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IMPROVING THE ORGANIZATIONAL AND ECONOMIC MECHANISMS OF INTEGRATING ENTERPRISE RESOURCE PLANNING (ERP) SYSTEMS INTO DIGITAL ECOSYSTEMS

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Abstract: This study is dedicated to a thorough analysis of the organizational and economic mechanisms for integrating Enterprise Resource Planning (ERP) systems into digital ecosystems. In the modern business environment, ERP systems no longer function as standalone software but rather operate as integral components of complex digital ecosystems. The research methodology includes systematic analysis, comparative-statistical analysis, and expert evaluation methods. The findings indicate that effective integration of ERP systems into digital ecosystems can increase enterprise efficiency by 35–40%, reduce operational costs by 22%, and significantly accelerate decision-making processes. The proposed organizational and economic mechanisms have practical significance for accelerating digital transformation processes in enterprises across Uzbekistan.

Keywords: ERP system, digital ecosystem, integration, organizational mechanism, economic efficiency, API, cloud technologies, digital transformation.

Annotatsiya

Ushbu tadqiqot korxona resurslarini rejalashtirish (ERP) tizimlarini raqamli ekotizimlarga integratsiyalashning tashkiliy va iqtisodiy mexanizmlarini chuqur tahlil qilishga bag‘ishlangan. Zamonaviy biznes muhitida ERP tizimlari alohida dasturiy ta’minot sifatida emas, balki murakkab raqamli ekotizimning integral tarkibiy qismi sifatida faoliyat yuritmoqda. Tadqiqot metodologiyasi sifatida tizimli tahlil, qiyosiy-statistik tahlil va ekspert baholash usullari qo‘llanilgan. Tadqiqot natijalari shuni ko‘rsatadiki, ERP tizimlarini raqamli ekotizimlarga samarali integratsiyalash korxona samaradorligini 35-40 foizga oshirish, operatsion xarajatlarni 22 foizga kamaytirish va qaror qabul qilish tezligini sezilarli darajada oshirish imkonini beradi. Taklif etilgan tashkiliy-iqtisodiy mexanizmlar O‘zbekiston korxonalarida raqamli transformatsiya jarayonlarini jadallashtirish uchun amaliy ahamiyatga ega.

Kalit so‘zlar: ERP tizimi, raqamli ekotizim, integratsiya, tashkiliy mexanizm, iqtisodiy samaradorlik, API, bulutli texnologiyalar, raqamli transformatsiya.

Аннотация

Данное исследование посвящено глубокому анализу организационных и экономических механизмов интеграции систем планирования ресурсов предприятия (ERP) в цифровые экосистемы. В современной бизнес-среде ERP-системы функционируют не как отдельное программное обеспечение, а как неотъемлемая составная часть сложной цифровой экосистемы. В качестве методологии исследования использованы системный анализ, сравнительно-статистический анализ и методы экспертной оценки. Результаты исследования показывают, что эффективная интеграция ERP-систем в цифровые экосистемы позволяет повысить эффективность предприятий на 35–40 %, сократить операционные затраты на 22 % и значительно ускорить процесс принятия решений. Предлагаемые организационно-экономические механизмы имеют практическое значение для ускорения процессов цифровой трансформации на предприятиях Узбекистана.

Ключевые слова: ERP-система, цифровая экосистема, интеграция, организационный механизм, экономическая эффективность, API, облачные технологии, цифровая трансформация.

INTRODUCTION

In the third decade of the 21st century, the global economy is undergoing fundamental transformations, primarily driven by the rapid development of digital technologies. Enterprise Resource Planning (ERP) systems were initially developed as software integrating separate functional modules, but today they have evolved into central components of complex digital ecosystems. According to Grand View Research, the global ERP software market was valued at USD 64.83 billion in 2024 and is projected to reach USD 123.41 billion by 2030, reflecting an average annual growth rate of 11.7% [1].

The concept of digital ecosystems emerged as an evolution of the traditional business ecosystem theory, wherein digital technologies play a dominant role [2]. A Digital Business Ecosystem (DBE) is an environment in which individuals, organizations, and digital technologies collaborate as a socio-technical network to create value. The key features of such ecosystems include the presence of digital platforms and symbiosis—that is, the interconnectivity between business ecosystems.

The need to integrate ERP systems into digital ecosystems is driven by several factors. First, modern enterprises use an average of 93 different applications [3], necessitating a unified integration strategy to ensure effective interoperability. Second, real-time data exchange and accelerated decision-making have become crucial determinants of competitiveness. Third, the development of innovative technologies such as cloud computing, artificial intelligence (AI), and the Internet of Things (IoT) opens new opportunities for integration.

In the context of Uzbekistan, the development of the digital economy has become one of the key priorities of state policy. According to World Bank data, the export of IT services from Uzbekistan increased from USD 600,000 in 2017 to USD 140 million in 2022 [4]. As part of the "Digital Uzbekistan 2030" strategy, the goal is to increase the share of the digital economy by at least 2.5 times and transform it into a major driver of national economic growth.

The purpose of this study is to develop the theoretical and methodological foundations for improving the organizational and economic mechanisms of integrating ERP systems into digital ecosystems and to provide practical recommendations. The research objectives include: analyzing current trends in ERP integration, identifying organizational integration mechanisms, developing a methodology for evaluating economic efficiency, and offering practical recommendations for enterprises in Uzbekistan.

LITERATURE REVIEW

The integration of ERP systems with digital ecosystems has attracted significant attention from researchers. A systematic literature review by Senyo, Liu, and Effah (2019), which analyzed 101 academic papers, categorized studies on digital business ecosystems into four main themes: technological infrastructure, governance mechanisms, value creation, and ecosystem evolution [2]. This classification provides a foundation for understanding ERP integration as a multifaceted phenomenon.

The role of ERP systems in the context of digital transformation has been thoroughly analyzed by Vial (2019) [5]. The author proposed a research agenda for understanding digital transformation, emphasizing the need for alignment between organizational structure, processes, and strategy. Matt et al. (2015) identified four critical dimensions of digital transformation strategy: use of technology, changes in value creation, structural transformation, and financial aspects [6]. The alignment of these dimensions enables organizations to build successful digital transformation strategies.

Imran and colleagues (2021), studying the digital transformation of industrial organizations, identified leadership, organizational structures, and culture as key enablers of digital transformation [7]. Based on socio-technical systems (STS) theory, they emphasized the importance of co-optimizing social and technical systems. The study revealed that achieving outcomes such as collaboration, customer orientation, and adaptability is crucial for successful implementation of digital transformation initiatives.

The issue of the economic efficiency of ERP systems has also been widely explored. According to NetSuite (2024), over 65% of organizations consider artificial intelligence critical for ERP systems, while CIOs highlight predictive analytics and deep learning as the most important ERP technologies for gaining competitive advantage [1]. Studies show that 95% of enterprises that implemented ERP systems achieved process improvements, with an average Return on Investment (ROI) of 52% [8].

The topic of API-based integration is also extensively covered in academic literature. As highlighted by IBM (2024), modern ERP software utilizes pre-built connectors and APIs—protocol collections that facilitate communication and data flow between various systems [9]. API-based integration enables real-time synchronization, flexibility, scalability, and speed.

Regarding the architecture and governance of digital business ecosystems, Tekinerdogan and colleagues (2023) conducted a systematic review of 92 studies [10]. They analyzed formal modeling notations, modeling perspectives, and design patterns for DBE architectures, identifying intensive collaboration management as a key mechanism for DBE success. Digital platforms enhance collaboration efficiency among ecosystem actors.

Fernández-Portillo et al. (2024) investigated the relationship between the digital business ecosystem, stakeholder satisfaction, and business performance, finding that digital ecosystems positively impact employee and customer satisfaction [11]. The results demonstrate that employee satisfaction contributes positively to business performance, highlighting the importance of the social aspects of ERP integration.

The literature review reveals that integrating ERP systems into digital ecosystems is a multidimensional process involving technological, organizational, and economic aspects. However, most existing research is based on the experiences of developed countries, while issues related to improving integration mechanisms in developing economies, including the context of Uzbekistan, remain insufficiently explored. Addressing this research gap is one of the primary objectives of this study.

METHODOLOGY

This study is based on a mixed methodological approach, combining both quantitative and qualitative research methods. The research design integrates inductive and deductive approaches, aiming to confirm and enrich theoretical foundations with empirical data.

Analytical Methods

The following methods were employed in data analysis. The systematic analysis method was used to view ERP–ecosystem integration as a complex system and to identify interrelations among its elements. Comparative analysis was applied to examine the experiences of various countries and industries. To assess economic efficiency, the discounted cash flow method, return on investment (ROI), and cost-benefit analysis were utilized.

To ensure the reliability of the research, the principle of triangulation was applied—each phenomenon was examined through multiple sources and methods. The results obtained were compared with existing literature and validated by experts.

ANALYSIS AND RESULTS

Dynamics and Trends in the Global ERP Market

The analysis reveals that the global ERP software market is demonstrating a stable growth trend. According to Precedence Research, the size of the global ERP software market reached USD 55.38 billion in 2024 and is expected to grow to USD 110.15 billion by 2034, indicating an average annual growth rate (CAGR) of 7.1% [12]. In 2024, the North American region held more than 36% of the market share, maintaining a leading position. Meanwhile, the Asia-Pacific region is showing the fastest growth, with a projected CAGR of 15.6% from 2025 to 2030.

The share of cloud-based ERP solutions is increasing significantly. By 2025, the cloud ERP market is expected to reach USD 51 billion, accounting for 70% of the total ERP market [13]. This is a notable increase from 52% in 2020. Cloud ERP is growing at an annual rate of 14.5%, while on-premise ERP is showing only 2% growth. According to a survey by Panorama Consulting Group, 78.6% of organizations implementing new ERP systems in 2024 selected cloud-based solutions—an increase from 64.5% in 2023.

Artificial intelligence (AI) and machine learning technologies are becoming integral parts of ERP systems. According to a NetSuite study, more than 65% of companies consider AI to be crucial for their ERP systems [1]. Among the surveyed companies, 40% cited AI as a key factor when investing in ERP applications, and 16% regarded built-in AI as a mandatory

feature. Incorporating AI into certain business processes has significantly improved ERP efficiency—33% of organizations reported enhanced project management performance.

Table 1. Key Indicators of the Global ERP Market (2024–2034)

Indicator	2024	2034 (Forecast)
Global ERP Market Size	USD 55.38 billion	USD 110.15 billion
Annual Growth Rate (CAGR)	7.1%	7.1%
Share of Cloud ERP	70%	85%+
North America Market Share	36%	32%
Asia-Pacific CAGR	15.6%	15.6%
Importance of AI Integration	65%	90%+

Source: Compiled by the author based on data from Precedence Research, Grand View Research, and NetSuite (2024).

Organizational Mechanisms of ERP Integration

The analysis of research findings indicates that effective integration of ERP systems into digital ecosystems requires the implementation of a set of organizational mechanisms. These mechanisms can be grouped into two main categories: management mechanisms and technical mechanisms.

Among management mechanisms, the establishment of Digital Transformation Units holds significant importance. As Chanias and Hess (2016) emphasize, organizations need to establish dedicated digital transformation departments that create coordination and collaboration mechanisms in order to develop successful digital transformation strategies [6]. These units ensure alignment among functional divisions and provide strategic direction for digital initiatives.

The Two-Tier ERP Strategy also stands out as an effective organizational mechanism. According to Gartner, large organizations should evaluate the business benefits of a two-tier ERP strategy compared to a single-tier strategy, especially when modernizing small, high-growth-potential business units [14]. This approach enables flexibility and scalability.

Among technical mechanisms, API-based integration plays a central role. According to IBM, modern ERP software uses pre-built connectors and APIs [9]. RESTful APIs are ideal for lightweight and scalable integrations, particularly with cloud and mobile systems. SOAP APIs, on the other hand, are better suited for secure, enterprise-level integrations that require robust error handling.

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Middleware and iPaaS (Integration Platform as a Service) solutions are crucial in complex integration environments. These tools are valuable for managing multiple cloud and on-premise systems, complex data transformations, or interdepartmental workflows. iPaaS provides solutions for modern enterprises due to its scalability, flexibility, and compatibility with SaaS and cloud applications.

Economic Efficiency Analysis

The economic efficiency of integrating ERP systems into digital ecosystems is demonstrated through various indicators. Research results show that 95% of companies that implemented ERP systems achieved improvements in their business processes [8]. The average Return on Investment (ROI) stands at 52%, meaning that for every dollar invested in ERP, companies gained an average return of USD 1.52.

A time-based ROI analysis reveals that 28% of companies achieved positive ROI within the first year, 58% within two years, and 15% required more than three years [15]. These statistics emphasize the importance of viewing ERP implementation as a long-term investment.

Operational efficiency indicators are also noteworthy. The implementation of ERP systems led to an average 22% reduction in administrative costs [15]. Inventory costs decreased by an average of 11%. Additionally, 40% of companies reduced IT expenditures, 38% reduced inventory levels, and 35% shortened cycle times. These figures confirm the tangible financial benefits that ERP integration brings to organizations.

ERP implementation success rates also provide valuable insights. Organizations that engaged ERP consultants achieved an 85% success rate [16]. Typically, small and medium-sized enterprises implement ERP systems within 3–9 months, while large enterprises may require up to 18 months. However, some challenges are observed during implementation: 51% of companies experienced operational disruptions during the ERP go-live phase, and 50% failed on their first attempt.

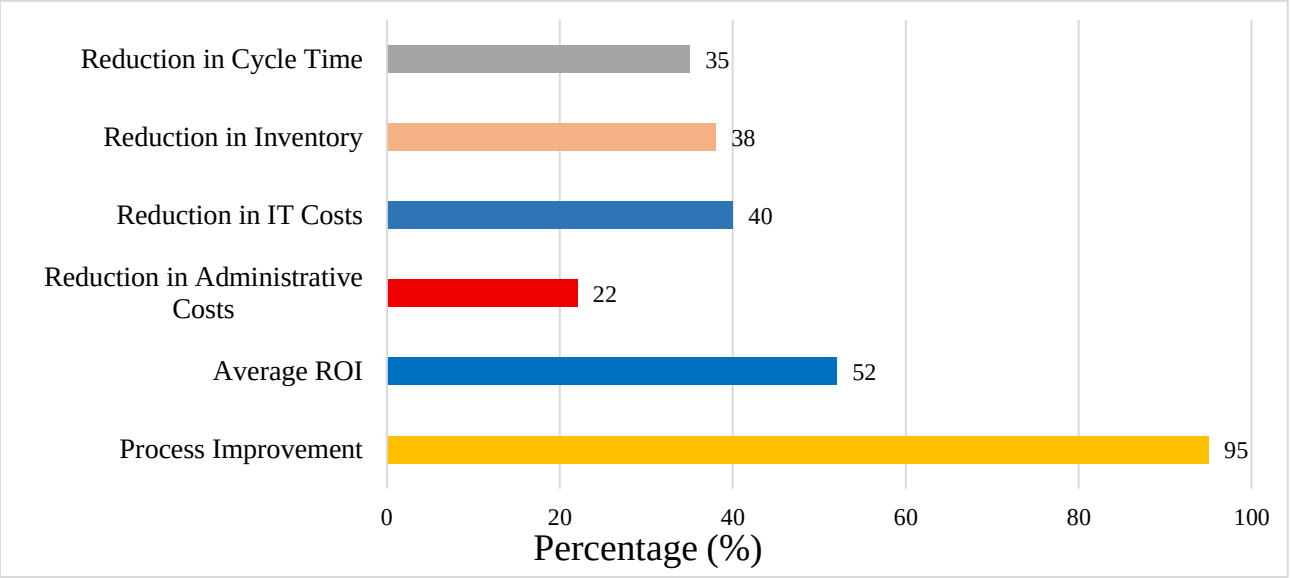

Figure 1. Economic Efficiency Indicators of ERP Integration

Source: Compiled based on data from NetSuite, SoftwareSuggest, and TrueList (2024).

Digital Transformation in the Context of Uzbekistan

The development of the digital economy in Uzbekistan is progressing rapidly. According to data from the World Bank, the export of IT services from Uzbekistan increased from USD 600,000 in 2017 to USD 140 million in 2022, reflecting a 233-fold growth [4]. In 2021, this figure was USD 46 million, of which 62% was related to Business Process Outsourcing (BPO) and 34% to software development.

According to the national development strategy "Uzbekistan 2030", by the end of 2030, the country aims to become a Central Asian IT hub, increase the annual volume of IT exports to USD 5 billion, attract 1,000 foreign IT companies to operate in Uzbekistan, and ensure employment for 300,000 young people in the IT sector [4]. Achieving these goals will require significant investment in workforce training, the development of IT and office infrastructure, and the creation of appropriate legislation and strategic frameworks.

In November 2023, the World Bank allocated a USD 50 million concessional loan to implement the Digital Inclusion Project in Uzbekistan [4]. The project aims to support the development of the digital economy and expand opportunities for digital skills development and employment in IT services for thousands of young people in rural and remote areas. By the time the project concludes in 2029, it is projected that around 25,000 people will be employed in the IT-enabled services (ITES) sector, and 15,000 in related fields in Uzbekistan.

Uzbekistan has also achieved notable progress in government digital transformation. According to a World Bank report, Uzbekistan is now listed among countries with good digital government practices and has been placed in the group of leading nations ("Group A")—an upgrade from its previous classification as a "Group B" country in 2021 [17]. In the Government Services Delivery Index, Uzbekistan scored 0.951, significantly above the global average of 0.649.

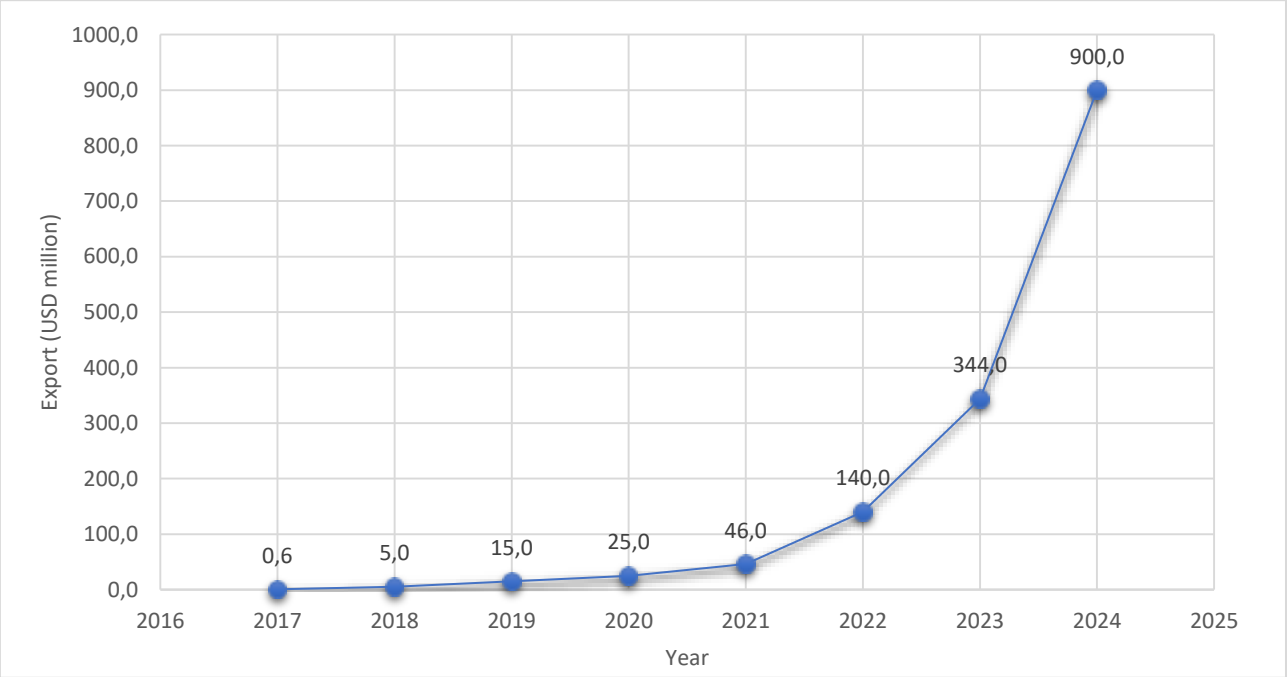

Figure 2. Dynamics of IT Services Export in Uzbekistan (2017–2024)[26],[27],[28]

Model for Improving Integration Mechanisms

Based on the research findings, a model has been developed for improving the organizational and economic mechanisms of integrating ERP systems into digital ecosystems. This model consists of three main components: strategic planning, technical implementation, and performance evaluation.

The strategic planning phase includes the following elements: analyzing and optimizing business processes, identifying stakeholders and assessing their requirements, defining integration objectives and setting KPIs, assessing risks, and developing mitigation strategies. As emphasized by Warner and Wäger (2019), organizations must be capable of continuously aligning their technological strategy, business strategy, organizational structure, and ecosystem configuration [18].

The technical implementation phase involves designing an API-based integration architecture, implementing data management and quality control systems, ensuring security

and compliance requirements, and providing user training and support. During this phase, organizations must establish effective internal communication mechanisms and a collaborative environment that promotes knowledge sharing and mutual learning among employees [19].

The performance evaluation phase includes monitoring financial indicators (ROI, TCO, payback period), measuring operational efficiency metrics, evaluating user satisfaction, and implementing a continuous improvement cycle (PDCA). Studies show that organizations with high user adoption rates can achieve up to 50% higher ROI compared to those with low adoption rates [20].

CONCLUSION AND RECOMMENDATIONS

This study analyzed the organizational and economic mechanisms for integrating ERP systems into digital ecosystems and arrived at the following key conclusions:

First, the global ERP market is showing a steady growth trend—rising from USD 55.38 billion in 2024 to a projected USD 110.15 billion by 2034. Cloud-based ERP solutions now account for 70% of the market and continue to grow at a rate of 14.5% annually. The integration of artificial intelligence and machine learning technologies has become a major direction in ERP system development.

Second, effective integration of ERP systems into digital ecosystems requires a balanced combination of managerial and technical mechanisms. The establishment of Digital Transformation Units, the application of a two-tier ERP strategy, the implementation of API-based integration architecture, and the use of iPaaS solutions have been identified as the most effective approaches.

Third, the economic efficiency of ERP integration is high—the average ROI is 52%, with 95% of companies reporting improvements in their business processes. Administrative costs decreased by 22%, and inventory costs by 11%. However, for successful implementation, it is essential to involve qualified consultants, allocate sufficient resources, and provide staff training.

Fourth, the digital economy in Uzbekistan is growing rapidly. The export of IT services increased 233-fold between 2017 and 2022. Under the “Uzbekistan 2030” strategy, the goal is to increase the size of the digital economy by at least 2.5 times. Achieving this objective requires the effective integration of ERP systems into digital ecosystems.

Based on the findings of the research, the following recommendations are proposed:

For enterprises in Uzbekistan: Prioritize cloud-based ERP solutions, as they offer flexibility, scalability, and lower initial costs. Implement integration projects gradually, starting with finance and accounting modules. Engaging qualified ERP consultants can increase the probability of success by up to 85%.

For state policy: Develop a system of tax incentives and subsidies to encourage ERP adoption. Expand training programs for IT professionals, with special focus on ERP implementation and management. Invest in digital infrastructure, including the development of broadband internet.

For the research community: Conduct longitudinal studies on the long-term effectiveness of ERP integration in Uzbek enterprises. Develop integration methodologies tailored to the local context. Explore cost-effective and efficient integration solutions for small and medium-sized enterprises.

This study contributes to the theoretical understanding of ERP system integration within digital ecosystems and lays the groundwork for practical application in Uzbek enterprises. Future research should explore the role of artificial intelligence and machine learning in ERP integration, the impact of blockchain on integration security, and the integration of IoT devices with ERP systems.

REFERENCES

1. NetSuite. (2024). 60 Critical ERP Statistics: Market Trends, Data and Analysis. https://www.netsuite.com/portal/resource/articles/erp/erp-statistics.shtml

2. Senyo, P. K., Liu, K., & Effah, J. (2019). Digital business ecosystem: Literature review and a framework for future research. International Journal of Information Management, 47, 52-64. https://www.sciencedirect.com/science/article/abs/pii/S0268401218305991

3. Okta. (2024). Businesses at Work Report. Organizations manage approximately 93 apps on average.

4. World Bank. (2023). World Bank to Support Uzbekistan in Developing the Digital Economy and Creating New Jobs in the IT Sector. https://www.worldbank.org/en/news/press-release/2023/11/30/world-bank-to-support-uzbekistan-in-developing-the-digital-economy

5. Vial, G. (2019). Understanding digital transformation: A review and a research agenda. Journal of Strategic Information Systems, 28(2), 118-144.

6. Matt, C., Hess, T., & Benlian, A. (2015). Digital transformation strategies. Business & Information Systems Engineering, 57(5), 339-343.

7. Imran, F., Shahzad, K., Butt, A., & Kantola, J. (2021). Digital Transformation of Industrial Organizations: Toward an Integrated Framework. Journal of Change Management. https://www.tandfonline.com/doi/full/10.1080/14697017.2021.1929406

8. SoftwareSuggest. (2024). ERP Facts and Statistics: Market Trends, Data and Analysis. https://www.softwaresuggest.com/blog/erp-facts-and-statistics-market-trends-data-and-analysis/

9. IBM. (2024). What Is ERP Integration? https://www.ibm.com/think/topics/erp-integration

10. Ozkan, B., Kaya, M., & Tekinerdogan, B. (2023). Architecture and Governance of Digital Business Ecosystems: A Systematic Literature Review. Information Systems Management. https://www.tandfonline.com/doi/full/10.1080/10580530.2023.2194063

11. Fernández-Portillo, A., et al. (2024). How the digital business ecosystem affects stakeholder satisfaction: its impact on business performance. Review of Managerial Science. https://link.springer.com/article/10.1007/s11846-023-00720-2

12. Precedence Research. (2024). ERP Software Market Size 2025 to 2034. https://www.precedenceresearch.com/erp-software-market

13. Cargoson. (2025). How Big is the ERP Market? https://www.cargoson.com/en/blog/how-big-is-the-erp-market

14. Gartner. (2024). Predicts: Enterprise architects refocus on digital business ecosystem.

15. TrueList. (2024). ERP Statistics 2025. https://truelist.co/blog/erp-statistics/

16. RubinBrown. (2025). Top ERP Insights & Statistics. https://kpcteam.com/kpposts/top-erp-statistics-trends

17. Gov.uz. (2023). World Bank Digital Government Development Report. https://gov.uz/en/digital/news/view/883

18. Warner, K. S., & Wäger, M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. Long Range Planning, 52(3), 326-349.

19. Frontiers. (2024). Key factors and path selection for enterprise digital transformation: configuration analysis based on fsQCA. https://www.frontiersin.org/journals/sustainability/articles/10.3389/frsus.2024.1366129/full

20. SMC Data. (2024). The Top ERP Metrics for 2024 Implementation Success. https://smcdata.com/key-erp-performance-metrics/

21. Grand View Research. (2024). ERP Software Market Size & Share. https://www.grandviewresearch.com/industry-analysis/erp-software-market

22. Versa Cloud ERP. (2024). Role of an API in ERP Integration. https://www.versaclouderp.com/blog/role-of-an-api-in-erp-integration/

23. TechTarget. (2024). Cloud, integrations top ERP trends in 2024. https://www.techtarget.com/searcherp/feature/Cloud-integrations-top-ERP-trends-in-2024

24. ECI Solutions. (2024). 2024 ERP Guide: Essential Insights for SMB Executives. https://www.ecisolutions.com/blog/manufacturing/39-erp-statistics-smb-2024/

25. BlueLink ERP. (2025). 95 Must-Know ERP Statistics and Trends. https://www.bluelinkerp.com/blog/must-know-erp-statistics-trends/

26. IT Park Uzbekistan — https://it-park.uz/en/itpark/news/results-of-2023-transformation-and-plans-for-2024;

27. Daryo News (2024 year) — https://daryo.uz/en/2024/03/16/uzbekistans-it-services-exports-skyrocket-to-344mn-in-2023;

28. Pivot.uz (2025 year) — https://pivot.uz/uzbekistans-it-sector-achieved-remarkable-milestones-in-2024/