

AI-Driven Transformation in Software Project Management: Framework Opportunities, and Challenges

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To Cite this Article

Aravindh Balan, "AI-Driven Transformation in Software Project Management: Framework Opportunities, and Challenges", *Journal of Science Engineering Technology and Management Science*, Vol. 03, Issue 03, March 2026, pp: 712-720, DOI: <http://doi.org/10.64771/jsetms.2026.v03.i03.pp712-720>

Submitted: 03-02-2026

Accepted: 10-03-2026

Published: 17-03-2026

Abstract—An Artificial Intelligence (AI) transformation is also undergoing a transformation to Software Project Management (SPM), which is equipped with intelligent frameworks that are data-driven and, thus, enhance planning, execution, monitoring, and control across the project lifecycle. The paper presents AI-based strategies, including AI-based Agile frameworks, AI-based DevOps/MLOps integration, smart Decision Support System (DSS) and automatic resource optimization. These models are based on machine learning (ML), predictive analytics, natural language processing (NLP), and real-time monitoring systems to improve the process of the sprint planning, foreseeing risks, cost estimation, and work of the teams. Anomaly detection systems and AI-enabled dashboards assist the proactive decision-making, and MLOps ensure the reliability of the models and ability to be scaled and to meet the governance requirements. The other point that the paper has highlighted is the use of AI in initiation, planning, execution, monitoring, and closure phases which are advantageous in regard to enhanced forecasting accuracy, resource optimization, augmented productivity, and knowledge retention. Even though the opportunities are extremely high, the problems of high-cost implementation, privacy of data, resistance to change and integration challenges have to be addressed to maximize the transformative potential of AI within the framework of contemporary software project environments.

Keywords—Artificial Intelligence (AI), Software Project Management (SPM), Machine Learning, Predictive Analytics and Project Lifecycle Management.

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I. INTRODUCTION

Software Project Management (SPM) is a very important field that can deliver software systems successfully within the scope, time, cost, and quality constraints. With the development of software engineering into a high-rated knowledge-based field that includes development, maintenance, and system evolution, the project management approach should deal with the uncertainty inherent in software processes and the human factor in them [1]. In comparison to the classical type of engineering projects, which tend to be deterministic, software projects need to be flexible, adaptable and in constant contact with the stakeholders [2]. This flexibility is bringing new pressure on project managers especially in an environment where there is a rapid technological change, dispersed development team, changing customer requirements and stiff global competition. This means that project overruns, budget overruns and quality shortcomings continue to be thorns in the flesh of the software industry.

Conventional methods of SPM rely mostly on human experience, past records, and inflexible planning models. Although decision-making basing on experience is still important, it is not always sufficient to handle large-scale data, dynamic risks, and real-time performance changes [3]. The increasing complexity of Industry 4.0 ecosystems has prompted the necessity to create new and data-oriented management strategies to facilitate adaptive and predictive project management.

The AI has now been a disruptive enforcer in any industry, project management included. The integration of AI systems, such as ML, NLP, and predictive analytics, into SPM processes introduces a paradigm shift in the utilization of data in decision-making and the use of intuition in management [4]. The AI algorithms can better estimate effort by processing vast volumes of both structured and unstructured project data, risk, schedule forecasting, resource optimization, and performance monitoring [5][6]. Using historical stages of projects, communication logs, records of defects, and performance metrics, AI increases the level of transparency and predictive accuracy, and enables proactive decisions. Consequently, the organizations have the potential to become more efficient, less expensive in terms of operations, and have better overall project performance rates [7][8]. It can be made ineffective by high implementation cost, data quality, privacy concerns, integration with old systems, inability to be explained, and organizational change resistance. Thus, to promote intelligent practices of project management, a sequential study of AI-powered frameworks, opportunities linked to them, and obstacles to their implementation is vital.

A. Structure of the Paper

This paper is organized as follows. Section II includes the concepts and frameworks of AI integration in the Software Project Management (SPM), including AI-enhanced Agile practices, DevOps, MLOps, and intelligent decision support systems. Section III examines how applications of AI can be used at various lifecycle stage projects and identifies planning, monitoring, risk management, and resource optimization tools. Section IV explains the main opportunities and challenges related to the CAI in SPM. Lastly, Sections V and VI conclude the paper by summarizing the literature reviewed and giving some of the key challenges and future research opportunities of intelligent and adaptive project management systems.

II. AI-DRIVEN FRAMEWORKS FOR SOFTWARE PROJECT MANAGEMENT

The contemporary project environment and its complex and interconnected environments cannot necessarily sustain the traditional management approaches to stay efficient and provide on-time delivery. The combination of AI and SPM through AI-enhanced Agile practices, AI-assisted DevOps and MLOps, intelligent Decision Support Systems, and automated resource optimization allows making informed decisions, predictive planning, observing real-time, and making data-driven decisions. This intelligent architecture achieves greater flexibility, reduced risks and expenses and results in greater success rates of the whole project exponentially.

A. AI-augmented agile project management in engineering

The proposed Agile Project Management framework is built on AI and uses agile approaches to enhance decision-making, lower risks, and boost overall project performance in engineering. Unlike traditional Agile approaches and methods based on human intuition and repetitive processes, this technique plans sprints, job priority, and resource allocation with Real-time data processing, AI-driven analytics, and ML. Furthermore, predictive analytics is used by the system to evaluate project risks, provide mitigation plans, and dynamically modify processes, leading to proactive as opposed to reactive decision-making [9]. The automation based on AI also enhances the management of tasks by identifying the bottlenecks and providing process improvement, therefore, reducing the delays, and increasing the use of the available resources. Additionally, Team morale is assessed using sentiment analysis based on AI and natural language processing (NLP) and collaboration effectiveness, facilitating tactical adjustments for project managers to improve performance.

The suggested method also includes AI risk analysis tools, with the addition of previous project data analysis that identifies tendencies and sends real-time warnings about possible risks. This guarantees the engineering projects remain on time, within the allocated budget while also fulfilling the stakeholders' expectations [10]. The framework may be used in a variety of technical domains, including software development, manufacturing, and infrastructure projects, thanks to its clever, scalable, and adaptable project management technique. These projects effectively replace conventional project management techniques by combining Agile principles with AI-driven insights that significantly increase precision, effectiveness, and resistance to risk. The process flow for the suggested task is depicted in Figure 1

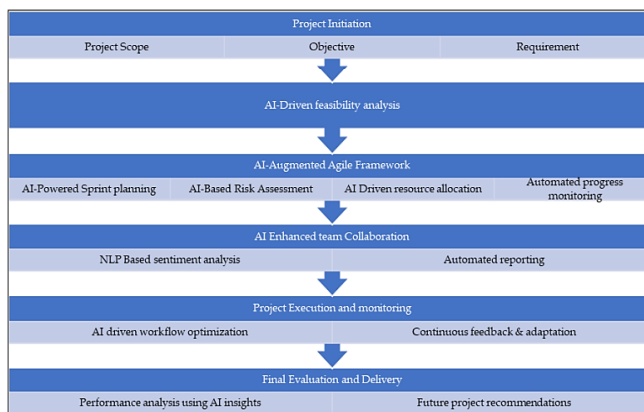


Fig. 1. Process Flow of Proposed Work

AI algorithms analyze historical project data to identify patterns and, based on feasibility and priority, generate sprint objectives. To maximize backlog refining, machine learning techniques assess user stories, dependencies, and stakeholder priorities. AI-driven models provide mitigation techniques and evaluate potential hazards based on real-time project data. AI initiatives need task distribution, talent availability, and resource limitations to ensure optimal utilization. AI monitors team performance data and provides forecasted insights to enhance productivity [11]. NLP and AI chatbot-based tools facilitate stakeholder interactions, requirement gathering, and documentation. Agile strategy modifications based on real-time discoveries are suggested by AI's dynamic responsiveness to project changes.

B. AI-Supported Agile and DevOps Frameworks

Machine Learning Operations (MLOps) is a vital aspect in operationalizing the AI-driven systems in Software Project Management (SPM) and especially continuous monitoring of the project and optimization of project performance. With the growing application of ML models to predict risks, schedules, estimate costs, and allocate resources, there is a need to have structured systems to control their usage, validation, and sustainability. MLOps combines the concepts of software engineering,

DevOps and data science to simplify the end-to-end life cycle of an ML model, such as automated data streams, model training, validation, deployment, continuous integration and monitoring. MLOps allows mitigating such problems as model drift and data shift that can occur in dynamic project environments by facilitating version control, reproducibility, scalability, and automated retraining [12]. Moreover, dashboard real-time tracking schemes and rollback functionality increase stability of the system and compliance with governance. MLOps enhances the efficiency of operations, costs, and makes AI-enabled systems of project monitoring more reliable and sustainable through the automation of workflows and minimizing the number of people involved in them.

C. Decision Support Systems in Software Project Management

Decision support systems (DSS) used in SPM involve the use of AI, as it can be used to make evidence-based decisions. Conventional project decision-making usually relies on managerial experience, intuition and fragmented data, which can potentially cause bias and uncertainty. By comparison, AI-based DSS uses large amounts of structured and unstructured project data to produce objective, analytical information.

By analyzing project history, current progress indicators, team productivity, defect patterns and external market signals, AI systems can be used in strategic and operational decisions by learning historical project records and current progress indicators. As an example, AI models are capable of predicting schedule delays, proposing the most effective resource reallocation, detecting new risks, and recommending budget changes depending on the trends of the performance. The NLP can also analyze stakeholder communications, requirement documentation, and feedback to identify changes in sentiment or scope.

AI-based DSS minimizes uncertainty and improves project-related transparency by combining predictive, prescriptive, and real-time analytics. This allows timely, consistent and evidence-based decisions to be made by project managers, which eventually enhance the reliability of the project, its effectiveness and the rates of the project's success.

D. MLOps Integration for Project Monitoring

Machine Learning Operations (MLOps) plays a crucial role in operationalizing AI-driven systems within Software Project Management (SPM), particularly for continuous project monitoring and performance optimization. As machine learning models find a new application in risk prediction, schedule forecasting, cost estimation and resource allocation, there must be a structured process to oversee the application, validation and long-term reliability. Software engineering, DevOps, and data science best practices are combined in MLOps to streamline the whole lifecycle of machine learning models, including automated data pipelines, model training, validation, deployment, continuous integration, and performance [13]. MLOps is helpful in overcoming the problems of model drift and data shift by allowing version control, reproducibility, scalability, and automated retraining to overcome challenges that occur during dynamic project environment. In addition, monitoring dashboards and rollback, which are used in real-time, make the system more stable and compliant with governance. MLOps enhances operational performance, cost-effectiveness and makes AI-based project monitoring systems more reliable and sustainable through workflow automation and less human intervention.

E. Resource Allocation and Optimization

The effective distribution and use of the available resources is among the most crucial elements of project management for software. These resources are made up of many different factors, including financial resources (project budgets and funding), technological resources (hardware, software tools, and development environments), and people resources (developers, testers, and project managers). Conventionally, allocation of resources has been done mainly in a manual manner by basing on the experience and judgment of the project managers [14]. Nevertheless, human biases, oversights, and limitations may affect this method when applied to the large amounts of data in large-scale software projects. It is the place where AI can make a difference. With the help of advanced algorithms and ML approaches, AI systems can handle complex data sets depending on the needs of the project, the level of the team members, the experience of the former project, and the resources at their disposal [15]. Based on this discussion, AI can offer the recommendation of resources distribution based on data to maximize the allocation of resources during the SDLC.

The AI models can also determine the most suitable arrangement of team to be used in a given project and also the level of experience of the developers needed to fulfil the needs of the project. In addition, AI can simplify the process of scheduling resources, i.e. priority should be provided to critical jobs and resources cannot be underutilized or overallocated. Furthermore, during the execution phase of the project, AI can constantly track the use of resources and can reallocate them automatically based on the necessity to take into consideration some unexpected changes or project bottlenecks. Such dynamism would be in a position to counter any delays that may arise and give the assurance that resources are being utilized as effectively as possible. The automation and optimization of resource allocation processes with the help of AI can greatly increase the efficiency of software engineering project management. Utilizing the resources better could lead to the enhancement of output, better cost of projects and managing multiple projects simultaneously.

III. APPLICATIONS OF AI ACROSS PROJECT LIFECYCLE PHASES

The various ways AI has been used in the project lifecycle, beginning with project initiation and continuing through to project closure. The AI-based technologies, such as ML and predictive analytics, intelligent automation, and NLP, are more suitable in terms of knowledge management, risk management, monitoring, and scheduling. Implementation of AI in project management at any stage of the lifecycle is statistically more precise, efficient, and flexible, especially in emerging economies, where it enhances cost management and productivity.

A. Types of AI Applications in Project Management

The following are some instances of AI in project management:

1) AI-Powered Tools for Scheduling, Budgeting, and Resource Management

The application of AI-based technology is changing the way projects are planned, financed, and operated. These solutions are an innovation that goes beyond the traditional project management software due to their advanced algorithm of intelligence that is capable of adapting and learning. Regarding scheduling, AI can be applied to study project schedules and deadline and limited resources to provide a project with an ideal schedule. As such that the schedules can be realistic and fit into, they always adjust the changes in the project conditions. AI is also advantageous to budgeting. Such technologies can forecast cost hikes and give early alerts to the project managers by looking at the past information and existing spending habits [16]. AI can be used in resource management because it can allocate resources in the most efficient manner to ensure that the right resources and staff are available when they are required. This removes bottlenecks and increases efficiency of the project. These AI-based solutions are not just automated tools, but also help in the process of decision-making through data that is supported by predictive analytics.

2) Machine Learning for Predictive Analytics and Risk Management

ML is a critical component of project management, risk management and predictive analytics. These algorithms consider extensive data to detect trends, patterns, and possible problems and prevent them before they occur. An example of this is ML, which can review past project experiences in risk management to determine the possible areas of danger in the present projects. It can provide a comprehensive risk evaluation considering such aspects as project scope, project schedules, project resource availability, and market conditions. Through this, the project managers are able to act in advance to absorb risks before they can impact the project. According to existing statistics, predictive analytics with the help of ML algorithms is capable of predicting the outcomes of a project. Project managers can apply these algorithms to obtain an informative set of knowledge that would assist in decision-making whether it is the probability of completing a deadline on time or it is the ultimate cost of a project. The use of ML as a strategic advantage allows data to be used in managing data in various areas, so that planning and execution can be done more precisely.

B. AI Applications Across the Project Lifecycle Phase

The Project managers utilize a framework called the project life cycle, which consists of five phases, to steer their projects to completion. It specifies what the team must do at each phase of the project, from conception to final implementation. By incorporating Artificial Intelligence (AI) throughout the project life cycle, a systematic, data-driven decision-making process that extends from the start of a project to the procedures for ongoing improvement is feasible [17]. All phases have specific technical requirements, risks, and governance implications. Formalizing makes the AI systems stable, secure, and supportive of the organizational goals. As seen in Figure. 2, in order to fully realize the collaborative aspect of project management, interaction with the remaining Process Groups is necessary.

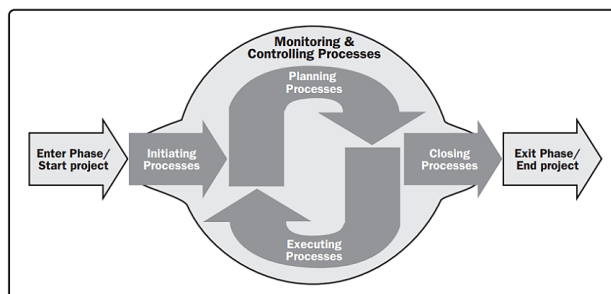


Fig. 2. Project Management Process Groups

The logical grouping of project management procedures into inputs, tools, and methodologies, and outputs that are tailored to the needs of the stakeholders, the company, and the project. These process groups collaborate during every stage of the project's life cycle, as opposed to being synonymous with project phases [18]. There may be differences in the quantity of iterations and interactions between processes depending on the needs of the project in order to preserve flexibility and adaptation throughout. Five categories can be developed according to distinct processes for projects that use a process-based approach:

- The initiating phase is the procedure for determining and obtaining approval for a new project or phase. To support project management decisions and ensure project success, this phase includes developing a project charter and establishing a structured project initiation procedure.
- Establishing the project's scope, honing its goals, and figuring out what has to be done to reach those goals are all part of the planning phase of the project. In this phase, the project's direction is formally established, decisions are made, and the course of action is defined [19]. Planning is an essential part of project management that involves consciously choosing how to proceed to achieve objectives. Planning often comes in industries like construction, following business planning but before to project execution.
- To satisfy the project's requirements, the project management plan's tasks must be completed. In order to achieve the objectives of the project, it involves carrying out the tasks and activities as outlined in the plan.

- To assure the success of the project, the monitoring and controlling phase of project management includes keeping tabs on developments, assessing performance, and making the required adjustments. The ability to handle unanticipated situations and timely control information is essential for effective monitoring and control, according to research.
- In project management, the closure phase is formally wrapping up all tasks and ending the project, phase, or contract [20]. It concentrated on the elements that contribute to project success or failure in Ghana's banking, construction, and agriculture industries. The study determined the tools, strategies, and tactics employed by project managers and suggested that Ghanaian businesses concentrate on enhancing their project management operations to get better results.

A tabular overview of the incorporation of AI technologies across the many phases of the software project life cycle is given in Table I. It also emphasizes the exact AI tools used in the initiation process, execution, monitoring, and closure and how they contribute to it [21]. The table especially underlines the benefits to the emerging economies such as optimization of costs, boosting of productivity, reduction of risk and enhancement of knowledge management.

TABLE I. AI APPLICATIONS ACROSS THE PROJECT LIFECYCLE PHASES

Project Lifecycle Phase	AI Technologies Applied	Key Benefits (Especially for Emerging Economies)
Initiation & Planning	Machine Learning, Predictive Analytics, Risk Modelling	Improved project outcome forecasting, early risk identification, optimized cost and resource allocation, better feasibility assessment
Execution	Real-Time Monitoring Systems, AI-enabled Project Management Information Systems (PMIS), Intelligent Automation	Reduced schedule delays, minimized human errors, enhanced productivity, improved supply chain coordination
Monitoring & Control	AI Dashboards, Big Data Analytics, Anomaly Detection Algorithms	Early trend detection, proactive risk mitigation, improved quality assurance, data-driven performance tracking
Closure	Automated Reporting Tools, Natural Language Processing (NLP), Knowledge Extraction Systems	Faster documentation generation, automated lessons-learned integration, improved knowledge retention and transfer

IV. OPPORTUNITIES AND CHALLENGES OF AI INTEGRATION IN SPM

The potential and the pitfalls of introducing AI to Software Project Management (SPM). Although AI promotes intelligent planning, automated monitoring, collaboration and predictive decision-making, its use is limited by the high cost of implementation, data privacy, change resistance and complexities of integrating the system into the organization.

A. Opportunities of AI integrated in SPM

Here are the opportunities based on AI integrated in software project management (SPM) as follows:

1) Intelligent Project Planning and Forecasting

Software Project Management (SPM) plays an important role in project planning and forecasting with the help of AI, which allows making decisions based on data and makes decisions being predictive. AI systems use past information on projects, performance indicators, market trends, and user behavior to come up with better requirement predictions and estimations of effort. Such predictive ability minimizes the uncertainties related to changes of scope, schedule and cost overruns. Through ML algorithms and big data analytics, AI capable of figuring out how best to distribute technical, financial, and human resources across different project phases [22]. Moreover, AI-based risk early-warning systems constantly analyze project indicators to determine possible bottlenecks, deviations or possible risks. Project teams can be able to react quickly and take corrective measures before they become detrimental due to proactive alerts and prescribed corrective action.

2) Automated Project Monitoring and Control

Using AI enables real-time monitoring and intelligent control of software projects through automated data collection and analytics. The continuous monitoring of the progress, cost variations, quality metrics, and milestones is established through project management solutions with AI integration, enterprise, and performance dashboards [23]. High technology analytics create automated status reports and performance summaries that save manual reporting. Artificial intelligence is able to identify anomalies like delayed schedule, excessive budget, or decreasing productivity and initiate pre-programmed responses. Also, automation based on rules enables dynamic changes in project plans to make them in line with the changing conditions of the project. Such monitoring ability promotes transparency, accountability, and proactive governance of the project.

3) Efficient Team Collaboration and Communication

The use of AI and collaboration tools helps organizations to enhance the efficiency and coordination of teams during distributed and agile work. The smart meeting systems, intelligent chatbots, and virtual assistants help in sharing information in real-time, automated documentation, and tracking. Task allocation systems with AI can be used to distribute tasks to team members so that the allocation is most effective based on skills, experience, workload, and previous performance (a more appropriate allocation yields better productivity). In addition, sentiment analysis algorithms are able to determine the pattern of communication and morale within a team based on text-based interaction, which helps in identifying the presence of conflicts or lack of interest at a very early stage. AI helps the project to create a more collaborative, motivated, and high-performing working environment by encouraging personalized task management and proactive conflict resolution.

B. Challenges and Impact of AI Implementation in Project Management

Project management has experienced tremendous transformation and has grown in importance to businesses. Substantial potential exists for both individuals and organizations as a result of the collaboration between humans and robots during substantial technology advances. One such advancement that is predicted to significantly affect project managers' roles is artificial intelligence. Notwithstanding its complexity, AI may increase output and reduce errors in a number of fields, including software development projects [24]. AI improves project management by cutting out superfluous information and providing predictions about probable outcomes, allowing one to concentrate on relevant information.

The first obstacle is that it is expensive to implement, which involves investment in costly software applications, computing hardware and employee education. This can be a constraint to adoption especially by small and medium-sized enterprises (SMEs) [25]. Also, there are barriers to data privacy and security, which are quite severe as the work of AI systems is based on mass amounts of structured and unstructured project data, and, in many cases, they deal with sensitive organizational information. Adherence to regulatory systems also makes it difficult to deploy in fields like healthcare and finance. The resistance of organizations is also a serious challenge. Employees and managers can be afraid to lose jobs, they do not trust automated decision-making systems, or they are not willing to change the traditional way of doing work [26]. This is the resistance to change that may slow the implementation process and minimize the use of AI-driven tools.

Moreover, combining AI with existing interoperability technical issues with both historical and current project management systems, scalability, and compatibility of systems, which usually prolong the implementation process and costs. Therefore, to realize AI's full potential in software project management, the stated obstacles to its adoption should be removed, even if AI offers several benefits in improving the quality of choices, the efficiency of operations, and the predictability of projects. These challenges are listed in Table II below, which also highlights their consequences and cites relevant research on AI in project management:

TABLE II. CHALLENGES IN ADOPTING AI IN PROJECT MANAGEMENT

Challenge	Description	Impact on Adoption
High Costs of Implementation	The upfront expenditures associated with implementing AI, such as technology, software, and personnel training, can be significant.	Limits the capacity of AI use to scale, particularly at small and medium-sized businesses (SMEs).
Data Privacy and Security	Artificial intelligence systems require large data sets, which raises concerns about the security and privacy of private project data.	Can lead to reluctance to use AI solutions, especially in industries with stringent standards (such as healthcare and banking).
Resistance to Change	Managers and staff may be reluctant to use AI because they are afraid of losing their jobs, don't trust the technology, or don't want to alter long-standing procedures.	slows down AI adoption, lowers engagement, and may prevent complete implementation of AI solutions.
Integration with Existing Systems	The difficulty of integrating AI solutions with legacy systems and current project management tools.	Leads to high implementation costs and lengthy timescales, which impair project delivery.

V. LITERATURE REVIEW

The reviewed literature, as summarized in Table III, highlights the growing adoption of IoT–AI–driven predictive maintenance, real-time monitoring, and intelligent decision-support frameworks in smart manufacturing to enhance productivity, quality, and system reliability. However, challenges such as data quality and availability, system integration complexity,

scalability limitations, and limited large-scale industrial validation remain key barriers. These results suggest that there should be generalized, scalable, and safe IoT -AI architectures that would be applicable to various manufacturing environments.

H et al. (2025) survey of the most popular approaches of integrating AI into software engineering, including techniques for requirements, design, development, release, testing, and upkeep. The paper also aims to answer the question of sufficient intelligence in the SE lifecycle, which evaluates the overlapping of the SE and AI domains, and challenges the current conventional wisdom of the state-of-the-art. There has been a significant need for Artificial Intelligence (AI) in the areas of research, tool development, and deployment applications [27].

Nenni et al. (2025) demonstrate how AI-driven methods and resources might revolutionize project risk management across the project lifecycle. To examine the progress made by the scientific community thus far on the subject, a total of 215 publications have been examined. Additionally, the PM process or industry that was most successful was identified by a cross-sectional examination of the AI categories and tools, where the predominance originated, and whether any particular path was prominent. Ultimately, this analysis revealed a number of gaps that need to be filled by scientific research in order to successfully apply AI in PM. In the form of a research agenda, the deficiencies have been transformed into possibilities for further study [28].

Almeida, Fernandes and Santos (2025) investigate the potential applications of AI in project management. AI offers enormous promise for fundamental project management knowledge domains including integration, scope, communication, risk, and stakeholder management, according to a thorough review of pertinent literature. The research also looks at the connection between these knowledge domains and the best AI technologies, depending on whether formal, data-driven, or tacit knowledge are the three main types of knowledge that any knowledge industry needs, such as generative AI and ML algorithms for automation and optimization [29].

Mohammad and Chirchir (2024) Scientific publications produced between 2019 and 2024 are included in the study; 17 of them were subjected to full-text analysis. Ten major obstacles were listed in this assessment and arranged according to the Technology–Organization–Environment (TOE) framework. Twelve papers cited organizational issues, six reported environmental challenges, and eleven documented technological obstacles, according to this assessment. Furthermore, this research discovered that, in contrast to organizational and technical constraints, environmental concerns received very little consideration in the literature [30].

Benitez and Serrano (2023) examine the methods, historical background, and real-world implementations of AI to determine its tremendous effects on software engineering. It investigates AI in software testing, SDLC, and project management. Additionally, it demonstrates the use of AI in software measurement, software engineering procedures generally, and software as medical devices (SaMD). Combining AI with software engineering creates mutual benefits and synergies, but it also has drawbacks, such as poor data quality, difficult-to-understand models, and moral dilemmas. The article concludes with a break on upcoming trends and research paths, underlining how AI can further revolutionize software engineering and why research is crucial to meet the evolving difficulties [31].

Nitin Rajadhyaksha and Saini (2022) focus on several software project management domains where RPA may be used to increase software project management process efficiency. The advancement of technology is accelerating, and both individuals and companies are capitalizing on these emerging trends. Robot Process Automation, or RPA, is one such trend. Industry research forecasts that RPA would assist several sectors and that the industry develop at a confirmed pace of 29% CAGR (compound annual growth rate) between 2017 and 2023. The usage of software has significantly expanded due to the pandemic situations in 2020 and 2021. Software is becoming increasingly complicated these days, and the time required to build it is decreasing relative to the industry's competitors [32].

TABLE III. SUMMARY OF RELATED LITERATURE ON AI INTEGRATING INTO SOFTWARE PROJECT MANAGEMENT

Authors	Focus Area	Objectives	Methodology	Key findings	Limitations
Nenni et al. (2025)	AI in Project Risk Management	To analyze AI-driven methodologies for managing project risks and identify research gaps	Cross-sectional examination of PM procedures and AI categories/tools; review of 215 publications	AI significantly enhances lifecycle risk management; identified dominant AI-PM paths and sector-specific applications; proposed future research agenda	Limited practical case validation; emphasizes academic trends over industrial deployment
Almeida, Fernandes & Santos (2025)	AI in Project Management Knowledge Areas	To investigate the potential of AI in several PM knowledge domains and align AI instruments with knowledge categories	Thematic literature analysis	AI has a lot of promise for managing stakeholders, risk, communication, integration, and scope; generative AI and ML suitable for optimization and automation	Lacks quantitative performance evaluation; mainly conceptual mapping
Mohammad & Chirchir (2024)	Barriers to AI Adoption in PM	To identify and categorize barriers to AI adoption using TOE framework	Systematic review (2019–2024); 17 full-text articles analyzed	Identified 10 key barriers; technological and organizational challenges dominate; environmental barriers underexplored	Limited sample size; emerging literature restricts generalization
Benitez & Serrano (2023)	AI Impact on Software Engineering	To examine AI's role in SDLC, testing, SaMD, and software measurement	Conceptual and analytical review	AI improves project management, testing automation, and SDLC efficiency; it also highlights issues	Broad scope limits depth in specific SPM applications

				with data quality, interpretability, and ethics.	
Nitin Rajadhyaksha & Saini (2022)	Robotic Process Automation (RPA) in SPM	To explore RPA applications in improving SPM efficiency	Exploratory and trend-based analysis	RPA improves efficiency and automation in SPM processes; projected strong market growth (29% CAGR 2017–2023)	Focused on RPA rather than broader AI; limited empirical validation

VI. CONCLUSION AND FUTURE WORK

Artificial Intelligence (AI) as an addition to the Software Project Management (SPM) is a revolutionary change in terms of a current approach to the project management practice which is intuitive-driven, as opposed to an intelligent, data-based model. The use of AI in Agile-based techniques, AI-assisted DevOps/MLOps tools, intelligent Decision Support Systems, and automated resource optimization will all contribute to improving the accuracy of planning, proactive risk management, real-time monitoring, and effective collaboration. The organizations will be in a position to significantly reduce any project delays, cost overruns, and operational inefficiencies through ML, predictive analytics, and NLP. Transparency, governance, and flexibility at every level of the lifecycle of a project are even more efficient with the help of AI-driven dashboards and automation systems. Nonetheless, the challenges that include high initial capital and investment, privacy and data privacy, organizational resistance and systems integration challenges must be successfully overcome. These problems must be tackled in a well-structured government, education and infrastructure that can be scaled. Overall, AI-driven SPM systems enhance reliability, productivity and strategic alignment that puts organizations in a more benefiting position to have a higher project success rate in a more dynamic and competitive environment.

The further approach to research path is the establishment of explainable and ethical AI models to manage the project and enhance the cyberspace security processes and integration of the legacy systems. Moreover, the effect of long-run performance should also be experimented empirically using industries and in emerging economies to come up with the standardized AI governance systems in SPM.

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