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Research paper

A Systematic Review of The Literature on the Technology Its Application and Integration Needs

Zulkieflimansyah [1] *, Muammar Khadafie [2], Dzulfikar Ahmad Furqon [3]

[1] Sumbawa University of Technology, Innovation Management Study Programme, Sumbawa, West Nusa Tenggara, Indonesia
[2] Sumbawa University of Technology, Communication Sciences study Programme, Sumbawa, West Nusa Tenggara, Indonesia
[3] Sumbawa University of Technology, Entrepreneurship Study Programme, Maras Sumbawa, West Nusa Tenggara, Indonesia
**Corresponding author E-mail: zulkieflimansyah@uts.ac.id*

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Abstract

This research seeks to offer valuable Understanding to help organizations develop optimal approaches to integrating Artificial Intelligence (AI) and enhancing project coordination procedures, with a particular focus on collaborative innovation initiatives. It utilizes a thorough and structured review of existing literature, selecting 365 scholarly articles from an initial set of 1,265 scholarly works sourced from the academ-ic databases such as IEEE and Scopus. The investigation creates a structure for synthesizing the previous studies based on five investigative questions, which cover artificial intelligence systems, project coordination activities, sectors implementing AI, and the conditions required to ensure effective adoption. The examination shows that automated learning systems is commonly used in project coordination, particularly for predictive data analysis, resource optimization, and risk management. AI enhances managing open innovation projects through the inte-gration of varied knowledge bases, fostering cooperation, and delivering planned decision-making understandings. Additionally, the study finds that adoption of AI relies not limited to technical aspects factors such as framework, system combination and information prepared-ness as well as on leadership backing and strategic coordination, funding, skill growth and company culture. The results emphasize the need to align AI efforts coupled with the specific demands of open innovation, characterized by collaboration, flexibility, and outside expertise integration play key roles. The construction industry is leading the way in AI adoption. This research addresses a critical gap by determining both the technological and non-technological conditions necessary for efficiently embedding integrating AI within open innovation project management methods.

Keywords: *Artificial Intelligence; Open Innovation; Technology; Application; Integration.*

1. Introduction

Open innovation has emerged as a significant factor in driving revenue expansion and improving company performance (van Lieshout et al., 2021). As organizations increasingly engage in open innovation, they seek methods to optimize these initiatives, one of which includes leveraging machine intelligence (Du et al., 2014).During the previous decade, AI and ML have seen widespread adoption across nearly all industries. In both academic and corporate contexts, these terms are sometimes used interchangeably, while in other cases, they are distinguished from one another (Kuzior et al., 2023). AI is often described as a comprehensive field aimed at replicating human mental processes, whereas ML is viewed as a category that empowers systems to learn using data autonomously, without being explicitly programmed (W. Liu, 2024). A specialized area within AI, known as Generative AI, involves the creation of original information including text, visuals, sound and visual media by identifying and leveraging trends in current datasets (Kar et al., 2023). This technology is significantly reshaping project administration by improving operational effectiveness, enhancing decision process, and streamlining automation in multiple fields (Deshpande, n.d.) and (M. Y. Mohammed & Skibniewski, 2023). Furthermore, AI for content generation is playing a significant contribution to driving collaborative efforts and driving innovation across multiple sectors. In the construction industry specifically, it contributes to improved design, greater sustainability, and more effective project management (Rane, 2023).
Although technological advancements have supported open innovation initiatives, their success still largely relies on strong project management practices. Project managers are responsible for managing the balance between time, cost, scope, and quality (Bannerman & Scientific, 2014), yet they often encounter difficulties in achieving these goals. Many projects still fall short of their intended outcomes, with recent studies pointing to weak risk assessment as a key contributing factor. According to a PwC report, the primary causes of project failure include scope changes, inaccurate estimates, and lack of adequate resources issues frequently linked to poor risk evaluation (O'brien et al., 2014). These persistent challenges highlight the shortcomings of conventional project management approaches in effectively handling the complexity and uncertainty inherent in contemporary projects.

Expanding on the flexibility implemented through agile and open innovation approaches, the rise of industry 4.0 has advanced driven the integration of AI solutions to tackle difficulties in overseeing open innovation initiatives (Peres et al., 2020). AI enhances risk control by offering end-to-end planning from identifying potential risks to devising appropriate responses leading to better-informed decisions and improved project performance (Barcaui & Monat, 2023). AI is steadily acknowledged as both a driver and enabler of innovation, supporting product development and facilitating various stages of the advancement process (Sarafanov et al., 2024). Within collaborative innovation initiatives, AI can streamline functions such as task distribution, resource coordination, team motivation, and knowledge development (Wisdom Ebirim et al., 2024). It also aids in activities like data analysis, conducting literature reviews, and generating new ideas (Hefny et al., 2021). Nevertheless, difficulties persist, particularly around responsible data use and ownership concerns in AI-powered environments (Corrales-Garay et al., 2024). Although these issues, AI is set to reshape innovation oversight by promoting increasingly transparent and cooperative practices and redefining roles within innovation teams.

Current literature reviews emphasize the increasing use of integration of AI within project management, specifically within the building and information technology sectors industries. Two reviews identify a wide range of AI applications across key project management functions, such as strategic planning and risk oversight assessment, Decision processes and resource planning allocation (Taboada et al., 2023). An additional review highlights the frequent use of machine learning techniques like employing support vector machines, neural networks, and genetic algorithms for various tasks such as cost estimation and effort forecasting (Davahli, 2020). Researchers also acknowledge AI's capabilities to boost productivity, lower expenses, and support sustainable approaches to managing projects (W. Liu, 2024). While most of the reviewed literature concentrate regarding present AI tools and their functions in project management, there remains a considerable lack of studies on the technical side and organizational requirements for AI adoption particularly in the environment of open innovation. Moreover, there is a lack of studies that systematically connect applying AI in project management to address specific industry specializations.

Expanding upon this groundwork, current literature highlights the growing importance of AI in both open and business innovation activities (Bahoo et al., 2023). AI is increasingly recognized as a key facilitator of innovation, enabling organizations to handle vast amounts of data within open innovation ecosystems and enhancing collaborative efforts (Corrales-Garay et al., 2024). Although AI's involvement in project oversight has been widely discussed, existing reviews have yet to specifically explore its use in open innovation projects, which rely heavily on external insights and joint strategies. Focusing on this area enables for a more in depth analysis of how AI is being integrated into these dynamic, collaborative contexts.

This study aims to fill existing research gaps by performing a thorough SLR focused on the application of AI in project management, with particular attention to open innovation settings. The research specifically investigates the main AI technologies in use, evaluates their impact on enhancing project management practices, and explores their deployment across different industries. Additionally, it examines including technical and non-technical factors essential for the effective incorporation of AI in open innovation initiatives. Through these findings, the study offers practical guidance for organizations seeking to leverage AI to boost collaboration, support informed making decisions, and improve initiative performance within agile innovation environments.

A thorough understanding of the features and benefits of existing AI technologies such as the functions they help for the industrial sectors where they are widely used, and the necessary both specialized and general conditions is essential for successful adoption in overseeing open innovation initiatives. AI can facilitate understanding exchange, streamline processes through automation, and offer meaningful insights throughout different stages of innovation (Broekhuizen et al., 2023). Nevertheless, effective application demands careful alignment with an organization's capabilities, business model, and broader innovation network (Reim et al., 2020). To fully harness AI's potential, companies need to build recent skills, embed AI into operational workflows, and ensure a well-balanced collaboration between humans and AI (Truong & Papagiannidis, 2022). This strategy supports more effective and sustainable innovation management practices.

2. Methodology

2.1. Research inquiries

The first phase in conducting any Systematic Literature Review (SLR) is to define the core investigative questions (Kharbat et al., 2020) and (Senivongse et al., 2017). Drawing from gaps in existing literature outlined in the first section, this review is structured around the central issue: "In what ways does AI adoption influence project management practices within the framework of open innovation?" This central issue serves as a unifying foundation for all subsequent sub questions (see Table 1). It encompasses the investigation of artificial Intelligence tools and techniques (RQ1), their effects related to project management practices (According to Research Questions 2), industry detailed requirements and obstacles (According to Research Questions 3), as well as the essential conditions for effective implementation (According to Research Questions 4 and 5), thereby guaranteeing a thorough and cohesive research approach.

The research inquiries in the current literature review are formulated to thoroughly investigate the integration of AI within overseeing projects in open innovation, focusing on critical aspects of its application. These questions establish a systematic and in depth model to evaluate the feasibility and effects and potential limitations of adopting AI in managing inclusive innovation projects throughout different industries. A detailed overview of the research questions and their corresponding rationales is presented in Table 1. Research Questions.

Table 1: Research Questions

ID	Research inquiry	Reasons/Explanations
According to Research Questions 1	Which AI technologies are most commonly applied in project oversight?	Recognizing the principal AI tools is vital for comprehension their function in project oversight. This is important because various AI technologies serve different goals in improving different areas of project management. This issue lays the groundwork for examining their effects, especially in the context of open innovation.
According to Research Questions 2	How do these AI tools support the optimization of project management, particularly in the setting of open innovation?	This issue explores the role of AI in enhancing project management, especially within contexts of open innovation where teamwork and the exchange of knowledge are essential. It guides the research toward examining real-world uses and advantages.
According to Research Questions 3	What industries have implemented artificial intelligence in overseeing open innovation projects, and what specific needs and challenges do they face?	The question explores the advantages of adopting AI within specific sectors, taking into account their distinct challenges. This is important, as industries such as healthcare, manufacturing, and IT differ in complexity and levels of collaboration, both of which play key roles in inclusive innovation environments.
According to Research	What technological prerequisites are necessary for implementing AI in the man-	Grasping the requirements is essential for effective embracing AI. This issue focuses on determining the system modifications needed to enable AI integration in collaborative

Questions 4	agement of collaborative innovation projects?	innovation initiatives.
According to Research Questions 5	What organizational or nontechnical factors are needed to assist AI adoption in managing collaborative innovation initiatives?	This question examines the non-technical aspects factors necessary to incorporate AI into current management of projects frameworks. It aims to ensure the research provides actionable approaches for aligning AI with existing management of projects practices in inclusive innovation contexts.

If your research manuscript includes large datasets that have been deposited in a publicly available database, please specify the location of the data deposition and provide the relevant accession numbers.

2.2. Search approach

Employing a carefully organized search approach is essential for efficiently identifying relevant literature. This involves several key steps, such as defining appropriate keywords and search queries, choosing suitable academic databases, and establishing criteria for selecting articles. The details of these procedures are outlined in the subsequent parts.

2.3. Explore formula

Based on the refinement process, the finalized search query used in this study is as follows: ((("project management") AND ("artificial intelligence" OR "AI" OR "machine learning") AND ("implement*" OR "adopt*" OR "integrat*" OR "applicat*" OR "transform*" OR "readiness" OR "maturity" OR "collab*" OR "enhanc*" OR "improv*" OR "require*"))). The OR operator is applied among “artificial intelligence,” “AI,” and “machine learning” as these terms are frequently used synonymously in both academic and industry literature (Kühl et al., 2022). This last query enables a broader exploration of AI applications across diverse project management contexts. It captures overarching AI innovations and technological progres, and adoption needs that may be relevant to both conventional and open innovation project management. By excluding terms like "open innovation," the search avoids unintentionally omitting relevant research that, although not clearly identified as such, still offer meaningful contributions to understanding AI’s contribution to overseeing complex project management. The literature search was undertaken through filters based on the heading, keywords, and summary. Only studies published during the period 2014–2024 and written in English were considered within the search scope.

2.4. Research databases

Digital databases were selected in advance to identify all pertinent publications related to the topic and the corresponding review questions. When choosing appropriate databases to support the search strategy, it is essential to consider both data coverage and reliability. For this systematic literature review, IEEE Xplore and Scopus were utilized to retrieve relevant articles and research studies.

2.5. Formulating the method for selecting articles

A keyword-based and controlled vocabulary search strategy was employed to identify and retrieve pertinent articles from the chosen databases. This initial screening process resulted in a narrower pool of literature. To facilitate the early selection stage, Rayyan AI was used, enabling researchers to efficiently assess and filter studies based on their titles and summaries, guaranteeing that only relevant articles were reviewed and exported. Figure 1 provides a detailed overview of the search procedure and the amount of pertinent studies recognized at every stage.

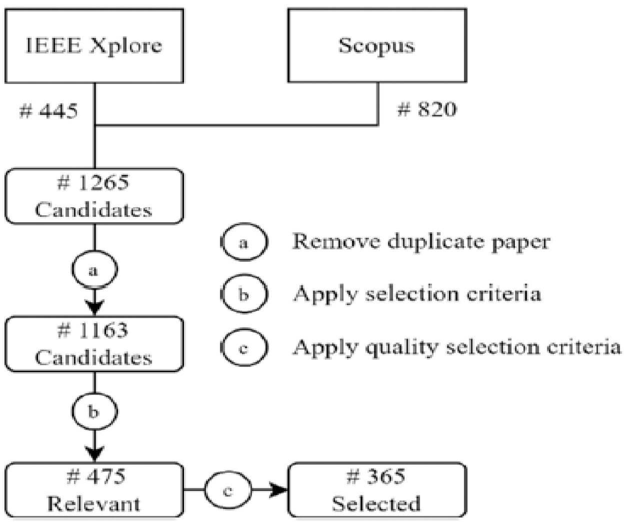

Fig. 1: Search, Selection and Quality Assesment Process.

2.6. Selection of studies

During the selection of main research (Senivongse et al., 2017), predefined selection and rejection standards were employed. Research were considered eligible if they centered on the use of AI in Project Management and were written in English. In contrast, studies addressing AI in not connected fields were excluded. The initial search yielded 1,163 articles. Following a review of headings and summaries (refer to step b in Fig. 1), this number was narrowed down to 475. These shortlisted articles were then subjected to a full-text review, during which a quality assessment was conducted, along with an evaluation of their relevance to the research questions.

2.7. Evaluation of study quality

A vital component of performing a Systematic Literature Review (SLR) is the evaluation of study quality (Senivongse et al., 2017). In this review, the quality evaluation (QE) is structured around five key criteria, each given equal importance. These five assessment questions are adapted from (Senivongse et al., 2017), with every item providing three possible responses: "yes" (scored as 1), "partly", and "no". A response of "yes" is assigned a score of 0.5, while "no" is scored as 0. The questions cover topics such as:

a) Research goals and formulated questions
b) Well-defined articulation of the study's scientific value
c) Description of how AI is applied or its technical function
d) Significance: Case studies, real-world applications, or potential impact
e) Explicit presentation of research outcomes

2.8. Collection and analysis of data

The studies chosen from the previous quality assessment are then examined in greater detail by answering the five research questions. During this phase, we addressed the five research questions corresponding to each selected paper using the data extraction form (see Table 1).

3. Result

The advancement related to computing capabilities and the growth of extensive data collections have supported the integration of AI across various fields, including project management. As AI continued to evolve during this period, its application in project management attracted increasing scholarly attention, contributing to the noticeable rise in research publications. This consistent growth in academic output highlights the enduring significance of AI applied to project management. Within the context of Project Management (PM), practical challenges related to implementation play a crucial role in shaping academic interest in AI applications. The PM domain has historically approached widespread AI integration with caution (Mariani & Mancini, 2023), largely because it depends heavily on interpersonal skills and intricate, decision-making focused on humans (Shang et al., 2023). Moreover, the specific prerequisites for adopting AI in PM remain ambiguous for many organizations. These aspects are frequently challenging to automate with existing AI capabilities. Consequently, if the perceived ROI generated by AI in project management falls short compared versus other applications like the generative AI sector players might shift their focus and investments toward technologies with more immediate impact. This trend should not be seen as a reduction in AI's long-term value within PM, but rather as a short-term pause while the sector evaluates actual world integration obstacles and awaits further technological progress tailored to PM requirements. Financial and organizational considerations are also likely contributing to this shift. In light of recent financial uncertainties, both companies and research institutions have become more selective with their budgets, favoring projects that offer quick returns or are critical for regulatory compliance. As a result, funding agencies and organizations may be deprioritizing applied AI in project management in favor of initiatives that promise greater visibility or wider-reaching impact.

The review of selected studies reveals that the majority of contributing authors and their affiliated institutions are based in developed countries (Table 2). China stands out as the leading contributor, followed by India and the United States. This observation reflects China's well-established position as an international frontrunner in research on artificial intelligence. Both China and the U.S. benefit from robust university funding, extensive R&D infrastructure, and strong government support aimed at advancing AI technologies. Additionally, these countries are home to numerous tech companies that actively implement AI across various sectors, including project management fostering a collaborative environment between academic institutions and industry players.

Table 2: Geographical Distribution of Authors in the Selected Studies

Country	Mentions	Country	Mentions
Country	Mentions	Malaysia	21
China	110	Germany	17
India	70	Taly	17
United States	61	Australia	16
Spain	27	Pakistan	16
United Kingdom	21		

Europe has made notable contributions, particularly originating from countries such as the United Kingdom, Germany, and France. This can be attributed to their well established studies ecosystems, substantial academic funding, and strong commitment to industry 4.0 efforts. Numerous European nations actively pursue AI and digital transformation efforts across both public and private sectors, which is evident in their research output. Meanwhile, the average research inputs from India and Southeast Asia indicate a growing focus on AI adoption and technological advancement in these emerging economies, often supported by government led innovation strategies. Nonetheless, these regions may still face limitations in terms of resources and research networks compared to major players like the United States and China, which contributes to their comparatively lower research volume.

The focus is on exploring artificial intelligence technologies and their implementation in management of projects. Because the search using the search term "open innovation" returned just five studies, the integration of the framework was expanded to encompass the broader context of overall project management. Below is a concise overview of the framework's elements:

What elements are involved (RQ1): This section highlights the main artificial intelligence tools applied in management of project activities, serving as the basis for comprehending the various instruments and methods utilized across diverse settings.

When (RQ2): This part examines the specific stages or tasks within project management where AI technologies can be applied most effectively. It aids in identifying the appropriate scheduling and use of AI applied across the entire project lifecycle.

Where (RQ3): This segment centers on the industries most suited for adopting artificial intelligence applied to project management. It highlights challenges and opportunities unique to each sector, linking them to relevant implementations of artificial intelligence.

The approach (RQ4 & RQ5): This section investigates both the technological and organizational prerequisites for incorporating integrating AI into project management. It also explores how companies strategize to integrate AI implementation with their current administration frameworks.The model connects these components in a structured manner, offering an integrated method to comprehending AI's contribution to managing projects and ensuring alignment with the main study goals.

3.1. Artificial intelligence technologies applied in management of project activities (RQ1)

Several prominent Artificial Intelligence (AI) approaches encompass: (1) data mining; (2) machine learning; (3) natural language processing; (4) mobile learning; (5) case-based reasoning; (6) fuzzy logic; (7) genetic algorithms; (8) lineage development; (9) cognitive computing; (10) computer vision; (11) robotics; and (12) big data or data analytics. (Lin & Yu, 2024) and (Varghese et al., 2023). Among these, eleven out of the twelve widely used AI methods appeared in the included studies, as illustrated in figure 6. Additionally, five papers were identified that discuss (13) AI for content generation (Barcaui & Monat, 2023).

Machine Learning and Natural Language Processing are one of the most widely adopted AI technological tools used in project management, thanks to their flexibility and ease of integration using current systems (Labd et al., 2024). Machine Learning, featured in 204 studies including those by (Alasadi & Fatla, 2023), plays a vital role in areas such as predictive analytics, resource optimization, and risk management. NLP, discussed in thirty-one research articles (Ghai et al., 2023) and (Younisse & Azzeh, 2023), is primarily utilized to automate records and improve interaction (Isreal, 2025). Both innovations provide numerous ready to use tools, libraries, and frameworks that facilitate swift implementation to tackle common project management challenges, making them particularly appealing to project managers seeking fast results requiring minimal operational interruption (Hamza et al., 2013).

Machine Learning and Natural Language Processing also show great potential in overseeing open innovation initiatives. Such technologies are able to derive useful understanding from extensive data collections such as intellectual property rights, social networking sites, and crowdsourcing tools (Just, 2024) and (Saura et al., 2023). NLP is useful for predicting trends, mapping technology landscapes, filtering inputs, and matching challenges paired with remedies (Just, 2024). ML methods enhance managing risks within projects and support advancements in complex organizational initiatives (B. Bharathi et al., 2023). Additionally, Machine Learning and Natural Language Processing facilitate better understanding of contracts by legalizing texts easier to access to non-experts. In the domain of safety and risk control, these tools can analyze data to predict risks and recommend reduction strategies (Shetty et al., 2023). Moreover, NLP assists scholars in managing the growing quantity of scientific literature by grouping content and recognizing emerging concepts (Barbier et al., 2022). In summary, Machine Learning and Natural Language serve as strong technologies that improve making decisions and foster invention across diverse fields.

Conversely, AI-driven technologies such as techniques such as data extraction (data mining), evolutionary algorithms (genetic algorithms), generative artificial intelligence, cognitive computing methods, large-scale data analytics (big data), case-based reasoning approaches, mobile learning platforms, and lineage tracking (lineage development). appear less often in the literature. This lower frequency is probably due to the specialized skills and expertise needed to implement them, posing challenges for numerous organizations especially those lacking sophisticated technical resources.

Data analysis receives less attention in project administration due to the requirement for a strong data infrastructure that can manage both structured and unstructured data. Although it contributes to improving making decisions and increasing rates of project success (Ghai et al., 2023), its use in project administration is still relatively restricted. This indicates that data mining remains a developing area in the field, with considerable opportunities for further theoretical and applied implementation (Bianchi & Amaral, 2020).Although generative AI has been shown to boost productivity and shorten delivery times, it receives less focus because of concerns related toward precision, consistency, and ethical standards issues (Bianchi & Amaral, 2020). Additionally, legal challenges such as taking ownership for mistakes, privacy protection and cyber security remain significant concerns (M. Y. Mohammed & Skibniewski, 2023). Although these obstacles, AI-driven content generation holds considerable possibility to greatly enhance management procedures applied across multiple sectors.

Experience-based reasoning and evolutionary algorithms, despite their strength in addressing problems of optimization, are considered too expert and missing the versatility required for the varied responsibilities within project management, which frequently demand more flexible and widely relevant tools. Cognitive computing, designed to mimic person thinking procedures (Megha et al., 2017), is still in its early steps and requires sophisticated computing power and very detailed data. This complexity creates it difficult to apply in the regular and organized settings characteristic of project management, where simpler AI approaches like machine learning or natural language processing can deliver effective results more easily and with smoother unification, causing them the favored options in the area. Machine learning operates through algorithmic processes driven autonomous learning system that uses quantitative techniques to continuously improve without person intervention (Raj, 2019). It enables frameworks to extract insights from data and generate forecasts or actions. Among 87 studies specifying the implemented machine learning methods include supervised learning and deep learning, which are both subfields of ML (Elghaish et al., 2022). Specifically, 41 research articles focused regarding supervised learning (L. Liu et al., 2023), (Meharunnisa et al., 2023) and (Suma et al., 2014), while 42 papers discussed advanced neural network learning (Alasadi & Fatla, 2023). This prevalence likely stems from the fact that project management activities, including risk management, optimizing resources and forecasting through data analysis which involve clearly defined results to classify or forecast are well appropriate for these techniques. These approaches effectively utilize the data that is organized and annotated commonly accessible within project management to generate dependable and practical insights.

Table 3: Algorithms Used in Supervised Learning

Supervised machine learning algorithm	Explanation	Notes	Articles
Random Forest	A group of models method that constructs several Tree based models using varied information subsets to improve estimation precision and minimize model overtraining. It is widely recognized for effectively managing complex datasets and delivering results that are easy to interpret (Wang & Qin, 2024).	12	(Ali et al., 2022), (Barrocas et al., 2022), (L. Liu et al., 2023), (Meharunnisa et al., 2023), (Suma et al., 2014) and (Tanbour et al., 2022).
Support Vector Classifier	Carries out linear separation in a high-dimensional space spaces by applying principles from statistical learning theory. It aims to enhance prediction accuracy by minimizing the gap between predicted and actual outcomes through a combination of regularization techniques and empirical error reduction (Fan et al., 2024).	11	(Ali et al., 2022), (Haris et al., 2023), (Chang & Liang, 2023), (M.-Y. Cheng et al., 2015) and (Rathod & Sonawane, 2022).
Bayesian classifier with independence assumptions	A categorization technique grounded in Bayes' Theorem, which operates under the assumption that all features are independent. It is known for its speed and strong performance on categorical datasets, though it can face difficulties with previously unknown classes and the frequently invalid presumption that features	6	(Mancini et al., 2023), (Haris et al., 2023) and (Gondia et al., 2023).

	are independent (Peretz et al., 2024).		
Tree-based decision model	A tree-structured model used for classification tasks, where internal nodes represent tests based on features, branches show the possible results of these tests, and leaf nodes represent class labels. This intuitive structure allows for easy interpretation of results. Algorithms such as ID3, C4.5, and CART are frequently employed to construct these decision trees (Lagzi et al., 2024).	4	(Haris et al., 2023), (Meharunnisa et al., 2023) and (Rahman et al., 2023).
Linear Regression	A probabilistic technique utilized to analyze the connection involving a continuous outcome variable and one or more independent variables. It is based on the assumption of a linear relationship, enabling clear and easily interpretable analysis of the results (Özden et al., 2024).	3	(Assefa et al., 2022), (Meharunnisa et al., 2023) and (Shu et al., 2015).
XGBoost	Combines gradient-enhanced boosting with tree-structured models to develop highly accurate forecasting models. It enhances effectiveness by applying constraint technique techniques and gradient-based optimization optimization, while also efficiently managing incomplete data (Shaik et al., 2024).	2	(Ali et al., 2022) and (Hsu et al., 2019).

The consistent application of supervised learning techniques underscores their proven capability in generating accurate predictions and informed decisions from past data. By leveraging labeled datasets, these methods effectively identify patterns between inputs and outputs, offering clear, practical insights that are essential for enhancing processes, supporting decision-making, and achieving improved results across industries. As shown in Table 4, our review reveals a notable inclination toward the application of Artificial Neural Networks within deep learning, cited 37 times (Peres et al., 2020), primarily for prediction-related functions. Convolutional Neural Networks, referenced fourfold (Hassan et al., 2023) are mainly used on images processing owing to their strength in capturing spatial characteristics. Recurrent Neural Networks, however, are referred to just once (H.-C. Jang & Wu, 2022), reflecting their less frequent use expected due to their complexity and high computational requirements when managing long sequences, which often results in challenges such as vanishing gradients.

Artificial intelligence is transforming management of projects by markedly improving both efficiency and success rates. Studies indicate that incorporating AI can enhance successful project outcome by approximately twenty percent throughout multiple sectors (Zia et al., 2024). This progress is largely due to AI's capabilities in the process of automating routine tasks, supplying predictive insights, and enhancing decision-making. By leveraging technologies including machine learning and NLP, project managers can optimize resource allocation, mitigate risks, and facilitate clearer communication. These innovations not only increase the likelihood of project success but also help organizations respond quickly to evolving market demands and drive continuous innovation. As AI technology advances, its influence on project management is expected to expand, unlocking even greater potential for achieving superior outcomes and long term organizational growth.

According to the institute specializing in project management, organizations that incorporate artificial intelligence into their processes complete 61% of their projects on schedule, in contrast to just forty-seven percent for those relying on conventional approaches (Labd et al., 2024). Although flexible methodologies are widely used with an adoption rate of 80% they still encounter obstacles that can result in project failures. AI has emerged as a key solution to these issues, enhancing outcomes throughout crucial Agile stages (Farhan & Setiaji, 2023). Studies also highlight AI's potential, showing it can reach achieved 99% accuracy during training and 78% during testing when forecasting project achievement (Labd et al., 2024). While the overall project achievement rate remains low at approximately 35%, AI is anticipated to transform management of projects practices by the year 2030 (Capone et al., 2024).

Table 4: Algorithms Based on Deep Learning

Deep Learning	Explanation	Notes	Articles
Computational Neural Networks	They are built to replicate natural neural networks, learning, and information processing information via linked artificial neurons Capable of handling both straight-line and complex relationships, these systems are commonly utilized for forecasting (Grosan, 2011).	37	(Alasadi & Fatla, 2023), (Chang & Liang, 2023), (Chou et al., 2014), (Deepa et al., 2023), (Gondia et al., 2023), (Lishner & Shtub, 2022) and (Peretz et al., 2024)
Convolutional Neural Models	It is commonly employed for error detection in spinning machinery. The method excerpts complex characteristics derived from signals to precisely identify faults and can be improved by incorporating generative adversarial networks to expand the example set (X. Xiao et al., 2024).	4	(Hassan et al., 2023) and (Matos et al., 2023)
Feedback Neural Networks	These are highly efficient for tackling optimization problems with fixed outcomes, particularly quadratic optimization, because of their simultaneous structure and efficiency of hardware components. Their use is growing in practical applications that involve uncertain data, Frequently expressed as interval values in interval quadratic programming (Wang & Qin, 2024).	1	(H.-C. Jang & Wu, 2022).

3.2. AI-boosted tasks in project management (RQ2)

We classified the tasks involved in project management outlined in the chosen papers related to core responsibilities, as shown in Table 6, following the Institute for Project Management (PMI, 2021). These responsibilities include: (1) Planning and managing scope; (2) Evaluating and handling risks; (3) Organizing and overseeing schedules; (4) Planning and managing budgets and resources; (5) Planning and managing product/Deliverable quality; (6) Engaging interested parties; (7) Managing project documents; (8) Managing project challenges; (9) Ensuring sharing knowledge to ensure project continuity; (10) Executing projects with the pressing need to provide business value; (11) Determining relevant project methodologies, techniques and procedures; and (12) Managing communications. Such tasks are summarized as shown in Table 5.

Table 5: The Contributions of AI To Procedures in Managing Projects

Assignmentt activities	Explanation	Notes	Illustrations of AI functions
Define and control project scope	Identify, structure, and control the project scope to guarantee consistency with defined requirements and support verification.	13	Categorization and structuring of project requirements (Hassan et al., 2023). Analyzing data to forecast critical success elements (Ali et al., 2022) and (Bang et al., 2022) Enhancing effectiveness in managing project scope (Wang & Qin, 2024), (Olukoga & Feng, 2022) and (Wang & Qin, 2024). Improving project planning to better align with organizational needs (Hamza et al., 2013).
Identify and mitigate potential uncertainties	Recognize and rank uncertainties, applying uncertainties mitigation approaches in a continuous cycle	79	Forecasting and controlling potential threats in building projects (Gondia et al., 2023)(Jha et al., 2023) and (Sousa et al., 2021). Enhancing the formulation of risk response and diminishment plans (Marmier et al., 2014). Recognition, evaluation, forecasting, and management of risks (Ozlati & Yampolskiy, 2017) and (Sousa et al., 2021).
Develop and oversee the project timeline	Develop and plan the project timeline based on benchmarks, making adjustments as necessary.	69	Forecasting potential schedule delays using analytical models (Berezka, 2018), (Wang & Qin, 2024) and (M. Wu et al., 2023). Streamlining scheduling tasks through automation (Ghai et al., 2023), and (Golab et al., 2022). Optimizing the order of tasks using heuristic approaches (J. Xiao et al., 2015) and (Zahid et al., 2021). Distributing resources and optimizing schedules across multiple projects with adaptive planning (Rzevski et al., 2018), (Zhu & Huang, 2022).
Organize and oversee financial plan and available assets	Assess and track the financial plan, foresee potential issues, and utilize assets effectively.	92	Expense forecasting and budgeting (Hammad, 2023), (Garg, 2015) and (Relich, 2016a). Forecasting assets and manpower needs, optimizing distribution of assets, and coordinating coordination (Coelho et al., 2019), (Elkholosy et al., 2024) and (Relich, 2016a). Managing risks and effects associated with resources (Morozov et al., 2020).
Develop and oversee the product excellence /deliverables	Establish product excellence, suggest enhancements, and regularly evaluate deliverable quality	64	Continuous quality tracking and anomaly identification (Avazov, 2022) and (R. Zhang et al., 2025). Managing reliable data and supporting decisions for improvements (Huang et al., 2021). Automated quality control assurance and workflow enhancement (Prieto & Alarcon, 2023) and (Villarroel et al., 2016).
Involve collaborators	Identify and classify collaborators, then design and implement a plan for involvement aligned with their requirements and level of impact.	8	Evaluation of collaborator attributes and involvement requirements (Fridgeirsson et al., 2021), (Ikuabe et al., 2023) and (Otero-Mateo et al., 2023). Collaborator grouping and segmentation (Berezka, 2018) and (Hudaib & Alhaj, 2019) Designer of visual and interactive tools for stakeholder interaction (Ferrer-rosell, 2023) Strengthening strategic collaboration to support stakeholder development and validation (Salimimoghadam et al., 2025).
Oversee assignment documentation and deliverables	Make sure project documents are consistently updated, easily available, and efficiently supervised during the assignment lifecycle.	18	Monitoring and maintaining project documents (Barrocas et al., 2022), (Martínez-Rojas et al., 2018) and (Mills et al., 2018). Categorizing and structuring the assignment data (Hassan et al., 2023) and (Serrano & Barnett, 2023). Mechanized assistance for determination -making and improved data access (S. Zhang & Li, 2023) Evaluation of the efficiency of project management methods across all assignment phases (Jallow et al., 2020) and (Tominc et al., 2023).
Handle assignment challenges	Respond quickly to problems using effective measures and work together with collaborators to find solutions.	12	Anticipating and identifying assignment problems (Heidari et al., 2024). Enhancing forward-thinking determination processes to handle issues (M. Y. Mohammed & Skibniewski, 2023). Enabling assignment cooperation to resolve issues (Baharum et al., 2015) and (Umer et al., 2018).
Guarantee the transfer of understanding to maintain project ongoing process	Define team roles, set anticipations, and establish techniques for sharing knowledge to maintain assignment continuity	13	Improving access to information and the decision-making process (Mercier-Laurent et al., 2015) and (Ziemba et al., 2024). Enhancing the management of skills and resources (Coelho et al., 2019) and (Dritsas et al., 2021). Enhancing the thoroughness of the knowledge base (C. Wu et al., 2022). Designing project task models to ensure continuous progress (Weichenhain et al., 2019).

Carry out the project promptly to ensure delivery of business value	Provide value step-by-step by helping the team ranks tasks by importance and assess company impact during the project	7	Enhancing the step-by-step value delivery in supervised projects (H. Jang, 2022) and (Viktor et al., 2021). Recognizing initiative elements that consistently deliver business value (Arsic et al., 2022) and (Marchinares & Rodriguez, 2021). Decompose jobs to create a basic functional product (Hefny et al., 2021).
Select suitable undertaking methodologies, techniques, and practices	Evaluate assignment requirements to suggest the best approaches and procedures, using repetitive and gradual methods.	6	Improve the effectiveness of project management methodologies (F. Fahmy et al., 2017), (Merzouk et al., 2023) and (Perera et al., 2021). Assisting the incorporation of technologies, such as cyberphysical systems, into project methodologies (Hefny et al., 2021) and (Marchinares & Rodriguez, 2021). Improving making choices assistance for choosing methodologies (Kolyshkina & Simoff, 2021).
Oversee interactions	Assess requirements of stakeholders, choose suitable approaches and platforms, ensure clear information dissemination, and verify comprehension and response	11	Improving interaction and teamwork within the undertaking team (Barcaui & Monat, 2023) and (Hefny et al., 2021) Enhancing communication with customers and stakeholders (Mccray et al., 2002) and (van Lieshout et al., 2021). Enhancing the exchange of knowledge and the ability to retrieve information (Reim et al., 2020) and (Taboada et al., 2023).

After examining 319 studies on improved project work items, the findings indicate that task four, "Plan and manage budget and resources," emerged as the most commonly referenced task, appearing in 92 publications (Aktürk, 2021). Its regular citation highlights the essential role of effective financial and resource planning in achieving successful project completion, as well as emphasizing the revolutionary role AI can play in this area. This task requires managing various factors, including cost forecasting, access to resources, and usage all rates of which may fluctuate throughout the project lifecycle. AI facilitates this process by analyzing extensive datasets to uncover patterns, optimize resource distribution, and generate predictive insights on possible cost overruns or resource constraints. Through AI-driven predictive analytics, project leaders can estimate future financial and resource demands using historical trends, which supports better informed decision-making. This foresight enables early identification of potential limitations and proactive mitigation, reducing the likelihood of budget or resource-related issues. Additionally, AI tools deliver real-time updates on budget status and resource consumption, supporting ongoing monitoring and adaptive planning throughout project execution. These capabilities lead to enhance accuracy in budgeting and resource coordination, enhancing project outcomes. AI can also contribute to optimizing both budgets and schedules, particularly in the context of innovation project management (González Moreno et al., 2022).

Second task, "Assess and manage risks," was also prominently featured, appearing in 79 studies (Pham & Han, 2023), highlighting AI's growing role in transforming risk management approaches. AI contributes to more efficient risk control by enhancing the speed and precision of threat detection. Machine learning developed models on past project data can identify early indicators of potential issues, enabling project managers to take preemptive action. In addition, AI can rank risks according to their severity and likelihood, helping managers concentrate on the most pressing threats. AI's ability to model different scenarios and their potential consequences also provides deeper insight into risk exposure. This empowers project leaders to develop backup plans and make data driven choices that carefully stability potential risks and benefits. Notably, AI-driven methods are increasingly being integrated into risk management strategies in open innovation projects as well (González Moreno et al., 2022).

Likewise, third task, "Plan and manage schedule," appeared among the 69 studies (H. Jang, 2022) and (R. Zhang et al., 2025) while Task 5, "Plan and manage the quality of products and deliverables," was cited in 64 studies (Opoku et al., 2022), (Opoku et al., 2022) and (Tan, 2021). These results highlight the expanding role of AI across multiple areas of project management. AI plays a key role in enhancing project scheduling and maintaining quality standards, underscoring its value in various project functions. Its integration in these tasks showcases its ability to process intricate data, anticipate potential issues, streamline schedules, and uphold standard benchmarks every one of which are essential for ensuring achieved project delivery.

Generative AI significantly contributes to project management by boosting productivity, fostering innovation, and enhancing team collaboration. It assists in breaking suspended projects into manageable activities and monitoring advancement, handling task interdependencies, and automating processes like data evaluation, document generation, and visual representation (Rajadhyaksha & Saini, 2022) and (Shi & Wu, 2021). Furthermore, it streamlines interaction and teamwork by offering context aware perceptions and simplifying processes aligning with the core objectives of collaborative innovation approaches. Additionally, Generative AI strengthens risk management, financial plan optimization, and overall project execution. It supports risk mitigation by evaluating extensive data collections and modeling various situations to develop thorough risk mitigation strategies (Barcaui & Monat, 2023). In terms of budgeting and resource allocation planning, it delivers automated prediction, refines asset distribution, and allows immediate modifications to adapt to evolving initiative needs. for implementation, it speeds up assignment creation, enables instantaneous tracking and documenting, and supports smooth cooperation enabled by automated notifications and communication platforms. By combining these sophisticated functions with person judgment, Generative AI not only improves operational effectiveness but also reinforces the partnership structures vital for success in collaborative innovation environments.

3.3. Impact on industry performance (RQ3)

MSCI's worldwide industry categorization framework categorizes fields divided into eleven distinct sectors, namely: (1) Energy, (2) Raw Materials, (3) Industrial Goods, (4) Non-Essential Consumer Goods, (5) Essential Consumer Products, (6) Healthcare Sector, (7) Financial Sector, (8) IT Sector, (9) Communication and Media Services, (10) Utility Services, and (11) Real Estate Sector (MSCI, 2024)

The implementation of AI technologies in management of projects has been widely explored across multiple sectors, with the industrial sector taking a prominent position in these discussions. Figure 2 illustrates the sectors that have gained the most from AI integration in management of projects. A total of 255publications that identify industries receiving benefits, 142 specifically highlight the role of AI in managing manufacturing projects, as noted in studies by Ali et al. (2022), Jallow et al. (2022), and Yin (2021), among others. This prominence is attributed to machine learning's capability to meet the facility requirements of major projects by improving effectiveness, accuracy, and security. In sectors such as building and production, AI contributes by automating processes, optimizing resource allocation, and enhancing risk mitigation strategies. These capabilities are crucial for adhering to strict timelines and minimizing financial exposure. Moreover, AI's strength in analyzing large datasets and generating actionable insights makes it especially valuable in such high-pressure environments, ultimately leading to improved project results.

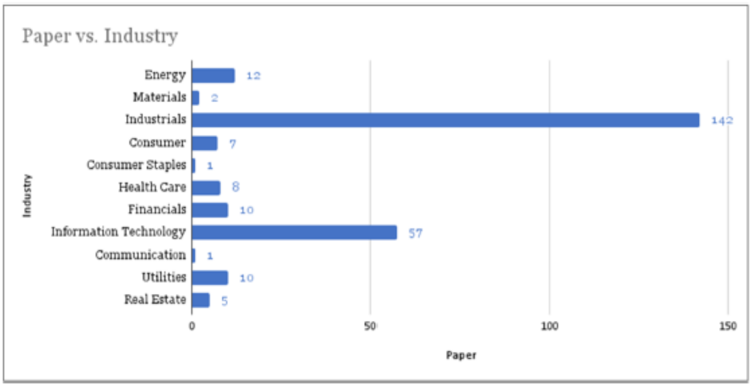

Fig. 2: AI Integration in Management of Projects.

Trailing the industrial sector, the IT industry also demonstrates considerable involvement in AI-driven project management, as evidenced by 57 studies (Chen and Zhang, 2023; Pang et al., 2022; Ranesh et al., 2022). This reflects the critical role AI plays in overseeing sophisticated software development and information technology framework projects. Meanwhile, energy, financials, and utilities sectors received 12, 10, and 10 mentions respectively (Makhotin et al., 2022; Mohammed et al., 2022; Olukoga and Feng, 2022) indicate expanding but comparatively limited engagement. This may be attributed to their niche or strictly controlled nature, which often hinders the rapid integration of emerging technologies such as artificial intelligence. Additionally, project management practices in these sectors tend to emphasize regulatory compliance and risk control, areas where conventional approaches remain dominant. These findings demonstrate that AI's value in management of projects is widely acknowledged across multiple industries, with the industrials sector, notably construction, emerging as a primary adopter of these technological advancements.

The energy sector also demonstrates notable engagement with AI applications. Task 2: Evaluate and control risks,' appeared in six studies (Koc, 2023; Vidmar et al., 2023), highlighting the sector's strong emphasis on risk mitigation. Tasks such as ' Develop and oversee the quality of products and deliverables ' (Nugroho et al., 2021; Shahrizan et al., 2023) and ' Develop and oversee the budget and resource allocation ' (Baharom et al., 2023; Mudhafar et al., 2021) were each referenced in two papers, underscoring the industry's focus regarding quality assurance and funding management. Task 6: Involve stakeholders was mentioned only twice (Buah et al., 2020; Rahman et al., 2021), likely reflecting the sector's focus of long-term operational prioritizing stability, safety, and compliance instead of immediate value creation, with stakeholder involvement being a continuous and integrated process rather than a standalone initiative.

The Information Technology sector also demonstrates substantial involvement with key project management tasks. Task 4: Develop and oversee budget and resource management,' is highlighted in 26 studies (Mamatha and Suma, 2021; Nazarenko et al., 2022; Pang et al., 2022), while ask 3: Develop and oversee the project timeline and Task 2: Evaluate and control risks are referenced at 16 (Jang and Wu, 2022; Pang et al., 2022) and eleven research articles (Asif and Ahmed, 2020; Viktor et al., 2021), respectively. This pattern reflects the sector places great importance on efficient financial supervision, schedule coordination, and risk management. AI is instrumental in enhancing these areas, particularly by resolving project-related challenges and supporting on-time project completion.

Sectors such as sectors such as discretionary spending, raw materials, property, essential goods, public services, and medical care demonstrate relatively low levels of involvement in AI-supported project management activities. The Consumer Discretionary sector concentrates regarding particular areas such as task 7, which involves handling project documentation, and task 9, which focuses on transferring knowledge to maintain project continuity,' suggesting a more limited scope in AI utilization. The raw materials and property sectors sectors show limited engagement, involving only the Materials sector referencing task 2, which involves evaluating and handling risks, and the Real Estate sector mentioning task 5: Design and oversee product quality /deliverables,' along with task 7. This limited engagement may stem from these industries' reliance on standardized and well-established procedures, lowering the perceived requirement for advanced project administration interventions. In the essential consumer goods sector, only task 5 is referenced. The Utilities sector places greater emphasis on task 5, cited four times (Liang, 2021; Shi and Wu, 2021), and task two, cited three times (Sohrabi and Noorzai, 2024; Tao et al., 2023), underscoring the sector's focus on dependability and safety. Additional project management responsibilities may be considered less clear or previously integrated into their fundamental operations.

In the Health Care sector, there is a strong emphasis on task 5, 'Plan and oversee the quality of products and deliverables,' referenced three times (Devarajan et al., 2023; Parr et al., 2021), reflecting the industry's prioritization of patient safety and strict regulatory requirements, which make quality management essential. In contrast, Task 1: Define and control project scope,' is mentioned only once (Staub et al., 2023), likely because healthcare projects typically operate under clearly defined and non-negotiable objectives, limiting the need for comprehensive scope planning. Similarly, Task 4, which involves budgeting and resource management, and Task 2, focused on risk assessment and control,' are each cited only once. Overall, the sector's limited engagement may indicate a focus on other project management priorities or a slower pace in adopting AI-driven practices.

The following sections present several practical case studies drawn from chosen articles that illustrate how companies have efficiently applied AI within project management, both generally and within inclusive innovation frameworks. In the field of energy, a prominent Engineering, Procurement, and Construction firm encountered major difficulties in overseeing intricate projects spread throughout multiple geographic locations (Dzhusupova et al., 2024). Due to the industry's challenging environment, optimal distribution of resources, accurate carrying out the project with limited manual involvement involvement were critical. Nonetheless, the company faced issues with disjointed processes and labor-intensive hands-on tasks. To overcome these obstacles, the EPC firm adopted an project management driven by AI system that leveraged machine learning used in predictive maintenance and Natural Language Processing to streamline documentation and communication with stakeholders. This AI-driven approach enhanced operations through analysis of previous project data to enhance organizing and delivering instantaneous equipment performance perceptions, enabling quicker problem solution. These features coordinated well using open innovation approaches, providing the AI platform supported working together with outside partners via improved interaction and data transmission capabilities. A crucial element of this achievement was the alignment of AI initiatives supporting the company's extended-term strategic targets and ongoing employee development programs. The organization recognized that a distinct AI adoption aspiration combined with proactive engagement of both internal and external stakeholders was vital for the smooth incorporation of AI into project workflows, leading to smoother transitions and enhanced project results.

A study conducted in the industrial field examined the use of AI within three construction firms based in the UK, emphasizing the sector's demand for improved safety and risk management (Jallow et al., 2022). Historically, the construction sector in the United Kingdom has struggled with maintaining employee safety and precisely assessing hazards at intricate locations. Companies often found it difficult to manage hazardous activities and maintain continuous safety monitoring. To tackle these challenges, the case study emphasized AI implementations including automated tunnel inspections and risk assessment automation, and risk identification, which reduced workers' contact with hazardous conditions. For example, AI systems enabled automated risk assessments and uncovered possibility hazards that might have gone unnoticed by personnel, leading to more accurate safety evaluations. Consequently, these AI-driven approaches enhanced both operational safety and efficiency, enabling firms to concentrate concerning crucial responsibilities and simplify inspection processes. These advancements also promoted open innovation by encouraging collaboration among organizations to develop and apply standardized AI safety protocols. Key to their success resulted from the effective blending of AI with current workflows, delivering more precise results without interrupting daily activities. Important insights included the need to align AI adoption with comprehensive employee education and effective communication of the advantages it provided, aiding overcome early opposition and fostered acceptance among teams. The study ultimately recommends wider industry collaboration to standardize AI applications and fully realize their advantages.

In the consumer goods sector, a manufacturing firm adopted AI to improve overseeing project execution by better addressing the needs of both inside and outside stakeholders (Otero-Mateo et al., 2023). This sector encountered difficulties in harmonizing intricate stakeholder expectations and decision-making procedures, especially across projects involving critical technical components. The study identified key key success elements including senior leadership backing, collaboration, and technical expertise based on three hundred fifteen survey responses offered by participants engaged at 45technology projects exceeding a decade. To overcome these obstacles faced by the company implemented AI-driven data analysis instruments that enhanced decision processes by extracting understanding derived from the trend analyses, past records and forecasting modeling. This method aligned with collaborative innovation concepts, As artificial intelligence continues to evolve facilitated understanding promoted stronger cooperation across varied groups stakeholders, improving efficiency in decisions and resource management. By effectively managing stakeholder relationships and uncertainties, the company realized better project results and increased backing from senior leadership. Key takeaways emphasized developing technical skills and utilizing AI to navigate complex collaborative environments, which are essential in collaborative innovation settings. The research highlights the importance of enhancing digital capabilities and strategically incorporating AI to strengthen innovative decision processes focused project administration.

Sixth table highlights the issues and advantages of implementing integration of AI into project management throughout various industry segments. In the energy sector, machine learning is used to assess and manage risks, providing benefits such as enhanced forecasting analysis and optimized asset utilization. Nevertheless, the issues encompass the necessity for strong data systems and expert knowledge. Likewise, the materials sector applies machine learning to improve risk management and handle uncertainties, though adoption remains limited and further research is needed. The industrials sector employs a wide array of artificial intelligence technologies such as machine learning, computer vision, and natural language processing, and robotics for controlling risks and arranging schedules purposes. These technologies enhance precision, mechanize processes, and maximize resource efficiency while incorporating various AI systems solutions poses complexity and high costs. In the nonessential consumer goods sector, machine learning supports sharing knowledge and ensuring project continuity, enabling quicker decisions, though issues with dependable data persist."

Table 6: Comparative Analysis of AI Implementation in Project Management Across Industries

Sector	AI Technology in Practice	PM Tasks	Advantages of Implementing AI	Issues	References
Energy resources	Machine Learning	Identify and mitigate potential risks	a) Enhanced accuracy in forecasting risks. b) Efficient utilization of resources. c) Informed decision-making through predictive insights.	Demands sophisticated data systems and specialized knowledge	(Baharom et al., 2022), (Diker et al., 2021), (Koc, 2023) and (Rahman et al., 2021).
Industrial inputs	Machine Learning	Identify and mitigate potential risks	a) Improved evaluation of risks. b) Improved management of uncertainty	Its application in project management remains minimal and is still developing in various sectors	(Chang & Liang, 2023), (Olorunshogo Benjamin Ogundipe et al., 2024) and (Shang et al., 2023).
Industrial sector	Technologies such as machine learning, computer vision, natural language processing, robotics, and big data, Data Mining, Fuzzy Logic, Case-Based Reasoning, Genetic Algorithms, and Generative Artificial Intelligence	a) Identify and mitigate potential risks. b) Develop and oversee the project timeline	a) Automated systems b) Precision in image-related tasks c) Improved allocation of resources d) Reducing potential risks	The integration of various AI tools is complex, requiring expert knowledge for certain technologies	(Prieto & Alarcon, 2023), (Xi, 2022), (Xu & Lin, 2015), (Yang et al., 2023) and (Yu et al., 2023).
Optional customer spending sector	Machine Learning	Facilitate the sharing of knowledge to maintain project continuity	a) Quicker and more precise decision processes. b) Enhanced consistency throughout major projects	Potential for system breakdown if input data lacks quality	(Ziemba et al., 2024)

Essential customer goods	Machine Learning, Natural Language Processing	Design and oversee the quality standards of outputs.	a) Enhanced quality assurance. b) Accelerated information exchange. c) Automated workflows.	Natural Language Processing needs tailoring and can face difficulties with specialized, complex terminology.	(Mancini et al., 2023) and (Mariani & Mancini, 2023).
Medical services	Machine Learning, Natural Language Processing, Robotic technology	Organize and oversee the standard of products and outputs.	a) Improved quality oversight. b) Automating routine activities. c) Effectiveness in information exchange.	Moral concerns regarding AI implementation and possible automation mistakes.	(Devarajan et al., 2021) and (Parr et al., 2021).
Financial data	Machine Learning, Robotic technology, Approximate reasoning system.	a) Evaluate and control risks. b) Develop and oversee budget and resource allocation. c) Develop and oversee the quality standards of products and deliverables.	a) Improved precision in budgeting. b) Risk forecasting. c) Automating financial operations.	Moral challenges in AI-based decisions, privacy risks, and difficulties in deploying complex systems.	(Cancer et al., 2023), (Geng et al., 2020), (Xi, 2022) and (Li et al., 2009).
Digital technology	Automated learning systems, Language understanding technology, Automated mechanical systems, Extraction of useful patterns from data, Logic for handling uncertainty, Optimization method inspired by natural selection, AI systems that simulate human thought, AI that creates new content or data.	a) Develop and oversee budget and resource allocation. b) Develop and oversee the project timeline. c) Evaluate and control risks.	a) Enhanced productivity. b) Forecasting tools for budget and timeline planning. c) Automating routine activities.	Difficulties in integration, high computational requirements, and legal plus ethical issues related to generative AI.	(Cancer et al., 2023) , (Rahman et al., 2023), (Ramana & Narsimha, 2022) and (X. Xiao et al., 2024).
Telecommunication offerings	Machine Learning	Develop and oversee standard standards for goods and deliverables	a) Improved quality oversight. b) Enhancement of communication efficiency.	Needs regular updates to maintain accuracy, with potential data security risks	(Farih et al., 2021) and (Karamthulla & Anish Tadimarri, Ravish Tillu, 2024)
Public services	Machine Learning, Automated mechanical system, Case-Based Reasoning.	a) Develop and oversee quality standards for products and deliverables. b) Evaluate and control risks.	a) Enhanced quality of the project. b) Automating routine activities. c) Improved risk handling.	Expensive to implement and demands expert knowledge.	(Chen et al., 2025) and (Xu & Lin, 2015)
Property sector	Machine Learning, Automated mechanical system.	a) Develop and oversee quality standards for products and deliverables. b) Oversee project documentation and deliverables.	a) Automating the handling of documents. b) Improved quality monitoring.	Possible mistakes in automating tasks and challenges with unstructured data management.	(Shi & Wu, 2021), (Sun et al., 2020) and (Tao et al., 2023).

The consumer staples sector utilizes machine learning and natural language processing to oversee quality of goods and mechanize communications, although tailoring these techniques to explicit requirements could be time-consuming. In the health care industry, machine learning, Natural Language Processing and robotic technologies enhance quality assurance and information exchange, but ethical issues such as data privacy present considerable obstacles. The financial industry employs machine learning, robotic technologies and fuzzy logic systems for managing hazard, budgets, and resources, improving financial prediction and automating processes; Nevertheless, concerns over information confidentiality and system intricacy persist. The IT sector industry is at the forefront of adopting machine learning, Natural Language Processing, cognitive computing, and generative AI applied to budgeting, scheduling, and managing risks. Although significant advantages, this sector faces challenges related to the need for sophisticated infrastructure along with legal and moral issues surrounding AI that generates content. Within the interaction services industry, machine learning supports quality of the product management and interaction automation, but regular updates and protection of data concerns remain significant obstacles. Finally, the utilities industry applies machine learning, robotics, and case-based reasoning for maintaining quality control and hazard evaluation, despite the significant implementation expenses and the demand for specialized expertise act as obstacles.

In the realty market, machine learning and robotic technology are used to digitize document processes processing and enhance accuracy of records, though challenges remain due to irregular data formats and possible mistakes in automation processes. Spanning multiple sectors, machine learning is extensively applied to manage risks, ensure quality, and automate processes. Although AI contributes to increased efficiency, improved precision and improved decision-making, frequently observed obstacles comprise concerns over data protection, substantial costs associated with implementation, and the requirement for dedicated skills. Additionally, the intricacy of integrating AI systems and ethical considerations continue to hinder wider implementation of AI in project management.

3.4. Required technical capabilities (RQ4)

Implementing integrating artificial intelligence into project workflows involves addressing various crucial aspects. Organizations must be adequately prepared to adopt and utilize AI technologies. According to our research, three main technical aspects significantly influence the successful implementation and incorporation of artificial intelligence applications into current management of projects practices (refer to Table 7): (1) Technological framework, (2) Compatibility with Current systems, and (3) Information management and Readiness (Jöhnk et al., 2021). Among the reviewed literature, "Technical Infrastructure" appears fifty-nine occasions, "Data Management/Data Readiness" is cited fifty-eight occasions, while "Integration with Existing Systems" is noted only 14 times.

Table 7: Technological Aspects Required for AI Implementation

Aspects	Explanation	Cites	Article
Technology Framework	The presence and sufficiency of physical devices, applications, and communication systems infrastructure required to efficiently enable and execute AI applications in managing projects settings (Pathak & Bansal, 2024).	59	(Angara et al., 2020), (B. H. Mohammed et al., 2022), (H. Jang, 2022), (HASSANI, 2019) and (Mills et al., 2018).
Incorporation into established technological infrastructures	The process of harmonizing AI applications with current project management platforms to enable smooth integration and improved performance (Fotso et al., 2022).	14	(Nafil et al., 2023), (Ozlati & Yampolskiy, 2017), (Lung & Wang, 2023) and (Waqar et al., 2023).
Data Infrastructure and Availability	The condition of data in terms of quality, structure, and readiness needed to support precise AI-driven evaluation and well-founded decision-making (Pathak & Bansal, 2024).	58	(Z. Cheng et al., 2023), (HASSANI, 2019), (Mills et al., 2018), (H. Jang, 2022) and (Relich, 2016b).

Technological infrastructure is often highlighted as it serves as the foundation for AI implementation, including the essential hardware, software, and network resources required to assist AI functionalities. Lacking a strong technological base, artificial intelligence instruments cannot operate efficiently, which accounts for the frequent occurrences of its mention. Likewise, data management and readiness are vital since AI technologies depend on high-quality, well-structured data to generate reliable perceptions and forecasts. The critical role of information used in artificial intelligence is evident in its regular emphasis, because organizations need to guarantee that their data is both available and accurate, well-organized, and pertinent to their specific applications.

Conversely, integration with existing systems receives the least attention, possibly suggesting that although it is important, it is often viewed as less critical compared to developing a solid technological framework and guaranteeing data preparedness. While combination can present notable challenges, it is often seen easier to handle after establishing the basic infrastructure and data requirements are met. This implies that companies tend to emphasize strengthening their technical and data competencies needed to back AI beforehand addressing the intricacies involved in merging latest AI tools with their current frameworks.

For successful AI implementation in collaborative innovation initiatives, companies need a strong technological foundation that includes effective data handling systems, sophisticated software applications, and sufficient processing power (Ummah, 2019). Embracing artificial intelligence in managing innovation calls for a data-centric method, which can encourage more transparent and partnership-driven innovation processes.

3.5. Requirements beyond technical aspects (RQ5)

Key factors influencing an organization's readiness for organizational adoption of AI include: (1) Guidance commitment, (2) Coordination with strategic goals, (3) availability of funding, (4) investment in education and competencies enhancement, and (5) Corporate culture (Jöhnk et al., 2021) and (Nortje & Grobbelaar, 2020). As outlined in Table 8, these elements form a structured framework for evaluating how prepared an organization is to implement AI.

Learning and capability enhancement emerges as the most commonly cited factor, consisting of 29 references, including those by (Angara et al., 2020) and (Ranesh et al., 2022). This frequent mention highlights its vital role in equipping employees with the capabilities required to effectively work with AI technologies. Strategic alignment is the next most noted dimension, with 15 references (B. H. Mohammed et al., 2022), underlining the importance of ensuring artificial intelligence programs are aligned belonging to the organization's overarching strategic goals. Proper alignment is essential to generate value and secure sustainable success.

Successfully implementing AI within the management of open innovation projects necessitates substantial investment in training and skills development. Organizations must provide targeted training for project managers to enable them to collaborate with artificial intelligence platforms, analyze AI-produced outputs, and embed incorporating AI into project workflows (Bushuyev et al., 2024). Emphasis is also placed on cross-functional teamwork and continuous learning to cultivate the skills essential for incorporating AI (Bushuyev et al., 2024).

AI has the potential to enhance several components of open innovation, including planning, coordination, and control throughout various steps (Broekhuizen et al., 2023). Effective implementation of AI in innovation management involves not only comprehension its functionalities but also building competencies in innovation, teamwork, and decision-making (Kolbjørnsrud, 2019). To meet evolving skill demands, organizations are encouraged to adopt flexible learning strategies such as customized education, bite-sized learning and mobile-based training instruments (Maity, 2019). Ultimately, AI can serve as a catalyst for advancing open innovation and fostering collaborative efforts (Kuzior et al., 2023).

Table 8: Organizational Factors Influencing AI adoption

Classifications	Explanation	Cites	Article
Technology Framework	The presence and sufficiency of physical devices, applications, and connectivity capabilities required to effectively deploy and run artificial intelligence applications in project management settings (Pathak & Bansal, 2024).	59	(Angara et al., 2020), (B. H. Mohammed et al., 2022), (H. Jang, 2022), (HASSANI, 2019), (Mills et al., 2018), (H. Jang, 2022) and (Morozov et al., 2020).
Compatibility with Current Systems	The procedure of adapting AI solutions to work cohesively with current project oversight platforms, aiming to guarantee smooth compatibility and improved performance (Fotso et al., 2022).	14	(B. H. Mohammed et al., 2022), (Hefny et al., 2021), (Ozlati & Yampolskiy, 2017) and (Waqar et al., 2023).
Data Handling	The condition of data accuracy, structuring, and readiness necessary	58	(B. H. Mohammed et al., 2022), (HASSANI, 2019),

/ Data Preparedness	to support precise artificial intelligence evaluation and informed decision process (Pathak & Bansal, 2024).	(H. Jang, 2022) and (Relich & Nielsen, 2021).

Corporate culture ranks following, involving 13 citations(Chen et al., 2025), (Heidari et al., 2024), (Rahman et al., 2023) and (R. Zhang et al., 2025), emphasizing the influence of shared values and behaviors on an organization's ability to adapt to change. A culture that supports innovation is essential for accepting and embedding emerging technologies, however it is frequently examined alongside additional elements. Support from leadership appears in 10 studies (Almahameed & Bisharah, 2023) and (Tominc et al., 2023). While leadership is vital in advocating for and guiding AI initiatives, it may be mentioned less often because it is frequently assumed once foundational conditions are met.

Funding, referenced 9 times (Nigar et al., 2023) and (Tominc et al., 2023), are the least commonly cited aspect. Despite being essential for funding AI adoption and ongoing operations, financial considerations are often embedded within broader discussions of readiness. In the realm of collaborative innovation projects, fostering a collaborative and open corporate culture is key to effective AI integration and new development processes (Broekhuizen et al., 2023), (Lam et al., 2021) and (Samira, 2022). Supportive guidance is critical for cultivating a culture conducive to AI adoption and enhancing innovation capacity (Kuzior et al., 2023) and (Sirisha Maddula, 2018). Likewise, monetary investment is essential to acquire AI systems and build related competencies (Bley et al., 2022). Organizations possessing robust dynamic capabilities perform better equipped to harness both AI and open innovation (Samira, 2022). Nonetheless, obstacles persist in applying AI to collaborative innovation, highlighting the need for continued investigative and strategic planning (Broekhuizen et al., 2023)

4. Discussion

Figure 3 shows a consolidated summary of the findings from the systematic literature review (SLR). It is organized around the primary research questions, illustrating the relationships between Artificial intelligence technologies, activities, business fields, and implementation needs. The section on artificial intelligence technologies (Research Question 1) outlines different categories of AI, grouped into a wider categories for example machine learning (ML), natural language processing (NLP), computer vision and additional integrated artificial intelligence tools. These classifications demonstrate the wide range of applications of AI pertinent regarding project management, machine learning (ML) and data analysis group covers computational methods and frame works that allow frameworks designed to extract insights from data, recognize trends, and generate predictions or choices such as ML methods used to forecast setbacks in project timelines (Salama, 2024). The linguistic and cognitive computation category includes artificial intelligence systems that interpret, comprehend and produce natural language, improving interaction and data access. Uses of natural language processing in managing projects involve tasks like mechanized report creation and examination (H. Liu et al., 2024). The field of computer vision and robotics group focuses on interpreting visual information and automating physical activities, notably enhancing precision and effectiveness in construction overseeing projects via visual assessments (Insa-Iglesias et al., 2021). Lastly, Additional AI technologies and their integration category covers artificial intelligence instruments combining several functions, for example, AI-based chat bots enabling real-time interaction and decisions support frameworks that streamline intricate decision processes (Kumar et al., 2023).

Project management activities (RQ2) links AI technologies applied to particular project management tasks, illustrating how AI enhances aspects such as scheduling, risk mitigation, information exchange, and knowledge sharing. It highlights AI's capability to address intricate project challenges. The classification of project coordination activities centers on essential functional domains where technology can greatly boost productivity and results. Scheduling and administration includes vital activities like defining project project scope, timeline, and budget, where AI tools improve accuracy and optimize workflows. Risk and challenge handling focuses on the early detection and resolution of uncertainties and concerns to ensure project steadiness. Management of stakeholders and communication aims to facilitate efficient teamwork and data sharing exchange across all stakeholders. Lastly, Management of knowledge and continuity supports the retention and transmission of essential knowledge related to the project to ensure sustained success. These categories represent the core elements of knowledge related to the project that are enhanced through high-tech solutions.

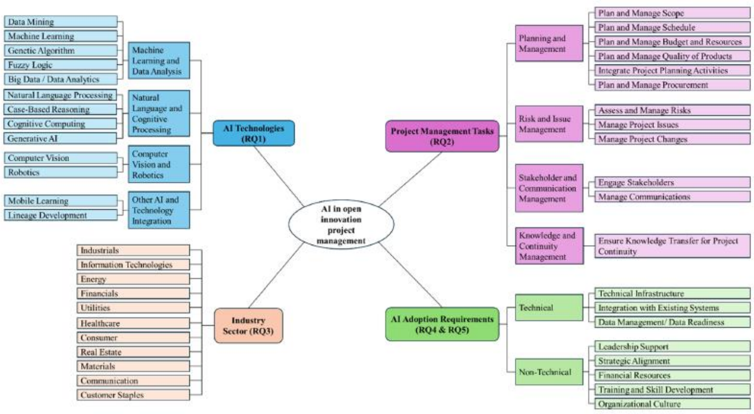

Fig. 3: Summary of the Findings.

As per the Project Management Institute, project management tasks also encompass activities such as "integrating project planning activities," "managing project changes," "planning and managing procurement," "establishing project governance structures," and "planning and managing project or phase closures and transitions",(PMI, 2011). Out of the 365 papers analyzed in this systematic literature review, none explicitly report the use of AI technologies in these areas. This lack of evidence indicates a potential research gap or suggests that AI applications in these tasks are still in early stages of development. Many of these tasks require qualitative decision-making that significantly depends relying on human judgment, expertise, and social skills. For example, setting up A project governance framework demands managing organizational dynamics, leadership approaches, and stakeholder interests areas where AI presently shows restricted capability. Furthermore, AI embracing tends to be influenced by the perceived benefits and effects of its implementation. Activities such as financial planning and risk control, which directly affect successful project outcome and financial outcomes, are prioritized for AI development. Conversely, tasks requiring less obvious effect on the project results or domains with unclear AI benefits typically attract less interest from researchers and practitioners alike. Therefore, while AI's advantages are well documented in domains like financial planning, risk mitigation, timeline management, and quality assurance, further exploration is needed to gain a complete understanding of its capabilities role and gains in these less-studied project management tasks.

Industry Sectors (RQ3) highlights the various industries that stand to gain from adopting AI, including fields such as technology, healthcare, power and property sectors. These industries differ in their levels of preparedness and face distinct obstacles when combining AI into collaborative innovation initiatives. Additionally, Prerequisites for AI Implementation (RQ4 & RQ5) describe both operational and managerial conditions necessary to ensure effective AI incorporation. Technological prerequisites emphasize the importance of technical factors such as infrastructure and system compatibility, contrasted with non-technical aspects cover guidance, organizational culture and competency building, offering a comprehensive perspective on the barriers to adoption. Collectively, the figure captures the complex dimensions of implementation of AI in managing open innovation projects by connecting techniques, uses, and sectors, and necessary conditions, thereby offering practical insights.

Our study highlights machine learning (ML), natural language processing and machine vision as the primary artificial intelligence systems applied in managing projects. ML is widely employed for forecasting analysis, optimizing resources, and managing risks, whereas NLP supports automation of reports and improves communication. The use of computer vision is progressively applied for maintaining quality assurance and monitoring project advancement. These technologies are strongly linked to essential project management activities, including planning and budgeting, risk assessment and mitigation, as well as scheduling and ensuring deliverable quality. The construction industry leads AI adoption by revolutionizing traditional methods, while the IT sector demonstrates substantial involvement, particularly in handling complex projects. Other industries such as the sectors of energy, finance, and utilities are also investigating AI applications, although implementation rates are lower because of the specialized nature of these fields.

Successful AI implementation requires careful attention to several key factors. On the technical side, essential elements contain a strong technological infrastructure to support AI applications, efficient data handling and preparedness that guarantees data accuracy and availability, and smooth incorporation into current systems to facilitate seamless processes. Equally important are human factors. Providing instruction and developing skills is crucial to ensure staff can effectively use AI technologies. Strategic alignment is necessary to make sure AI initiatives align with the organization's general objectives. A supportive corporate culture fosters the implementation of new technologies, whereas leadership backing and adequate financial assets are also important, although these are often presumed once the additional essential components are established.

This study high lights the transformative capabilities of AI within project management by showcasing how advancements in visual recognition and language understanding technologies, and machine learning are reshaping conventional approaches. Guided learning approach is extensively applied in managing risks, optimizing resource use, and forecasting through data analysis, underscoring AI's growing role in automating routine tasks, extracting insights derived from data, and enhancing information exchange. The widespread adoption of AI in managing resources and budgets demonstrates its ability to improve the precision of budget planning, a critical factor in project success. Nevertheless, given the limited focus on AI applications in areas such as project management control and finalization, there remain untapped chances for further investigation and creative development in project management.

AI is essential in Overseeing open innovation initiatives through facilitating the combination of various knowledge sources, supporting cooperation, and improving choosing courses of action. In the context of open innovation, where ideas come from outside sources merge with organizational assets, AI helps identify key external partners and expertise obtained by analyzing extensive data collections and detecting trends that could be challenging for people to recognize. AI-driven systems enhance cooperation by offering immediate data insights, automating repetitive activities, and facilitating better information exchange among stakeholders, thereby speeding up the new development process. Moreover, AI assists in assessing and choosing the best ideas or solutions from a wide range, guaranteeing efficient and strategic allocation of resources towards projects with great potential. This ability is especially important in open innovation environments, where the sheer quantity and diversity of information may be excessive without advanced analytical assistance.

This study emphasizes the significant potential of AI technologies to improve project management by boosting efficiency, reducing risks, and enhancing decision-making. AI has already made substantial advancements in areas like risk evaluation, scheduling, and budget control. These improvements contribute to more efficient resource utilization and more accurate forecasting, both crucial for project success. By automating routine tasks, AI allows project supervisors to focus more regarding strategic priorities. Additionally, it strengthens risk control and offers based on data insights that support improved decisions. As AI progresses to be integrated, managing projects is poised for transformation, resulting in more effective outcomes and smarter resource allocation.

5. Conclusion

Incorporating artificial intelligence within project management can greatly enhance productivity, decision processes, and the general success of projects throughout different sectors. This is especially true within collaborative innovation, where companies progressively draw on outside knowledge references for research, development, and new product creation. Given the complexity of open innovation projects which involve large volumes of data from a variety of external collaborators and contributors to AI initiatives sophisticated analytical tools are essential. They help navigate this complexity by detecting patterns, optimizing how resources are used, and enabling better-informed decisions. By streamlining repetitive processes process and providing immediate understanding, AI allows companies to quickly adapt to promote changes and work more seamlessly with outside collaborators. This makes AI a crucial factor in the effectiveness of open innovation efforts. The present research offers a detailed examination of AI's influence on managing projects, highlighting that the industrial sector particularly building benefits the most from artificial intelligence systems. The key function of AI in this industry is due to its ability to improve conventional project oversight enhanced by advanced analytics and automation, and more efficient asset utilization.

Effective implementation of AI depends on fulfilling certain technical and non-technical requirements. Companies should prioritize building the appropriate technological framework and managing data effectively to ensure that AI systems function correctly. Moreover, although it is less commonly emphasized, integrating AI with current systems is a critical obstacle that must be overcome completely unlock AI's benefits. On the organizational side, training and developing skills are essential to ensure employees can effectively utilize AI tools. Aligning artificial intelligence projects with the company's objectives and cultivating a supportive culture are also key factors for achieving lasting success. While leadership backing and sufficient funding are important, they are generally seen as subordinate to these foundational willingness aspects.

For future study, various important fields need to be explored to improve artificial intelligence implementations within project management. Firstly, examining AI's use within specific industries including sectors like Energy, Finance, Healthcare, and Utilities will offer a clearer understanding of how AI can be customized to fulfill the distinct needs of each sector. Carrying out long term research can assess the long-term impact of AI on project coordination procedures. Moreover, establishing effective strategies for merging AI with established project management frameworks is essential to ensure smooth adoption. Research should also focus on the ethical and regulatory aspects of AI to guarantee compliance with relevant protocols and recommendations. Lastly, since education and competency building are essential, next phase investigations should explore successful education and development programs approaches to equip employees for AI implementation. Tackling these topics will yield meaningful understanding and actionable strategies, helping companies fully leverage AI's potential in management of projects and foster innovation throughout various industries.

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