BARRIERS TO AI ADOPTION IN PROJECT MANAGEMENT: A FRAMEWORK FOR TRANSITIONAL ECONOMIES - INSIGHTS FOR UZBEKISTAN'S DIGITAL FUTURE

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Abstract: Artificial Intelligence (AI) is transforming project management (PM) practices globally, offering advanced functionalities in scheduling automation, risk prediction, resource optimization, and real-time reporting. However, despite the increased use of AI-powered PM tools, the adoption rate remains uneven across regions, with transitional economies facing distinct and not well researched barriers. This paper analyzes AI adoption barriers in project management, applying them to the socio-technical context of Uzbekistan (a transitional economy in Central Asia undergoing rapid digital transformation). The analysis identifies four categories of barriers: technological, organizational, human, and environmental. When applied to the context of Uzbekistan, these barriers demonstrate themselves through fragmented government data systems, a shortage of AI specialists, and evolving but incomplete regulatory frameworks. The paper recommends adopting a four-pillar framework: Infrastructure, Capability, Culture, and Governance to guide policymakers and PM practitioners in accelerating AI integration.

Keywords: Artificial Intelligence, Project Management, Technology Adoption, Barriers, Transitional Economies, Uzbekistan, Digital Transformation

1. INTRODUCTION The integration of artificial intelligence into project management has accelerated dramatically over the past decade. AI and machine learning technologies are now being deployed across the project lifecycle, from planning and scheduling to risk management, resource allocation, and performance reporting (Salimimoghadam et al., 2025). Generative AI improves efficiency across all life cycle phases, with the ability to reduce execution time by 10–15%, decrease budget deviations by 10 20%, and enhance quality through automation, advanced forecasting, and optimized resource allocation (Antoniuk et al., 2025). For developing and transitional economies, including Uzbekistan, AI presents an opportunity for "leapfrogging," which includes bypassing traditional inefficiencies that have historically constrained project delivery in infrastructure, public services, and industrial development (Chigbu, 2026). Rather than investing decades in building conventional PM capabilities, these economies can potentially adopt AI-enhanced tools that accelerate learning curves and the impact of limited human resources. Despite the potential of AI in PM, a significant gap exists between technological availability and actual adoption in transitional economies. Most existing AI adoption frameworks are reflected in the institutional, infrastructural, and human capital of developed Western contexts. These frameworks assume robust data ecosystems, digitally literate workforces, mature regulatory environments, and organizational cultures open to algorithmic decision-making assumptions that are rarely true in transitional settings. As one of the rapidly growing Central Asian economies, Uzbekistan has been actively developing digital transformation through its "Digital Uzbekistan – 2030" strategy (UNDP, 2025b), and activities are creating the urgency for understanding AI adoption in project management as well.

However, the country's unique combination of Soviet era institutional legacies, evolving regulatory frameworks, regional digital divides, and emerging PM maturity presents challenges that cannot be adequately addressed by Western-centric frameworks. This paper addresses three interrelated research questions: 1. What are the primary technological, organizational, and environmental barriers to AI adoption in project management? 2. How do these barriers look specifically in transitional economies, such as Uzbekistan? 3. What actionable strategies can Uzbekistan adopt to mitigate these barriers and accelerate AI integration in project management? This study focuses mostly on barriers and enablers to AI adoption in PM, rather than evaluating the general impact or performance outcomes of AI integration. Uzbekistan is used as an illustrative transitional economy, reflecting challenges that, while context-specific, often mirror broader patterns observed across similar economic environments.

2. METHODOLOGY This study uses both global academic sources and context-specific policy evidence, recognizing that AI adoption barriers are simultaneously universal and different based on the context. By combining a systematic literature review with supplementary documentary analysis, the study achieves both broad understanding through comprehensive coverage of global literature and depth through detailed contextualization for Uzbekistan. First, a global literature review identified peer-reviewed research to explore AI adoption barriers in project management. The review focused on literature published between 2018 and 2026 to capture both foundational studies and recent developments in AI-PM integration, which is the period of rapid AI development following the release of modern, transformative models and the subsequent increased integration of generative AI applications. Collected data on theoretical framework, identified barriers, and key findings were synthesized thematically and organized using the TOE framework to ensure analytical coherence. Second, a supplementary documentary analysis was conducted to apply the global barriers to the Uzbekistan context. The analysis focused on three categories of sources: national policy documents, including Uzbekistan's "Digital Uzbekistan – 2030" strategy (2020) and the Strategy for the Development of Artificial Intelligence Technologies until 2030; international development reports from the UNDP mainly offering independent assessments of Uzbekistan's digital infrastructure, skills landscape, and regulatory environment; and local academic and industry publications, including peer-reviewed articles in Uzbek journals, which provided perspectives on PM and digital adoption in specific sectors. The documentary analysis employed qualitative content analysis, and key topics were extracted using a framework derived from the TOE barrier categories, ensuring direct comparison and integration between the global and local evidence. Limitations include the exclusive reliance on secondary sources, which cannot capture the lived experiences of PM practitioners, and potential biases or incompleteness in official documents. Despite these limitations, the methodology provides a rigorous and transparent foundation for analyzing AI adoption barriers in transitional economies, contributing both to academic understanding and to policy and practice in Uzbekistan's digital transformation journey.

3. LITERATURE REVIEW The literature on AI adoption barriers in project management is provided using the widely accepted Technology-Organization-Environment (TOE) framework (Baker, 2011). This framework describes the entire process of innovation from its development to adoption and implementation, has been extensively validated in AI adoption

research, and provides a comprehensive way of categorizing barriers. 3.1 Technological Barriers Technological barriers are the most frequently cited challenges in the literature, with the vast majority of reviewed studies identifying technology-related obstacles as primary challenges to successful AI integration. One of the primary concerns is data quality and availability (Rezaei, 2025). AI systems in project management require large volumes of structured, high-quality historical project data to train algorithms for accurate prediction, risk assessment, and resource optimization. However, some organizations maintain inconsistent or disconnected project data that cannot support effective AI deployment, which is a problem that is improving but still exists in Uzbekistan, where "disconnected data systems" limit effective AI integration into governance and management (Bobirshoevich, Olimjonovich and Tolibovich, 2026). In addition to the data fragmentation problem, organizations with established PM information systems find that the current technological systems are incompatible or need improvements for modern AI tools integration. For instance, in Uzbekistan's banking sector, research has identified "rigid legacy systems" as a key barrier to innovative project management approaches, with outdated infrastructure limiting the implementation of methodologies that could otherwise facilitate AI integration (Mansurova, 2025). Despite this, it is worth noting that there are some sectors that are successful in integrating AI into their business processes (such as content, sales and marketing, product development), but the adoption is still narrow (UNDP, 2025b). The financial aspect of these technological barriers is substantial. As highlighted in the UNDP's report (2025a), in Uzbekistan, the costs of computing and the scarcity of shared technical resources are among the most significant barriers to AI innovation and adoption, since a robust AI ecosystem requires reliable access to high-performance computing, scalable cloud infrastructure, along with large, high-quality datasets. 3.2 Organizational Barriers Organizational barriers recognize that AI adoption is fundamentally a change management challenge rather than completely a technical one (HKU CAMO, 2026). Without management's support, AI initiatives lack the resources, authority, and organizational priority necessary for successful adoption. Traditional leadership and resistance to change pose major barriers, with hierarchical structures prioritizing top-down decision-making, which is insufficient and makes it difficult for middle managers and project teams to support AI initiatives (Zamir, 2025). A study revealed that limited technological infrastructure, gaps in digital literacy, privacy concerns, and organizational resistance are some of the factors that prevent the effective integration of AI solutions in the public sector, for instance (Omonov and Ahn, 2025). Moreover, Uzbekistan's AI strategy acknowledges the need to train AI specialists, indicating the skills gap. Also, the UNDP has noted that most Uzbek firms still use AI in very limited ways, indicating that the shift from awareness to capability has to be further developed (UNDP, 2025b). At this point, human-related barriers occur that focus specifically on individual and workforce level factors that prevent AI adoption, with particular importance in transitional economies where educational systems have to be developed to match technological change. The low technical expertise and the need for further digital skills development among project managers are persistent issues, but many project managers should possess the skills to integrate AI into decision-making (Bobirshoevich, Olimjonovich and Tolibovich, 2026). In Uzbekistan, moderate digital skills in the workforce, with AI-specific expertise concentrated in the capital city (UNDP, 2025b). Uzbekistan has launched ambitious programs to address this

gap, including the "Five Million AI Leaders" program in partnership with the UAE, with plans targeting training 4.75 million schoolchildren and students, 150,000 teachers, and 100,000 civil servants by 2030 as AI will be integrated into school, vocational, and higher education (Gazeta, 2025). 3.3 Environmental Barriers Environmental barriers include the broader ecosystem challenge in which organizations operate and regulatory, economic, and infrastructural factors shape the context for AI adoption and are often beyond the direct control of individual organizations. Uzbekistan was among the first countries in Central Asia to begin regulating artificial intelligence, with the Strategy for the Development of Artificial Intelligence Technologies until 2030 approved in October 2024 and the AI Ethics Rules adopted in March 2026 (Woo, 2026; Tuxsinov, 2026). Uzbekistan's technological transformation may be advancing faster than the necessary regulatory frameworks, creating a gap between policy ambition and implementation reality that threatens to undermine the country's AI aspirations (Saida and Kuliev, 2026). While partnerships with Nvidia to create AI clusters and an AI Center of Excellence represent progress, these initiatives remain in early stages (IT Park Uzbekistan, 2025). Also, while Uzbekistan has established ambitious policy targets, including the implementation of at least 100 AI projects by the end of 2026 and the attraction of over $1 billion in foreign investment by 2030, the achievement of these targets requires time (UzDaily, 2025). Reports indicate that bureaucracy and lack of clear strategic direction have contributed to delays in AI implementation, and local entrepreneurs and technology companies have expressed concerns over the limited support and funding for AI startups. While government support and legislative frameworks are generally perceived positively, challenges in terms of financial constraints and regulatory effectiveness create a gap between the country's digital ambitions and the environment necessary to realize them (UNDP, 2025a). 4. THE CASE OF UZBEKISTAN Uzbekistan's digital transformation has started to develop following the 2017 economic reforms, with the "Digital Uzbekistan – 2030" strategy approved by presidential decree in October 2020 establishing five priority areas: digital infrastructure, e-Government, digital economy, digital technologies market, and IT education. This policy architecture has been backed by approximately USD 2.5 billion for digital infrastructure (UNDP, 2025b). In addition, in October 2024, Uzbekistan adopted its first dedicated AI Strategy (Presidential Decree No. PQ-358), establishing measurable objectives for expanding Uzbekistan's AI ecosystem through regulatory development, infrastructure enhancement, workforce upskilling, and the deployment of AI solutions across key economic and public sectors with a goal of entering the global top 50 in the Government AI Readiness Index (Ministry of Digital Technologies of the Republic of Uzbekistan, 2024). By 2030, AI is expected to contribute approximately $10 bn to Uzbekistan's GDP and create over 430,000 new jobs in sectors such as industry, construction, and agriculture (Aliyeva, 2024). Despite the promising results and progress, persistent structural constraints exist. Rural-urban digital inequality is still present, the education system struggles to modernize curricula, and gender disparities persist, with women falling behind men by nearly 24% in basic digital competencies (UNDP, 2025b). These interconnected constraints, such as infrastructural, educational, and social, create a context where global best practices cannot simply be applied but should be adapted to local realities. When global barriers are viewed in the Uzbek context, a pattern of interconnected challenges becomes visible: Technologically, fragmented data across state enterprises and low

interoperability between government PM systems constrain AI effectiveness. The UNDP's research (2025a) confirms that while Uzbekistan's government open data portal has expanded, the number of AI-ready datasets remains small and practical data access for developers is constrained. In addition, Uzbekistan still lacks national supercomputing capacity sufficient for large-scale model training, forcing businesses to spend millions of dollars on foreign infrastructure. The government has responded by allocating $50 million for the acquisition of 16 supercomputers to develop AI technologies and is creating a supercomputer cluster in partnership with Nvidia to provide modern computing power for AI-based solutions (IT Park Uzbekistan, 2025). However, the challenge extends beyond raw computing power to the very root of data governance: high-quality datasets are limited, and the country has not outlined targets for a large-scale language model, though work on developing Uzbek-language datasets for natural language processing applications has started (UNDP, 2025a). Organizationally, hierarchical management structures, products of Soviet-era governance, create resistance to AI-driven decision-making. Research on Uzbekistan's banking sector identifies "cultural resistance, regulatory constraints, lack of skills and resources, and rigid legacy systems" as persistent barriers (Mansurova, 2025). PM maturity remains low, with an average level of 2.6 out of 5, reflecting a deficit in integrating PM with strategy and digital analytics (in the banking sector) (Mirzaev, 2025). Additionally, there is a critical shortage of specialists in AI, machine learning, and data science, with only 16 universities offering AI programs. The skills gap exists even by gender: women's digital skills lagging reflects broader social inequalities that must be addressed if AI adoption is to be inclusive (UNDP, 2025a). Environmentally, regulatory frameworks are evolving but have yet to be developed further. While the AI Ethics Rules were adopted in March 2026, comparative analysis suggests the Uzbek model differs from the EU's risk-based approach. The economic environment compounds these challenges: venture capital investment reached only USD 6.3 million in 2023 compared to USD 80 million in Kazakhstan (UNDP, 2025a). The barriers to AI adoption do not exist in isolation but interact in ways that compound their effects, with technological, human, organizational, regulatory, and financial challenges mutually reinforcing one another. Project management maturity, which is the extent to which an organization has standardized and continuously improved its PM processes, provides a crucial element for understanding AI adoption readiness (Pennypacker and Grant, 2002). Organizations with low PM maturity lack the foundational data, processes, and governance structures that AI systems require, creating a vicious cycle where weak PM practices impede AI adoption. In Uzbekistan, PM maturity remains uneven. Research on the banking sector (one of the more advanced industries) identifies barriers such as cultural resistance, regulatory constraints, lack of skills and resources, and rigid legacy systems (Mansurova, 2025). The construction sector demonstrates only gradual integration of digital solutions, with adoption remaining uneven (Djabriev and Tashmuxamedova, 2025). This maturity gap is compounded by the historical dominance of the state in Uzbekistan's economy. While reforms since 2017 have opened the economy, the legacy of centralized, hierarchical decision making persists, creating cultural friction with AI's data-driven logic. The result is that even where AI tools are technically deployed, adoption may remain superficial rather than transformative. Breaking this cycle requires not only technical investment but systematic attention to the organizational and cultural conditions that enable AI to deliver value.

5. STRATEGIC RECOMMENDATIONS Based on the analysis of global barriers and their application to Uzbekistan, strategic recommendations are proposed across three interconnected levels: 1. At the policy level, a national "AI-in-PM Roadmap" aligned with "Digital Uzbekistan – 2030" and the 2030 AI Strategy could provide strategic direction and policy certainty. Regulatory sandboxes would allow controlled experimentation, while fiscal incentives would address weak access to finance. Mandating data standardization across state enterprises would address data quality challenges. 2. At the organizational level, piloting AI tools in state infrastructure projects would generate evidence of ROI. AI governance frameworks addressing ethics, privacy, and transparency would build trust. Additionally, integrating AI literacy into PM certification programs at local universities would build foundational competencies. Scaling programs like "One Million Uzbek Coders" to include PM-specific AI training and addressing gender disparities through targeted programs are necessary. 3. At the technological level, investing in cloud-based SaaS PM tools would bypass expensive on-premise infrastructure. Developing shared data infrastructure and analytics platforms for government PM would address fragmentation, and prioritizing interoperability standards would enable integration between legacy systems and AI tools. Building on the TOE framework and the specific Uzbek context, this paper proposes a 4-Pillar Framework for overcoming AI adoption barriers: Pillar 1: Infrastructure (cloud and data standardization) addresses technological barriers through data standardization across government enterprises, cloud services to bypass expensive solutions, and shared analytics platforms. Infrastructure is the foundation of all other pillars. Pillar 2: Capability (upskilling PMs) addresses human capital through integrating AI literacy into university curricula, scaling digital skills programs, and addressing gender disparities. Capability development is the engine that drives adoption; without skilled practitioners, investments in infrastructure cannot be effectively utilized. Pillar 3: Culture (change management) addresses organizational dimensions by fostering AI readiness. For Uzbekistan, this means addressing hierarchical management cultures, building leadership commitment through demonstrated effective pilots, and creating psychological safety for experimentation. Pillar 4: Governance (ethical AI policies) addresses the environmental dimension through regulatory frameworks. The AI Ethics Rules adopted in March 2026 provide a foundation, but specific provisions for AI bias and algorithmic transparency remain needed. Regulatory sandboxes would allow controlled experimentation. The 4-Pillar Framework recognizes the interdependence of infrastructure, capability, culture, and governance. Effective AI adoption requires simultaneous progress across all four pillars, as weakness in any domain creates bottlenecks that limit the effectiveness of investments in others. 6. CONCLUSION The integration of AI into project management offers transformative opportunities for transitional economies seeking to bypass traditional inefficiencies. However, this paper has demonstrated that transitional economies cannot simply copy Western AI adoption strategies and use them in practice. The barriers (technological, organizational, and environmental) are differently reflected in contexts like Uzbekistan, where fragmented data systems, skills shortages, hierarchical management cultures, and evolving regulatory frameworks create unique challenges. For Uzbekistan, the path to AI-enhanced PM must prioritize foundational investments in data readiness and human capital before expecting significant returns from AI investments. The "Digital Uzbekistan – 2030" strategy and the 2030

AI Strategy provide the policy architecture, but implementation requires attention to the specific barriers identified in this paper. The 4-Pillar Framework: Infrastructure, Capability, Culture, and Governance recommended offers a starting point for policymakers and PM practitioners. By addressing each pillar systematically, Uzbekistan can build the AI readiness necessary to develop AI's potential for more efficient and effective project delivery. The journey from AI ambition to AI adoption is not linear and not guaranteed. But for transitional economies willing to invest in the foundations such as data, skills, culture, and governance, AI offers a genuine opportunity to transform how projects are managed and, ultimately, how development outcomes are achieved.

Adabiyotlar, References, Литературы:

1. Aliyeva, S. (2024). Uzbekistan's GDP to see $10 bn boost from AI By 2030, says Sberbank's first deputy chairman. [online] Daryo. Available at: https://daryo.uz/en/2024/04/24/uzbekistans gdp-to-see-10-bn-boost-from-ai-by-2030-says-sberbanks-first-deputy-chairman/.
2. Antoniuk, D., Damir Bikulov, Karpenko, A., Lyazzat Beisenova and Yuliia Polusmiak (2025). Generative AI in project management: Enhancing efficiency and financial performance. Financial and credit activity problems of theory and practice, 6(65), pp.525–535. doi:10.55643/fcaptp.6.65.2025.4904. Baker, J. (2011).
3. The technology–organization–environment framework. Information Systems Theory, 28(1), pp.231–245. doi:10.1007/978-1-4419-6108-2_12.
4. Bobirshoevich, M.S., Olimjonovich, I.E. and Tolibovich, M.T. (2026). Artificial intelligence in the management sphere OF Uzbekistan. Repository Antis Publisher, [online] p.698759. Available at: https://www.neliti.com/publications/698759/#cite. Chigbu, B.I. (2026).
5. Automation, AI, and the global future of work: Bridging north-south divides. Sociology Compass, 20(5). doi:10.1111/soc4.70198.
6. Djabriev, A.N. and Tashmuxamedova, F.A. (2025). Development of Uzbekistan's construction industry in the context of global innovative trends. Modern Science and Research, [online] 4(12), pp.222–227. doi:10.71337/inlibrary.uz.science-research.139402.
7. Gazeta (2025). Uzbekistan launches five million artificial intelligence leaders project. [online] Газета.uz. Available at: https://www.gazeta.uz/en/2025/12/02/five-million/. HKU CAMO (2026). Deloitte-HKU AI adoption index 2026: The paradox of promise and performance - HKU centre for AI, management and Organisation. [online] HKU Centre for AI, Management and Organisation. Available at: https://camo.hku.hk/ai-adoption-survey/. IT Park Uzbekistan (2025).
8. ITPARK - the Republic of Uzbekistan launches major AI initiative with NVIDIA. [online] It-park.uz. Available at: https://www.it-park.uz/en/itpark/news/the republic-of-uzbekistan-launches-major-ai-initiative-with-nvidia
9. Mansurova, S. (2025). Challenges and risks of implementing innovative project management approaches in Uzbekistan's banking sector. Journal of Multidisciplinary Sciences and Innovations, [online] 1(6), pp.328–333. doi:10.71337/inlibrary.uz.jmsi.134679.
10. Ministry of Digital Technologies of the Republic of Uzbekistan (2024). Presidential decree "approval of the strategy for artificial intelligence development until 2030" announced. [online]

Ministry of Digital Technologies of the Republic of Uzbekistan. Available at: https://digital.uz/en/news/view/24510.
11. Mirzaev, S.M. (2025). Project Management Maturity in the Banking Sector of Uzbekistan: Current State and Development Directions. Omonov, M.S. and Ahn, Y. (2025).
12. Towards Smart Public Administration: A TOE-Based empirical study of AI chatbot adoption in a transitioning government context. Administrative Sciences, [online] 15(8), pp.324–324. doi:10.3390/admsci15080324. Pennypacker, J.S. and Grant, K.P. (2002).
13. Project management maturity: an industry-wide assessment. . [online] www.pmi.org. Available at: https://www.pmi.org/learning/library/pm maturity-industry-wide-assessment-9000. Rezaei, M. (2025). Artificial intelligence in knowledge management: Identifying and addressing the key implementation challenges. Technological Forecasting and Social Change, 217, p.124183. doi:10.1016/j.techfore.2025.124183. Saida, N. and Kuliev, K. (2026).
14. Uzbekistan's race to build a digital state. [online] Thediplomat.com. Available at: https://thediplomat.com/2026/07/uzbekistans-race-to-build-a digital-state/.
15. Salimimoghadam, S., Ghanbaripour, A.N., Tumpa, R.J., Rahimi, A.K., Golmoradi, M., Rashidian, S. and Skitmore, M. (2025).
16. The rise of Artificial Intelligence in Project Management: A systematic literature review of current opportunities, enablers, and barriers. Buildings, [online] 15(7), pp.1130–1130. doi:10.3390/buildings15071130. Tuxsinov, D. (2026). Uzbekistan introduces ethical guidelines for AI use. [online] Kun.uz. Available at: https://kun.uz/en/news/2026/03/17/uzbekistan-introduces-ethical-guidelines-for-ai use. UNDP (2025a).
17. Adoption of AI in the private sector in Uzbekistan: drivers, challenges, solutions. UNDP (2025b). Digital economy of Uzbekistan: The State of Digital Entrepreneurship to Harness AI. UzDaily (2025).
18. President of Uzbekistan approves measures for AI development. [online] UzDaily.uz. Available at: https://www.uzdaily.uz/en/president-of-uzbekistan-approves measures-for-ai-development/. Woo, S. (2026). Capitalising on Central Asia: Advancing Digitalisation in Uzbekistan. [online] Hktdc.com. Available at: https://research.hktdc.com/en/article/MjMxNTc2MjYyOA. Zamir, N.A. (2025).
19. The role of leadership in supporting artificial intelligence (AI) integration in organizations. International Journal of Entrepreneurship and Management Practices, 8(31), pp.800–820. doi:10.35631/ijemp.831054.