Application of Artificial Intelligence Tools in Project Management in Software Development*

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Abstract

The article explores the impact of applying artificial intelligence (AI) tools in project management during software development. It analyzes modern AI instruments used at various stages of the project life cycle: initiation, planning, execution, monitoring, and closure. A SWOT analysis is employed to identify the strengths, weaknesses, threats, and opportunities associated with the use of AI in project management. Using the Decision Making Helper decision support software, a priority scenario for implementing AI in the field of project management in software development has been determined.

Keywords

Artificial intelligence, information security, project management, software, Decision Making Helper.

1. Introduction

Project management is an essential component of modern business that requires quality planning, efficient resource utilization, and timely decision-making. With the advancement of digital technologies, an increasing number of organizations are adopting innovative solutions to optimize management processes. One of the most promising technologies in this context is artificial intelligence (AI), which opens up new opportunities for automation, risk forecasting, activity planning, and data-driven decision-making.

According to Google Trends data, global interest in the topic of AI (in English) remained relatively low from 2004 but began to increase in 2011, with a sharp surge in search activity starting in June 2022—from a level of 13 points, reaching 100 points by April 2025 [20].

The relevance of this research is driven by the rapid growth in the number of digital tools and platforms using AI algorithms to support managerial functions. In a competitive environment, where software projects are becoming more complex and require greater flexibility, AI contributes to enhancing management efficiency, reducing the likelihood of errors, and improving the quality of decision-making.

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The effectiveness of AI tools is also recognized by leading organizations in the field of project management and information technology. For instance, a report by the Project Management Institute notes that companies actively implementing AI in project management demonstrate better outcomes in terms of cost, time, and quality. 81% of project managers have achieved or exceeded project goals with the help of AI [1].

The IT research and consulting firm Gartner forecasts that by 2030, 80% of project management tasks will be automated using AI [2]. McKinsey identifies AI as one of the key technologies transforming the field of project management, emphasizing that AI implementation can enhance planning efficiency, risk management, and decision-making [2].

The growing popularity of AI tools is also illustrated by statistical trends from the European Union [1], as presented in Figure 1.

As shown in Figure 1, large enterprises in EU countries used artificial intelligence more frequently than small and medium-sized enterprises. This difference can be explained by the fact that AI-related costs and investments are generally more affordable for larger companies. However, demand for AI tools increased across all enterprise groups during 2023–2024, demonstrating improved accessibility and effectiveness of AI for a broad range of users.

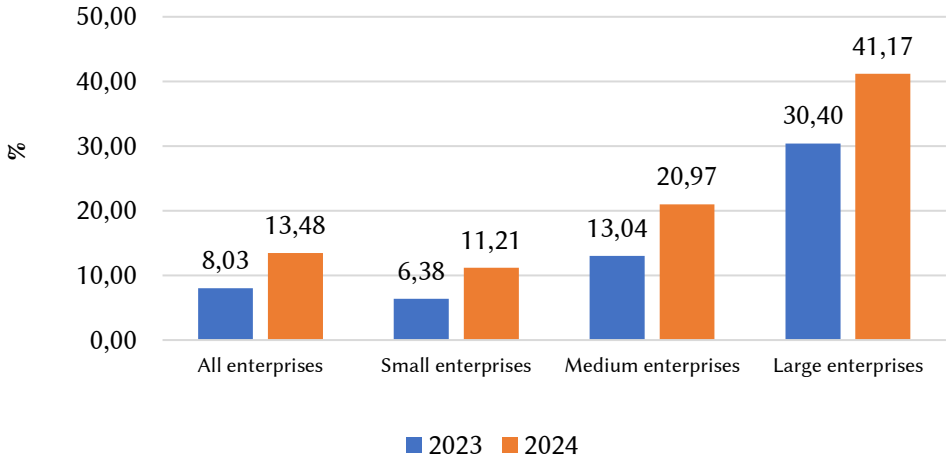

Figure 1: Dynamics of the share of enterprises using AI in 2023-2024
Source: calculated according to [1]

Despite the significant potential and rapidly growing demand for AI tools, their application in project management is still associated with a number of risks—informational, technical, and organizational. Therefore, analyzing the strengths and weaknesses, threats and opportunities, as well as selecting a priority scenario for AI adoption in this field, remains relevant for both researchers and practitioners.

Moreover, project management in the field of software development is characterized by a high level of complexity due to the need for flexibility in rapidly changing market requirements and intense competition.

2. Literature review

The issue of applying artificial intelligence (AI) in project management has been studied by both Ukrainian and international scholars, including: Hudakov D. and Kolodinska Ya. [2], Vasylenko V.M.

and Vakaluk T.A. [3], Dr. Md. Mahfuzul Islam Shamim [4], Bachynskyi O.I. [5], Orekhov D. [6], Muhammad Tayyab Zia, Muhammad Nadim, Muzammil Ahmad Khan, Nijah Akram, and Furqan Atta [7], Wang H. [8], among others.

In the article by Hudakov D. and Kolodinska Ya. [2], the impact of modern AI tools on the management of human-oriented information technology (IT) projects is explored. The authors examine the relevance of integrating AI technologies into project management processes amid rapid digital transformation, competitive pressure, and increasing complexity of user-oriented IT product requirements. The researchers propose a software solution concept that includes modules for data input, analysis, forecasting, visualization, and reporting, which allows flexible adaptation to various IT project applications.

In the research conducted by Vasylenko V.M. and Vakaluk T.A. [3], a comprehensive analysis of the transformational impact of AI on modern project management is provided. The study demonstrates how AI-based tools and methods are changing traditional project management practices, opening new opportunities for optimization and innovation.

Md. Mahfuzul Islam Shamim [4] examines the integration of AI into project management practices to improve efficiency and decision-making processes. The study demonstrates how AI can optimize project planning, scheduling, resource allocation, risk management, and stakeholder communication. Ethical considerations and social implications associated with AI use in project management are also addressed.

The scientific work by Bachynskyi O. I. [5] focuses on the influence of AI on project management and the forecasting of its application prospects. The study explores the opportunities and challenges of AI use, particularly in the context of developing work breakdown structures and predictive analytics. Advantages and disadvantages of AI use in project management are analyzed.

Orekhov D., in his scientific paper [6], investigates directions for applying AI in modern enterprise management and analyzes key AI components such as machine learning, deep learning, natural language processing, computer vision, robotics, expert systems, recommendation systems, autonomous systems, intelligent agents, and their applications in enterprises. As a result, the researcher identifies prospects for AI use in enterprise management.

The specific issues of AI implementation in project management are also addressed in the study by Muhammad Tayyab Zia, Muhammad Nadim, Muzammil Ahmad Khan, Nijah Akram, and Furqan Atta [10]. The authors highlight several benefits of AI adoption, including task automation, resource allocation optimization, and enhanced decision-making. However, the researchers also point out that AI implementation comes with challenges such as data protection, ethical considerations, and the need for workforce retraining.

In the work of Haoyu Wang [8], the importance of integrating AI into management processes to achieve high efficiency and business competitiveness in the digital era is emphasized. The author provides practical recommendations for AI implementation, stressing the importance of developing internal processes and personnel.

Summarizing the available research on the application of AI in project management [5,6,7,8,9,10,11], it can be concluded that most scholars emphasize the significant benefits of its implementation. At the same time, this mechanism is not without its drawbacks and risks, underscoring the need to determine a prioritized scenario for AI use in project management and outline the paths for implementing the chosen scenario. This serves as the basis for defining the aim of this study.

3. Purpose

The aim of this article is to explore the possibilities and prospects of applying artificial intelligence tools in project management, to analyze their impact on project implementation efficiency, to identify the key advantages, risks, and limitations of AI integration into project activities, and to determine the priority scenario for the further development of intelligent technologies in the field of project management.

4. Methodology

The theoretical foundation of this study is based on the works of contemporary scholars in the field of project management [5, 6, 7, 8, 9, 10, 11], as well as reports from organizations in the fields of project management and information technology [1, 2, 3]. To achieve the stated research objective, a system of general scientific and specialized research methods was applied, including theoretical generalization, comparison, systems analysis, formalization, SWOT analysis, and expert ranking using the Decision Making Helper software tool [15], among others.

5. Results

In the current context of technological change and increasing business environment complexity, effective project management is becoming crucial for ensuring the competitiveness of enterprises and organizations across various economic sectors. One of the key drivers transforming this field is the implementation of artificial intelligence (AI) tools, which are significantly changing approaches to project planning, execution, monitoring, and completion. AI enables the automation of routine processes, improves forecasting accuracy, optimizes resource utilization, and supports informed managerial decision-making [1, 10]. Thanks to machine learning algorithms, natural language processing (NLP), and analytical tools, AI is already actively used at all stages of the project life cycle — from initiation to completion.

Currently, there is a wide range of AI tools [12, 13, 14] that can be used in project management, which can be broadly divided into two groups: universal and specialized.

Universal AI tools are general-purpose software solutions not tied to a specific industry or functional area but can be effectively adapted to solve a wide array of project management tasks. They are typically used for automating routine processes, generating texts, analytics, communication, and supporting decision-making. Examples of such universal AI tools include: ChatGPT, Gemini, Claude (for generating reports, project documentation, and responding to inquiries), Notion AI, Microsoft Copilot (for writing texts and task planning), Power BI with AI analytics (for analyzing project performance indicators), FireFlies, Zoom AI Companion, MeetGeek, Jamie, Krisp (for automatically generating meeting summaries, protocols, and agreements), and others.

Specialized AI tools are software solutions specifically developed for application in project management. These tools integrate AI modules into systems managing tasks, resources, risks, and schedules, considering the specifics of project activities. Examples of specialized AI tools include: Forecast App (for resource and cost planning), Gantt Chart AI, Instagantt AI-powered, Microsoft Project with AI enhancements (for building project schedules), ClickUp AI / Asana AI (for automated task and team management), and others.

These two groups of tools can be combined, providing both flexibility and automation for various types of project management tasks.

Based on the analysis of reports from project management organizations [12, 13, 14, 16, 17], AI tools for different stages of the project life cycle and the tasks they help automate are summarized in Table 1.

As shown in Table 1, the use of AI tools allows for the automation and simplification of a range of tasks at all stages of the project life cycle, creating advantages and opportunities for enterprises and organizations in the field of software development. However, the use of AI is not without its drawbacks, which, in turn, may pose significant risks to the functioning of enterprises. The relevance of analyzing various methods is due to the fact that the modern external environment is characterized by an extremely high level of dynamism, complexity, and uncertainty. The use of different strategic analysis methods, specifically SWOT analysis, allows for the assessment of influencing factors and the making of effective decisions [19]. In order to summarize the strengths and weaknesses, threats and opportunities of using AI in project management, a SWOT analysis was conducted, the results of which are presented in Figure 2.

Table 1
Characteristics of AI software tools at different stages of the project life cycle in software development

Stages of the project life cycle product	Artificial Intelligence software tools services	Tasks that AI automates
Initialization	ChatGPT, Gemini, Claude	Formulating the project goal, identifying stakeholders, creating a project charter
	FireFlies, Zoom AI Companion, MeetGeek, Jamie, Krisp	Conducting a kick-off meeting with the project team, creating meeting minutes
Planning	ChatGPT, Gemini, Claude	Defining the SDLC project model, creating a project management plan
	Gantt Chart AI, Instagantt AI-powered, Microsoft Project with AI add-ons	Project schedule development
	Forecast App, Monday.com	Creating a project resource plan
	ChatGPT, Claude, Gemini, ClickUp AI, RiskWatch	Risk identification and management
Monitoring and control	FireFlies, Zoom AI Companion, MeetGeek, Jamie, Krisp	Preparing minutes of meetings with the team and the customer
	ClickUp AI, Notion AI, ChatGPT / Gemini / Claude	Preparing project status reports
	Power BI with AI analytics	Project performance indicators analytics
Closing	Notion AI, ChatGPT	Creating a project closure report, documenting lessons learned (Lessons Learned)

Source: developed by the authors

As shown in Fig. 2, the use of AI creates significant advantages for business operations in modern conditions, but at the same time presents equally substantial risks. Therefore, companies in the field of information technology inevitably face the question of whether to adopt or limit the use of AI tools in project management.

Overall, the authors propose considering three scenarios for the use of AI in software project management:

– Rejection of AI implementation – a scenario in which the company deliberately refrains from integrating artificial intelligence tools into project management, focusing on traditional approaches and relying solely on human resources, experience, and manual or semi-automated methods of planning, analysis, and decision-making;

– Full AI implementation – a scenario involving the systematic and thorough integration of AI solutions into all key stages of project management, from initiation to completion. AI is used to automate planning, risk assessment, resource management, communication, and decision-making;

– Partial or phased AI implementation – a compromise scenario in which AI is introduced into selected aspects of project management while maintaining the key role of humans in strategic decision-making. AI performs supportive functions such as data processing, forecasting, and automation of routine tasks, while managers retain control over critical processes.

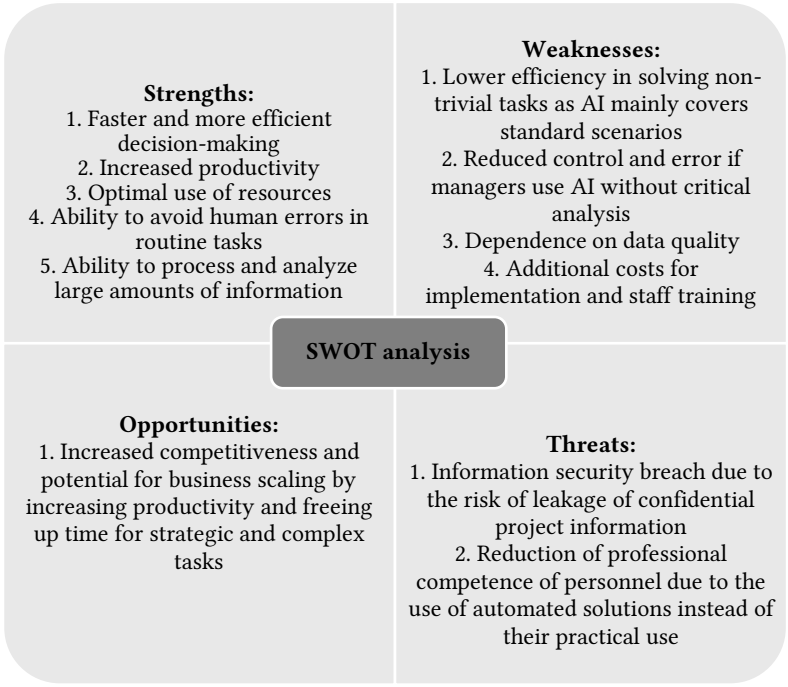

Figure 2: Results of SWOT analysis of the application of AI tools in project management
Source: developed by the authors

To select the most priority scenario among these, the study used a decision support system within the Decision Making Helper software package [15]. This software is designed to enhance the decision-making process through structured analysis of alternatives and a clear presentation of expert choices based on defined criteria. Its main advantages include a structured selection process based on formulated criteria and ratings for each alternative, reduced emotional influence, transparency and justification of decisions, comparability of alternatives, and versatility of application.

The first step in the process of selecting AI usage scenarios in project management is determining the selection criteria and establishing their significance. In this study, the chosen criteria are the opportunities and threats of using AI tools in project management as identified by a SWOT analysis (see Fig. 2), namely: increased competitiveness and business scalability potential, breaches of information security, and reduction of staff professional competencies.

During the expert survey, the impact of each criterion is determined based on its importance. In this software product, the importance of a criterion is assessed using a differentiated scale from 1 to 5 (from low to high). The results of expert evaluations regarding the significance of selection criteria for the optimal AI implementation scenario are presented in Fig. 3.

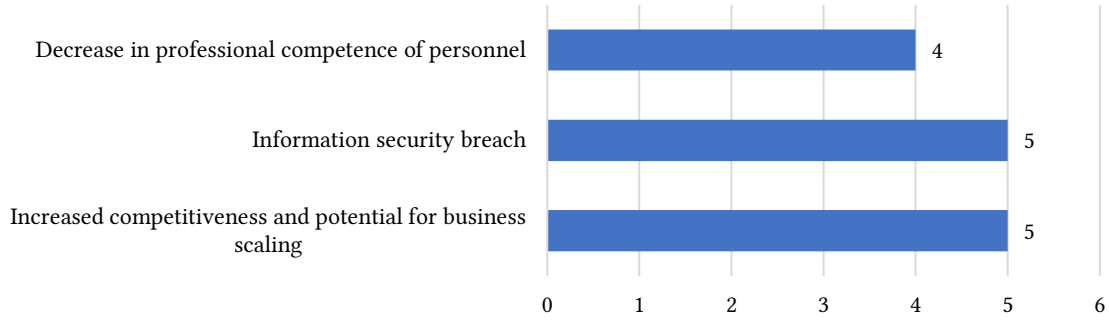

Figure 3: Importance of criteria for choosing the optimal AI implementation scenario
Source: calculated by the authors

As shown in Fig. 3, all selected criteria have high significance for choosing the optimal scenario.

At the next stage in the Decision Making Helper software, it is necessary to determine the priority of each scenario based on each criterion (ranging from -5 "low level" to +5 "high level," with 0 indicating a neutral level). The evaluation window for AI implementation scenarios using the Decision Making Helper software is presented in Fig. 4.

Figure 4: Assessment of the priority of AI implementation scenarios in project management
Source: calculated by the authors

Based on the data in Fig. 4, the Decision Making Helper program automatically determines the priority scenario for introducing AI into project management. The results in the form of a histogram and three-dimensional space are presented in Fig. 5-6.

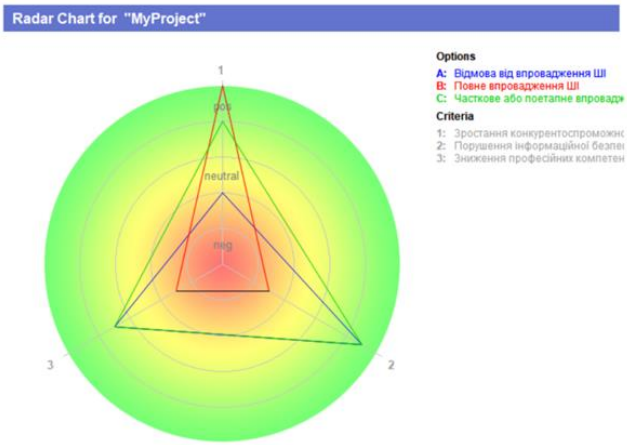

Figure 5: Results of choosing the optimal scenario for implementing AI in project management in three-dimensional space

Source: calculated by the authors

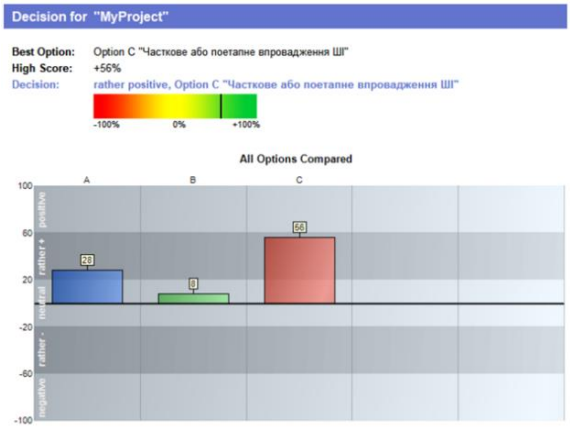

Figure 6: Results of determining the optimal scenario for implementing AI in project management

Source: calculated by the authors

The ranking results presented in Fig. 5 and Fig. 6 indicate that the priority scenario is partial or phased implementation of AI in project management. This scenario is the most balanced, offering an optimal combination of advantages while minimizing risks. Partial or phased implementation allows software organizations and companies to test AI in specific processes, reducing risks related to information security, staff professional competence, or costs.

The authors believe it is advisable to expand the use of modern intelligent systems for continuous monitoring and control of the level of innovation in project management, as well as for identifying and forecasting risks — particularly in the field of information security — and determining possible ways to address them [18].

6. Conclusion

Based on the conducted research, it can be concluded that the implementation of AI in project management is a necessary condition for ensuring competitiveness and creating opportunities for business scalability in the field of software development. However, this process must be controlled and well-justified, and should include the following:

– Analysis and selection of priority AI software products from the perspective of financial and information security;

– Verification of AI solution providers for compliance with information security standards, particularly ISO/IEC 27001;

– Implementation of encryption and anonymization mechanisms for confidential or personal data;

– Regular information security audits and identification of vulnerabilities;

– Identification of management areas where the use of AI is inappropriate or should be limited;

– Adaptation of training programs and personnel qualification assessment, taking into account the risks of AI usage;

– Phased implementation of AI, starting with low-risk processes, especially routine or auxiliary tasks;

– Integration of AI risk assessment into the overall project risk management system;

– Preparation of a contingency plan in case of AI system failures.

Thus, effective AI implementation requires a strategic approach that combines technical, organizational, and ethical components aimed at achieving sustainable business development and enhancing the efficiency of management processes.

The study for the first time ranks AI software tools that emerge at different stages of the project life cycle in relation to the tasks automated by artificial intelligence. Additionally, further development has been made in the methods of applying the Decision Making Helper decision support system software to determine the priority scenario for AI implementation specifically in software development within the field of project management.

Declaration on Generative AI

During the preparation of this work, the authors used Decision Making Helper software to determine the optimal scenario and generate images for figures 4–6. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the publication's content.

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