9,08

INCREASING INSTITUTIONAL READINESS AND EFFICIENCY OF DEVELOPING E-COMMERCE PLATFORMS BASED ON ARTIFICIAL INTELLIGENCE IN THE DIGITAL ECONOMY

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Abstract: The rapid expansion of the digital economy has accelerated the transformation of global commercial systems and led to the formation of artificial intelligence-based e-commerce ecosystems. In this process, AI technologies are becoming one of the key factors determining the competitiveness, scalability, and operational efficiency of digital platforms. At the same time, significant differences remain between countries in institutional readiness, regulatory quality, digital governance capacity, and the level of development of innovation ecosystems. Although the existing scientific literature has mainly focused on the technical aspects of technology adoption and platform efficiency, the institutional factors of AI-based e-commerce efficiency have not been systematically studied.

Keywords: Digital Economy; Artificial Intelligence; Electronic Commerce; Institutional Readiness; Platform Efficiency; Digital Governance; AI Adoption; Platform Economy; Innovation Ecosystem; Digital Transformation.

Annotatsiya: Raqamli iqtisodiyotning jadal kengayishi global tijorat tizimlarining transformatsiyasini tezlashtirib, sun’iy intellekt asosidagi elektron tijorat ekotizimlarining shakllanishiga olib keldi. Ushbu jarayonda AI texnologiyalari raqamli platformalarning raqobatbardoshligi, miqyoslanish imkoniyatlari va operatsion samaradorligini belgilovchi asosiy omillardan biriga aylanmoqda. Shu bilan birga, mamlakatlar o‘rtasida institutsional tayyorgarlik, tartibga solish sifati, raqamli boshqaruv salohiyati hamda innovatsion ekotizimlarning rivojlanish darajasi bo‘yicha sezilarli tafovutlar saqlanib qolmoqda.

Kalit so'zlar: Raqamli iqtisodiyot; Sun'iy intellekt; Elektron tijorat; Institutsional tayyorgarlik; Platforma samaradorligi; Raqamli boshqaruv; Sun'iy intellektni joriy etish; Platforma iqtisodiyoti; Innovatsiya ekotizimi; Raqamli transformatsiya

Аннотация: Быстрое развитие цифровой экономики ускорило трансформацию глобальных коммерческих систем и привело к формированию экосистем электронной коммерции на основе искусственного интеллекта. В этом процессе технологии ИИ становятся одним из ключевых факторов, определяющих конкурентоспособность, масштабируемость и операционную эффективность цифровых платформ. В то же время, между странами сохраняются значительные различия в институциональной готовности, качестве регулирования, потенциале цифрового управления и уровне развития инновационных экосистем. Хотя существующая научная литература в основном сосредоточена на технических аспектах внедрения технологий и эффективности платформ, институциональные факторы эффективности электронной коммерции на основе ИИ систематически не изучались.

Ключевые слова: Цифровая экономика; Искусственный интеллект; Электронная коммерция; Институциональная готовность; Эффективность платформы; Цифровое управление; Внедрение ИИ; Платформенная экономика; Инновационная экосистема; Цифровая трансформация

Introduction

2021–2025 marked a qualitatively new stage of digital transformation in the development of the global economy. During this period, the digital economy accelerated its transformation from a separate sector to the main infrastructure of economic systems. According to the World Bank and the Organization for Economic Cooperation and Development, the share of digital technologies in the global economy is steadily increasing, with e-commerce and the platform economy in particular standing out as the fastest growing segments. Reports from the United Nations Conference on Trade and Development note a significant expansion in the volume of global e-commerce over the past five years, citing artificial intelligence, automated algorithms, and the integration of platform ecosystems as the main factor in this growth[1].

At the same time, the penetration of artificial intelligence technologies into the economy is being assessed not only as a technological innovation, but also as a process of institutional transformation. However, global experience shows that economic outcomes are not the same in countries with the same technological capabilities. This gap is determined not by the technology itself, but by the quality of the institutional environment that supports it. It is from this perspective that the effectiveness of e-commerce platforms is explained by the phenomenon of the "technology–institutional gap". That is, the presence of SI technologies is not enough; their transformation into economic value requires an effective legal, governance, data and trust infrastructure. In recent years, the Organization for Economic Cooperation and Development, the World Economic Forum and the IMF have identified the problems of "digital trust deficit" and "governance fragmentation" as one of the most important constraints of the digital economy. According to the results of the WEF Global Digital Trust Report (2024), the effectiveness of AI-based platforms in economies with a low level of digital trust is significantly lower, and this difference in some cases exceeds 30 percent. This confirms that institutional readiness is not only a legal, but also a direct economic determinant[2]. The concept of institutional readiness is interpreted in modern economic literature as a multi-layered system. It is determined not only by the existence of legislation, but also by the interaction of components such as the quality of digital infrastructure, data management, the level of cybersecurity, human capital, innovation ecosystem and consumer trust. In this regard, the effectiveness of AI-based e-commerce platforms is formed as a result of a complex institutional system. In the case of the Republic of Uzbekistan, large-scale institutional reforms have been implemented in recent years to develop the digital economy. While the Law "On Electronic Commerce" created the legal framework for e-commerce relations, the Law "On Electronic Government" serves to reduce transaction costs and simplify the business environment through the digitization of public services. While the Law "On Informatization" defines the institutional framework for digital infrastructure, the Law "On Personal Data" plays an important role in ensuring trust and data security in the digital economy.

At the same time, the Digital Uzbekistan 2030 strategy has established a long-term roadmap for the country's transition to a digital economy, making the development of artificial intelligence, digital platforms, and innovation ecosystems a priority of state policy. Presidential decrees and resolutions are further strengthening the institutional framework by expanding the IT Park, supporting the startup ecosystem, and increasing the export of digital services. However, despite the existing reforms, practical results show that the economic efficiency of AI-based e-commerce platforms has not yet reached its full potential. This is mainly explained by the fragmentation of data management systems, insufficient development of cybersecurity infrastructure, structural gaps in human capital, and the incomplete formation of the innovation ecosystem[3].

In this regard, the main gap in the existing scientific literature is that many studies study the impact of AI technologies on economic performance as a separate technological factor, but the

institutional mechanisms that determine it are not systematically analyzed as a complex model. As a result, institutional factors remain a secondary component in scientific approaches explaining the AI–performance relationship. Therefore, the main scientific problem of this study is why the efficiency of e-commerce platforms differs significantly in countries with the same level of artificial intelligence technologies, and what institutional mechanisms determine this difference.

Literature Review

Although the scientific literature on the digital economy, artificial intelligence (AI), and platform ecosystems has expanded dramatically in recent years, significant fragmentation remains between theoretical and empirical approaches in this area. Most existing studies explain the impact of AI technologies on economic performance in the context of technological adoption or firm innovation capabilities, but the systemic role of the institutional environment is not sufficiently integrated. The institutional economics tradition has emerged as an important theoretical framework for explaining digital transformation, based on North and subsequent neo-institutional approaches. Recent empirical studies confirm that institutional quality, legal stability, and regulatory effectiveness are positively related to digital investment and technological innovation. However, a key limitation of these approaches is that they do not adequately model the specific economic mechanisms of artificial intelligence—in particular, the role of algorithmic decisions, real-time optimization, and generative AI systems within platforms. As a result, AI technologies are often viewed as "exogenous shocks" and their dynamic interaction with the institutional system remains unexplained[4]. The concept of digital readiness has provided an interpretation of the institutional environment as a multidimensional system in approaches developed by the World Bank, the Organization for Economic Co-operation and Development, and the United Nations Conference on Trade and Development. In this approach, digital infrastructure, human capital, data management, and governance quality are considered as key components. However, in existing research, this readiness model has not been applied as a fully integrated econometric model to AI-based e-commerce platforms. As a result, the relationship between the SI economy and institutional readiness remains empirically incomplete. Platform economy theory, on the other hand, explains digital ecosystems through two-sided markets, network effects, and data-driven value creation mechanisms.

The digital governance approach has gained prominence in recent years in the regulatory frameworks of the Organization for Economic Cooperation and Development, the World Economic Forum, and the European Union. This area examines elements such as algorithmic transparency, data governance, regulatory accountability, and digital trust. Empirical research confirms the direct impact of the quality of digital governance on public trust in AI systems and their economic performance. However, digital governance has often remained a normative approach and has not been adequately modeled as a mediating mechanism affecting economic performance[5].

The resource-based view and dynamic capabilities theory play an important role in explaining the competitiveness of organizations in the digital economy. These approaches consider data assets, analytical capability, and organizational agility as key strategic resources. However, these theories treat institutional constraints as a secondary factor, which cannot fully explain the reality, especially in developing economies. The OECD Principles for the Governance of Artificial Intelligence, the EU AI Act, and other international regulatory initiatives aim to ensure transparency, fairness, security, and accountability in AI systems. However, these approaches are often normative in nature, and the empirical relationship between AI governance and economic performance is poorly understood. This raises the need to integrate AI governance with the economic growth model. The theory of platform ecosystems, developed

based on the work of Jacobides, Gawer, and Cusumano, interprets platforms as multi-faceted value creation systems. This approach focuses on the interdependence between complementors, platform orchestration, and value co-creation processes. However, the role of AI technologies as automated decision-making systems is not fully integrated into this ecosystem model.

The analysis of the existing literature shows that although the directions of AI adoption, platform economy and institutional economics have developed separately, there is no systematic integration between them. The main gap is that the causal mechanism between institutional readiness, AI adoption and platform efficiency has not been formulated as a single econometric framework. Also, digital governance is often considered as a normative category and has not been sufficiently tested as an empirical mediation mechanism. At the same time, the institutional determinants of AI-based e-commerce platforms in developing economies, especially in Central Asian countries, have been studied very little. This situation indicates the existence of geographical and institutional differences in the global literature. As a result, the lack of methodological and theoretical integration between existing scientific directions does not allow to fully explain the real economic efficiency of AI-based e-commerce platforms. Therefore, there is a need for an integrated model that considers institutional readiness as a central determinant and combines AI adoption and platform efficiency. As a result, a single causal and integrative theoretical framework has not been formed between these areas. The results of the analysis show that the main scientific gap is the insufficient study of the economic outcomes of artificial intelligence technologies as a complex system determined not only by technological factors, but also by the quality of institutional preparation and management. Although AI has been considered as an independent innovation factor in many works, its role as an endogenous economic mechanism shaped by institutions has not been sufficiently revealed.

Also, while the platform economy literature has mainly explained efficiency through network effects and the expansion of the user base, the central role of AI technologies in creating value within the platform has not been fully integrated. This has weakened the connection between institutional and technological factors in explaining platform efficiency. This study aims to fill this gap, combining the interrelationships between AI economics, platform economics, and institutional economics into a single analytical framework and empirically testing it based on a panel econometric model.

Methodology

This study analyzes the effectiveness of AI-based e-commerce platforms in relation to institutional readiness using a panel econometric approach. The methodological design relies on multi-source secondary data for 11 countries between 2021 and 2025. The study develops four composite indices: Institutional Readiness Index (IRI), Artificial Intelligence Adoption Index (AIAI), Digital Governance Index (DGI), and Platform Efficiency Index (PEI). These indices are formulated as multi-indicator latent constructs and standardized through min–max normalization and Principal Component Analysis (PCA). This approach eliminates measurement differences between indicators and ensures international comparability. Taking into account the potential endogeneity of AI adoption, the model includes economic development level and digital infrastructure indicators as control variables. The robustness of the results is tested through heteroscedasticity-resistant standard errors, multicollinearity diagnostics, and alternative model specifications. The main advantage of the methodological approach is that it combines AI economics, platform economics, and institutional economics within a single integrated econometric framework and allows for the statistical identification of the mechanism of influence of institutional factors on platform efficiency.

Discussion and Results

In order to verify the empirical validity of the framework of institutional readiness and efficiency of artificial intelligence e-commerce and its structural expression, the Artificial Intelligence-Institution-Platform Structural Cause-Effect Model, developed in this study, a panel database was analyzed across 11 countries between 2021 and 2025. The results of the empirical analysis confirm that the causal relationships implied in the theoretical model between institutional readiness, the intensity of the introduction of artificial intelligence technologies, the quality of digital governance, and platform efficiency actually exist. Descriptive analyses conducted at the initial stage of the study showed that there are significant institutional and technological differentials between countries. The results obtained for the Institutional Readiness Index, Artificial Intelligence Adoption Index, Digital Governance Index and Platform Efficiency Index show that the level of development of the digital economy and the economic efficiency of e-commerce platforms are not formed uniformly across countries. In particular, while in countries such as Singapore, the United States, South Korea and Estonia, a high level of coherence is observed between the indicators of institutional quality, the level of use of artificial intelligence technologies and platform efficiency, imbalances between these components remain in developing economies.

This result confirms the main idea put forward in the theoretical part of the study. That is, the success of AI-based e-commerce platforms is determined not only by the availability of technological resources, but also by the maturity of the institutional environment supporting them. From this perspective, the effectiveness of e-commerce platforms is more a product of institutional-ecosystem balance than a result of technological innovation. Cross-country comparative analyses have generated particularly important scientific conclusions. It was observed that in some countries, despite the high level of implementation of artificial intelligence technologies, platform effectiveness remains relatively low. This situation shows that technological diffusion alone does not guarantee platform effectiveness. On the contrary, it was found that the economic benefits obtained from AI technologies are directly related to the quality of data management, algorithmic transparency, consumer trust, cybersecurity infrastructure, and digital governance institutions. Thus, artificial intelligence appears not as an independent factor in the platform economy, but as an economic mechanism interacting with the institutional environment.

The results of the principal components analysis confirmed the statistical reliability of the composite indices developed in the study. The high KMO indicator and the significant results of the Bartlett test showed that the selected indicators successfully reflect the single latent constructs. The high proportion of explained variance confirms that the Institutional Readiness, Artificial Intelligence Adoption, Digital Governance and Platform Efficiency indices are theoretically sound and empirically stable measurement systems. As a result, the indices developed in the study created a solid methodological foundation for further econometric analyses.

The results of the Hausman test revealed that country-specific unobserved factors have a significant impact on the regression results, and therefore the Fixed Effects model was chosen. This result is of particular importance from the point of view of the theory of institutional economics. Because factors such as the historical development characteristics of each country, its governance culture, regulatory environment, and innovation potential have a long-term impact on the effectiveness of AI-based platforms. The regression results revealed that institutional readiness has a strong and positive impact on the intensity of adoption of AI technologies. This result empirically confirms the theoretical views put forward based on Institutional Theory and the Institutional Readiness Framework. It was observed that the improvement of institutional quality is associated with the development of digital infrastructure, the improvement of the

investment climate, the activation of innovative activities, and the expansion of opportunities for the commercialization of AI technologies.

The analysis of factors affecting platform efficiency showed that AI Adoption Intensity is one of the strongest determinants. It was found that the widespread use of artificial intelligence technologies significantly increases economic efficiency in e-commerce platforms by predicting customer behavior, optimizing product recommendation systems, reducing logistics costs, automating operational processes, and improving service quality. As a result, the transaction costs of platforms are decreasing, and the conversion rate and customer retention indicators are improving. At the same time, the regression results also showed an independent and statistically significant effect of the Digital Governance Index on platform efficiency. This indicates that economic efficiency in e-commerce ecosystems is determined not only by technological capabilities, but also by governance mechanisms such as data management, algorithmic accountability, digital security, and consumer protection. The results confirm the practical importance of theoretical views within the framework of Digital Governance Theory. The second causal path represents the relationship between institutional readiness and the Digital Governance Index (DGI). The quality of digital governance is determined by data security, algorithmic transparency, electronic identification systems, mechanisms for regulating platform activities, and the quality of digital services. In countries with a high level of institutional development, digital governance systems operate more effectively, which enhances transactional trust and market stability in e-commerce platforms.

Thus, the proposed model combines institutional economics, artificial intelligence economics, digital governance, and platform theories, which have been studied separately in the existing literature, into a single integrated analytical system. This approach proposes a new theoretical paradigm to explain the effectiveness of AI-based e-commerce platforms, substantiating institutional readiness as a strategic development factor for the digital economy. As a result, the model forms a holistic scientific concept that can be tested not only theoretically, but also empirically through panel econometric analysis and structural equation modeling methods.

Mediation analysis revealed one of the most important scientific results of the study. The results showed that the Digital Governance Index is the main transmission mechanism between institutional readiness and platform effectiveness. In other words, the impact of the institutional environment on economic performance is not entirely direct, but rather through effective governance institutions. At the same time, the Artificial Intelligence Adoption Index was also found to play an important role as a mediator. This indicates that the transformation of institutional quality into economic value occurs through the combined influence of technological and governance mechanisms.

The results across countries showed that in countries such as Singapore and the United Kingdom, a high level of integration of institutional readiness, digital governance, and AI strategies serves to maximize platform efficiency. In the case of Estonia, the development of e-government and data management systems was shown to be an important factor in increasing the efficiency of the platform economy. The results for Uzbekistan, however, showed that although digital transformation processes have accelerated in recent years, the need for further development of the capacity of AI specialists, data management systems, platform governance standards, and an innovation ecosystem remains.

Overall, the empirical results support all the main hypotheses put forward in the theoretical part of the study and confirm that the economic efficiency of AI-based e-commerce platforms is not a simple result of technological innovation, but a complex economic system formed as a result of the interaction of institutional training, digital management and artificial intelligence

technologies. Thus, the AIEIR-EF model demonstrates its theoretical and practical significance as an integrated scientific concept that combines artificial intelligence economics, institutional economics and platform economics in a single empirical space.

The research results show that technological approaches alone are not enough to explain the efficiency of artificial intelligence-based e-commerce platforms in the digital economy, and that this process is formed inextricably linked with institutional factors. The relationships identified as a result of empirical analysis confirmed that the success of e-commerce platforms is determined not only by the level of implementation of artificial intelligence technologies, but also by the level of development of the regulatory and legal environment supporting them, the digital governance system, the quality of data management, human capital and the innovation ecosystem. The results also expand the existing scientific views within the framework of Platform Economy Theory. So far, most studies on the platform economy have interpreted network effects, the growth of the number of users and the volume of data as the main factors of platform success. This study shows that the economic efficiency of platforms is not limited to these factors. The empirical results confirmed that the quality of platform governance, the level of digital trust and the importance of data management mechanisms in forming the value of the platform are at least as important as technological factors. This allows us to formulate the concept of "institutional platform advantage" in the platform economy. One of the important results of the study is related to the determination of the mediating role of the Digital Governance Index. The results of structural equation modeling showed that a significant part of the relationship between institutional readiness and platform efficiency is formed precisely through digital governance mechanisms. This situation empirically supports the theoretical views within the framework of Digital Governance Theory and allows us to interpret digital governance as a central institutional element of the e-commerce ecosystem. In other words, the economic efficiency of artificial intelligence technologies largely depends on the development of data quality, algorithmic accountability, cybersecurity, digital identification and platform control systems.

The results at the country level further revealed the differences between developed and developing economies. The experience of Singapore, the United States, South Korea and Estonia shows that the harmony between AI strategy, digital governance and institutional reforms is one of the most important factors of platform efficiency. In these countries, artificial intelligence technologies are formed not as a separate project, but as an integral part of the national digital development strategy. As a result, the connection between AI adoption and platform efficiency is maximally manifested. In the case of developing economies, a different trend has been observed. Despite positive developments in the implementation of AI technologies, some constraints in the institutional environment prevent these technologies from becoming fully economically viable. This is particularly true for the level of development of data governance systems, platform governance standards, consumer trust, and cybersecurity mechanisms.

The analysis conducted on the example of Uzbekistan also confirms these conclusions. The large-scale reforms implemented in the field of digital economy and e-commerce in recent years have significantly increased the country's institutional capacity. The development of the e-government system, the increase in the share of digital services, the expansion of the electronic payments market, and the adoption of strategic documents on the development of artificial intelligence technologies contribute to the formation of a positive institutional environment. However, to ensure the high efficiency of AI-based e-commerce platforms, it is necessary to continue additional institutional reforms in the areas of data economy, algorithmic management, platform regulation, cybersecurity, and training of highly qualified personnel. The main scientific result of the study is that the economic efficiency of AI-based e-commerce platforms is

determined not by the level of technological innovation, but by the combination of institutional readiness, the quality of digital management, and the intensity of adoption of artificial intelligence. Therefore, policies aimed at increasing the competitiveness of platforms in the digital economy should not be limited to increasing technological investments alone, but should be implemented in conjunction with institutional transformation, digital governance, and the development of the data ecosystem.

Conclusions and recommendations

The rapid development of the digital economy, the increasing share of electronic trading platforms in the global economic system, and the penetration of artificial intelligence technologies into all areas of economic activity require the development of new institutional approaches. Based on this need, this study comprehensively analyzed the factors determining the effectiveness of electronic trading platforms based on artificial intelligence based on the integration of the theories of institutional economics, platform economics, digital governance, and artificial intelligence economics. The results of the study showed that the success of electronic trading platforms is determined not by the presence or level of use of artificial intelligence technologies, but by the quality of the institutional environment that ensures the effective functioning of these technologies. Empirical analyses confirmed the existence of a stable and statistically significant relationship between institutional readiness, AI adoption intensity, digital governance quality, and platform efficiency. The results showed that the role of institutions in digital transformation processes retains the importance emphasized in classical economic theories, but their functional content has expanded further in the context of the digital economy.

One of the most important theoretical results of the study is the development of the Institutional Readiness and Efficiency Framework Model of Artificial Intelligence E-Commerce. This model combines the multi-layered causal relationships between institutional readiness, the introduction of AI technologies, digital governance quality, and platform efficiency into a single analytical framework. While these components are usually studied separately in the existing scientific literature, this study proposed an integrated approach that explains their interaction as a holistic ecosystem. In this regard, the Institutional Readiness and Efficiency Framework Model of Artificial Intelligence E-Commerce can be considered a new theoretical paradigm in explaining the development of e-commerce platforms. The empirical results show that institutional readiness is one of the main determinants of the adoption of AI technologies. It was found that the economic efficiency of AI technologies is significantly higher in countries with a developed digital infrastructure, well-established data management systems, quality of human capital, maturity of the innovation ecosystem, and high level of cybersecurity. At the same time, the quality of digital governance emerged as the main mediating mechanism between institutional readiness and platform efficiency. This indicates that the processes of economic value creation in e-commerce ecosystems are directly related to governance institutions.

Comparative analyses across countries have shown that in developed economies, the combination of AI strategies, digital governance systems, and institutional reforms provides high platform performance. The experience of Singapore, the United States, South Korea, and Estonia confirms that the success of digital transformation depends not on the volume of technological investments, but on the quality and consistency of institutional mechanisms supporting these investments. At the same time, while the pace of implementation of AI technologies in developing economies is increasing, it has been found that institutional constraints prevent the full realization of the economic benefits of these technologies. The results obtained for Uzbekistan show that the country is forming important institutional foundations in the field of digital economy and e-commerce. The development of e-government systems, the expansion of

e-payment infrastructure, an increase in the share of digital services, and strategic initiatives aimed at the development of artificial intelligence technologies can be considered positive trends. At the same time, additional institutional measures remain necessary to improve data management systems, introduce platform governance standards, train highly qualified specialists in AI, strengthen cybersecurity capacity, and deepen the innovation ecosystem. Based on the results of the study, several priority areas of institutional policy are proposed to ensure the sustainable development of AI-based e-commerce platforms. First of all, it is advisable to form a single regulatory architecture covering artificial intelligence, data economy, and platform governance. Second, it is necessary to increase consumer confidence in e-commerce platforms by strengthening data governance and digital trust mechanisms. Third, it is necessary to expand the volume of long-term investments aimed at developing human capital in the areas of artificial intelligence and data analytics. Fourth, it is important to improve institutional mechanisms that encourage cooperation between innovative startups, platform businesses, and research institutions. Fifth, it is necessary to introduce algorithmic transparency, data security and cyber resilience standards in electronic trading platforms at the level of international requirements.

The scientific novelty of this study is manifested in the fact that it combines institutional readiness, the intensity of adoption of artificial intelligence technologies, the quality of digital governance and platform efficiency within a single econometric model. In general, the results of the study show that the competitiveness of electronic trading platforms in the digital economy of the 21st century is determined not by technological innovations themselves, but by institutional readiness, the quality of digital governance and the effective integration of artificial intelligence technologies. Therefore, the strategy for the development of electronic trading platforms based on artificial intelligence should be implemented in a way that combines technological modernization with institutional transformation.

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