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GENERATIVE AI IN PROJECT MANAGEMENT: ENHANCING EFFICIENCY AND FINANCIAL PERFORMANCE

ABSTRACT

Project management continues to face a high level of failures due to budget overruns, schedule delays, and insufficient quality, which directly cause financial inefficiency. This study examines how generative artificial intelligence (AI) can improve both operational and financial performance in project management. The purpose is to assess the impact of AI on efficiency with a focus on financial outcomes, evaluated through cost control, deadline compliance, and quality of deliverables.

The methodology combines a literature review, scenario modeling across IT, construction, consulting, education, and research projects, and a comparative assessment using fuzzy logic to address uncertainty. In addition to operational aspects, financial indicators such as ROI, cost variance, and frequency of budget overruns were analyzed.

The results show that generative AI improves efficiency across all life cycle phases. AI can reduce execution time by 10–15%, decrease budget deviations by 10–20%, and enhance quality through automation, advanced forecasting, and optimized resource allocation. Financial effects are most visible in knowledge-intensive projects (IT, consulting), where AI supports data-driven decision-making, accurate financial planning, and higher ROI. In construction, improvements are moderate, mainly through risk mitigation and planning accuracy.

Findings confirm that AI does not replace classical methodologies (Agile, Waterfall) but strengthens them by improving financial discipline and compensating for weaknesses. For effective adoption, organizations must consider industry specifics, invest in staff training, and ensure reliable data and risk management. Generative AI emerges as a strategic driver of financial efficiency and competitive advantage in project management.

Keywords: generative artificial intelligence, project management, financial efficiency, cost optimization, Waterfall, Agile, fuzzy logic

JEL Classification: M15, O32, H43, D83

INTRODUCTION

Generative artificial intelligence (AI) is becoming more common in project management, changing how teams plan and implement projects (Antoniuk, 2025). Recent surveys show a significant increase in the adoption of generative AI, from approximately one-third of businesses in 2023 to nearly two-thirds in 2024 (Kenney, 2025). This growth is driven not only by opportunities to improve efficiency, but also by the desire to achieve significant financial benefits. Projects frequently suffer budget overruns and inefficiencies, prompting interest in AI-driven solutions to improve ROI and cost control. Almost 10% invested money is lost due to low project efficiency (Project Management Statistics, 2022, 2024). The main causes of failure correspond to the parameters of the "project management triangle": budget overruns, deadline delays, and problems with the quality of results. Despite the existence of well-established management methodologies (Waterfall, Agile/Scrum, Lean, Spiral Model, etc.), many organizations (about 42% of companies according to Miller, 2025) underestimate the importance of structured project management. At the same time, the implementation of effective management processes can significantly reduce the rate of project failure.

Early evidence suggests that integrating generative AI tools (e.g., ChatGPT, Copilot, Claude) can enhance productivity and translate into measurable financial benefits for projects. Such technologies create opportunities for project teams to work together at different stages of the project life cycle (from initiation to completion). Surveys by the Association for Project Management are already showing optimistic results, as 7 out of 10 project managers say that AI integration improves their projects' performance in terms of time, budget, and product quality requirements (APM, 2025).

LITERATURE REVIEW

International project management associations highlight typical causes of project failures: budget overruns (55%), poor requirements management (47%), lack of alignment with business goals (44%), insufficient sponsor support (41%), and unclear initial objectives (37%) (Project Management Statistics, 2022; 2024). Additionally, about 33% of projects fail due to weak top management involvement, and 31% of companies cite the absence of a unified vision as a key reason for failure (Miller, 2025). Ultimately, budget overruns and planning errors remain the primary factors in the failure of projects (Project Management Statistics, 2024).

Against this backdrop, AI is seen as a tool for risk reduction. An Association of Project Management survey (APM, 2025) reveals that the greatest benefits of AI are in performance analysis (28%), data analysis (26%), and automating administrative tasks (25%). These findings align with our previous studies (Antoniuk, 2025): AI demonstrates the highest effectiveness in routine, labor-intensive tasks and work with large data sets. Notably, 63% of project managers report increased productivity, and 90% of companies that have integrated AI recorded a positive ROI within a year (Montgomery & Page, 2024).

Research also confirms that generative AI increases project management efficiency. It transforms execution, monitoring, and control (Badmus, 2023), improves the accuracy and effectiveness of decisions (Hossain et al., 2024), eliminates inefficiencies of traditional methods (Diao, 2024), and enhances forecasting and risk management (Salleh & Aziz, 2022; Mishra et al., 2024). Hashfi & Raharjo (2023) argue that AI can minimize human intervention in decision-making, increasing efficiency, although none of the studies provide a comprehensive assessment of the scale of this effect.

Special attention is paid to the financial efficiency of AI-using projects. Analytical and applied studies show that AI enables the automation of financial processes, reduces operating costs, and increases the accuracy of financial reporting (Antwi et al., 2024). The use of machine learning algorithms improves risk management and helps prevent financial losses in advance (Sari & Indrabudiman, 2024; Rahman et al., 2021). AI also increases the accuracy of financial forecasting and supports scenario planning, which is critical for budgeting and resource management (Lin & Yu, 2023; Diao, 2024). At the same time, researchers emphasize the need for responsible use of AI in the financial area to avoid legal and ethical risks (Adeyelu et al., 2024; Lu et al., 2024).

Generative AI can't replace classical methodologies (Waterfall, Agile), but strengthens their advantages. In the case of Waterfall, it improves planning and forecasting, but its flexibility is limited (Vial et al., 2022; Sallam et al., 2023). Agile, on the other hand, integrates better with AI due to its iterative nature: workflow automation, analytics for sprint planning, and resource coordination significantly improve outcomes (Bahi et al., 2024; Jin, 2024). Additionally, Dam et al. (2019) emphasize that AI-based analytics reduces project execution risks.

Along with the benefits, researchers note challenges – data privacy, ethical issues, and integration barriers (Karamthulla et al., 2024; Friðgeirsson et al., 2023). Nevertheless, there remains a pressing need for an integrated approach that links the typical causes of project failures, especially financial ones, with the potential of generative AI to prevent them. Assessing this impact on financial performance becomes a key task for further research.

Despite the growing number of publications and facts about the potential of generative AI in project management, there is still a lack of an integrated analytical approach that directly links the typical causes of project failures, primarily financial, with the capabilities of AI to prevent them. The question remains open as to how significantly the use of generative AI can affect key project success parameters, particularly schedule, budget, and quality. Equally important is the fact that there is still a lack of clear quantitative or qualitative tools for assessing this impact. These gaps highlight the necessity of our research.

AIMS AND OBJECTIVES

The purpose of this paper is to study the impact of generative AI on reducing common mistakes in project management and to evaluate not only overall project success but also its financial efficiency. The research focuses on how generative

AI contributes to compliance with three main criteria of the project management triangle (budget keeping, execution on time, and quality of the final results), while also providing measurable improvements in financial indicators.

The following tasks have been set for this purpose:

1. To summarize data on the main reasons for project failures in various fields, with special emphasis on financial inefficiency (budget overruns, cost deviations, losses).
2. To analyze the possibilities of using generative AI (on the example of tools such as ChatGPT, Copilot, and Claude) at each phase of the project life cycle (from initiation to completion), with attention to its financial implications.
3. To compare traditional project management approaches with an AI-based approach, we evaluate not only operational but also financial performance.
4. To propose a qualitative model for assessing the impact of AI on project success, including the use of fuzzy logic principles to take into account uncertainty and to link them with financial outcomes.
5. To identify the potential for using AI based on models and examples of projects of different duration and scope, considering the specifics of financial efficiency in each domain.

METHODS

We used a multi-step methodological approach combining comparative scenario analysis, financial evaluation, and fuzzy logic modeling to assess the impact of generative AI on project management effectiveness.

We analyzed the possibilities of integrating generative AI into the standard project life cycle model (initiation – planning – execution – monitoring – completion) and determined the feasibility of using AI tools at each of the phases. The analysis was based on published examples of the use of ChatGPT and similar systems in project management (Richter, 2024), case studies of leading companies that implement AI solutions in their project offices (Koopman, 2025), and our own experience of using AI. Potential benefits and possible risks were identified for each phase.

Five representative project types were selected to illustrate the impact of generative AI: IT, construction, consulting, education, and scientific research. For each case, two scenarios were developed: (1) a traditional approach without AI integration and (2) an AI-supported approach using generative tools such as ChatGPT, Copilot, or Claude. The comparison focused on three key parameters of project success: time, cost, and quality. These dimensions are closely linked to project financial outcomes, as delays and cost overruns directly influence the return on investment.

To assess the impact of generative AI on financial efficiency, this study employs a comparative analytical approach based on literature data and scenario analysis. First, we identified key financial indicators relevant to project management (ROI, cost variance, schedule performance (as it relates to cost), and frequency of budget overruns). Subsequently, the study collected data from published surveys, case studies, and industry reports that measure these indicators before and after the integration of AI into projects. For example, we collected survey results that quantitatively assess the percentage of cost savings achieved through the use of AI tools, as well as examples of projects that utilized and did not utilize generative AI. Several project domains (IT, construction, consulting, research, and education) were examined to capture cross-industry differences in financial outcomes. We also included a stage-by-stage analysis (planning, execution, monitoring, closure), analyzing how AI adoption at each stage affects costs, such as AI-based cost estimation during planning or progress tracking with AI during execution.

In the absence of a single data set, a synthesis of empirical results was used to draw general conclusions. Where possible, quantitative comparisons were made (for example, comparing average cost overrun percentages in AI-enabled projects with those in traditional projects). This method enables data triangulation: global survey results are complemented by detailed case studies, providing a robust overall assessment of financial impact. Any observed improvements in financial performance are analyzed for their statistical and practical significance in terms of project management effectiveness. Additionally, to develop practical recommendations, we analyzed success factors noted in the literature (such as organizational support or process reengineering efforts accompanying AI implementation) and examined how these methodological aspects impact financial outcomes. Overall, our approach combines qualitative and quantitative data to thoroughly assess whether and how generative AI tools improve project financial performance, ensuring the validity of conclusions based on documented data from multiple sources.

Given the uncertainty and limited availability of precise project data, the study further integrates a fuzzy logic methodology to evaluate the potential impact of AI on financial and operational outcomes. Instead of relying exclusively on numerical

indicators, expert judgments were expressed through linguistic variables such as "low", "medium", and "high" improvements in three dimensions: time, cost, and quality. The relative improvement for each indicator is defined as:

$$\Delta T = \frac{T_{withoutAI} - T_{withAI}}{T_{withoutAI}}, \quad (1)$$

where $T_{withoutAI}$ and T_{withAI} are the project duration (e.g., in months) without and with AI.

Similar calculations are defined for cost improvement ΔC (fraction of budget saved due to AI) and quality improvement ΔQ (fractional increase in quality or stakeholder satisfaction). Given the limited availability of hard data, these improvements are estimated based on expert opinion and survey findings. Each Δ value is then fuzzified into linguistic terms: a $\sim 5\%$ schedule reduction might be considered "Low" time improvement, $\sim 15\%$ reduction "Medium", and $>20\%$ reduction "High" improvement (thresholds can be adjusted based on expert consensus). We designed a set of if-then fuzzy rules to infer an overall Project Performance Impact rating from these inputs. For example, a simple rule is: "IF time improvement is High AND cost improvement is High AND quality improvement is High, THEN overall impact is High". Other rules cover mixed cases (e.g., moderate improvements in some dimensions still yielding moderate overall gains). The output of the fuzzy inference is a linguistic rating of the overall efficiency/success improvement due to AI (also categorized as Low/Medium/High), which can be defuzzified into a numerical index if needed for comparison. This methodological approach provides a balanced and comprehensive assessment of generative AI's contribution to both operational and financial efficiency in project management, ensuring that conclusions are grounded in multi-source evidence and robust analytical tools.

Based on known cases from the literature and expert opinions, this approach was tested for several types of projects (IT project, construction, consulting, educational, and research), in which traditional project management and management using generative AI were compared. This approach made it possible to evaluate the relative efficiency even in the absence of detailed numerical data for each case.

It is assumed that the impact of AI is additive: it does not change the methodology itself (Waterfall or Agile), but adds tools that reduce the time of certain processes and improve the quality of solutions.

RESULTS

Generative AI has a wide range of uses throughout the project life cycle (Table 1).

Project phase	Typical challenges (without AI)	Approach with generative AI (advantages)
Initiation	Unclear goals, incomplete requirements; difficulty in coordinating the project vision between stakeholders	AI generates a project charter and requirements based on descriptions, ensures clarity of goals; analyzes stakeholder feedback, identifies common vision and conflicts
Planning	Unrealistic plans, overlooked risks; time-consuming preparation of documents (schedules, budgets, plans)	AI creates a project plan, schedule, and Work Breakdown Structure (WBS) based on parameters; identifies risks from similar projects; optimizes resource allocation, models options, and suggests where cost overruns are possible
Execution	Low productivity due to routine tasks; human error factor; communication difficulties in large teams	AI assistants generate code and texts (accelerate development, documenting); automate routine tasks (emails, status updates); help with translation and creation of messages, increasing the efficiency of communication
Monitoring and control	Schedule or budget delays are detected too late; managers are overloaded with data analysis; incomplete reporting to stakeholders	AI generates regular reports with insights; monitors progress in real time and warns of deviations; analyzes data and predicts the consequences of delays or cost overruns; prepares clear summaries for management
Closing	Insufficient analysis of lessons; time-consuming preparation of final documentation; some knowledge is lost	AI summarizes the project results, generates drafts of the final report; highlights key lessons from correspondence and documentation; helps prepare materials for distribution (articles, presentations), ensures knowledge preservation

In the project initiation phase, one of the typical tasks is to prepare project documentation (project proposal, business case, project charter, description of goals and product). These documents are formed on the basis of a large amount of

text information from stakeholders. Generative AI can significantly help in this phase by accelerating the drafting process and ensuring greater consistency of business cases. From a financial perspective, AI contributes to more accurate cost-benefit justifications and investment appraisals, which reduces the likelihood of approving projects with unrealistic budgets or underestimated costs. AI is also used for brainstorming and structuring ideas, which improves the identification of financially viable alternatives at the earliest stage.

During the planning phase of a project, managers prepare a detailed work plan, Gantt charts, budget, risk management plan, communication plan, etc. Generative AI also helps automate the creation of these planning documents. Although such a plan needs to be checked and adjusted by the manager, it saves time on preparatory work. An important area is risk management with the help of AI. Experience shows that generative models are able to analyze historical data on similar projects and predict potential risks, estimate the probability of their occurrence, and propose response plans. Financially, this means more accurate cost estimation, reduction in cost variance, and early identification of budget items prone to overruns. AI also supports more efficient resource allocation, which minimizes unnecessary expenditures and improves the financial performance of the project.

Generative AI can act as a “smart assistant” to the team during the project implementation phase. In consulting and research projects, AI helps to prepare drafts of reports, presentations, and analytical documents, taking over routine text writing. In the IT sector, developers can receive code suggestions in real time, which speeds up development and reduces the number of errors in code generation (Richter, 2024). If necessary, the AI assistant will translate materials into different languages for international teams, which is relevant in global projects. In addition, AI-based Chatbots can answer typical requests from team members (e.g., provide information on procedures, remind them of process steps), while analytical models can provide project managers with data for decision-making. From a financial standpoint, the reduction in man-hours needed for routine work translates into direct labor cost savings, while lower error rates reduce rework expenses, leading to a measurable improvement in project profitability.

Monitoring progress and controlling deviations is an area where AI was one of the first to prove itself in project management. Current business intelligence tools already actively use AI elements to build dashboards and forecasts. Moreover, they can automatically prepare project status reports with key information from task tracking systems, risk logs, and financial data. This provides the manager with timely analytics to take action. In addition, by analyzing the sequence of tasks, the system is able to detect that a delay in one task can affect several others and warn in advance of a critical chain of dependencies (Koopman, 2025). In addition, AI facilitates better communication with stakeholders during this phase, as it can summarize meetings or a technical report into a concise summary for management, highlighting key decisions and issues. Financially, this reduces the frequency of undetected budget overruns and enables earlier corrective actions to prevent financial losses. Increased transparency also strengthens stakeholders’ trust by demonstrating control over project finances.

At the final stage of the project (the completion phase), generative AI is used to prepare the final report, collect lessons learned, and technical documentation for commissioning. AI is able to quickly collect disparate information accumulated during the project and generate a draft of the final report describing achievements, deviations from the plan, realized benefits, and conclusions. In terms of financial efficiency, this ensures better tracking of actual vs. planned costs, identification of financial risks for future projects, and clearer reporting of realized ROI. Properly documented financial lessons learned allow organizations to refine cost estimation and control practices for subsequent projects.

Thus, AI tools complement traditional management methods, reducing the risk of common mistakes at every stage – from missing requirements at the start to late detection of problems during execution or superficial analysis of success at project closure.

To illustrate the impact of generative AI on project success, several scenarios from different areas were considered. Traditional management and AI-assisted management were analyzed for five types of projects (Table 2). For each of them, the levels of improvement in time, budget, quality, as well as financial efficiency indicators (ROI, cost variance, and frequency of budget overruns) were expertly assessed and then compared with the baseline without the use of AI. The data in the table are based on generalized expert estimates and the sources cited above about improvements from AI.

Table 2. Comparison of project results without AI and with generative AI. (Source: author's development based on general trends; Koopman, 2025; Richter, 2025; PMI, 2024)

Project Type	Project parameters	Traditional approach (without AI)	Generative AI approach	Fuzzy logic (AI) assessment (see Table 3)	Financial efficiency indicators (AI vs. baseline)
IT project (software development, 6 months, Agile)	Team of 5 developers, budget USD 500 000	Implementation: 7 months Budget: +15% Quality: 10% of functions not implemented	Implementation: 5.5–6 months Budget: savings of ~10% Quality: full range of functions	High efficiency (all three indicators – medium/high improvement)	ROI +12–15%; cost variance reduced from +15% to –5%; frequency of budget overruns reduced from 30–35% to ~10–15%
Construction (office center, 24 months, Waterfall)	>100 employees, budget USD 20 million	Implementation: 30 months Budget: +10% Quality: defects after completion	Implementation: 26 months Budget: +3–5% Quality: meets requirements the first time	Average efficiency (high quality, average time, low savings)	ROI +5–7%; cost variance reduced from +10% to +3%; budget overruns lowered from ~25% to ~15–20%
Consulting/research (marketing research, 9 months)	Team of 3 analysts, budget USD 200 000	Implementation: 10 months Budget: +20% Quality: needed further development	Implementation: 8 months Budget: within limits Quality: modern trends included	High efficiency (all three indicators improved)	ROI +18–20%; cost variance reduced from +20% to 0%; frequency of budget overruns reduced from ~35–40% to ~15%
Educational project (creating a curriculum, 6 months)	2 Methodists, budget USD 5 000	Release delay of 1 month Budget: +5% Quality: basic program, low adaptability	Implementation on time Budget: within limits Quality: adapted modules with AI.	Average efficiency (average time/quality, low savings)	ROI +7–9%; cost variance reduced from +5% to 0%; overruns lowered from ~20% to ~10–12%
Research project (market research, 12 months)	Team of 4 researchers, budget USD 150 000	Implementation: 13 months Budget: +10% Quality: partial validation of results	Implementation: 11 months Budget: within limits Quality: advanced AI analytics	Medium-high efficiency (improvement in all three indicators)	ROI +10–12%; cost variance reduced from +10% to –2%; frequency of budget overruns reduced from ~30% to ~15–18%

Based on this, the levels of improvement (low/medium/high) for each type of project were assumed, and the model obtained an overall impact rating for the AI approach (Table 3). The fuzzy evaluation was complemented by financial efficiency metrics to quantify economic benefits more explicitly.

Table 3. Impact of generative AI on different project types, using fuzzy linguistic evaluations of improvement in Time, Cost, and Quality. (Source: author's development based on general trends; PMI, 2024; APM, 2025; Montgomery & Page, 2024)

Project Type	Time Improvement	Cost Improvement	Quality Improvement	Overall Impact (AI vs. Baseline)	Financial efficiency (AI vs. baseline)
IT Project (software development)	High (e.g., significant time saved by code generation & automation)	Medium (some cost savings in development effort)	Medium (improved product quality via better testing)	High (AI) vs. Moderate (baseline)	ROI ↑12–15%; cost variance reduced from +15% to –5%; budget overruns ↓ from 30–35% to ~10–15%
Construction Project (engineering)	Medium (AI aids in planning, moderate schedule reduction)	Low (minimal direct cost saving, materials dominate costs)	Medium (better monitoring improves quality control)	Medium (AI) vs. Low (baseline)	ROI ↑5–7%; cost variance reduced from +10% to +3%; overruns ↓ from ~25% to ~15–20%
Consulting Project (business analysis)	High (AI automates research and documentation, fast delivery)	Medium (reduced labor hours, some cost savings)	High (insights and reports are more accurate)	High (AI) vs. Moderate (baseline)	ROI ↑18–20%; cost variance reduced from +20% to 0%; overruns ↓ from ~35–40% to ~15%
Educational Project (curriculum development)	Medium (AI speeds content creation, some time saved)	Medium (some cost saving in content generation)	Medium (consistent quality of materials)	Medium (AI) vs. Low (baseline)	ROI ↑7–9%; cost variance reduced from +5% to 0%; overruns ↓ from ~20% to ~10–12%
Research Project (R&D initiative)	Medium (AI accelerates literature review & data analysis)	Medium (partial cost saving in analysis phase)	High (deeper insights, fewer errors)	Medium-High (AI) vs. Moderate (baseline)	ROI ↑10–12%; cost variance reduced from +10% to –2%; overruns ↓ from ~30% to ~15–18%

According to this fuzzy logic, the impact of AI is seen as an addition to existing project management practices. In other words, AI does not replace the chosen project methodology or life cycle phases, but complements them, reducing the time of certain processes and improving the quality of solutions and work products. This modeling approach allows for comparison of relative performance results even without precise quantitative data, using expert knowledge and survey indicators within a structured assessment method. At the same time, the inclusion of financial indicators (ROI growth, reduced cost variance, and lower frequency of budget overruns) demonstrates that generative AI not only enhances operational parameters but also provides measurable financial efficiency benefits.

DISCUSSION

Generative AI provides significant benefits in three key dimensions of project success (time, budget, and quality). First, automation of a significant part of routine tasks (planning, document preparation, coding, reporting) speeds up the work of teams, increasing the possibility of reaching deadlines. Secondly, AI helps to avoid financial costs through more accurate budget planning and change control. Thirdly, thanks to better requirements processing and automated testing, the final product is more in line with user expectations, which improves project quality. Our results demonstrate improvements in all aspects of the project triangle, which is consistent with existing empirical evidence. In particular, Badmus (2023) notes the transformative impact of AI on project implementation and monitoring, and Hossain et al. (2024) emphasize the increased efficiency and accuracy of work with AI tools. This is in line with the general view that AI integration into project management is becoming an effective tool for improving project success (by reducing typical causes of failure, such as budget overruns or deadlines). In financial terms, our scenario modeling confirms the trends reported by Montgomery & Page (2024) and Antwi et al. (2024): AI adoption reduces cost variance by 10–20 percentage points, lowers the frequency of budget overruns by almost half, and increases ROI in the range of 5–20% depending on project type.

The use of generative AI does not replace classical project management methodologies, but complements them by expanding the team's capabilities. In our opinion, AI acts as an enhancer to existing approaches, reducing the time of certain processes and improving the quality of decisions and work products, but not canceling the need for the methodological structure itself. This conclusion is consistent with the ideas of other researchers who emphasize the changing role of the project manager with AI taking over routine operations, allowing managers to focus more on leadership, decision-making, and creative aspects that cannot be replaced by AI. According to Montgomery & Page (2024), most managers are already finding benefits from AI-based software in accelerating data analysis, automating administrative tasks, and supporting project monitoring, which actually complements standard management processes, making them more productive. So, instead of a radical change in methodology (Waterfall, Agile, etc.), we are seeing the evolution of roles and procedures. AI becomes an intelligent assistant that improves each stage of the project life cycle. This confirms the idea that the key effect of AI is to expand the capabilities of existing approaches, not to replace them. In addition, our results show that financial improvements (lower budget overruns, positive ROI) are not uniform across all methodologies. Agile projects benefit most due to flexibility and cost responsiveness, while Waterfall projects demonstrate more limited but still positive effects.

The analysis of AI use in different types of projects has shown that projects with informational and creative components benefit most from generative AI. In particular, IT projects, consulting, and analytical projects show the highest cumulative effect of AI. After all, in such projects, most of the work is digital and knowledge-intensive, where generative AI can automate programming, speed up documentation preparation, provide smart data analysis, etc. Similarly, consulting and financial projects gain high efficiency gains, as AI is able to instantly process large amounts of market data, prepare analytical reports and presentations, and generate out-of-the-box ideas to solve business problems. In contrast, the effect of AI in construction projects is moderate, as generative models are useful mainly at the planning and quality control stages, but cannot radically reduce the duration of construction and installation work or change the cost of materials. Educational and R&D projects show an average level of benefit from AI. In educational initiatives, AI speeds up the creation of training materials and tests, partially saving teachers' time, but the overall quality still depends on human pedagogical expertise. In research projects, AI is already being used to review literature, generate hypotheses, and even plan experiments, allowing teams to save time and direct it to the actual experiments. However, the generation of new scientific knowledge still largely depends on the creativity of researchers, so AI is a useful tool, but not a panacea. Financially, this differentiation is also evident. ROI is highest in consulting and IT projects (+15–20%), moderate in research (+10–12%) and education (+7–9%), and lowest but still positive in construction (+5–7%). This aligns with the notion that AI generates greater financial efficiency in knowledge-intensive environments than in resource-intensive industries.

From a methodological point of view, fuzzy logic allowed aggregating qualitative assessments by three criteria (time, budget, quality) into an integral indicator of AI impact, even in the absence of precise data, formalizing expert terms

("low/medium/high improvement") to assess performance under uncertainty. However, the method has limitations: first, its results depend on subjective settings (choice of variables, membership functions, IF-THEN rules), which can distort conclusions; second, it provides only a relative, linguistic assessment, not specific numbers (e.g., % time savings), which makes it difficult to translate results into business metrics; third, the model simplifies reality by ignoring some factors due to a limited number of rules. Thus, the approach is useful for preliminary analysis and trend detection, but it should be supplemented with quantitative methods or empirical data to increase its reliability. Our approach partly addressed this limitation by incorporating financial metrics (ROI, cost variance, budget overrun frequency) into the fuzzy logic framework, bridging qualitative linguistic categories with measurable business outcomes.

To summarize, generative AI has a positive impact on project management, increasing efficiency in terms of key criteria (time, budget, quality), which is confirmed by both our fuzzy logic modeling and practical experience. The biggest effect is observed in knowledge-intensive areas (IT, consulting), while in physical work, it is more moderate. Although the fuzzy logic method is useful for estimating under uncertainty, its results need to be further verified. To successfully implement AI, organizations need to invest in tools, staff training, and risk management (data accuracy, privacy). Most importantly, AI integration demonstrates not only operational improvements but also measurable financial efficiency, expressed through higher ROI, reduced cost variance, and lower frequency of budget overruns. This makes AI not only a technological but also a financial enabler of project success, fully aligning with the goals of modern project-oriented organizations.

CONCLUSIONS

1. The main reasons for typical project management failures are insufficient planning and risk assessment, unclear goals and requirements, ineffective communication, and weak control over resources. An analytical review of these failures confirmed that these factors systematically reduce project performance, indicating the need to implement new approaches and tools to minimize their impact. In particular, financial inefficiency caused by cost overruns and inaccurate forecasts is identified as one of the most critical reasons for project failure.
2. An analysis of the potential of generative AI at different stages of the project life cycle has shown that it brings significant benefits at all stages of implementation. Generative AI models help speed up and improve planning efficiency and accuracy, optimize resource allocation and risk management at the execution stage, and improve progress monitoring and final documentation. This also translates into measurable financial effects – more accurate cost estimation in planning, reduction of unplanned expenses in execution, and better reporting quality in closing phases, all of which strengthen financial performance.
3. A comparison of traditional and AI-based approaches to project management has shown significant advantages of the latter in terms of a number of efficiency indicators. It has been established that the use of generative AI can reduce planning time, increase the accuracy of estimates and forecasts, and improve adaptability to changes during the project compared to classical methods. Thus, the integration of AI qualitatively transforms traditional project management practices, providing a significant increase in efficiency. In financial terms, the results demonstrate a reduction in cost variance by 10–20 percentage points, a decrease in the frequency of budget overruns by almost half, and a measurable increase in ROI (from +5% in construction projects to +20% in consulting and IT projects).
4. The quantitative model developed in the study, based on fuzzy logic, made it possible to formally assess the impact of generative AI on project implementation efficiency. According to the modeling results, the integration of AI helps to improve key indicators of project success (deadline compliance, budget compliance, and quality of implementation) even under conditions of high uncertainty. By incorporating financial indicators (ROI, cost variance, and budget overruns) into the fuzzy logic framework, the study demonstrated that linguistic assessments ("low/medium/high improvement") can be translated into financially relevant insights, bridging qualitative judgments with measurable economic outcomes.
5. The analysis of the impact of generative AI on five types of projects (IT, construction, consulting, education, and science) revealed the industry specifics of benefits obtained. The most significant positive effect is observed in IT projects (accelerating development, reducing the number of errors) and consulting projects (automating data analysis, improving decision support). In construction projects, generative AI improves the efficiency of risk management and planning optimization; in educational projects, it provides personalized learning; and in research projects, it accelerates research. Thus, generative AI has a positive impact on all the types of projects considered, but the nature and level of this impact differ, which emphasizes the need to take into account industry specifics in its implementation. In addition, the study shows that the financial impact is strongest in knowledge-intensive sectors

(IT and consulting, where ROI exceeds +15%), while it remains moderate but positive in resource-intensive projects (construction and research).

Future research should focus on developing integrated datasets to empirically validate these financial outcomes, refining fuzzy logic models to incorporate more precise financial parameters, and exploring long-term sustainability effects of AI-driven financial efficiency in project management.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All authors have contributed equally.

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The Authors declare that there is no conflict of interest.

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ГЕНЕРАТИВНИЙ ШІ В УПРАВЛІННІ ПРОЄКТАМИ: ПІДВИЩЕННЯ ЕФЕКТИВНОСТІ ТА ФІНАНСОВИХ ПОКАЗНИКІВ

Управління проектами й надалі стикається з високим рівнем невдач через перевищення бюджету, затримки виконання та недостатню якість результатів, що безпосередньо спричиняє фінансову неефективність. Це дослідження аналізує, як генеративний штучний інтелект (ШІ) може підвищити й операційну, і фінансову ефективність у проектному менеджменті. Мета полягає у визначенні впливу ШІ на ефективність із акцентом на фінансові результати, оцінювані за критеріями контролю витрат, дотримання термінів і якості результатів.

Методологія поєднує огляд літератури, сценарне моделювання для ІТ, будівельних, консалтингових, освітніх і наукових проєктів і порівняльний аналіз із використанням нечіткої логіки для врахування невизначеності. Поряд з операційними аспектами автори аналізували фінансові показники, такі як ROI, відхилення бюджету та частота перевищень витрат.

Результати показують, що генеративний ШІ підвищує ефективність на всіх фазах життєвого циклу проєкту. Використання ШІ дозволяє скоротити час реалізації на 10–15%, зменшити бюджетні відхилення на 10–20% і підвищити

якість результатів завдяки автоматизації, точнішому прогнозуванню та оптимізації використання ресурсів. Найбільший фінансовий ефект спостерігається в проєктах, орієнтованих на знання (ІТ, консалтинг), де ШІ забезпечує ухвалення рішень на основі даних, точне фінансове планування та вищий рівень ROI. У будівельних проєктах ефект помірний і пов'язаний переважно зі зменшенням ризиків і точністю планування.

Висновки підтверджують, що ШІ не замінює класичних методологій (Agile, Waterfall), а посилює їх, підвищуючи фінансову дисципліну та компенсуючи слабкі місця. Для ефективного впровадження організаціям слід враховувати галузеву специфіку, інвестувати в навчання персоналу та забезпечувати надійність управління даними й ризиками. Генеративний ШІ постає стратегічним драйвером фінансової ефективності та конкурентної переваги в управлінні проєктами.

Ключові слова: генеративний штучний інтелект, управління проєктами, фінансова ефективність, оптимізація витрат, Waterfall, Agile, нечітка логіка

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