Augmented Project Management: Exploring The Role of Ai Tools in Decision-Making and Resource Optimisation

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ABSTRACT

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| **Background:** Project management is defined as the planning, execution, and monitoring of projects to meet predefined objectives/success criteria while adhering to specified time, budget, and scope constraints and is crucial to successful business. Conventional project management processes have been largely dependent on human expertise and manual processes, but, due to increasing project complexity as a result of globalisation, technological advancement and more sophisticated client demands, conventional methods are also seen as having limitations.  **Aim:** This review aims to discuss the disruptive capabilities of AI on in the field of project management with an emphasis on the use of AI instruments to help decision making, resource deployment and risk handling within complicated projects.  **Methodology:** The paper consisted of a review of studies, case studies and tools deployed within multiple sectors, including construction, IT and Healthcare, in academic articles. Reports produced between the years of 2015-2025 were included.  **Results**: AI applications have transformed the manner in which projects are managed, specifically by revolutionising how projects deal with resource allocation, risk and decision making. Decision making can be improved through the use of data-driven insights from predictive analytics and automatic learning of machine algorithms, serving to reduce the role of human error and predicting project trends. Forecast, LiquidPlanner, Smartsheet, and other similar AI-driven software applications assist in scheduling projects and managing resources. AI tools further reduce the administrative burden, support collaborative teamwork, and automate repetitive tasks. On top of that, the case studies of Bechtel and Fluor, among others, reveal the actual advantages AI brings to decrease project costs, resource allocations, and overall project performance.  **Conclusion**: The use of AI tools has changed the face of project management, hugely improving efficiency and decision-making and overall risk management. Additional studies should assess the ethical implications of AI and the future implications of projects. The future of AI in project management is optimistic, and, as technologies progress, it is likely to impact project management by making projects more efficient, sustainable, and economical throughout industries. |

***Keywords:***Artificial Intelligence (AI), Project Management, Resource Optimisation, Decision-Making, Risk Management

1. INTRODUCTION

Businesses urgently need to accept change. If organisations do not embrace these changes, they will eventually die away. Project management is a permanent fixture. In one way or another, people, groups, and even countries manage projects. A man who organises his children's marriage or constructs a house is practising project management (Vincent & Ernest, 2025). Project management is defined as the planning, execution, and monitoring of projects to meet predefined objectives/success criteria while adhering to specified time, budget, and scope constraints (Korhonen et al., 2022) and is crucial to successful business. A broad variety of organisations operating in a wide variety of industries have resorted to project management as a management strategy to achieve a wide variety of objectives. The work that has to be done, the strategies that need to be implemented, the resources that need to be assigned, and the environment in which the project is going to be carried out are all linked components of a project (Okine, 2024). Conventional project management processes have been largely dependent on human expertise and manual processes; but, due to increasing project complexity as a result of globalisation, technological advancement and more sophisticated client demands, conventional methods are also seen as having limitations (Regona et al, 2022). Investments made every year are rightly noted at around $48 trillion. But the Standish Group reports that just 35% of the projects are successful. The “lost” portion of this other 65% is a ridiculous waste of resources and untapped value (Nenni et al., 2024). Project management has remained a serious challenge, especially regarding making decisions, allocating resources, and dealing with risks. The low degree of maturity of the technologies available is one of the reasons for the low success rates (Kaufmann & Kock, 2022).

Being able to predict and control risk is considered one of the major challenges to effective project management. Uncertainty is inherent in the nature of projects, especially large and/or complex projects (Goswami, 2024). Projects can also be impacted by external economic conditions, regulations or unforeseen circumstances that can cause delays or disruption to timelines or budgets (Goswami, 2024). Conventional techniques of risk management are based upon analysing data manually and using intuition, which errors and take time. The second problem that project managers have is resource optimisation. Project failures by managers are identified as stemming from two public sources, which are either systemic or provisional issues (Stone, 2023). A project requires many resources, such as human resources, equipment, and materials, and properly allocating these resources is essential to a successful project. Conventional resource allocation processes are premised on past experiences and decisions that are face validity and so, can lead to misallocation of resources or resource bottlenecks. Also, project managers should ensure that their projects are on time and on budget (Abdelalim et al., 2024; Adepu et al., 2023; Daoud et al., 2023). Gantt charts and spreadsheets have long provided a visual representation of project management status, but do not capture projects’ inherent dynamism (Levin & Levin, 2019). These tools are insufficient when projects become more complex, and there is insufficient real-time progress tracking and adjusting.

Leveraging AI in project management could have a meaningful impact on solving complex persistent issues as well as optimising project execution and achieving organisational goals (Pan & Zhang, 2021). More importantly, the benefits of AI-powered solutions, like smart automation, AI and data-driven decisions, and augmented predictability, provide a compelling case. Within the last few years, the use of AI in project management has grown significantly as organisations began realising the value of AI to profoundly change project management processes in the way projects are conceived, implemented, and monitored and controlled (Darko et al., 2020).

By processing vast amounts of past project data, AI tools can detect patterns, render actionable insights and assist decision-making processes to minimise risks (Tian et al., 2025). These instruments provide project managers with real-time information as well as prediction capabilities to identify early signs of where a project may be running into a bottleneck or veering off course, and thus allow for interventions to take place that keep the project on course (Prasetyo et al., 2024). With adoption of AI within project management processes, the efficiency of project management will increase, but project managers will also evolve and change in terms of their roles and skillsets. AI enables managers to have more time to make higher-level decisions while concentrating on more productive matters such as engaging with stakeholders and making strategic decisions (Kolbjørnsrud et al., 2016).

Artificial intelligence (AI) has emerged as a transformative force in various industries and in project management (PM). The integration of AI technologies into PM practices has the potential to revolutionise how projects are planned, executed, and monitored. The need for data-driven decision-making processes, more effective resource allocation, and the growing complexity of projects are the main forces behind this paradigm change, where most projects are immersed in Industry 4.0 (Vergara et al., 2025). But the benefits of using AI for project management are also extensive as the drawbacks. Data quality is one of the key challenges of AI adoption within project management. AI tools depend on the quality and quantity of data “in order to make accurate predictions and recommendations”. But organisations do often have problems with data quality, such as with incomplete or inconsistent data, which diminishes the usefulness of AI tools. Also, the complexity of AI algorithms, like deep learning, makes it difficult for project managers to understand how the system arrived at a particular decision. The lack of transparency of the model used by the AI can create scepticism on the AI’s suggestions and devalue them by project managers (Felicetti et al., 2024; Prasetyo et al., 2024).

Moreover, there is growing interest and uptake of AI for project management. But a few are already employing AI-driven technologies to assist in the planning, implementation and monitoring of projects within organisations. These are beneficial for especially large, complex projects that involve a great deal of uncertainty, such as in for example construction, IT, and the health care industry. AI has a huge potential to improve project performance and ultimately reduce project failure levels through helping to automate administrative tasks, deploying resources more effectively, and controlling risks better (Adamantiadou & Tsironis, 2025; Salimimoghadam et al., 2025). The influence of machine learning technology on project management will only grow from this point forward as it becomes more sophisticated, and projects will be run more efficiently and successfully, with greater predictability.

This review aims to discuss the disruptive capabilities of AI in the field of project management with an emphasis on the use of AI instruments to help decision making, resource deployment and risk handling within complicated projects. The present state of AI in project management and the associated challenges and opportunities of adoption are discussed. Among others, this paper discusses how AI can help solve traditional project management problems like resources, risk, and decision-making. Some of the major questions tackled are: “Can A.I. help in optimising the use of resources and reducing the risk in projects? What are the challenges to the adoption of AI in project management, and how can they be addressed?

2. METHODOLOGY

A systematic literature review was used in developing this paper. The literature used was chosen through a strict inclusion criterion to assure quality and relevance: only peer-reviewed academic papers, case studies and industry reports produced between the years of 2015-2025 were included. The articles included were required to consider AI applications within the context of project management, specifically in optimisation of resources, risk management and decision making. Also, papers that dealt with the use, difficulties, and results of AI in actual projects were favoured.

The data included studies on the construction, IT, and healthcare sectors. These documents were obtained from the databases Science Direct, Research Gate, and Google Scholar. The results were collated and organised by bringing the literature into major themes of the use of AI tools for resource allocation, risk management, and decision making in project management.

3. RESULTS AND DISCUSSION

**3.1 AI Tools in Project Management**

Artificial Intelligence AI) is already well advanced in the incorporation of tools and capabilities into Project Management PM) to help improve resource allocation, decision making, and project outcomes in general (Felicetti et al., 2024). The use of AI tools in PM includes several, but not limited to, categories such as predictive analytics, automation, optimisation of resources, among others (Vergara et al., 2025). With these AI capabilities, the project managers can deal with the complexities more effectively and resulting in a more successful project outcome.

Project managers can use AI technology to improve resource allocation, improve decision making, and offer efficient solutions to everyday tasks, thus transforming project management. These are used to improve the performance of the entire project life cycle processes using machine learning (ML), Natural language processing (NLP), predictive analytics, and robotic process automation (RPA) technologies. Among others, AI tools are developed to support project managers with fundamental issues like prediction, risk control, timing, and resource distribution (Ayeni, 2025; Prasetyo et al., 2024).

Among the advantages of AI in management is its ability to process large datasets and provide insight from detections that would be overlooked or difficult to detect (Salimimoghadamet et al., 2025). ML methodologies are able to identify such patterns and trends, thus enabling project managers to make more informed decisions. This is particularly useful in resource allocation, risk management, and cost control. AI, for example, can analyse historical performance data of projects and make predictions of delay, over budget, and shortages of resources. Management can use these projections to detect problems and apply remedies before they are unmanageable, adjusting the parameters of the project as necessary to keep it on schedule and within budget (Odejide& Edunjobi, 2024).

Automated task planning and scheduling via project management software, which enables the automation of the planning and scheduling of tasks, are becoming more common AI implements, among other AI tools (Barcaui & Monat, 2023). These tools incorporate predictive analytics and machine learning algorithms to examine historical data and offer real-time updates and insight into the progression of a project. Intelligent scheduling software can project the future of the project, spot future bottlenecks, and suggest changes based on task dependencies and resource availability. AI-enabled solutions allow project managers to be more precise in scheduling projects, resulting in fewer late projects occurring and deadlines being met with little to no human effort. An example of this is Forecast, an AI-based project management software that utilises machine learning to automate task assignment as well as provide predictive insights and real-time data on team productivity and project status and issues (Low, 2025). A further illustration is Smartsheet, a resource levelling and scheduling AI technology that optimises scheduling by automatically levelling resources and modifying the schedule according to real project data and historical knowledge (Ogunbukola, 2024).

**3.1.1 AI in Risk Management**

The importance of the function of managing project risks through AI is that it helps to understand and identify potential project risks even at the project conception stage and helps to formulate means for their mitigation. Artificial intelligence tools and applications, including; IBM Watson, RiskWatch, use artificial intelligence to mine and access a large data pool of information, for example historical projects data, which, among other things, enables the analysis as well as the prediction of risks (Ogunbukola, 2024; RiskWatch, 2023). Machine learning algorithms refine their models based on incoming data, increasing the accuracy of their predictions, and enabling project managers to engage in proactive, data-driven interventions (Odejide & Edunjobi, 2024). This kind of continuous learning ensures the AI is up to date with the changing context of the project and is able to update its risk assessment when necessary.

AI’s attitude in risk management is also highly useful in fields like construction and IT, with complex and dynamic projects. AI risk mitigators, for example, are reported to lessen incidences of project failure by up to 25% (Tanim & Ahmad, 2025). So, AI tools allow project managers to avoid risk traps, improve decision making, and lead to greater chances of project success. The capacity to “de-risk” as they go along represents a more efficient way of doing projects and producing great results.

**3.1.2 AI for Communication and Collaboration**

AI has changed how project teams communicate and collaborate by eliminating time, geographical and workload barriers. AI-enabled platforms, such as Slack and ChatGPT, allow for sharing knowledge and context-sensitive assistance, contributing to better collaboration, communication, and productivity in digital workplaces. (Fahad et al., 2024; Nenni et al., 2024). As a result, these types of AI communication tools could automate much, if not most, of the mundane work of meeting scheduling, follow-up, discussion summaries, and email/status report writing. It frees up team members to do more meaningful and less administrative work. Natural Language Processing or NLP adds another level to these tools, attempting to analyse communications at the team level for sentiment, urgency, intent, etc. Therefore, they highlight and prioritise messages and tasks that require urgent action, so that nothing is overlooked (Tanim & Ahmad, 2025).

AI helps teamwork across time zones and languages in real time. Translation capabilities and smart summarising make it possible to join and/or participate anywhere, including in teams distributed globally. According to Gupta et al. (2024), AI chatbots can also act as virtual assistants in giving answers to questions, troubleshooting small problems, and directing team members toward resources, thereby lessening reliance on human go-betweens and increasing response time. Also, by analysing team behaviour and communication patterns, AI can assist managers in detecting bottlenecks, improving team dynamics and workflows. It may, for instance, highlight that some channels of communication are saturated, while others are unused or that some team members are always getting their responses late (Florea & Croitoru, 2025).

**3.1.3 Automation Tools**

The various activities in project management are also being impacted by AI tools that automate tasks. The automation of administrative work through AI systems to accomplish tasks such as scheduling, tracking project progress, or collections of documents, can allow project managers to concentrate even more and pay attention to higher-level decisions. As seen by the usage of Robotic Process Automation (RPA) and AI-driven task schedulers, AI is already decreasing the burden of administration and making things efficient (Nabeel, 2024; Nenni et al., 2024; Tanim & Ahmad, 2025).

The use of cognitive computing and reinforcement learning paradigms to create AI-based decision support systems enables project managers to understand and make better real-time decisions. Their ability to constantly feedback and change according to new conditions and inputs from the project, ensures that their decision-making is adapted to the project goals and strategies.

**3.1.4 AI for Real-Time Performance Tracking:**

Utilising AI tools, organisations have access to and can monitor data on all of their KPIs in the time, and thus can know the status of a project in real time (Nabeel, 2024; Villazón et al., 2020). With these in-the-moment adjustments, the consumption of resources and the development of the project can also be objectively managed by the project manager, who can at any moment have an overall picture of the project and know if it is deviating from what was originally planned. This type of monitoring can be critical to prevent delays and bottlenecks, something that in industries such as construction or IT can be of utmost importance for a project’s success. A further significant capability of AI in the decision-making process is the capacity to run different project simulations. Deep learning and reinforcement learning algorithms evaluate different project outcomes based on the analysis of past data and risks. These simulations allow project managers to explore different options and select the optimal route for resource allocation, scheduling and budgeting.

Table 1: Overview of AI Tools in Project Management and Their Key Features

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| AI Tool | Key Features/Benefits | Example Tools |
| AI-Powered Project Planning Tools | Higher accuracy in project timelines, reduction of delays, better resource management. | Forecast, Smartsheet (scheduling tool) |
| AI in Risk Management | Proactive risk management, predictive insights, continuous learning, reduction in costly setbacks. | IBM Watson, RiskWatch |
| AI for Communication and Collaboration | Improved team collaboration, efficient communication, real-time language translation, sentiment analysis. | Slack (with AI integration), ChatGPT (Conversational Agents) |
| Automation Tools | Reduced administrative overhead, more focus on strategic decisions, adaptive decision-making. | Robotic Process Automation (RPA), Cognitive computing systems |
| AI for Real-Time Performance Tracking | Real-time monitoring of project health, proactive tracking of KPIs, immediate identification of deviations. | Various AI-powered real-time monitoring tools |

**3.2 AI in Decision-Making**

The use of AI in decision making is likely one of the biggest shifts in how projects are managed, as managers can make decisions based on data instead of gut feelings or previous experience. AI supports better decision-making via predictive analytics, which are models used to predict future trends of projects based on project historical data, and machine learning, which “allow systems to learn from patterns in data to improve decision-making processes over time”.

**3.2.1 Predictive Analytics for Strategic Decisions**

Predictive analytics provided by AI tools can assist project managers in making informed decisions regarding resource allocation, scheduling, and risk management, among other things. AI analyses vast amounts of historical data on past projects to forecast potential problems and challenges, as well as opportunities, thus providing project managers with “foresight” to make decisions. Technologies such as Prophix allow financial executives to gain real-time predictive knowledge of cash availability based on past usage patterns, allowing for planning and proactive prevention of financial problems (BPM Partners, 2025).

**3.2.2 Machine Learning for Dynamic Decision-Making**

One response to this dynamic feature of projects is machine learning algorithms, which help to revolutionise decision making. Different from rule-based project management systems, decision support systems based on machine learning do not use fixed rules; they use a continuous learning process derived from the new data processed. This allows them to be flexible to changes in conditions like project scope, resources and unexpected risks. AiCure uses AI and computer vision technologies to observe patient adherence in real time, specifically during clinical trials. Utilising mobile devices, the platform allows for treatment to be modified in real-time by the researcher based on a visual verification of medication compliance, optimising compliance and ultimately clinical outcomes. It is an example of the potential of AI-based tools to usefully enhance the management of healthcare projects with decision support that is timely and data-based, where non-AI-based tools are unable to provide sufficient support to decision-makers (Bain et al., 2017).

Machine learning ML algorithms have become an integral part of predictive analytics within project management. These applications use AI to Mine historical project data to predict things like cost, time, and resource needs. AI is now being used in tools like Microsoft Project and Asana to predict project delays, analyse risks, and anticipate resource bottlenecks (Tanim&Ahmad, 2025; Ogunbukola, 2024), enabling project managers to address potential problems before they occur and reducing the effects of surprises when they do. AI risk management techniques such as decision tree analysis, regression, and time series analysis enable project managers to predict and control risks before they get out of hand.

Figure 1: Overview of AI in Decision-Making

**3.2.3 Case Studies of AI in Decision-Making**

One example is the application of AI to construction projects, where AI tools are integrated to improve delivery times. Smart scheduling tools, in Asta Powerproject, are helpful in this respect for improving operational efficiency and cost control. One UK building contractor, Kier Group, which is also one of the largest in the U.K., turned to Asta Powerproject to better handle complex build schedules, including the construction of healthcare facilities such as the Tessa Jowell Health Centre. It allowed for planning of material deliveries, workforce, and schedules with Gantt charting and Building Information Modelling (BIM) integration capabilities. This reduced the expensive downtime, improved the communication between subcontractors, and also lowered overhead on the project by using data to help make decisions on logistics and supply chain timing (Elecosoft, 2024).

Similarly, the multinational construction company Skanska found itself unable to provide its projects on time and within cost through conventional means that depended on manual data analysis and subjective interpretations of decisions. To solve this, they deployed a single, integrated data platform, aggregating project data from across many project sources into a single source of truth for real-time insights. Skanska used predictive analyses based on historical data around projects and trends within the industry to proactively flag and mitigate issues before they began. They applied machine learning to create predictive models that would allow for better time prediction of a project, factoring in things like weather patterns, resource availability and other delays. Facilitated more realistic and flexible project timelines. Also, project managers had real-time data on the status, resources and risks of the projects, allowing for data-backed decision making and corrections. Implementing this AI-based, data-heavy model allowed Skanska to allocate resources more effectively and minimise disruptions, leading to better project delivery times. They also set themselves up for success from the outset by investing in data governance practices to ensure their data was high-quality and consistent. They now save a huge amount of cost and use it with more efficiency, putting them at the forefront of AI in the industry (Odejide & Edunjobi, 2024).

**3.2.4 Limitations and Challenges in AI-Driven Decision-Making**

Though there is value for AI in improving decision-making, challenges also exist. The quality and availability of data presents one of the major challenges. AI needs a lot of good data for it to be insightful. Decisions are flawed if biased, incomplete or wrong data are put into the system. Finally, AI’s decisions are difficult to interpret. This could make it challenging for project managers to comprehend the logic of AI recommendations, and thus difficult to trust the AI system.

**3.3 AI in Resource Optimisation**

Being able to effectively manage and improve the resources allocated to each project is an important part of project management; this is especially true for large, complex projects that require multiple groups of people to work together with various stakeholders on interdependent tasks. Effective resource allocations make certain that projects meet their milestones on budget and on time, and to the desired quality. Project management resources encompass financial resources as well as human resources, time, materials, technology and other assets required to execute a project (Pratama et al., 2023; Nabeel, 2024). AI tools augment the management of resources by making better use of resources, wasting less, and matching the skills and capabilities of team members to the needs of a project. The combination of these factors enables project managers to allocate resources effectively and thus enhance project performance.

**3.3.1 AI for Resource Allocation**

AI-based resource management tools help in allocating resources better by getting the right resources to the right tasks at the right time. LiquidPlanner (Nenni et al, 2022) and Smartsheet (Ogunbukola, 2024) are tools that employ predictive algorithms as they take into account existing projects as well as the current use of resources and enable project managers to allocate resources on an as-needed basis. They take into consideration dimensions such as the skillsets of the team members, their availability and deadlines on the kind of tasks to be produced, so that resources can be utilised in the most efficient manner possible. Also, AI can prevent over-/under underallocations, as they can be continuously adjusted according to the progress of the project.

AI tools support optimisation of resources by anticipating the best use of resources, including personnel, equipment, and budget. ML algorithms detect patterns that emerge from analysing historical data on resource consumption, thereby enabling them to offer more accurate predictions of resource requirements. The ability to make such predictions is useful in a project with many stakeholders and variable demand (Uddin et al, 2024).

AI tools can also provide automated resource scheduling. Intelligent task planning considering team member availability and task priority, and deadlines is increasingly supported by AI-augmented scheduling tools like Trello AI through integrations and automation and Monday.com (Nabeel, 2024; Nenni et al., 2024; Ogunbukola, 2024). Trello uses Butler automation and other third-party plugins to create intelligent task recommendations and efficient workflow processes, whereas Monday.com includes built-in automation to assign tasks, identify when resources exceed available time, and synchronise schedules with resource capabilities. This allows for faster decision-making and fewer scheduling bottlenecks when collaborating.

**3.3.2 AI-Driven Forecasting for Resource Needs**

AI solutions are also instrumental in estimating future resource requirements. AI project management systems use predictive models based on various types of data, such as prior performance data, real-time sensor data, task progress data, and data on environmental factors (Sarker, 2021). Past projects, for example, could identify patterns of resource use that manual systems may have missed. These trends can be detected by applying machine learning, via regression or time series forecasting, which facilitates recommendations about future needs of resources and hence helps managers not to fall in the trap of bottlenecking or surplus. The ability to make these forecasts enables project managers to recognise resource shortages and excess resources ahead of time to make necessary changes and not after the fact (Ucar et al., 2024).

Programs like Forecast (Low, 2025) use such AI capabilities to analyse future workload requirements, allowing project managers to determine resource requirements for specific workloads in the future. This minimises the chances of “running late” for lack of resources and “wasting resources”. These models are not strictly trendsetters but curve and adapt to the new conditions of the project as they emerge. Through reinforcement learning, AI applications update their predictions based on real-time input and adapt to unforeseen shifts in scope, deadlines or resource allocation. The ability and knowledge of the learning effect help every team to have accurate resource predictions even in highly dynamic project environments, where traditional learning would find this too difficult to keep up with.

**3.3.3 Real-Time Performance Tracking and Adjustments**

AI technologies are able to digest ongoing data feeds from a variety of project management tools and sources, such as project management tools, IoT sensors, and group communication tools, and thus can track project status in real time (Alahi et al., 2023). Such systems can monitor the status of resource consumption, performance of specific activities or processes, and interruptions, and can produce information regarding the use of resources in real-time. According to this live analysis, resources like human or financial or material resources can automatically be re-oriented by the AI to the parts of the project that need them to be urgent (Rashid & Kausik, 2024).

One of the ways in which AI tools enhance project management is that resource allocations can be adjusted immediately, as opposed to at the next period. In contrast to conventional systems, in which changes are a response to something, artificial intelligence systems simply analyse project data on a constant basis and propose or make changes automatically. AI can, for instance, Austral, handle labour allocations or material reallocation according to actual requirements on the job site, to enable resources to be utilised efficiently. AI tools are able to model various possible distributions of resources in order to help identify optimal distributions. Necessary for this is the ability to automate resource needs based on multiple project parameters – team efficiency and output, material costs, as well as extrinsic variables like weather, which is particularly critical with large projects. For example, workers can be optimised in construction projects by using an AI-based system that interprets data, including weather forecasts, timing of material delivery, and availability of workers to estimate the required labour and modify resource allocation plans (Abioye et al., 2021; Regona et al., 2024).

Also, simulations of scenarios through AI helps project managers to anticipate and minimize risks caused by constraints related to resources. AI can also help in planning contingencies by utilizing scenarios where resources are not available, for instance if there is a labour strike, impact on supply chains or lack of funds, and recommending how to proceed to avoid the risks.

**3.3.4 Case Studies of AI in Resource Optimisation and Allocation in Project Management**

The global engineering and construction company Bechtel applied AI to better allocate skilled labour and materials across several large infrastructure projects. The AI interpreted available resources, projects, and skills to analyse the best path of resources. 20% of the project costs were reduced using this model, and the allocation of resources to projects running simultaneously was more effectively utilised (Garza, 2018; Ghodsian, 2025).

Fluor Corporation has begun using AI project analytics for workforce planning, project execution, and risk reduction in its engineering projects around the world. In conjunction with IBM Watson, Fluor anticipates future labour requirements, identifies the necessary employee expertise for each project, and tracks the health of project schedules for over fifty projects underway and two hundred that have been completed. More than 550 people, on a daily basis, use its AI tools for supply chain and workforce intelligence, it says in its 2023 Integrated Report. These industry trends are reinforced by scholarship that highlights the impact of AI on workforce optimisation. For example, Ayanponle et al. (2022) highlight how productivity and worker satisfaction are enhanced in large projects through the use of AI models for capacity and skill matching, labour forecasting and optimising shift scheduling (Fluor, 2023; Ayanponle et al., 2022).

On top of that, Acciona, a sustainable infrastructure company, used AI to track and project costs of work in real time. The AI flagged potential budget concerns in advance and proposed reallocating resources in order to avoid going over budget. As a result of this effort, they were able to decrease their annual budget overage by 15% and gain more predictability in their finances in construction projects in general (Ghodsian, 2025).

**3.3.5 Benefits and Challenges of AI in Resource Optimisation**

The advantages of resource optimisation by AI include greater efficiency and cost savings, as well as mitigation of delays in projects. AI tools also provide support in making sure that resources are allocated and utilised well, thus avoiding both over- and under-use, which leads to delays and budget excesses. Though also challenges to be dealt with. There are challenges, such as the difficulty of incorporating AI into legacy project management systems. The ability to integrate AI tools into the workflow of an organisation may be a challenge for many organisations. Plus, AI can only be effective for the optimisation of resources if the data fed into the system is high quality and accurate. Poor quality data will lead AI models to generate erroneous predictions or suggestions on resource allocation.

Figure 2: Overview of AI in Resource Optimisation

**4. CONCLUSION**

Artificial Intelligence and its application in project management have transformed project planning, execution and control, making them more efficient, intelligent and resource optimising. AI tools provide project managers with a new type of data-driven information that enables a better forecast of projects’ trajectories, resource allocation and risk management. A major finding of this review is the impact of leveraging AI technologies such as predictive analytics, machine learning and natural language processing in the advancement of project management procedures. AI technology has mostly shown results in project planning, scheduling, forecasting, etc., as they are better at it with higher accuracy and less human error. For example, AI-supported project planners use past data to create predictions such as possible bottlenecks, resource shortages, and project delays. With these tools, project managers are updated in real time and can use the information to decide what adjustments to make to project schedules. Likewise, artificial intelligence allocations have been found as useful to ensure that resources are allocated to tasks at what time to make projects more efficient and less wasteful.

While improving the management of resources, AI has also made efforts in the management of risk. Risk assessment tools like IBM Watson and RiskWatch apply machine learning algorithms to forecast where possible risks might lie and the means of their mitigation. As a means to proactively manage project risk, this has resulted in fewer project and budget failures and has become instrumental in large projects such as construction and IT, among other areas.

The future possibilities for AI in project management are great. Future development of AI technology will likely result in even smarter tech that combines machine learning, real-time data and scenario simulations to improve decision-making and resources. On the other hand, large-scale AI adoption has its challenges as well. Concerns around data quality, transparency of systems, and trust in the outcomes of AI’s project management and managerial decision-making- processes need to be overcome. In addition, even with the multiple advantages that AI tools could provide, PMs should never totally displace human input, and therefore AI should be seen as a complementary ally rather than a substitute.

Future studies should consider the ethical dimensions of project management from the perspective of AI, particularly with regard to data privacy and accountability of decisions. Also, possible future research can be directed to the longitudinal effect of AI in terms of successful project outcomes and its potential to develop innovation and collaboration in the project team. The future of AI in project management is optimistic, and as technologies progress, it is likely to impact project management by making projects more efficient, sustainable, and economical throughout industries.

**COMPETING INTERESTS DISCLAIMER:**

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

Option 2:

Author(s) hereby declare that generative AI technologies such as Large Language Models, etc. have been used during the writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

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References

1. Korhonen, T., Jääskeläinen, A., Laine, T., & Saukkonen, N. (2022). How performance measurement can support achieving success in project-based operations. *International Journal of Project Management*, *41*(1), 102429. <https://doi.org/10.1016/j.ijproman.2022.11.002>
2. Regona, M., Yigitcanlar, T., Xia, B., & Li, R. Y. M. (2022). Opportunities and adoption Challenges of AI in the construction industry: A PRISMA review. *Journal of Open Innovation Technology Market and Complexity*, *8*(1), 45. <https://doi.org/10.3390/joitmc8010045>
3. Nenni, M. E., De Felice, F., De Luca, C., & Forcina, A. (2024). How artificial intelligence will transform project management in the age of digitization: a systematic literature review. *Management Review Quarterly*. <https://doi.org/10.1007/s11301-024-00418-z>
4. Kaufmann, C., & Kock, A. (2022). Does project management matter? The relationship between project management effort, complexity, and profitability. *International Journal of Project Management*, *40*(6), 624–633. <https://doi.org/10.1016/j.ijproman.2022.05.007>
5. Goswami, V. (2024). The Effectiveness of Risk Management in Project Success. Retrieved from <https://digitalcommons.harrisburgu.edu/dandt/52>
6. Abdelalim, A. M., Salem, M., Salem, M., Al-Adwani, M., & Tantawy, M. (2024). An analysis of factors contributing to cost overruns in the global construction industry. *Buildings*, *15*(1), 18. <https://doi.org/10.3390/buildings15010018>
7. Adepu, N., Kermanshachi, S., Pamidimukkala, A., & Loganathan, K. (2023). Analyzing the factors affecting construction project schedules amidst COVID-19 pandemic. *Project Leadership and Society*, *4*, 100100. <https://doi.org/10.1016/j.plas.2023.100100>
8. Daoud, A. O., Hefnawy, M. E., & Wefki, H. (2023). Investigation of critical factors affecting cost overruns and delays in Egyptian mega construction projects. *Alexandria Engineering Journal*, *83*, 326–334. <https://doi.org/10.1016/j.aej.2023.10.052>
9. Levin, S. P., & Levin, M. (2019). Managing Ideas, people, and Projects: Organizational tools and Strategies for Researchers. *iScience*, *20*, 278–291. <https://doi.org/10.1016/j.isci.2019.09.017>
10. Pan, Y., & Zhang, L. (2021). Roles of artificial intelligence in construction engineering and management: A critical review and future trends. Automation in Construction, 122, 103517.
11. Darko, A., Chan, A. P., Adabre, M. A., Edwards, D. J., Hosseini, M. R., & Ameyaw, E. E. (2020). Artificial intelligence in the AEC industry: Scientometric analysis and visualization of research activities. Automation in Construction, 112, 103081.
12. Tian, K., Zhu, Z., Mbachu, J., Ghanbaripour, A., & Moorhead, M. (2025). Artificial intelligence in risk management within the realm of construction projects: A bibliometric analysis and systematic literature review. *Journal of Innovation & Knowledge*, *10*(3), 100711. <https://doi.org/10.1016/j.jik.2025.100711>
13. Prasetyo, M. L., Peranginangin, R. A., Martinovic, N., Ichsan, M., & Wicaksono, H. (2024). Artificial Intelligence in Open Innovation Project Management: A Systematic literature review on technologies, applications, and integration requirements. *Journal of Open Innovation Technology Market and Complexity*, 100445. <https://doi.org/10.1016/j.joitmc.2024.100445>
14. Kolbjørnsrud, V., Amico, R., & Thomas, R. J. (2016). How artificial intelligence will redefine management. Harvard Business Review, 2(1), 3-10.
15. Felicetti, A. M., Cimino, A., Mazzoleni, A., & Ammirato, S. (2024). Artificial intelligence and project management: An empirical investigation on the appropriation of generative Chatbots by project managers. *Journal of Innovation & Knowledge*, *9*(3), 100545. <https://doi.org/10.1016/j.jik.2024.100545>
16. Adamantiadou, D. S., & Tsironis, L. (2025). Leveraging Artificial intelligence in Project Management: A Systematic review of applications, challenges, and future directions. *Computers*, *14*(2), 66. <https://doi.org/10.3390/computers14020066>
17. Salimimoghadam, S., Ghanbaripour, A. N., Tumpa, R. J., Rahimi, A. K., Golmoradi, M., Rashidian, S., & Skitmore, M. (2025). The rise of Artificial intelligence in project Management: A Systematic literature review of current opportunities, enablers, and barriers. *Buildings*, *15*(7), 1130. <https://doi.org/10.3390/buildings15071130>
18. Ayeni, O. (2025). Advanced multi-phase project management frameworks: Optimizing AI-driven decision-making, risk control, and efficiency. International Journal of Research Publication and Reviews, 6(3), 330–348. <https://doi.org/10.55248/gengpi.6.0325.1117>
19. Vergara, D., Del Bosque, A., Lampropoulos, G., & Fernández-Arias, P. (2025). Trends and applications of Artificial intelligence in project management. *Electronics*, *14*(4), 800. <https://doi.org/10.3390/electronics14040800>
20. Odejide, O. A., & Edunjobi, T. E. (2024). AI in project management: Exploring theoretical models for decision-making and risk management. Engineering Science & Technology Journal, 5\*(3), 1072–1085. <https://doi.org/10.51594/estj/v5i3.959>
21. Barcaui, A., & Monat, A. (2023). Who is better in project planning?Generative artificial intelligence or project managers? *Project Leadership and Society*, *4*, 100101. <https://doi.org/10.1016/j.plas.2023.100101>
22. Low, G. (2025). *Forecast project management software in-depth review 2025*. The Digital Project Manager. <https://thedigitalprojectmanager.com/tools/forecast-review/>
23. Ogunbukola, M. (2024). *The impact of artificial intelligence on project management*. MDPI Systems, 12(3), Article 174. <https://doi.org/10.3390/systems12030174>
24. RiskWatch. (2023). *RiskWatch: AI-driven risk management solutions*. <https://www.riskwatch.com/>
25. Tanim, S. H., & Ahmad, M. S. (2025). AI driven Strategic Decision-Making in IT project management: enhancing risk assessment, cost control, and efficiency. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.5202585>
26. Fahad, S. A., Salloum, S. A., & Shaalan, K. (2024). *The role of ChatGPT in knowledge sharing and collaboration within digital workplaces: A systematic review*. In A. Al-Marzouqi et al. (Eds.), *Artificial Intelligence in Education: The Power and Dangers of ChatGPT in the Classroom* (pp. 259–282). Springer. <https://doi.org/10.1007/978-3-031-52280-2_17>
27. Gupta, R., Nair, K., Mishra, M., Ibrahim, B., & Bhardwaj, S. (2024). Adoption and impacts of generative artificial intelligence: Theoretical underpinnings and research agenda. *International Journal of Information Management Data Insights*, *4*(1), 100232. <https://doi.org/10.1016/j.jjimei.2024.100232>
28. Florea, N. V., & Croitoru, G. (2025). The impact of artificial intelligence on communication dynamics and performance in organizational leadership. *Administrative Sciences*, *15*(2), 33. <https://doi.org/10.3390/admsci15020033>
29. Nabeel, M. Z. (2024). *AI-enhanced project management systems for optimizing resource allocation and risk mitigation: Leveraging big data analysis to predict project outcomes and improve decision-making processes in complex projects*. *Asian Journal of Multidisciplinary Research & Review, 5*(5), 53–65.
30. Villazón, C. C., Pinilla, L. S., Olaso, J. R. O., Gandarias, N. T., & De Lacalle, N. L. (2020). Identification of Key Performance Indicators in Project-Based Organisations through the Lean Approach. *Sustainability*, *12*(15), 5977. <https://doi.org/10.3390/su12155977>
31. BPM Partners. (2025, January). *In the news: Prophix One FP&A Plus sets a new benchmark for financial performance management*. <https://www.bpmpartners.com/wp-content/uploads/2025/01/IntheNews011425.pdf>
32. Bain, E. E., Shafner, L., Walling, D. P., Othman, A. A., Chuang-Stein, C., Hinkle, J., & Hanina, A. (2017). Use of a novel artificial intelligence platform on mobile devices to assess dosing compliance in a phase 2 clinical trial in subjects with schizophrenia. *JMIR Mhealth and Uhealth*, *5*(2), e18. <https://doi.org/10.2196/mhealth.7030>
33. Elecosoft. (2024). *Asta Powerproject delivers best-in-class results for Kier Construction*. <https://elecosoft.com/stories/asta-powerproject-delivers-best-in-class-results-for-kier-construction/>
34. Pratama, I. N., Dachyar, M., & Pratama, N. R. (2023). Optimization of resource allocation and task allocation with project management information systems in information technology companies\*. \*TEM Journal, 12(3), 1814–1824. <https://doi.org/10.18421/TEM123-65>
35. Uddin, S., Yan, S., & Lu, H. (2024). Machine learning and deep learning in project analytics: methods, applications and research trends. *Production Planning & Control*, 1–20. <https://doi.org/10.1080/09537287.2024.2320790>
36. Rutherford, J. (2024, October 8). Mastering task organization with Trello AI tools. Todopedia. <https://todopedia.com/trello-ai-organization>
37. Sarker, I. H. (2021). Machine learning: algorithms, Real-World applications and research directions. *SN Computer Science*, *2*(3). <https://doi.org/10.1007/s42979-021-00592-x>
38. Ucar, A., Karakose, M., & Kırımça, N. (2024). Artificial intelligence for Predictive maintenance Applications: key components, trustworthiness, and future trends. *Applied Sciences*, *14*(2), 898. <https://doi.org/10.3390/app14020898>
39. Alahi, M. E. E., Sukkuea, A., Tina, F. W., Nag, A., Kurdthongmee, W., Suwannarat, K., & Mukhopadhyay, S. C. (2023). Integration of IoT-Enabled Technologies and Artificial intelligence (AI) for Smart City Scenario: recent advancements and future trends. *Sensors*, *23*(11), 5206. <https://doi.org/10.3390/s23115206>
40. Rashid, A. B., & Kausik, M. A. K. (2024). AI Revolutionizing Industries Worldwide: A comprehensive overview of its diverse applications. *Hybrid Advances*, *7*, 100277. <https://doi.org/10.1016/j.hybadv.2024.100277>
41. Abioye, S. O., Oyedele, L. O., Akanbi, L., Ajayi, A., Delgado, J. M. D., Bilal, M., Akinade, O. O., & Ahmed, A. (2021). Artificial intelligence in the construction industry: A review of present status, opportunities and future challenges. *Journal of Building Engineering*, *44*, 103299. <https://doi.org/10.1016/j.jobe.2021.103299>
42. Regona, M., Yigitcanlar, T., Hon, C., & Teo, M. (2024). Artificial intelligence and sustainable development goals: Systematic literature review of the construction industry. *Sustainable Cities and Society*, *108*, 105499. <https://doi.org/10.1016/j.scs.2024.105499>
43. Garza, A. (2018). *Sequencing made simpler: Bechtel is turning to artificial intelligence for megaprojects*. *PM Network, 32*(11), 14.
44. Ghodsian, N. (2025). Top 8 AI in Project Management Case Studies (2025) - Neuroject. <https://neuroject.com/ai-in-project-management-case-studies/>
45. Ayanponle, L., Okatta, C. G., & Ajiga, D. (2022). *AI-powered HR analytics: Transforming workforce optimization and decision-making*. *International Journal of Science and Research Archive, 5*(2), 338–346. <https://doi.org/10.30574/ijsra.2022.5.2.0057>
46. Fluor Corporation. (2023). *2023 Integrated Report*. <https://flipbook.fluor.com/ir-2023/43>
47. Okine, J. (2024). Study on Implementation of Concepts of Project Management Theories in Delivery of Projects in Ghana. Journal of Economics, Management and Trade, 30(5), 22–32. <https://doi.org/10.9734/jemt/2024/v30i51207>

48. Stone, C. (2023). Challenges and opportunities of completing successful projects using Earned Value Management. Open Journal of Business and Management, 11(2), 455–470.

49. Vergara, d., del bosque, a., lampropoulos, g., & fernández-arias, p. (2025). Trends and applications of artificial intelligence in project management. Electronics, 14(4), 800. [Https://doi.org/10.3390/electronics14040800](https://doi.org/10.3390/electronics14040800)

50. Vincent, e., & ernest, e. E. (2025). Impact of project management information system (pmis) on project management practices in delta state, nigeria. Asian research journal of arts & social sciences, 23(5), 143–152. [Https://doi.org/10.9734/arjass/2025/v23i5689](https://doi.org/10.9734/arjass/2025/v23i5689)