Journal of Advanced Research in Applied Sciences and Engineering Technology

Journal homepage:
https://semarakilmu.com.my/journals/index.php/applied_sciences_eng_tech/index
ISSN: 2462-1943

From Automation to Autonomy: A Qualitative Comparative Case Study of AI Agents across Project Management Environments

Ahmad AlSharif[1], Faieza Abdul Aziz[1,*], Siti Azfanizam Ahmad[1]

[1] Advanced Manufacturing Research Center (AMREC), Department of Mechanical and Manufacturing Engineering, Faculty of Engineering Universiti Putra Malaysia, 43400 UPM Serdang, Selangor Darul Ehsan, Malaysia

ARTICLE INFO

Article history:
Received 1 May 2026
Received in revised form 6 Jun 2026
Accepted 20 July 2026
Available online 12 August 2026

ABSTRACT

Artificial intelligence (AI) agents are increasingly being integrated into project management practices and transforming how project activities are coordinated and supported. However, empirical evidence regarding their impact on decision-making, coordination, accountability, and the transition from task automation to semi-autonomous project support across different project environments remains limited. This study aims to explore how AI agents reshape project management practices by comparing their implementation across software development, construction and engineering, and consulting/Project Management Office (PMO) environments. A Qualitative Comparative Case Study (QCCS) was conducted using secondary evidence from three project environments, employing directed content analysis, thematic coding, and structured cross-case comparison to examine task automation, decision support, coordination, managerial control, and emerging autonomy. The results illustrated how AI agents reduced repetitive administrative duties, enhanced the ability to generate information reports, facilitated risk identification, enabled forecasting, and enhanced communication within project teams. The functions of AI agents varied based on the project context. A comparative analysis showed that software projects tended to adopt agile coordination more effectively, while construction and engineering projects required AI to better manage risks and maintain control. Additionally, PMO settings demonstrated the greatest need for AI to assist with documentation tasks and facilitate communication with stakeholders. The research findings showed that AI agents were reshaping project management roles and decision-making processes rather than replacing project managers. The study contributes to project management theory by extending current understanding from AI-enabled automation toward AI-supported partial autonomy while providing practical guidance for organizations seeking responsible AI integration within project governance frameworks. The study demonstrated AI's transformative impact on project management while emphasizing the importance of human oversight, data quality, trust, and ethical governance for responsible AI use.

Keywords:
AI agents; artificial intelligence; project management; human–AI collaboration; decision support; Project Management Office (PMO); automation; partial autonomy

* *Corresponding author.*
E-mail address: faieza@upm.edu.my

https://doi.org/10.37934/araset.62.5.5164

1. Introduction

Project management is in a state of rapid transformation, as digital tools are becoming partners in tackling projects. Project management software has been assisting with various aspects of task scheduling and resource allocation, expense tracking, progress monitoring, and communication for decades [19,26]. However, these tools primarily relied on predefined rules and workflows. AI, generative AI, and agentic systems are paving the way for a transformation in how simple tasks are automated to how these AI agents can identify meaning, recommend tasks, moderate communication, and assist with semiautonomous decision-making across the project lifecycle [5,29]. This research examines how AI agents can be used and their effects on project management organizations. In particular, it covers the use of AI agents, how they differ in automation, decision-making, coordination, and control, and how transitioning from automation to autonomy with AI agents impacts them. It contributes to the body of knowledge by providing a comparative analysis that takes into account the unique context of each industry, highlighting the transition from automation to autonomy and the emergence of AI agents as active participants in the project ecosystem, not just tools.

This study aims to investigate the evolving role of AI agents in project management by comparing their implementation across software development, construction and engineering, and consulting/Project Management Office (PMO) environments. Specifically, the study examines how AI agents influence task automation, decision support, project coordination, managerial control, and the gradual transition from automation toward AI-supported partial autonomy. Furthermore, the study seeks to identify contextual factors that influence AI adoption across different project settings and provide practical insights for organizations implementing AI-enabled project management systems. This research contributes theoretically by extending the discussion of AI in project management beyond productivity enhancement and technology adoption toward a deeper understanding of AI-supported autonomy and human–AI collaboration. Unlike previous studies that primarily examine automation benefits, this study compares AI-agent implementation across multiple project environments to explain how organizational context shapes AI capabilities and managerial responsibilities. Practically, the findings provide guidance for project managers, PMOs, and organizational leaders regarding responsible AI implementation, governance mechanisms, and human oversight necessary for effective AI-assisted decision-making.

1.1 Problem Statement

Despite the increasing integration of artificial intelligence into project management software, empirical evidence explaining how AI agents influence managerial decision-making, coordination, accountability, and organizational control remains limited. Existing research has predominantly emphasized automation efficiency, productivity gains, and technology adoption while providing comparatively little understanding of how AI agents support the gradual transition from automated task execution toward partial project autonomy. Furthermore, few comparative studies investigate how AI-agent capabilities differ across software development, construction and engineering, and consulting/PMO environments, each of which possesses unique governance structures, operational complexities, and stakeholder requirements. Consequently, project managers continue to face uncertainty regarding the appropriate balance between AI-supported decision-making and human managerial oversight. Addressing these knowledge gaps forms the primary motivation for the present study.

2. Literature Review

AI disruption is critical considering increasingly complex projects, dispersed locations, datadriven, and unpredictable scenarios. Project managers have to face the demands of the schedule, budget, clients, stakeholders, supply chain, resources, and changing client requirements, and be held accountable for the results [32,36]. In reality, AI agents are capable of implementing flexible automation and decision-making [16,22]. AI is gradually gaining ground in project management, as it can boost prediction accuracy, coordination, and control. As of today, around 23–37% of projects are already using AI, and the use of AI is projected to grow even more in the next three years [33]. Nevertheless, many professionals still view AI as irrelevant, reflecting a lack of uniformity in the understanding and use of AI [8,20].It is also being adopted to transform business processes; 71% of businesses use generative AI in at least one workflow, and by 2028, it's estimated that 33% of enterprise software will have agentic capabilities that could automate 15% of work decisions [1,4,37].

AI Agents can analyze delays, detect risk patterns, suggest corrective actions, summarize meetings, prioritize backlogs, prepare stakeholder communications, and help with resource allocation, unlike traditional automation which provides only reports or updates dashboards [3]. They help with software sprint preparation, issue triage, documentation, construction forecasting, cost tracking, procurement coordination [15,30] and PMO administrative duties. The organization of AI-agents depends on the type of project, the maturity of the data, management responsibility, and governance.

Collectively, previous studies demonstrate that AI improves operational efficiency through scheduling optimization, predictive analytics, documentation support, and workflow automation. However, much of the existing literature adopts either technology-centric or productivity-oriented perspectives, emphasizing implementation benefits while providing limited explanation of how AI agents reshape managerial cognition, collaborative decision-making, and organizational governance. Moreover, most investigations examine single industries or isolated AI applications, restricting understanding of how contextual differences influence AI capabilities. Consequently, current knowledge remains fragmented regarding the transition from conventional automation toward AI-supported partial autonomy across diverse project environments.

Although previous studies have substantially improved understanding of AI-enabled automation, significant gaps remain. First, limited empirical evidence compares AI-agent implementation across multiple project environments using a common analytical framework. Second, previous research rarely investigates how AI influences managerial control, accountability, coordination, and human–AI collaboration simultaneously. Third, the transition from task automation toward partial autonomy remains conceptually underdeveloped within project management literature. This study addresses these gaps through a qualitative comparative case study that examines AI-agent implementation across software development, construction and engineering, and consulting/PMO contexts.

2.1 Conceptual Variables

The independent variable (IV) of this study is the implementation of AI agents in project management practices. The dependent variables (DVs) comprise decision-making effectiveness, task automation efficiency, project coordination, managerial control, and the level of AI-supported project autonomy. The study investigates how variations in AI-agent implementation influence these organizational outcomes across different project environments while considering contextual factors such as governance, trust, project complexity, and data maturity. Figure 1 presents the conceptual framework of the study, illustrating how AI-agent implementation serves as the independent variable influencing project management outcomes across three project environments: software development, construction and engineering, and consulting/PMO. AI agents enhance key project management capabilities, including task automation, decision support, project coordination, knowledge management, and communication support, which subsequently improve decision-making effectiveness, task efficiency, project coordination, project control, and human–AI collaboration. Collectively, these outcomes facilitate the gradual transition from traditional automation to AI-supported partial autonomy, where AI complements rather than replaces managerial decision-making. The framework further demonstrates that this relationship is influenced by contextual factors such as human oversight, organizational governance, data quality, trust in AI, ethical and legal considerations, and project complexity highlighting that successful AI adoption depends on both technological capabilities and responsible governance. This conceptual model provides the theoretical foundation for the qualitative comparative analysis conducted in the study as shown in Figure 1.

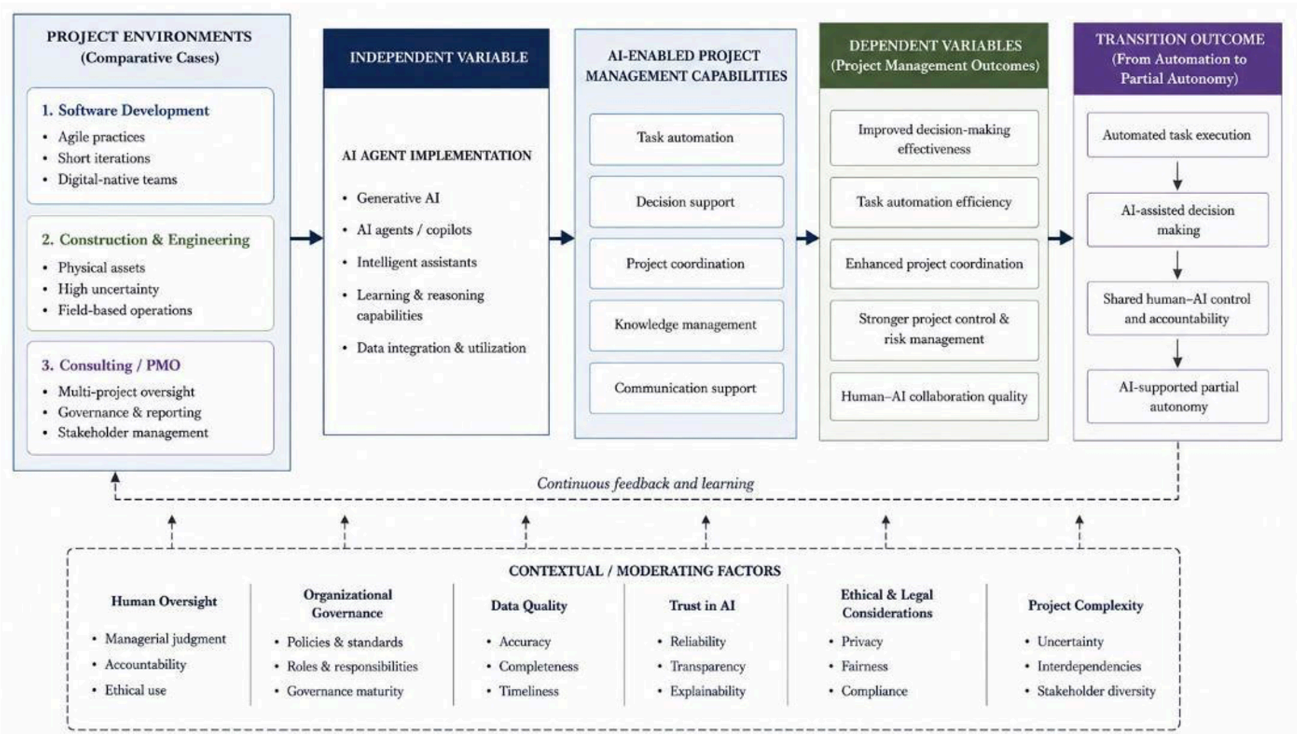

Fig. 1. Conceptual framework illustrating how AI-agent implementation influences project management outcomes through AI-enabled capabilities across different project environments, facilitating the transition from automation to AI-supported partial autonomy under the influence of organizational and governance factors

3. Research Method

3.1 Research Design

A Qualitative Comparative Case Study (QCCS) methodology was used to investigate how AI agents can be used in project management in various organizational settings. The design was suitable since the study did not establish statistical relationships, but rather to gain insight into the operations of AI agents in actual project settings. It had a focus on task automation, decision support, coordination and implications of autonomy which were analyzed across the cases systematically. Qualitative data interpretation was used to explain the themes of contextual factors like project characteristics, maturity of data, team composition, trust, and governance mechanisms. The qualitative analysis was supported by descriptive evidence such as efficiency improvements and documentation statistics.

3.2 Case Selection

This study employed purposive case sampling to select information-rich cases representing diverse organizational contexts where AI agents are actively implemented. The three selected environments software development, construction and engineering, and consulting/PMO were intentionally chosen because they differ substantially in project complexity, governance requirements, communication patterns, and operational workflows. Such variation enables meaningful cross-case comparison while improving the explanatory power of qualitative comparative case study analysis.

Three project settings were chosen, one in each of the three realms: digital, physical, service oriented. In Case A (IT/Software), the researchers explored the use of AI agents in agile software development projects and their utilization in sprint planning, backlog prioritization, task management, and documentation. Case B (Construction/Engineering) delved into the application of AI in risk management, project planning and scheduling, cost management, and procurement coordination. AI-related aspects of reporting, meeting summarization, stakeholder communication, and dashboard management were explored in Case C (Consulting/PMO). All cases fulfilled the inclusion criteria of: (i) active AI deployment rather than experimental, (ii) adequate analyzable evidence, and (iii) adequate contextual variation to allow for meaningful cross-case comparison.

3.3 Data Sources

Only secondary data were collected from authoritative public, mostly industry contributed resources like industry report, published case studies, organizational sites, project management documentation, vendor technical documentation, and academic literature (2021–2025). Multiple sources of information are triangulated in order to develop depth and credibility. All documentary evidence is clear and can be verified. (See evidence source mapping in Table 1.)

3.4 Analytical Procedure

Three analytical steps were used to guarantee the methodological rigour and transparency of the data analysis process.

Stage 1 – Within-Case Coding: Each case was analyzed via the process of directed content analysis. The codes derived from the conceptual framework and a posteriori from the data with four codes identified. Case descriptions and documentation were manually coded line by line using a predefined framework.

A structured coding protocol was developed before analysis to ensure consistency throughout the study. Initial deductive codes were derived from the conceptual framework, including task automation, decision support, coordination, and autonomy, while inductive coding allowed additional themes to emerge from the evidence. Coding definitions, inclusion criteria, and representative quotations were documented within a coding manual to maintain analytical consistency.

Stage 2 – Theme Extraction: Coded segments were used to create themes and sub-themes with supporting evidence to enable traceability and methodological rigor.

Qualitative data organization and manual coding was performed, which facilitated systematic document coding, theme organization, cross-case comparison, and traceability of analytical decisions throughout the research process. The coding process progressed from initial descriptive codes to higher-order themes through iterative comparison across cases. The resulting thematic structure formed the basis of the subsequent cross-case analysis as shown in Table 1.

Table 1
Coding framework

Raw Evidence	Initial Code	Theme	Analytical Dimension
AI generated sprint summaries	Documentation automation	Task automation	Automation
AI predicted schedule delays	Risk forecasting	Decision support	Decision Support
AI prepared client reports	Reporting assistance	Coordination	Coordination
Human approved AI recommendations	Human oversight	Governance	Autonomy

Stage 3 – Cross-Case Comparison: This involved comparing themes across cases and was achieved using a structured comparison matrix across four dimensions of the framework. To make the cases more comparable, contextual factors of the project type, data maturity, trust, and governance constraints were included to underscore the similarities and differences among cases.

3.5 Validity and Reliability

Trustworthiness was established through the qualitative criteria of credibility, dependability, confirmability, and transferability. Credibility was enhanced through data triangulation across multiple documentary sources. Dependability was maintained using a structured coding protocol and audit trail documenting all analytical decisions. Confirmability was ensured through systematic evidence mapping linking interpretations to documentary sources, thereby minimizing researcher bias. Transferability was supported by providing rich contextual descriptions of each case, enabling readers to assess the applicability of findings to similar organizational settings.

4. Result and Discussion

4.1 Case Profiles

The findings are based on three comparative cases that have different project management settings (Table 2). In case A (IT/software), AI was applied to the agile software sprint planning, tracking, and documentation. Case B (construction/engineering) centered on risk monitoring and management, scheduling prediction, cost tracking, and procurement notifications using AI. AI was used in client communication, meeting summarization, dashboards, and reporting in Case C (consulting/PMO).

Table 2
Case profiles

Case	Industry Context	Project Type	Main AI-Agent Use	Project Management Context
Case A	IT/software	Agile software projects	Sprint planning, task tracking, documentation	Data-rich, digitally integrated
Case B	Construction/engineering	Engineering project control	Risk monitoring, schedule prediction, cost	Complex, time-sensitive, high accountability

			tracking	
Case C	Consulting/PMO	Professional services projects	Reporting, meeting summaries, client coordination	Communication-heavy, documentation-driven

4.2 Level of AI-Agent Integration and Maturity

There was no organization that showed a completely independent solution for end-to-end AI deployment. AI was only used in specific tasks and not on a company level in each scenario. The majority of 'AI agents' were the integration of an existing PM software copilot and automation tools, such as Microsoft Teams Copilot, Jira AI plugins, dashboard analytics, etc. Systems that were fully self-contained, being able to make autonomous decisions or coordinate autonomous learning processes, were not observed.

In Case A, AI was used as an assistant to the existing tools and was limited to making notes and priority hints, but did not have any autonomy in making decisions. In the case of B, predictive risk alerts were the main application, and no autonomous action was taken because contractual responsibilities had to be fulfilled by an individual and thus under human oversight. In Case C, the Microsoft 365 Copilot was not used as an agent but as an efficiency tool to generate meeting minutes. These practices are at the early to intermediate level of AI adoption.

4.3 Within-Case Findings

Case A (IT/Software): AI agents enhanced agility and consistency by creating sprint meeting summaries, task board updates, identifying issues, providing progress reports, and organizing the backlog. They reduced repetitive administrative work to provide time to coordinate the team and plan. All AI recommendations were reviewed by humans. There were still some things that human intervention was required to help with, such as sequencing decisions, dependency management, and understanding of delays, which were beyond the capabilities of AI.

Case B (Construction/Engineering): AI agents were more effective in areas like decision support (risk identification, schedule forecasting, tracking costs, and progress tracking). AI tools modeled and visualized plan changes and delays. But there was limited use of AI in team communication. Project managers used the information AI can provide to make decisions, but they still had control over how they implement the recommendations. Collaborate with human for approving both risk responses and informed corrective actions, as AI is only needed to pinpoint potential risks and assist with corrective solutions because of contractual and legal commitments; human oversight is still necessary.

Case C (Consulting/PMO): The predominant use of AI tools was to minimize documentation and reporting tasks such as project status reports, dashboards, client communications and knowledge retrieval. AI tools provided the biggest advantages of efficiency and consistency in reporting. However, the final documents needed to be reviewed, edited, and approved by humans to make sure that they were accurate and met the requirements of the client. Issues raised were the concerns about AI-generated content redundancy, the reliability of AI's output, and confidentiality matters.

4.4 Cross-Case Comparative Findings

Table 3 shows the level of adoption of AI at early to intermediate levels in the three environments.

Table 3
Cross-case comparative findings

Theme	Case A: IT/Software	Case B: Construction/ Engineering	Case C: Consulting/PMO	Cross-Case Insight
Task automation	High	Medium	High	AI agents mainly reduced repetitive administrative work
Decision support	Medium	High	Medium	Stronger decision support appeared in risk-heavy environments
Coordination	High	Low	Medium	AI agents influenced communication differently by context
Managerial control	Medium concern	High concern	Medium concern	Autonomy raised accountability and trust concerns
Human-AI collaboration	Strong	Emerging	Strong	Human oversight remained central across all cases

The automation of cases was high at both sites (Cases A and C) where repetitive documentation and task workflows were problems. The construction tasks still needed to be validated onsite in the construction industry, which is why medium automation was used in Case B. The highest was the level of decision support in Case B, where AI assisted with risk monitoring, schedule prediction, and cost-management. In cases A and C, decision support was not as noticeable.

Case A had the most amount of coordination support with regular communication and checking of tasks. In case C, the medium coordination is the case in which AI helps in client communication, while human beings take care of the client relationship. For Case B, there was little or no use of AI for team coordination – and an analytical focus.

Managerial control issues were highest in Case B, where the AI suggestions might affect the schedule, budget, and contractual aspects of the project. Cases A and C indicated medium concerns, as there is medium human control of the outputs of the AI. In all cases, the relationship between human and AI was the top priority, and project managers still had the final say and responsibility for the decisions.

4.5 AI Agents in Project Management

The results show that AI agents are actively participating in and changing the organizational practices, and the perception and practice of project management within the institutionalization landscape. Traditional tools for project management are typically seen as helping tools that a project manager can use to schedule, monitor, report and organize project material. The presented evidence suggests that AI agents have progressed a step further, and now they are incorporated into the process of the project itself [7,8]. They can give out information summaries, establish risk factors, help in prioritizing the task, help in forecasting activities, and affect communication. This study indicates that project management may be moving from a tool centric approach of digital assistance towards a project control approach where humans and AI are working together. It is important to note, however, that the analyzed cases are at a transitional level of automation and partial autonomy and do not involve fully autonomous project management.

Numerous discussions regarding the current applications of AI in project management focus on the benefits of efficiency, automation, and technological integration. However, this study offers a deeper comprehension as it focuses on the impact of AI agents on managerial judgment, coordination, accountability, and control [24,30]. In the sectors studied, AI agents are not just a tool for speeding up project completion but can also influence the cognitive and decision-making processes involved. The transformative role of AI agents can be seen as more than just replacing roles, but as a digital companion that helps project teams to automate tasks and make better decisions. In all three, however, human decision makers remain primarily responsible and accountable.

4.6 AI Development in Project Management: From Automation to Partial Autonomy

The study helps to differentiate between automation and autonomy. Automation is a process where AI does repetitive and routine tasks like reporting, dashboard updates, summarizing meetings, and identifying risks. This is not all, though, as autonomy also allows AI agents to interpret project-related scenarios, suggest solutions, and assist in decision-making processes without significant human interaction. Currently, the application of AI in project management hasn't reached the level of full autonomy; its use is more of a hybrid, where AI assists in executing tasks but remains under the control of humans. This has the effect of holding everyone accountable, ensuring the standards on governance, maintaining governance oversight and managerial control, improving efficiency, and enabling informed decision making [11,27,31]. This again gives a sense of the interpretation of organizations being in a transition stage.

Furthermore, the cross-case comparison enriches the theories' origins and contributes to explaining variations in the work roles of AI agents depending on the project context. For the cases studied, AI agents seem to be particularly effective in agile coordination, task tracking and documentation of software projects [13,14]. They are most usually linked to modern initiatives in the construction sector dealing with risk management, predictability of schedules, and project control. In consulting and PMO-type projects, they are predominantly employed in reporting, communication, and knowledge management. The pattern comparison indicates that an AI agent can't replace all the operations involved in project administration [21]. The roles vary based on the type of project, access to data, project complexity, stakeholder trust, and governance arrangements.

4.7 Theoretical Implications

The findings extend existing project management theory by demonstrating that AI agents should be conceptualized as collaborative decision-support actors rather than autonomous project managers. Consistent with socio-technical systems theory, organizational performance depends on the interaction between technological capability and human expertise rather than technology alone. Likewise, the findings align with Human–AI Collaboration theory by showing that managerial judgment, trust, governance, and accountability remain indispensable despite increasing AI sophistication. Furthermore, the Technology–Organization–Environment (TOE) framework helps explain why AI-agent implementation differs across software, construction, and consulting environments, as organizational context, governance mechanisms, and technological maturity jointly influence AI adoption outcomes. Consequently, the study extends current project management literature by proposing partial autonomy as an intermediate stage between conventional automation and fully autonomous project management.

4.8 Practical Applications of AI Agents for Project Teams

The results provide valuable actionable advice for project managers and PMOs, along with organizations using AI agents in their projects. Most importantly, in the cases studied, AI agents were able to assist in reducing routine administrative responsibilities, such as summarizing meetings, progress reports, documentation, task updates, preparing dashboards, and communicating with stakeholders [19,25]. This approach may afford project managers additional opportunities to concentrate on the interpretation of information, the resolution of issues, the leadership of their teams, and the formulation of strategic decisions.

Secondly, AI agents can assist in predicting and identifying risks. In large projects, a project manager should be alerted to budget issues, resource constraints, performance problems, and similar challenges. AI can help by scanning project data and spotting potential hazards, as shown in this process [34]. The value of the data depends on data accuracy and completeness of the data. If there is a delay in project schedules, budgets, risk logs, or task records, the AI recommendations might be misguided [24]. In order for organizations to effectively integrate AI agents into their decision-making processes, they must prioritize the enhancement of data quality and reliability. Establishing a robust foundation of trustworthy data is a prerequisite for leveraging AI technologies in a manner that promotes informed and accurate decision-making.

Third, AI can improve team coordination by ensuring seamless communication and task synchronization. They can offer notes, action items, flagging any outstanding tasks, and integrating workflows to digital platforms. This is an advantage for distributed teams and PMO environments, where project information can be found in meeting notes, software programs, and emails [18]. But AI-driven coordination is by no means the antithesis of human leadership. Project managers continue to oversee conflict resolution, social and organizational context decisions, team motivation, and interpretation of stakeholders.

AI agents should be introduced step-by-step within an organization. It is recommended to proceed in a stepwise fashion, beginning with easier-to-implement automation tasks like reporting and documentation, and progressing with more intricate and challenging decision making support [10,12]. For project managers, it is also important to check the accuracy of AI-generated reports before making any formal decisions to maintain responsible and professional decisions.

4.9 Governance, Accountability, and Ethical Considerations in AI

AI integration brings forth some ethical and managerial challenges. One main issue that is of concern is accountability. The final decision-maker may not be obvious when actions suggested by AI agents carry risks or when AI agents impact project priorities. AI can offer support with decisions and suggestions, but human managers or administrators must take the final decision and hold full responsibility, and oversight is required to ensure that the projects are carried out ethically and efficiently [6,35]. Prospective organizations and project managers are still responsible for funds, safety, contracts, staff and client results. This requires a transparent decision-making process, too. Project teams need to have insight into the why of AI-suggestions, predictions or warnings of risk. Poorly coherent AI outputs can lead to either a complete rejection or a failure to adequately review them for accuracy, both of which are problematic [17,24].

Confidence in AI tools can be established through increased accuracy, transparency, and appropriate governance from intelligent systems. Too little or too much trust can inhibit adoption. AI agents are therefore not decision-making tools; they are advisory systems, a special focus that project managers need to have regarding the role of AI [8,28]. Where uncertainty, sensitivity, and/or risky project situations exist, human intervention is still necessary.

The quality and bias of data and algorithms should not be neglected. Data quality has a significant impact on the performance of the AI-driven solutions, as the quality of the data will directly affect the quality of the recommendations that are provided [18]. The inadequate documentation of the project, distorted performance information, or revised schedules and incomplete risk registers can adversely affect AI-informed decision making [2]. Therefore, organizations must implement adequate data governance, minimize chances for data breaches, and keep an eye on any biases in AI-generated content.

Overall, the conversation indicates that automated agents can contribute when embedded in responsible governance processes for projects. Their main value lies in making it easier to be

visible, coordinate and support decision making rather than taking over project management responsibilities. Effectively integrating technology, user responsibility, ethical considerations, and management decisions is essential for the future of AI in project management. The results show the transition from automation towards some degree of autonomy; full autonomy has not yet been seen in practice.

5. Limitations and Future Research Directions

This study has several limitations that should be considered when interpreting its findings. First, the research employed a qualitative comparative case study (QCCS) based exclusively on secondary documentary evidence from published literature, industry reports, and organizational documentation. While this approach enabled comprehensive cross-case comparisons, it did not incorporate primary data from project managers or organizational stakeholders, limiting insights into their experiences and perceptions. Second, the study examined only three project environments—software development, construction and engineering, and consulting/Project Management Office (PMO) settings. Although these cases represent diverse organizational contexts, the findings may not fully reflect AI-agent implementation in other industries such as healthcare, manufacturing, education, or the public sector. Finally, the study focused on organizational and managerial dimensions of AI adoption rather than evaluating technical performance metrics or quantitatively measuring project outcomes.

Future research should address these limitations by conducting empirical studies using interviews, surveys, or mixed-method approaches to examine how project professionals perceive and interact with AI agents in practice. Longitudinal research could also explore how AI capabilities and organizational reliance on AI evolve over time. Additionally, comparative investigations across different industries and countries would improve the generalizability of the findings and reveal context-specific adoption patterns. Future studies should further examine emerging issues such as explainable AI, trust, governance, ethical decision-making, and organizational readiness for AI-supported project management. Quantitative research may also validate the relationships between AI-agent implementation and project outcomes, including decision quality, project performance, collaboration effectiveness, and organizational resilience, thereby advancing both project management theory and the responsible implementation of AI-supported partial autonomy.

6. Conclusion

The analysis in this study assessed the state of AI agents for project management within the software, construction/engineering, and consulting/PMO environments. The results indicated that AI agents can drive value in contexts like: Software projects with agile coordination and task automation; Construction projects with situational risk monitoring and project control; and Project management offices (PMO) reporting, documenting, and communicating with stakeholders. The findings indicated that the deployment of AI agents in projects is focused not on eliminating repetitive tasks but on significantly influencing projects, their roles, decision making processes, collaborative efforts, and managerial duties. The cases examined, however, lie at an intermediate level between automation and partial project autonomy, and fully autonomous project management has not yet been witnessed. Data quality, human oversight, processes, and trust will still play a key role in data governance. Consequently, the effective integration of AI in project management requires a holistic approach that combines AI capabilities with the expertise and oversight of skilled project managers, ensuring accountability, governance, and sustainable performance improvements. Organizations should implement AI agents gradually, beginning with administrative automation before extending AI support toward decision-making activities. Effective implementation requires strong governance mechanisms, high-quality project data, transparent AI outputs, and continuous human oversight. Future research should investigate AI-agent implementation across additional industries using longitudinal and mixed-method research designs while examining organizational readiness, trust development, explainability, and ethical governance in increasingly autonomous project environments.

Acknowledgement
The authors would like to express their gratitude to Universiti Putra Malaysia. The organizations and vendors with public documentation are a great help in making this comparative analysis possible.

References

[1] Adabara, Ibrahim, Bashir Olaniyi Sadiq, Aliyu Nuhu Shuaibu, Yale Ibrahim Danjuma, and Venkateswarlu Maninti. "Trustworthy agentic AI systems: a cross-layer review of architectures, threat models, and governance strategies for real-world deployment." *F1000Research* 14, no. 905 (2025): 905. https://doi.org/10.12688/f1000research.169927.1

[2] Adebayo, Yetunde, Paul Udoh, Xebiso Blessing Kamudyariwa, and Oluyomi Abayomi Osobajo. "Artificial intelligence in construction project management: A structured literature review of its evolution in application and future trends." *Digital* 5, no. 3 (2025): 26. https://doi.org/10.3390/digital5030026

[3] Akinnagbe, Olayiwola Blessing. "Human-AI collaboration: Enhancing productivity and decision-making." *International Journal of Education, Management, and Technology* 2, no. 3 (2024): 387-417. https://doi.org/10.58578/ijemt.v2i3.4209

[4] Al-Arafat, M., M. E. Kabir, A. S. M. Morshed, and M. M. Islam. "Artificial intelligence in project management: Balancing automation and human judgment." *Frontiers in Applied Engineering and Technology* 2, no. 01 (2025): 18-29. https://doi.org/10.70937/faet.v1i02.47

[5] Allam, Hesham, and Juan Dempere. "Agentic AI for IT and beyond: A qualitative analysis of capabilities, challenges, and governance." *The Artificial Intelligence Business Review* 1, no. 1 (2025). https://doi.org/10.64044/j63vmh26

[6] Babar, Zahir, Rajesh Paul, Md Arifur Rahman, and Tonmoy Barua. "A systematic review of human-AI collaboration in IT support services: enhancing user experience and workflow automation." *Journal of Sustainable Development and Policy* 1, no. 01 (2025): 65-89. https://doi.org/10.63125/grqtf978

[7] Borghoff, Uwe M., Paolo Bottoni, and Remo Pareschi. "An organizational theory for multi-agent interactions integrating human agents, LLMs, and specialized AI." *Discover Computing* 28, no. 1 (2025): 138.https://doi.org/10.1007/s10791-025-09667-2

[8] Bushuyev, Sergey, Denis Bushuyev, Victoria Bushuyeva, Nataliia Bushuyeva, and Yuri Tykchonovych. "Strategic project management development under influence of artificial intelligence." *Bulletin of NTU" KhPI". Series: Strategic management, portfolio, program and project management* 1 (8) (2024): 3-7.
[9] Bulletin of NTU "KhPI". Series: Strategic management, portfolio, program and project management. https://doi.org/10.20998/2413-3000.2024.8.1
[10] Cadet, E., E. D. Etim, I. A. Essien, J. O. Ajayi, and E. D. Erigha. "Ethical challenges in AI-driven cybersecurity decision-making." *International Journal of Scientific Research in Computer Science, Engineering and Information Technology* 10, no. 3 (2024): 1031-1064.https://doi.org/10.32628/cseit25113577
[11] Cañas, José J. "AI and ethics when human beings collaborate with AI agents." *Frontiers in psychology* 13 (2022): 836650.https://doi.org/10.3389/fpsyg.2022.836650
[12] So-Won, Choi, Eul-Bum Lee, and Kim Jong-Hyun. "The engineering machine-learning automation platform (emap): A big-data-driven ai tool for contractors' sustainable management solutions for plant projects." *Sustainability* 13, no. 18 (2021): 10384. https://doi.org/10.3390/su131810384
[13] Deng, Zehang, Yongjian Guo, Changzhou Han, Wanlun Ma, Junwu Xiong, Sheng Wen, and Yang Xiang. "Ai agents under threat: A survey of key security challenges and future pathways." *arXiv preprint arXiv:2406.02630* (2024). https://doi.org/10.1145/3716628
[14] Diao, Ziwen. "Project management in the age of artificial intelligence." *Highlights in Business Economics and Management* 39 (2024): 1119-1125. https://doi.org/10.54097/23axpg43
[15] Haesevoets, Tessa, David De Cremer, Kim Dierckx, and Alain Van Hiel. "Human-machine collaboration in managerial decision making." *Computers in Human Behavior* 119 (2021): 106730. https://doi.org/10.1016/j.chb.2021.106730
[16] Hao, Xinyue, Emrah Demir, and Daniel Eyers. "Exploring collaborative decision-making: A quasi-experimental study of human and Generative AI interaction." *Technology in Society* 78 (2024): 102662.https://doi.org/10.1016/j.techsoc.2024.102662
[17] Hauptman, Allyson I., Beau G. Schelble, Wen Duan, Christopher Flathmann, and Nathan J. McNeese. "Understanding the influence of AI autonomy on AI explainability levels in human-AI teams using a mixed methods approach." *Cognition, Technology & Work* 26, no. 3 (2024): 435-455. https://doi.org/10.1007/s10111-024-00765-7
[18] Hermansyah, Heri, and Ricky Muhamad Zakaria. "Novatio: Journal of Management Technology and Innovation." *Innovation* 2, no. 3: 189-204. https://doi.org/10.61978/novatio.v2i3.851
[19] Hossain, Muhammed Zakir, Latul Hasan, Md Abutaher Dewan, and Nurjahan Akter Monira. "The impact of artificial intelligence on project management efficiency." *International journal of management information systems and data science* 1, no. 5 (2024): 1-17.https://doi.org/10.62304/ijmisds.v1i05.211
[20] Hemanth J, Bdr. Lakshminarayana K. (2025). The Impact of AI on IT Project Management: An Analysis of Success Factors in the Indian Context. International journal of scientific Research in engineering and management. https://doi.org/10.55041/ijsrem51521
[21] Karim, Md Monjurul, Dong Hoang Van, Sangeen Khan, Qiang Qu, and Yaroslav Kholodov. "Ai agents meet blockchain: A survey on secure and scalable collaboration for multi-agents." *Future Internet* 17, no. 2 (2025): 57.https://doi.org/10.3390/fi17020057
[22] Li, Yuan, Lichao Sun, and Yixuan Zhang. "Metaagents: large language model based agents for decision-making on teaming." *Proceedings of the ACM on Human-Computer Interaction* 9, no. 2 (2025): 1-27. https://doi.org/10.1145/3711032
[23] Faruk, Md Imtiaz, Fatin Wahab Plabon, Udoy Sankar Saha, and Mohammad Didar Hossain. "AI-driven project risk management: Leveraging artificial intelligence to predict, mitigate, and manage project risks in critical infrastructure and national security projects." *Journal of Computer Science and Technology Studies* 7, no. 6 (2025): 123-137.https://doi.org/10.32996/jcsts.2025.7.2.6
[24] Nabeel, Muhammad Zahaib. "AI-enhanced project management systems for optimizing resource allocation and risk mitigation: Leveraging big data analysis to predict project outcomes and improve decision-making processes in complex projects." *Asian Journal of Multidisciplinary Research & Review* 5, no. 5 (2024): 53-65.https://doi.org/10.55662/ajmrr.2024.5502
[25] Pujari, Tejaskumar, Anshul Goel, and Ashwin Sharma. "Ethical and responsible AI: Governance frameworks and policy implications for multi-agent systems." *IJST* 3, no. 1 (2024). https://doi.org/10.56127/ijst.v3i1.1962
[26] Rhali, Najoua, Youssef Said, and Zainab Joukhrane. "A comparative analysis between AI and traditional methods in management control." *Int. J. Res. Econ. Financ* 2 (2025): 21-29. https://doi.org/10.71420/ijref.v2i5.109
[27] Sapkota, Ranjan, Konstantinos I. Roumeliotis, and Manoj Karkee. "Ai agents vs. agentic ai: A conceptual taxonomy, applications and challenges." *Information Fusion* (2025): 103599. https://doi.org/10.1016/j.inffus.2025.103599

[28] Savaş, Sezer. "Artificial intelligence in construction project management: Trends, challenges and future directions." *Journal of Design for Resilience in Architecture and Planning* 6, no. 2 (2025): 221-238. https://doi.org/10.47818/drarch.2025.v6i2165

[29] Schmitt, Marc. "Automated machine learning: AI-driven decision making in business analytics." *Intelligent Systems with Applications* 18 (2023): 200188. https://doi.org/10.1016/j.iswa.2023.200188

[30] Raja, Shahzaib, Latif Faiza, and Wahaj Ali Syed. "The role of intelligent AI agents in optimizing business management and decision-making processes." *Research Journal for Social Affairs* 3, no. 5 (2025): 1107-1121. https://doi.org/10.71317/rjsa.003.05.0413

[30] Spitzer, Philipp, Joshua Holstein, Patrick Hemmer, Michael Vössing, Niklas Kühl, Dominik Martin, and Gerhard Satzger. "Human delegation behavior in human-AI collaboration: The effect of contextual information." *Proceedings of the ACM on Human-Computer Interaction* 9, no. 2 (2025): 1-28. https://doi.org/10.1145/3710999

[31] Srinivasan, Shreyansh. "The Influence of Artificial Intelligence on Project Management Decision-Making: Opportunities and Risks." *Journal of Management World* 2025, no. 3 (2025): 194-202. https://doi.org/10.53935/jomw.v2024i4.1105

[32] Taboada, Ianire, Abouzar Daneshpajouh, Nerea Toledo, and Tharaka De Vass. "Artificial intelligence enabled project management: a systematic literature review." *Applied Sciences* 13, no. 8 (2023): 5014. https://doi.org/10.3390/app13085014

[33] Vaccaro, Michelle, Abdullah Almaatouq, and Thomas Malone. "When combinations of humans and AI are useful: A systematic review and meta-analysis." *Nature Human Behaviour* 8, no. 12 (2024): 2293-2303.https://doi.org/10.1038/s41562-024-02024-1

[34] Vössing, Michael, Niklas Kühl, Matteo Lind, and Gerhard Satzger. "Designing transparency for effective human-AI collaboration." *Information Systems Frontiers* 24, no. 3 (2022): 877-895. https://doi.org/10.1007/s10796-022-10284-3

[35] Vyhmeister, Eduardo, and Gabriel G. Castane. "TAI-PRM: trustworthy AI—project risk management framework towards Industry 5.0." *AI and Ethics* 5, no. 2 (2025): 819-839. https://doi.org/10.1007/s43681-023-00417-y

[36] Van Der Waa, Jasper, Sabine Verdult, Karel Van Den Bosch, Jurriaan Van Diggelen, Tjalling Haije, Birgit Van Der Stigchel, and Ioana Cocu. "Moral decision making in human-agent teams: Human control and the role of explanations." *Frontiers in Robotics and AI* 8 (2021): 640647. https://doi.org/10.3389/frobt.2021.640647

[37] Zdravković, Milan, Hervé Panetto, and Georg Weichhart. "AI-enabled enterprise information systems for manufacturing." *Enterprise Information Systems* 16, no. 4 (2022): 668-720.https://doi.org/10.1080/17517575.2021.1941275