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AI AND INTELLIGENT PROJECT MANAGEMENT

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Abstract

Artificial Intelligence (AI) is transforming project management with enhanced project planning, project execution, and risk management. AI further streamlines the decision-making process. This research examined the state of AI in project management using a systematic literature review (SLR) based on the PRISMA 2020 guidelines. Using the PRISMA methods, 120 peer-reviewed articles on AI and project management published between 2018 and 2025 were collected and analyzed. Five databases were searched: Scopus, Web of Science, Science Direct, IEEE Xplore, and Google Scholar. The applications, advantages, and trends of AI in project management were the focus of these articles. The outcomes showed more research was conducted in the review period, thus showing more project-based organizations were adopting AI. The most cited forms of AI were Machine Learning and Predictive Analytics. These forms of AI were applied to project management functions including, but not limited to, planning, scheduling, risk management, decision-making, project management, and performance. AI was shown in all cited articles to enhance decision-making, improve management of project risks, improve project efficiency, improve management of project resources, and improve project time management. AI in combination with digital transformation was shown to help organizations move from a reactive approach to project management and planning to a proactive approach. Data management, AI algorithm transparency, research on AI ethics, and AI skills are still barriers to the widespread adoption of AI. AI is proving to be a key competitive advantage to organizations that wish to use project management to improve performance. Further studies need to concentrate on explainable AI, applications of generative AI, human-AI collaboration, and governance frameworks that facilitate the functional and responsible use of AI within project settings.

INTRODUCTION

In the modern, more globalized, and competitive business climate, effective project management has become a core organizational capability (Rissman et al., 2020). Companies across multiple sectors – construction, IT, healthcare, manufacturing, and public services – are realizing the value that strong project management practices can bring in meeting their strategic goals and maximizing the use of their resources. Yet, modern-day project management challenges are marked by a new order of complexity and uncertainty, interrelations, and rapid technological evolution (Mennicken & Espeland, 2019). To add to the challenge, project managers face the difficult task of managing large and diverse teams and congested data sets, as well as balancing stakeholder needs and risks against the constraints of cost, time, and quality. Such challenges have shown that traditional project management techniques have their shortcomings, as they typically rely on static forms of planning, human judgment, and historical experience to guide them (Asif & Bashir, 2026; Dwivedi et al., 2019). These techniques have proven to be inadequate to deal with the modern project management environment's complexity.

The use of artificial intelligence (AI) promises to change this. AI most simply refers to the ability of computers to perform tasks that require human cognitive functions, such as learning, reasoning, and problem-solving (Duan et al., 2019). With the aid of emerging technologies like intelligent automation, natural language processing, predictive analytics, and machine learning, AI helps businesses to analyze huge data sets and provides them with the capability of pattern recognition and the generation of actionable insights for real-time decision-making (Chowdhury et al., 2022). Because of this, AI is being viewed as an important component in the future of project management practices and of organizational management.

The integration of Artificial Intelligence (AI) into project management in recent years has created a paradigm shift in project management. It is now common to have AI tools incorporated into project managers to assist with the automation of project plan schedules, deadline forecasts, schedule management, and even task dependency scheduling (Baduge et al., 2022). A project management AI is capable of creating predictive models/assessments and can even identify risks and threats to the overall project and estimate the impact. AI tools enhance various time management skills and optimize the performance analysis of the project. Automating AI helps employees to focus on more strategic initiatives rather than get bogged down with routine tasks (Ahmed & Asif, 2026a; Schneider & Kokshagina, 2021). AI also helps create a more obvious analysis of the most strategic initiatives based on an analysis of the most important tasks to the least important tasks. Project management systems that integrate AI tools have been shown to improve productivity and increase the success of projects (Dwivedi et al., 2020).

Though the tools have many benefits, the development of AI tools and systems creates a number of risks (Arrieta et al., 2019). Project management tools that integrate AI systems do create a balance of the positive and predictable project management outcomes. The development of AI tools to manage projects also helps to evaluate and integrate risks and cyber threats to the project management system (Ahmed & Asif, 2026b; Rasheed et al., 2020).

While some have looked at the use of AI in the fields of project management, a lack of understanding still exists about how AI integrates into working with intelligent project management and the performance of an organization (Liu et al., 2022). Most research on AI management is very compartmentalized and focuses on functions of projects and certain technologies (Dziejarski et al., 2023). Because of this, more research is required to understand the ways in which AI can improve projects and the related technical, managerial, and ethical problems.

In looking to address this challenge, this research examines the involvement of AI in intelligent project management, improving project performance, and making decisions based on data (Raisch & Krakowski, 2021; Rafiq-uz-Zaman & Asif, 2026). This research aims to cover the gaps in knowledge about the impact of AI on improving project management systems and about how AI can be used in the various phases of project management, so that researchers and organizational leaders can understand how AI can be integrated into organizations to improve the management of projects.

Methodology

Research Design

To explore the increasing integration of Artificial Intelligence (AI) into smart project management and the implications for project planning, execution, risk management, and the related decision-making processes, this research implemented a Systematic Literature Review (SLR). The SLR method was appropriate because it detailed a well-structured, verifiable, and logic-based approach for the comprehensive identification, assessment, and collation of all published scholarly works. Additionally, systematic reviews are the preferred method for consolidating incomplete data and describing new research issues, suggesting the gaps in current methodological approaches and the opportunities for future research. The review was undertaken following the PRISMA 2020 framework, ensuring consistency of approach and accuracy of reported outcomes.

Search Strategy and Data Sources

Five leading academic research databases were used to complete a comprehensive and robust review of the literature: Scopus, Web of Science, ScienceDirect, IEEE Xplore and Google Scholar. The inclusion of the five named databases was justifiable based on their relatively comprehensive coverage of cross-cutting research and publications in the domains of project management, research in relation to systems, engineering, and artificial intelligence. The reviews that were undertaken were time-limited to the years of publication between 2018 and 2025. This limitation was set to ensure that the most contemporary research on the advancement and integration of technology and artificial intelligence within the realm of project management was captured.

Boolean operators and relevant keywords were combined for optimal search parameters. The most relevant search terms included the following: "**artificial intelligence**," "**AI-driven project management**," "**intelligent project management**," "**machine learning in projects**," "**predictive analytics**," "**project risk management**," and "**decision support systems**." These search terms were linked with Boolean operators to establish search strings. An example of a search string is as follows: ("**artificial intelligence**" or "**machine learning**") and ("**project management**" or "**intelligent project management**").

Inclusion and Exclusion Criteria

To maintain the quality and relevance of the literature assessed, specific inclusion and exclusion criteria were set. Peer-reviewed journal articles describing the application of AI technology in the context of project management were included, regardless of the type of article, if published in English and during the years 2018 to 2022.

All other records were excluded, including non-English publications, editorials, book reviews, and articles lacking a reference to the application of AI to project management. Studies that were unpublished or had a lack of detail on methodology were also removed from the review.

Study Selection Process

The study selection process adhered to the PRISMA 2020 framework's four stages: identification, screening, eligibility, and inclusion. Records were identified in a search of relevant databases and uploaded to a reference management program. Duplicate records were then removed. During the screening stage, relevant titles and abstracts were selected, and the full text of the remaining eligible studies were reviewed and assessed. Inclusion and exclusion criteria were developed and applied. The studies reviewed and evaluated in this research were the studies that met the full eligibility criteria.

Data Extraction and Analysis

An advanced data extraction framework was designed to collect specific and relevant data from the selected studies. The collected data that were reported on component studies included: author(s) and year of publication, country of the study, type of AI technology, study domain within project management, type of study, and main outcomes of the study. The data that were collected and reported were organized in a systematic manner, and data were analyzed using thematic analysis.

Thematic analysis of the data resulted in the identification of five major themes. The themes were: (1) Project Planning and Scheduling, (2) Risk Prediction and Management, (3) Resource Optimization, (4) Decision Support and Forecasting, and (5) Project Performance Monitoring. The themes aided the assessment and analysis of the application and use of AI within the domain of project management.

Quality Assessment

To evaluate study quality, specific criteria were developed based on a systematic appraisal of methods, data, integrity, and how the study advanced theoretical frameworks in AI-enabled project management. Strong evidence studies with clear, strong designs and procedures were considered more important than weaker evidence studies. The quality assessment also enhanced the review findings' credibility and trustworthiness.

Ethical Considerations

This study did not require an ethics review due to the complete reliance on data from published literature and no confidential data, human participants, or personal data. The research process was in the framework of the standards of ethics in research.

Results

A systematic literature review was performed according to the standards set by PRISMA 2020. The first step resulted in 1,250 records from Scopus, Web of Science, Science Direct, IEEE Xplore, and Google Scholar. After the removal of 230 duplicated records, title and abstract screening was performed on the remaining 1,020 records. 215 full-text articles were then reviewed to determine eligibility based on set inclusion and exclusion criteria. After determining eligibility, 120 articles were selected for final review and study analysis. These articles were all published in peer-reviewed journals between the years of 2018 and 2025.

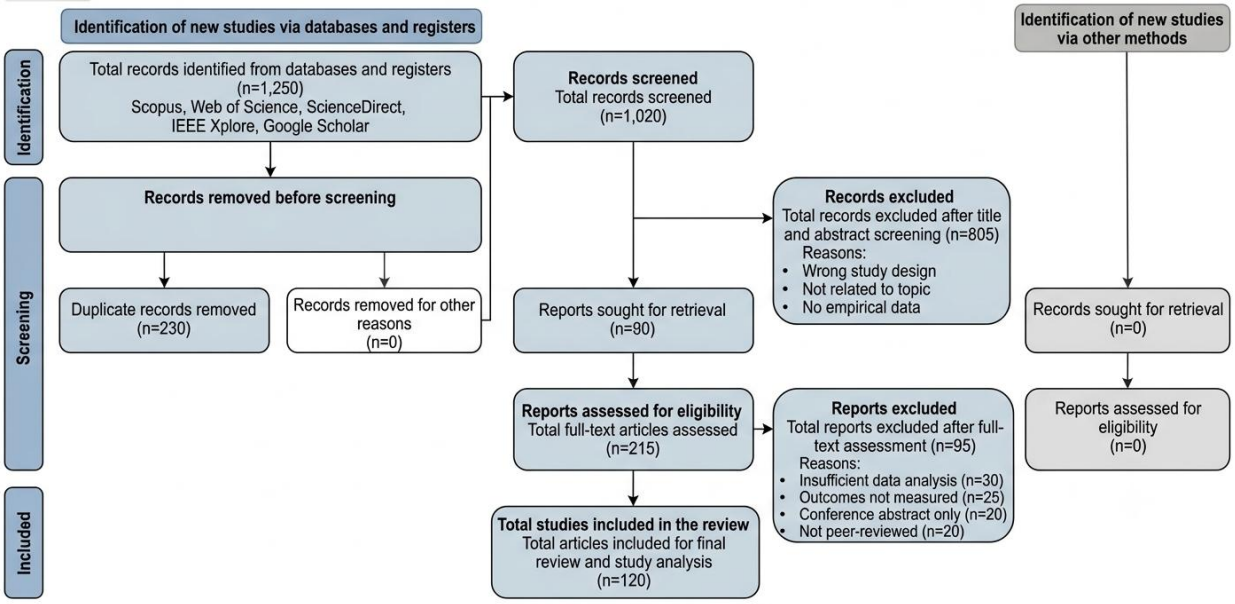

Figure 1: PRISMA Flowchart

Table 1: *Selected Studies Distributed by Year of Publication*

Year	Number of Studies	Percentage (%)
2018	8	6.7
2019	10	8.3
2020	14	11.7
2021	18	15.0
2022	22	18.3
2023	20	16.7
2024	18	15.0
2025	10	8.3
Total	**120**	**100**

Table 1 provides a yearly breakdown of the chosen studies. The results demonstrate a distinct escalation of published works associated with AI and Project Management from 2018 to 2022. In the 2018-2022

time period, the number of works published rose from 8 works (6.7%) to 22 works (18.3%), representing the peak in scholarly activity for the time period. A modest decline was seen in 2023 and 2024; despite this, significant levels of publishing continued. This is suggestive of the enduring interest in the field of intelligent Project Management. The developments demonstrate clearly that the consideration and inclusion of AI in Project Management, and specifically the consideration of AI in the evolution of the components of Project Management, is of emerging significance.

Table 2: *AI Tools Noted in Project Management Research*

AI Technology	Frequency	Percentage (%)
Machine Learning	35	29.2
Predictive Analytics	28	23.3
Natural Language Processing	18	15.0
Expert Systems	15	12.5
Deep Learning	12	10.0
Computer Vision	7	5.8
Intelligent Agents	5	4.2
Total	**120**	**100**

Machine Learning appeared most frequently in papers, making up 29.2% (35). As shown in Table 2, Predictive Analytics and Natural Language Processing ranked second and third, with 28 (23.3%) and 18 (15.0%) instances, respectively. The strong showing of machine learning and predictive analytics suggests their particular strength in the identification, projection, and outcome analysis of trends in data, and, as such, analysis of data toward strategic informed actions. Other technologies, including expert systems, deep learning, computer vision, and intelligent agents, were also utilized but to a lesser extent. This highlights the range of AI applications in project management.

Table 3: *AI Application Areas in Project Management*

Application Area	Frequency	Percentage (%)
Project Planning and Scheduling	32	26.7
Risk Prediction and Management	28	23.3
Resource Optimization	22	18.3
Decision Support and Forecasting	21	17.5
Project Performance Monitoring	17	14.2
Total	**120**	**100**

Table 3 presents the key areas of AI use in project management. Project Planning and Scheduling was the most prevalent use case, being 26.7% of the reviewed studies. This was quickly followed by Risk Prediction and Management (23.3%) and Resource Optimization (18.3%). The findings indicate that AI technologies are most commonly used to improve the accuracy of project Planning, the prediction of risks, and the optimization of resources. The use of AI in decision support, forecasting, and performance monitoring, among others, indicates the potential of AI to enhance proactive project control and management.

Table 4: *Benefits of AI in Project Management*

Benefit	Frequency	Percentage (%)
Improved Decision-Making	34	28.3
Enhanced Risk Management	27	22.5
Increased Project Efficiency	24	20.0
Better Resource Allocation	18	15.0
Improved Schedule Accuracy	17	14.2
Total	**120**	**100**

The key benefits outlined in the studies are summarized in Table 4. Across the studies, Improved Decision-Making was the primary benefit, occurring in 34 studies (28.3%). This was followed by Enhanced

Risk Management (22.5%) and Increased Project Efficiency (20.0%). Better resource allocation and schedule accuracy were other cited benefits. It can be concluded from the results that evidence-based decision-making, uncertainty, and optimization of process and performance improvements of AI contribute to the success of the project.

The most important trends the survey results demonstrate are the emerging technologies of machine learning and predictive analytics, and the growing use of AI in project management. It was also noted that the primary project management areas the technologies were used in include Planning, Scheduling, and Risk Management. The most significant improvements attributed to the technologies were Improved Decision-Making, Increased Efficiency, and Improved Outcomes.

Discussion

The evidence gathered from the systematic literature review shows that from 2018 to 2025, more and more researchers are interested in the intersection of Artificial Intelligence and Project Management. This growing interest is justified, stemming from the disruptive role AI will play in the Project Management space, partially in response to the rapidly evolving nature of Project Management. In tune with the growing number of publications in the field of Project Management, the Project Management Institute (PMI, 2024) claims organizations are using more AI tools to enhance project execution, improve decision-making, and gain a competitive advantage. In addition, Holmes et al. (2021) believed that AI has transformed the field of Project Management and is now pivotal to project management, especially data-based and dynamic Project Management.

In terms of the focus of this review, the spotlight was on Machine Learning (ML) and Predictive Analytics. The review concluded that both of these technologies have the power to be applied to 'smart' Project Management. This is because these technologies help organizations analyze beyond the millions of records of either completed or 'in-flight' projects and identify data patterns and trends to make informed and proactive decisions. Similarly, the results of You et al. (2020) showed that in most business and management domains, machine learning has strengthened and optimized predictive functions. In the same way, Davenport et al. (2019) explained project managers can use Predictive Analytics to help them identify and fix problems that might cause a project to go off track in terms of schedule and budget, and also help them avoid running out of resources.

The prevalence of AI tools in project planning and scheduling demonstrates the technology's critical value. Planning remains integral to determining project success. AI systems handle a variety of complex data and create scheduling and planning optimization with greater accuracy. Delgosha et al. (2021) noted that AI-enhanced scheduling tools help decrease the uncertainty of planning by applying historical project data and functional data in the vicinity. AI resource optimization empowers organizations to improve project results and reduce operational costs by more effective planning of personnel, financial, and technological resources (Khan et al., 2026).

The next application of the technology was prediction and control of the uncertainty related to project risks. This is in line with emerging findings that the technology is at its best in the early detection and assessment of project risks. Kasneci et al. (2023) outline that machine learning models are able to evaluate the risks at the project end and continuously even when the project is underway. Dwivedi et al. (2019) noted that uncertainty and complex environments are reduced, and AI-enhanced project management increases the ability of organizations to make decisions and improve organizational resilience.

AI in project environments is described through reliable decision-making, refined risk management, and improved project efficiency. AI remains useful due to operational and strategic decisions that rely on data. Hariram et al. (2023) observed that intelligent decision support systems foster more objective evaluations of project options and help decrease reliance on subjective decisions. AI systems also enhance the real-time tracking of project work. This is made possible when machine learning is combined with IoT, the cloud, and big data. This combination allows the performance of a project to be continuously monitored and deviations to be reported and responded to almost instantaneously.

There are also limitations and barriers to the implementation of AI in project management. Data quality and the data available are also a concern since AI relies on a complete and accurate data set. Poor data management is detrimental to the quality of data analysis and affects the reliance on AI to make assessments. The concern of researchers and

practitioners focusing on AI remains the transparency of algorithms and the traceability of decisions. Highly developed AI systems must be explainable to be widely accepted and to support the accountability of the system. Ethical concerns regarding privacy, bias, and fairness, as indicated by Dwivedi et al. (2020), should also be considered. Other issues include a lack of cyber readiness, a lack of readiness to change the structure, and a lack of project managers with sufficient knowledge.

Conclusion

The study finds that interest in this field from both academic and industry communities continues to rise, and the field's significance is growing increasingly prominent. Results of this analysis show that the role of AI in intelligent project management shifted from a support analytical tool to a major enabler. Also, the literature shows that AI is mostly applied to project planning and scheduling, risk prediction and management, resource optimization, and decision support and forecasting, along with project performance monitoring. Across these domains, AI has led to the improvement of several aspects of decision-making and risk management and to enhanced operational efficiency, optimal resource allocation, and schedule accuracy (Asif et al., 2026). There are a number of implications of this study. For most, this research suggests that project managers are able to use AI-based tools to better plan and make decisions in a proactive manner, ultimately improving project outcomes and the competitiveness of the organization. For other stakeholders, the study suggests that policymakers are able to create regulations and ethical frameworks to support the safe practice of AI. At the same time, tech developers are able to create solutions that meet the needs of the organization and are transparent and human-centered. Even with possible advancements, there are still obstacles, including inadequate data quality, ethics and privacy issues, a lack of algorithm transparency, and a lack of expertise on the part of project staff. Due to these challenges, future studies should focus on Explainable AI (XAI), Generative AI, the collaboration of humans with AI, and strong AI governance models that ensure responsible use.

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