ЭКОНОМИКА ЖӘНЕ БИЗНЕС
ECONOMY AND BUSINESS
ЭКОНОМИКА И БИЗНЕС

UDC 65.011
IRSTI 06.81.12, 06.81.23

https://doi.org/10.55452/1998-6688-2025-22-3-381-389

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ARTIFICIAL INTELLIGENCE IN PROJECT MANAGEMENT: REVIEW AND ASSESSMENT OF CRITICAL SUCCESS FACTORS

Abstract

Artificial intelligence (AI) technologies such as machine learning, predictive analytics, and natural language processing are increasingly being integrated into project workflows in organizations. However, while AI improves efficiency, automation, and decision making, many organizations struggle with technology infrastructure, workforce readiness, and regulatory compliance. The purpose of this study is to review and assess the critical success factors (CSFs) that influence the implementation of AI technology in project management. Based on the methodology of bibliometric analysis and expert assessment, advanced research on the topic, key development areas in the field were examined, and CSFs that contribute to the effective implementation of AI technology were identified. The findings indicate that successful integration of AI requires senior management support, strong leadership, organizational agility, workforce competence, and technology readiness. The results will be useful for project managers in organizations planning to implement AI to improve the efficiency of their workflows and projects. The application of the recommended list of 6 CFUs in the project management system will allow organizations to most adaptively and smoothly transition from traditional project management methods to AI-based methods.

Keywords: artificial intelligence, bibliometric analysis, critical success factors, change management, project management, sustainable implementation, digital transformation.

Introduction

The rapid development of artificial intelligence (AI) has had a profound impact on many sectors of the economy and business, including project management. AI technologies, including machine learning, natural language processing, and predictive analytics, are gradually being integrated into project management workflows to enhance efficiency, improve decision-making processes, and

optimize resource allocation [1]. Organizations worldwide are increasingly adopting AI-based solutions to automate repetitive tasks, forecast project risks, and improve project performance.

Although the advantages of applying AI in project management–particularly its ability to enhance data analysis and decision-making–are widely recognized, the adoption of these technologies across industries remains uneven. Many organizations continue to face difficulties in identifying the most effective methods for integrating AI into their project management systems [2]. The growing need to identify critical success factors (CSFs) for the effective use of AI in project management, given its uneven application across industries, defines the relevance of this study.

The purpose of this research is to review and evaluate the application of CSFs that influence the process of integrating AI technology into organizational project management. Accordingly, the objectives of the study include identifying CSFs that facilitate AI adoption and barriers that hinder its implementation, examining the impact of AI-driven decision-making on project performance, and analyzing the financial, ethical, and regulatory prerequisites associated with AI integration.

The research methodology is based on bibliometric literature analysis and expert evaluation by the authors. The scientific novelty of the study lies in the use of bibliometric analysis to identify CSFs for AI implementation in project management. This approach provides a comprehensive understanding of global trends, advanced research, and the key factors that drive or hinder the adoption of AI in organizations.

Materials and methods

In the past decade, there has been a growing body of research examining the integration of AI into project management. Such studies emphasize how AI can enhance resource optimization, business process automation, risk assessment, decision-making within project teams, and the maintenance of effective relationships with project owners [3].

However, the literature also highlights that increasing competition, the rapid growth of data, complex business process protocols, and the constantly changing needs of project clients are common challenges that traditional project management methods are unable to address. It is also noted that the effective integration of AI into an organizational environment requires the presence of critical success factors (CSFs) [4].

Examples of CSFs in the field of project management include leadership support, strategic alignment, robust data-processing infrastructure, staff training, and ethical governance, all of which contribute to the most effective integration of AI technology [5]. Accordingly, the application of CSFs within an organization's project management system ensures the successful implementation of AI into project workflows and helps maintain operational integrity and transparency [6]. International experience demonstrates that AI-based solutions facilitate real-time communication, predictive analytics, and dynamic planning, thereby enabling project managers to make informed decisions based on vast datasets [7].

Nevertheless, current research remains fragmented and lacks a unified framework. This study addresses this gap in the literature by conducting a comprehensive bibliometric review and providing a deeper understanding of the role of CSFs in the integration of AI into organizational project management.

This study employs a bibliometric analysis methodology to systematically examine and quantitatively assess the critical success factors (CSFs) associated with the adoption of AI applications in project management [8]. The bibliometric method has proven particularly valuable, as it facilitates the identification of significant scholarly contributions, collaboration networks, and emerging research gaps in the field of AI applications for project execution. By applying bibliometric tools, this study provides substantial insights into the success factors and barriers related to AI integration in project management, thereby enriching both academic discourse and the practical applicability of the findings.

Data collection for this research was carried out using Scopus, a widely recognized bibliometric database. The search was conducted in four stages. The initial literature search, using general keywords on AI in project management, yielded 8,372 articles from Scopus. Additional keywords helped narrow the dataset to 452 articles. Further refinement of terms related to CSFs and barriers reduced the total to 419 documents. Finally, filters were applied for publication year (2019–2025), document type (article), and language (English), resulting in 269 documents for bibliometric analysis.

The data were exported in CSV, BibTeX, and RIS formats to ensure compatibility with the three bibliometric tools used in the study: Bibliometrix, VOSviewer, and CiteSpace. Bibliometrix, based on R, was selected for its robust capabilities in scientometric analysis [8]. VOSviewer was employed to analyze CSV data, enabling the visualization of co-authorship networks, keyword co-occurrence, citation patterns, bibliographic coupling, and PageRank analysis to understand the structure of influence and collaboration in this domain [9].

The RIS file format was imported into CiteSpace, a Java-based program designed to identify and visualize patterns in scientific literature, in order to map citation networks and detect emerging trends [10]. CiteSpace has proven to be an effective tool for uncovering research directions, intellectual turning points, and temporal patterns in the field of AI adoption in project management. It enabled the analysis of co-citation networks, cluster detection, and clustering analysis, thereby providing a comprehensive view of the intellectual landscape of the field.

Results and discussion

The conducted bibliometric analysis revealed the following results. Publication trends: Research on the adoption of AI in project management has expanded significantly, with the annual number of publications increasing from just two in 2019 to 133 in 2024 (Figure 1). This indicates a growing academic interest in the topic and a heightened recognition of its importance.

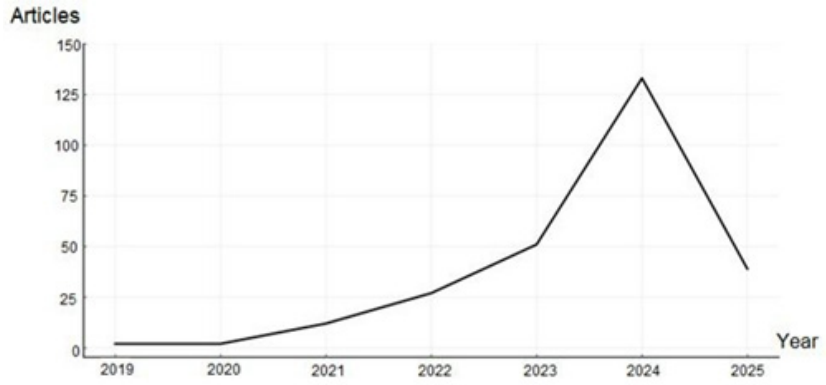

Figure 1 – Annual scientific output

Geographical distribution: As shown in Figure 2, significant international collaboration suggests geographically dispersed yet focused research efforts. China leads globally both in terms of the number of authors and the total number of publications on AI in project management, followed by India, the United Kingdom, and the United States.

Comparative and cluster analyses show that research on AI in project management from 2019 to 2025 has evolved into a diverse interdisciplinary field with strong thematic linkages in decision-making, digital transformation, social intelligence, and sustainable development. It is also worth noting that new research directions have emerged, such as concerns about AI, employee well-being, accident prevention, and social impact. The co-occurrence network analysis in Figure 3 illustrates the most frequently used keywords and their interrelations, providing a visualization of the connections among key terms in the field of AI in project management.

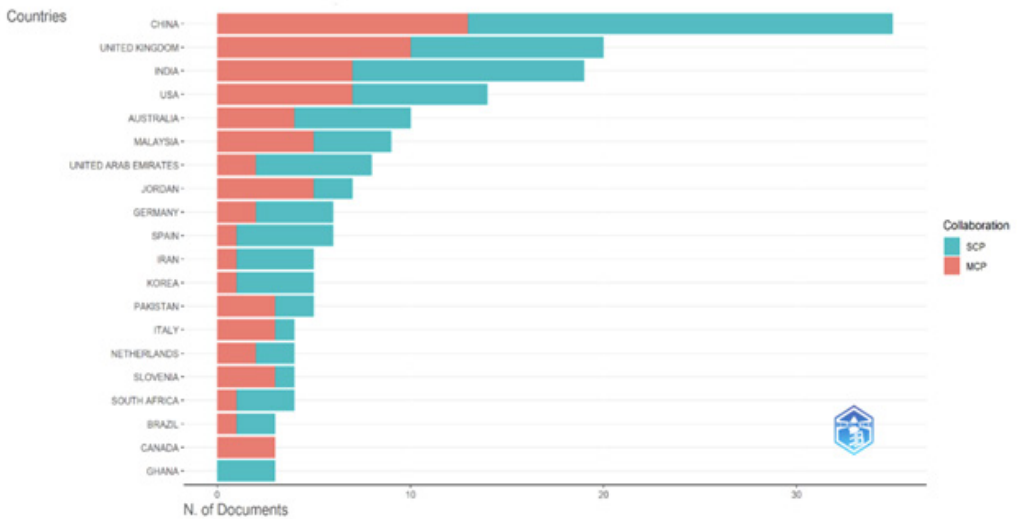

Figure 2 – Countries of corresponding authors (SCP – Single country publications; MCP – Multiple country publications)

Figure 3 – Co-occurrence network analysis in VOSviewer

As a result of the cluster analysis of keywords, nine unique thematic groups were identified, each representing a specific research area in the literature on AI and its applications in project management, industry, education, and organizational development (Figure 4).

Figure 4 – Keyword clusters in CiteSpace

PageRank analysis: Taking into account both the number and the impact of citations, the PageRank analysis made it possible to identify key articles within the citation network [11]. The

$$PR = \frac{1-d}{N} + d\sum \frac{PR(Y_n)}{C(Y_n)}$$

PageRank score of an article is calculated using the following formula:

where PR – PageRank score;

d – damping factor ranging from 0 to 1;

$C(Y_n)$ – number of citations;

$PR(Y_n)$ – PageRank score of the cited article, calculated on an annual basis.

Table 1, which lists the five most influential articles, presents the results of the PageRank analysis. These works are the most significant in the field under consideration. For example, the study by Abdul Wahab and Radmehr focuses on the adoption of AI in small and medium-sized enterprises, while Almashawreh et al. examined the impact of technological and organizational processes on AI implementation in project management in Jordan [12, 13]. Both studies emphasize that the use of AI is positively associated with improved business efficiency, absorptive capacity, and client flexibility, particularly when firms are technologically and organizationally prepared.

The work of Munjeyi and Schutte explores the prospects, drivers, and barriers of AI adoption in project management [14]. According to their findings, strong leadership, regulatory support, and technological infrastructure are the three main CSFs for applying AI in project-related tax management. Overall, the conclusions of these studies highlight the importance of leadership vision, technological readiness, and strategic alignment for the effective integration of AI. These results are consistent with previous research indicating that some CSFs – such as strategic oversight and infrastructure readiness—are applicable across different sectors, including project management.

Despite the strategic potential of AI, several challenges remain. Shang et al. emphasize the high cost of implementation, shortage of skilled personnel, and organizational resistance to change as significant barriers [15]. These results contrast with more optimistic studies, underscoring the fact that both financial and human resource constraints often hinder AI adoption.

Critical success factors (CSFs) are what make the application of AI in project management successful. These variables were derived from the synthesis of the most influential articles identified through bibliometric analysis. According to the findings, AI adoption involves more than mere technical changes; successful integration also requires organizational and strategic approaches.

Table 1 – PageRank analysis results

Rate	PageRank	Authors	Study topic
1	195	Abdul Wahab (2024)	The impact of AI assimilation on firm performance in SMEs
2	177	Almashawreh (2024)	AI adoption in Jordanian SMEs: The influence of technological and organizational orientations
3	223	Munjeyi (2024)	Examining the critical success factors influencing the diffusion of AI in tax administration in Botswana
4	82	Shang (2023)	Prospects, drivers of, and barriers to AI adoption in project management
5	80	Grover (2022)	Understanding artificial intelligence adoption in operations management: Insights from the review of academic literature and social media discussions

The results indicate that the most important CSFs for the successful implementation of AI in project management are:

Leadership and strategic vision. According to prior studies, strong leadership commitment is a key determinant of AI effectiveness. AI integration is more likely to succeed in organizations with clearly defined goals, proactive leadership, and a coherent strategy. To maximize the impact of AI on project success, Abdul Wahab and Radmehr highlighted the importance of organizational adaptability [12].

Technological readiness and infrastructure. Successful AI adoption requires high computational power, reliable data management systems, and robust IT infrastructure. According to Almashawreh et al., technological capabilities — such as automation tools and AI-based data analytics – enhance project execution efficiency [13].

Workforce competence and training. Zhang et al. identified the shortage of skilled workers as a critical barrier to AI adoption [11]. For effective AI implementation, project managers and teams must develop competencies related to AI, including automation, algorithm-based decision-making, and predictive analytics.

Cost–benefit analysis and financial feasibility. Implementing AI entails substantial costs, particularly for small and medium-sized enterprises [15]. Conducting a long-term return-on-investment analysis is essential to determine whether AI adoption is financially viable and to ensure that its benefits outweigh the associated costs.

Regulatory and ethical considerations. AI applications are subject to ethical concerns as well as regulatory constraints. To achieve responsible AI integration, Munjeyi and Schutte stress the importance of compliance with AI ethics standards and governmental support [14].

Organizational culture and change management. AI-driven changes require businesses to foster an innovative and adaptable culture. Structured change management practices are necessary to overcome skepticism and ensure smooth integration of AI, as resistance to change remains a persistent challenge [15].

Conclusion

This study employed bibliometric analysis to identify and evaluate the critical success factors (CSFs) that influence the adoption of artificial intelligence (AI) in project management. The results clearly demonstrate that successful integration of AI extends beyond technical implementation and requires a combination of organizational, strategic, and human-centered elements. Specifically, the

research highlights top management support, strong leadership, organizational flexibility, workforce competence, and technological readiness as indispensable conditions for effective AI adoption. The bibliometric methodology applied and the structured list of six CSFs proposed in this study constitute the novelty and scholarly contribution of the research.

The findings have important practical implications for organizations seeking to transition from traditional project management methods to AI-driven approaches. By incorporating the six CSFs into project management systems, organizations can create a more adaptive environment, minimize resistance to change, and ensure a smoother and more sustainable integration process. For project managers, these insights provide a roadmap for balancing technological investments with strategic planning, leadership commitment, and workforce development.

In addition, this research contributes to the academic discourse by offering a systematic bibliometric perspective on AI adoption in project management – a field that is rapidly evolving but still fragmented. The identification of key themes, influential publications, and emerging research directions provides a valuable foundation for future scholarly inquiry.

However, the study also underscores that challenges remain. High implementation costs, skills shortages, and ethical and regulatory concerns are persistent barriers that organizations must address to fully realize the benefits of AI. This points to the need for further research, particularly in the following areas: 1) The long-term impact of AI adoption on project success, efficiency, and organizational competitiveness; 2) the scalability of AI integration across different industries and project type; 3) the development of frameworks for responsible and ethical AI use in project management.

Overall, the study demonstrates that AI has the potential to transform project management by enhancing decision-making, resource allocation, and risk management. Yet, its successful implementation depends on a holistic approach that aligns technological readiness with strategic vision, leadership, and human capital development. By addressing both the opportunities and the barriers, organizations can leverage AI not only to improve project performance but also to contribute to broader goals of digital transformation and sustainable organizational growth.

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ЖОБА БАСҚАРУЫНДАҒЫ ЖАСАНДЫ ИНТЕЛЛЕКТ: ТАБЫСТЫҚ ФАКТОРЛАРЫН ҚАРАСТЫРУ ЖӘНЕ БАҒАЛАУ

Аңдатпа

Машиналық оқыту, болжамды аналитика және табиғи тілді өңдеу сияқты жасанды интеллект (ЖИ) технологиялары ұйымдардағы жобаның жұмыс үрдісіне көбірек біріктірілуде. Дегенмен, ЖИ тиімділікті, автоматтандыруды және шешім қабылдауды жақсартқанымен, көптеген ұйымдар технологиялық инфрақұрылыммен, жұмыс күшінің дайындығымен және нормативтік талаптарға сәйкестікпен күреседі. Бұл зерттеудің мақсаты – жобаны басқаруда ЖИ технологиясын енгізуге әсер ететін сыни табыстық факторларын (СТФ) қарастыру және бағалау. Библиометриялық талдау және сараптамалық бағалау әдістемесі негізінде тақырып бойынша озық зерттеулер, саладағы негізгі даму бағыттары сарапталып, ЖИ технологиясын тиімді енгізуге ықпал ететін CSF анықталды. Нәтижелер ЖИ табысты интеграциясы жоғары басшылықтың қолдауын, күшті көшбасшылықты, ұйымдастырушылық ептілікті, жұмыс күшінің құзыреттілігін және технология дайындығын қажет ететінін көрсетеді. Нәтижелер жұмыс процестері мен жобаларының тиімділігін арттыру үшін ЖИ енгізуді жоспарлап отырған ұйымдардағы жоба менеджерлері үшін пайдалы болады. Жобаларды басқару жүйесінде ұсынылған 6 СТФ тізімін қолдану ұйымдарға жобаларды басқарудың дәстүрлі әдістерінен ЖИ негізіндегі әдістерге барынша бейімделгіш және тегіс көшуге мүмкіндік береді.

Тірек сөздер: жасанды интеллект, библиометриялық талдау, табыстың сыни факторлары, өзгерістерді басқару, жобаларды басқару, тұрақты енгізу, цифрлық трансформация.

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ИСКУССТВЕННЫЙ ИНТЕЛЛЕКТ В УПРАВЛЕНИИ ПРОЕКТАМИ: ОБЗОР И ОЦЕНКА КРИТИЧЕСКИХ ФАКТОРОВ УСПЕХА

Аннотация

Технологии искусственного интеллекта (ИИ), такие как машинное обучение, прогнозная аналитика и обработка естественного языка, все больше интегрируются в рабочие процессы проектов в организациях. Однако в то время как ИИ повышает эффективность, автоматизацию и принятие решений, многие организации испытывают трудности с технологической инфраструктурой, готовностью персонала и соблюдением нормативных требований. Целью данного исследования является проведение обзора и оценки критических факторов успеха (КФУ), которые влияют на ход внедрения технологии ИИ в управлении проектами. На основе методологии библиометрического анализа и экспертной оценки, были изучены передовые исследования по тематике, выявлены основные направления развития области и КФУ, способствующие эффективному внедрению технологии ИИ. Выводы показывают, что успешная интеграция ИИ требует поддержки высшего руководства, сильного лидерства, организационной гибкости, компетентности персонала и технологической готовности. Полученные результаты будут полезны проектным менеджерам в организациях, которые планируют внедрение ИИ для повышения эффективности их рабочих процессов и проектов. Применение 6 КФУ в системе управления проектами позволит организациям наиболее адаптивно и плавно перейти от традиционных методов управления проектами к методам, основанным на ИИ.

Ключевые слова: искусственный интеллект, библиометрический анализ, критические факторы успеха, управление изменениями, управление проектами, устойчивое внедрение, цифровая трансформация.

Article submission date: 11.09.2025