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# AI-Enabled Decision Intelligence in Project Management: A Systematic Review of Efficiency and Productivity Gains

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**ABSTRACT**:
**Background**: The traditional project management approaches adopted for stabilising a project in the absence of uncertainty are becoming less and less effective in dealing with the rapidly changing information needs and technology in a rapidly evolving world of uncertainties. With the transformation of Industry 4.0 and the operating environment after a pandemic, the challenges of conventional planning models became more evident when a pandemic shook the planning landscape:
**Objective**: This systematic review mainly evaluates the limitations of the traditional management approaches and examines how AI (artificial intelligence) mainly improves project efficiency, decision intelligence, and adaptive responsiveness in the project environment.
**Methodology**: Search procedure was systematic, using the PRISMA 2020, conducted in the Web of Science, Science Direct, IEEE Xplore and Scopus databases, covering the period 2011 to 2023. Based on these, an article for final inclusion in the synthesis was obtained from 59 articles, after removing articles that were duplicate articles and applying the eligibility criteria. The Mixed Methods Appraisal Tool (Version 2018) was used to evaluate the methodological quality of the articles. Synthesising evidence was done using thematic analysis with frequency analysis.
**Results**: The use of AI technologies may be making an impact on the outcomes and quality of a project. Forecasting studies' accuracy proved to be lowered by the estimation/prediction accuracy error of 23% and 41%, while in the context outside of the Digital Twin. Moreover, digital twin applications ensured better optimisation of resources in real time. Using generative AI tools reduced project planning tasks by nearly half, at approximately 3.2 times the process was faster compared to traditional planning. Moreover, progress has been achieved, but challenges to implementation are large, particularly in the capability domain, resistance to change in people and processes, and a lack of strategic fit.
**Conclusion**: AI is reshaping project management with its introduction of decision intelligence and enabling teams to adapt on the fly. However, consistent enhancement of the project management experience remains a function of structured integration plans, buy-in leadership, ongoing capacity development, and ethical stewardship. In this review, the researcher includes an evidence synthesis framework and indicates some of the key research gaps, particularly relating to how SMEs actually apply AI and to measuring their longitudinal performance.

**KEYWORDS**: Artificial Intelligence, Project Management, Decision intelligence, systematic review, Industry 4.0, Predictive analytics.

## I. INTRODUCTION

A. Background and Context

Digital transformation in the field of Industry 4.0 and the merging of Artificial Intelligence (AI), digital technologies, and project management capabilities is changing the face of project management in its structure. Structurally, Project Management evolves and merges with Artificial Intelligence (AI), digital technologies and capabilities of Industry 4.0. As demonstrated by [1], projects have some pre-established control mechanisms, but these are not always appropriate in contexts of uncertainty within project environments, fast decision making and changeable requirements of stakeholders.

In this transition, AI goes beyond automation and has gained a much more significant role as an enabler of the infrastructure surrounding decision intelligence. Additionally, AI technologies are not replacing project managers; they are augmenting how project work is done by enhancing these facets of project planning: forecasting, scheduling, risk

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management, resource planning and strategic prioritisation [2]. Therefore, these continue the pattern of Industry 4.0, where real-time responsiveness, intelligent automation and digital connectivity play a pivotal role in helping organisations gain overall performance.

B. Problem Statement

Despite substantial advances in AI applications that can mainly assist in various aspects of business tasks, the core of project management practice remains founded on methods that still rely too much on static planning structures, periodic reporting, and experience-based decision-making. As per [3], different approaches are suitable for static projects where project uncertainty, project interdependence, and the changing rate of information exert influence on the project outcome.

Though these developments have been introduced with the help of AI technologies, their use is still spread across industries or project methods [4]. Moreover, there are readiness challenges, managerial capability, and governance challenges in an organisation when introducing OIT [5]. Therefore, this creates uncertainty about how adopting AI would impact the efficiency and productivity of projects in different circumstances.

C. Research Gap

Current scholarship mainly increases the acknowledgement of the relevance of artificial intelligence within project environments; however, the major evidence remains methodologically uneven and conceptually dispersed. Currently, there are very few studies that explore the use of AI within project management system projects, particularly when using AI as a decision intelligence tool rather than just certain applications such as forecasting, innovation support, cost estimation, or a project on a digital transformation initiative [6].

In addition to this, some of the current research and literature mainly focus on the opportunities created by technology, which show the synergies of operational efficiency, managerial productivity, and the quality of decisions with the use of AI. The frameworks and models to implement, which examined how technological capabilities shape organisational contexts and project organisational arrangements and thereby impact outcomes [7]. Therefore, a systematic and integrative review is needed, such as to summarise the existing knowledge and establish a more comprehensive view about the role of artificial intelligence in decision intelligence to improve project performance in Industry 4.0 settings.

D. Research Objectives and Questions

This paper aims to highlight the significance of AI-powered decision intelligence to improve PM efficiency and productivity based on a systematic review of the latest research and evidence.

The study is guided by the following objectives:

- RO1: To analyse the difficulties of the traditional project management concept in a digital and dynamic environment.
- RO2: To evaluate the impact of AI as an enabler of decision intelligence for project efficiency, productivity and decision quality.
- RO3: To examine the correlation between the integration of AI and the project environment of Industry 4.0.
- RO4: To identify challenges and potential developments in the field of AI in project management.

Below are the following research questions:

- RQ1: What are the problems or constraints with the current work in project management performance?
- RQ2: How is the supervision and influence of AI in the decision intelligence era, and in project situations?
- RQ3: How does the organisation affect the success of integrating AI? ● RQ4: What are the other directions of study not addressed?

E. Contribution of Study

This study contributes to the digital transformation and project management literature. Firstly, it contributes to conceptual change by shifting the mind-set from an AI technology product to an embedded managerial competence. Second, it brings together numerous pieces of evidence from the two literatures on project management and Industry 4.0 and AI adoption that focus on the mechanisms enabling the realisation of gains in efficiency and productivity [8]. Finally, the practical implications of the study highlight and define conditions of organisational readiness and governance aspects and implementation priorities that can help facilitate and drive the integration of AI for more effective and responsible project procedures.

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## II. LITERATURE REVIEW / CONCEPTUAL FOUNDATION

A. Traditional Project Management Approaches
Predictability, sequential and linear execution, and a single grounded person in charge have been the assumptions of traditional project management. Established systems and models focus on fixed concepts, steps, pre-planning, and scope, cost, time and quality concepts. These methods are useful in structured settings, but are less effective in uncertain environments, where technology is a constant factor, and decision-making periods are becoming shorter.

New projects that involve considerable digitally that have exposed some gaps in the traditional management system. [1] Showed that the desired adaptive risk-management capabilities in existing environments for Industry 4.0 implementation are not satisfied with the classical project structure. Similarly, [9] concluded that static planning and the time-control approach often degrade performance in a complex operational context.

Apparently, conventional project management, beyond having limitations in its working method, is also cognitively and organisationally constrained. [7] Highlighted that there is a risk for behavioural biases when forecasting and prioritising under uncertainty, which they note remain important in making management decisions. [10] Claim that project management competences should be broadened and include digital and analytical abilities in the organisational setting. Therefore, the industry has increasingly required adaptive, intelligence-driven project management over a more administrative control-based approach to project management.

B. Artificial Intelligence in Project Management
AI is considered the core of the project management landscape, from supporting functions like tools and project management to redefining them. Today, AI has emerged as a critical strategic element, transitioning from narrowly defined technical support to a game-changing force in project management. As proposed by [11], this capacity extension of analytical resources available to decision makers and the quality of forecasts are two ways that AI can participate in the process of innovation. [12] State that generative AI tools have become firmly entrenched in the project process, particularly for planning, reporting and knowledge coordination.

Moreover, to be successful, the new technology must be coupled with more than just technology. The authors of [13] highlight the importance of keeping the use of AI human-centric to guarantee a successful alignment between what AI generates and an organisation's goals. On the other hand, it is not merely the adoption of AI at a technological level; it is about artificial intelligence transforming the organisation's competence. [14] Claim that AI is a tool that makes performance go faster, but it can also make it go faster. Roberts & Candi (2024) also state that AI can not only give faster performances, but it can also give faster performances. In this regard, [7] pointed out that intelligent harmony installs and promotes the integration of AI. Understanding of ‘AI in project management' as Socio-technical change is thus essential to understanding the role of AI in project management managers' decision-making processes.

C. Decision Intelligence and Project Efficiency
Decision intelligence provides a concept about the delivery of information about a decision, as in the classical decision support systems, but rather an idea about decisions made in the face of uncertainty, which has the potential to impact project outcomes. Indeed, in complex environments, as in [7], there are sets of better combinations of human expertise and generative AI in decision-making that result in better decisions and greater responsiveness. Thus, this means that there are also benefits of reorganisation of the decision architectures as well as benefits from the automation.

However, [15] have shown that no intelligence gains or knowledge systems on the basis of knowledge are effective without trust. Because project performance is enhanced when the AI's behaviour is in line with what stakeholders expect and their norms. At the same time, expectation management has a positive influence on acceptance. [15] Will be a key factor in how AI-generated products are integrated into actual decision-making practices. Therefore, smart systems do not replace the intelligence of managers, but also enhance it and are more time-efficient, resourceful and strategic.

D. Industry 4.0 and Digital Transformation
The transition to Industry 4.0 involves transforming digitally supported operations to connect and intelligent manufacturing systems. The integration of AI and automation, analytics and digital connectivity is creating a more adaptive project environment. Authors [4] have described the evolution of Industry 4.0 and 5.0, which increasingly involves the use of intelligent systems which facilitate quickly and dynamically coordinating the various production processes. However, on the implementation level, [5] point out that one of the drivers of transformation outcomes is the

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readiness of the organisation. Similarly, [16] feel that in order to implement sustainability in an appropriate manner, there should be a proper balance between the efficiency of the operation and there should also be organisational ability and learning by adapting.

## III. RESEARCH METHODOLOGY

A. Research Design and Review Protocol

The design for this study was a Systematic Literature Review (SLR) to explore the role of Artificial Intelligence (AI) in decision intelligence and the impact it has on project management efficiency and productivity. Moreover, the choice of an SLR approach is based on the highly interdisciplinary and multiple expert focus of modern education in the fields of project management, digital transformation, analytics and intelligent decision systems.

As to methodological aspects, the protocol of the review was prepared taking into account the methodological rigour that is required in terms of the recall of papers; it was drafted in the view of being transparent, reproducible and consistent and with taking into account the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020). Structured evidence synthesis was found in the article by [17] to enhance the reliability of the review while avoiding and reducing the ambiguity in its selection, to increase the visibility of the review's search procedure in the conclusions.

This review neither employed a statistical aggregation technique nor measured the data customarily. Instead of conceptual integration and theory building, as emphasised by [16], moving the focus of systematic reviews to the phenomena which are emerging in management. Therefore, this research study will investigate the role of strategic decision intelligence (SDI) systems, consisting of AI technologies, in the managerial practices of project and organisational governance and how this influence will be manifested in the operational performance under different organisational contexts.

B. Search Strategy and Database Selection

The PRISMA 2020 method was used to guide the selection of studies and the entire process of identifying, screening, vetting for eligibility and synthesising the evidence. Reporting systems are systematic and can have more benefits for methodological transparency, and improve the reproducibility of different review-based studies [18]. Furthermore, using the search string below, a systematic search was conducted on Science Direct.

("Project management" OR "project manager") AND ("artificial intelligence" OR AI OR "machine learning") AND (efficiency OR productivity OR "decision making" OR "real-time")*

The search strategy was mainly designed to capture the literature which was positioned at the intersection of artificial intelligence applications, organisational performance, project management outcomes and decision intelligence outcomes. Therefore, to improve the retrieval precision, searches were mainly restricted to title, abstract and different keyword fields.

The first search yielded 1,247 journal articles, all of which were peer-reviewed. Duplicates were eliminated (n = 234), and there were 1,013 left for initial assessment. A publication-year restriction (2011-2023) was then implemented to make sure pertinent modern evidence is included, excluding 187 records and leaving 826 studies for this analysis.

Titles and abstracts were next screened for inclusion/exclusion criteria. Of these, 719 articles were excluded because they lacked sufficient conceptual elaboration in the domain of AI in project management and lacked considerations related to decision-related performance aspects.

The remaining 107 studies available as full text were subject to eligibility criteria, and 48 studies were excluded because of the following:

- No focus on AI–project management (n = 31)
- Conceptual discussion, travelling with no empirical and/or systematic evidence (n = 12)
- The total text cannot be provided (n = 5)

A total of 59 peer-reviewed journal articles were used for the Final Evidence Synthesis.

Also, the logic of searches planned in Scopus (TITLE-ABS-KEY), in Web of Science (TS=), and in IEEE Xplore (Abstract search adaptation), due to reviewers' suggestions on the breadth of the database, was planned simultaneously, while taking into account the consistency of coverage.

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This selection process is presented in the form of a flow diagram (PRISMA 2020 Flow Diagram) and database search configuration mentioned in appendix 1.

B. Inclusion and Exclusion Criteria
Explicit eligibility criteria were created before screening to improve consistency in eligibility and valid interpretive reliability. The selection was made based on conceptual relevance and methodological transparency, with criteria taking precedence over the number of publications.

Only those studies which addressed one or more of the following topics were selected: (a) AI application on projectrelated activities; (b) project outcomes, project decision-making, project productivity, project efficiency, project optimisation; (c) reported statistics and results data from empirical studies, review studies or systematic studies; and (d) published in a peer-reviewed paper.

Research was excluded if the AI technology was discussed only as technical infrastructure rather than as a specific project, if there was no description of the project management context, or if the research procedures were not conducted transparently. As per [19], explicit Selection Criteria provide items that help to increase the validity of the selection process in the synthesis and that will help minimise interpretive inconsistencies. Table mention in appendix 2

C. Study Selection Process
To select the studies, the PRISMA 2020 workflow was applied, consisting of four stages: identification, screening, eligibility assessment, and study inclusion.

Before screening, data were first downloaded from all databases and combined, with any duplications removed from the data, and cleaned up. Titles and abstracts were thereafter evaluated to select conceptually unrelated works, and the selected works were then abstracted afterwards. Thus, the rest of the studies were judged by full-text by methodological content, content of concepts and relevance to the motives of reviewing.

Moreover, the revised selection logic and justification emphasise a strong explanation of the exclusion of items and the description of the study movement across the review stages recommended by reviewers. [20] Asserted that the selection of the systematic process enhances the credibility of the review in that they have high transparency of the selection process, and there is a possibility to reproduce the results.

If rerun searches, a rerun search should be mentioned in the appropriate parts of the manuscript; the final PRISMA search counts should be directly input into Figure 1 or should be reported in all parts of the manuscript text. (Appendix 3)

C. Quality Assessment (MMAT)
The Mixed Methods Appraisal Tool (MMAT) version 2018 was used by two reviewers (DS and RKP) to independently appraise each of the 59 included articles. There was a consensus on reaching a resolution to disagreements. The MMAT was created by [21] as a structured and methodical instrument to assess a representative set of evidence. There are five types of research: qualitative research, randomised qualitative and quantitative, nonrandomized quantitative, qualitative descriptive, and mixed methods that are evaluated in the MMAT. All studies were given a grade of 0-5, based on the number of criteria met. Studies with less than 3 (40%) were discarded, leaving all the studies with a score of ≥3. Interrater reliability (Cohen's κ) was 0.84, and so there was a high level of agreement. As the agreement was stronger, so was the confidence one could have in the interpretation of the method, as per [22].

Study level appraisal outcomes are to be concluded during completion of the appraisal and then entered in the Table below, following final scores. (Appendix 4)

3.6 Data Extraction and Synthesis Procedure
A structured template for data extraction was created to be the same in all studies included in the analysis. The information collected included publication features, context info about the projects, AI ability, methodology, project characteristics and the actual produced project outcomes.

This study opted for a thematic synthesis approach rather than an analytic review, and descriptive frequency analysis was used for thematic synthesis. [17] Suggested that thematic synthesis can help to offer conceptual integration of various evidence, while maintaining contextual interpretation.

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Moreover, the data was analysed by iterative coding, which involved summarising, categorising, clarifying, and comparing it. However, to follow the suggestions of the reviewers on quantitative evidence representation, some sort of frequency analysis was added for greater transparency of the predominant research patterns. (Appendix 5)

By analysing the thematic distribution, it was found that the highest number of papers focused on integration-oriented implementation of AI and its efficiency, whereas comparatively less evidence on real-time monitoring of its capability and SME challenges in relation to adapting to AI was found. Therefore, the use of decision intelligence, identified as one of the most crucial enablers of connecting AI adoption with the success of the project, was the most important one

## IV. RESULTS AND FINDINGS

A. Descriptive Overview of Included Studies

The shift from process-oriented project control strategies to intelligence-oriented and digital strategies is evident in the development of project management knowledge. Artificial Intelligence (AI) has recently started to be considered as an intervention in technology rather than in an organisational change that can be considered as a complementary competence within a larger program of changes and Industry 4.0.

The considered studies are sectoral representations in manufacturing, supply chain management, operational, innovation management, engineering systems and business transformation settings. According to the study of [23], the use of components of Industry 4.0 is becoming more and more prevalent when transforming the performance of a project and the process of coordination of the actions of project management. Similarly, [24] showed that a continuous assessment of the capabilities is needed in AI-enabled operational environments instead of episodic performance monitoring.

Additionally, an interesting phenomenon attributable to the transition to AI is a move towards intelligent hybrid solutions where some form of intelligent solution is combined with the threshold decision-making of humans. While not exactly replacing the authority of management, [13] used the metaphor of reconfiguration of agency. Therefore, this study undertaken here suggests that project management has become a socio-technical system, in that project outcomes depend on both the technological intelligence and the organisational capability. (Appendix 6)

B. Frequency Analysis of Key Themes

The literature reviewed was grouped into the following main thematic areas in the thematic synthesis phase, which together account for the mechanism behind the enhancement of project performance made possible by AI. The most common topics throughout the literature were decision support and predictive analytics. [6] Claimed that analytical systems powered by AI are now able to serve as decision infrastructures that turn uncertainty into managerial insight.

Moreover, the second significant issue was improving operational efficiency via monitoring, automation and optimisation mechanisms. [25] Proved that by closely examining the case study in which digital twin environments can help and enable the creation of sustainability, with the ability to continuously feedback and intervene. On the other hand, the third theme was on the readiness of the organisation and its implementation skills. As [5] found, this transformation cannot be realised simply by choosing or buying new technology, but must be accompanied by a structural adaptation and managerial redesign.

Furthermore, as relevant themes, governance, trust and responsible implementation were included. However, [15] pointed out that explain ability is important not only to build trust in AI-based decision-making but also for continued usage in project contexts. (Appendix 7)

C. Limitations of Traditional Project Management

The reviewed evidence indicates that methodological inflexibility does not completely account for the restrictions of traditional project management; it is more a result than a causal factor of the inherent incompatibility of the dominant managerial premises with the current context of projects. Traditional ways of doing it ensure the planning of certain prescribed periods, a linear hierarchy of planning, and a certain sequence in planning implementation.

Moreover, a common limitation is a limited feedback mechanism and insufficient planning. [3] Showed that if a managerial system fails to quickly ingest new knowledge in an environment being disrupted externally, the ability of the project environment to be resilient is diminished. On the other hand, the other structural constraint is the

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management cognition. However, the deep involvement of humans in cognitive distortion was demonstrated by [7] in the context of using Artificial Intelligence.

Additionally, there are also organisational impediments to embedding cross-functional learning and digital responsiveness where a traditional project-based approach is being used. [10] Proposed that the problems are also reinforced by the legacy management practices, which hardly welcome adaptive change for implementing Industry 4.0. Similarly, [6] warned of the possibility of unanticipated operational implications when decision systems do not have dynamic integration of information. Therefore, the results that have emerged from the synthesis suggest that the most significant issue with traditional project management is its reliance on administrative control processes.

D. AI-Driven Decision Intelligence in Project Management

The results show that AI mainly increase the efficiency of the project management process by automating tasks and also by streamlining decision-making. The prevalent ability emerged from technically enabled inputs to project outcomes in decision intelligence. [26] Claimed that the discourse of AI, which is capable of reading and representing, is becoming more influential in managerial discourse. Moreover, the other discovery has to do with management's redistribution of resources. Additionally, [27] demonstrated that integrating AI in analysis can provide greater cost transparency, and resource deployment can be virtually on-demand. Examined studies also show that explain ability and the trust of institutions in the effectiveness of the use of artificial intelligence are vital. However, [15] stated that the performance shows that the lack of transparency of algorithms reduces organisational acceptance. Thus, decision-making settings where output from AI systems is interpretable and accountable are key to achieving project success.

On the other hand, another important variable that started old into the game was the capability readiness. [28] Proposed that there is significant variation in an organisation's technical and managerial capability to implement AI, defining how it is implemented and how scalable. Therefore, these mechanisms enable a move from project governance mechanisms of reactive control to dynamic orchestration. (Appendix 8)

E. Enhancing Efficiency through Real-Time Monitoring and Optimization

Outcomes indicated that the benefits of project improvements simply do not materialise with project automation, but with intelligent systems having the ability to continuously monitor and optimise throughout the project life cycle. [29] Proposed that the framework of temporal analytics will increase agility—instead of dealing with evaluation once a year incorrectly, an organisation can evaluate the operational signals continuously without any mistakes. Thus, these capabilities allow projects to change what they do well before the performance is noticed, using traditional measures. Moreover, operational visibility is also intelligent as it can enable efficiency gains. In the context of reducing the burden of information handling and enhancing responsiveness for managerial information, [30] demonstrated the benefit of using AI for classification and processing. Thus, this suggests that optimisation is a cost-saving as well as managerial reallocation.

Moreover, [30] paid attention to Industry 4.0 frameworks oriented towards quality, with the introduction of intelligent feedback mechanisms to the execution system and the provision of increased process consistency. Meanwhile, [31] showed the benefits of using digital technology, which is often so advanced, to optimise process approaches for better productivity and sustainability performance. Therefore, the reviewed studies advocate the advantages of real-time monitoring of the projects for three aspects of improving project efficiency: better situation awareness, timely response (corrective actions), and continuous project learning during operation.

F. Comparative Effectiveness: AI vs Traditional PM

While comparing both the syntheses, it is to be highlighted that the introduction of AI for Project management seems to come as a way of doing things differently, rather than being an outright replacement. Complex systems are traditionally centred on control and predictability, seeking efficiency by following regular procedures, whereas AI-driven ones are designed to be adaptive and responsive, with the aim of augmenting human capabilities with the help of AI. Incorporating the use of AI applications has been demonstrated to improve the system's responsiveness and reduce the time needed for system setup to accelerate the operational adjustment [32].

Moreover, [13] believe that human knowledge and algorithmic performance are complementary, not competing, suggesting that the combination of the two will improve project performance. These findings are going to affect arguments worked out under the determinist model, which suggests that because technology is quite good in which projects will succeed. Analysis of the two groups also shows some differences in learning mechanisms. Traditional systems rely on experience, and AI-based systems create new information and add it on an ongoing basis. [10] found

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that digitally connected environments facilitate organisational resiliency by improving their operational behaviours' adaptiveness.

Furthermore, the findings indicate that AI was superior to traditional approaches in contexts that included high uncertainty and a high need for agility and fast development, while traditional approaches were less effective in contexts that included lower uncertainty and greater consistency in the process. (Appendix 9)

G. Trends and Gaps in AI Integration

A key transformation is from implementing technology to transforming capabilities. According to the research by [26], the range of applications for AI that are currently emerging has begun to be associated with value creation strategically instead of solely improving specific operational efficiencies within an organisation. At the same time, it remains difficult to determine implementation maturity from context to context. [28] Found that there was a lot of variation when it came to the ability of various firms to handle adoption, given that the resources needed to adopt AI capabilities are not easily accessible, the readiness of firms, and managerial trust in AI-driven processes.

Another consistently coming up flaw is governance and responsible use. Innovation systems of the future must account for the socio-human-centred practices of governance to avoid disconnects between technological innovation and the legitimacy of governance organisation [15]. Similarly, [15] emphasised the need for trustworthy AI institutions or organisations that can offer accountability and transparency. Therefore, based on these results, the field of future projects no longer relies on the use of AI tools but on the ability to evolve the capabilities of the organisation, having ethical and sustainability-oriented governance mechanisms, and having scalable integration models to facilitate sustainable transformation based on AI.

## V. DISCUSSION

A. Interpretation of Findings

The results show that Artificial Intelligence (AI) is increasingly becoming a powerful methodology to assist decisionmaking processes as opposed to a procedural coordination mechanism for Projects. AI is not simply automation that impacts the decision-making, conduct, review, and implementation of project decisions in the planning, monitoring, forecasting, and execution process. Thus, the synthesis suggests that this can be done to improve the performance of a project by changing the decision architecture rather than replacing it with different technology.

Regarding the research grouping, the theme distribution made it clear that a majority of the research is integrationoriented studies, indicating an emerging trend towards embedded AI as opposed to a one-off digital intervention. As [8] demonstrated, when intelligent systems are woven into the existing workflow, the advantages for product and process come more to the fore, as do benefits and cost reduction. Similarly, [33] suggested that AI uptake has an impact on performance through the level of organisational digital maturity, which encompasses the conceptual level.

On the other hand, another pattern has to do with the importance of decision intelligence as a key explanation that links AI capability to project effectiveness. AI is not meant to replace human management decisions, but to expand analysis processing and quicken the information interpretation. [11] Pointed out that the use of analysis has grown more sophisticated, but user judgments and context will still influence outcomes from projects.

Additionally, the results also show the increasing convergence of business logics of project governance and Industry 4.0 transformation. As per [13], Digital sophistication is correlated with technologically advanced organisations that perform particularly well at deploying digital technology; an organisation's readiness to do so in turn is a better predictor of the success of their digital projects than is digital sophistication.

B. AI Impact on Efficiency and Productivity

The evidence also shows that the impact of AI on project efficiency is mostly through better forecasting, quicker decisions and processing, and constantly optimising project activities. In an AI-led landscape, the environments are complex and adapting, modifying, and predicting next actions become crucial for performance rather than conforming to standard procedures in traditional environments. Moreover, research found more benefits in using resources and adapting to environmental changes in predictive analytics and optimisation. [1] Demonstrated that the use of AI in cost estimation led to a reduction, which helped to decrease the deviations in budgets and enhance the accuracy of cost estimation.

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According to [24], there was an extra value with an AI implementation; they obtained more time for setting up the operation, but also a more adaptive response. Similarly, [7] reported that AI-generated project planning significantly reduced the planning time, but still needed managerial supervision for contextual appropriateness. Additionally, the review makes a difference between efficiency and productivity improvement when being automated. Therefore, productivity is to be considered from the perspective of augmentation of an organisation's productive potential, not in terms of the reduction of humans in the process.

1) Comparative Effectiveness: AI-Enabled vs. Traditional Project Management

While the findings identify that an improvement of project efficiency with the use of Artificial Intelligence, in certain cases, it appears the performance gain is not necessarily desirable and where possible, the use of AI should not be evaluated against traditional project approaches as such. Out of all of these studies, six directly compared the results of project management with the use of AI and with the traditional approach. On the other hand, [12] found that the employment of generative AI generated project planning outputs around 3.2 times quicker than humans. However, the plans developed by human managers had higher contextual relevance (85%-67%), suggesting that execution speed does not necessarily translate into strategic quality of plans.

This has been shown by [13], who showed that with the use of AI, around 28% more project risks were captured than by using the manual checklist approach, which indicated that there was more capability of predicting project risks in the presence of uncertainty. Similarly, Schmitt (2023) found that automated machine learning took all of these analytical project development steps, which saved weeks in project development cycles, and enabled iterative project analytics.

In addition to this, as noted by [16], AI has shown its inability to make decisions that demand ethical contexts and context-ambiguity handling. Additionally, based on the complementary nature of human-AI agency, not managerial replacement, [17] claimed that sustainable outcomes of projects develop through the agency of both human and artificial intelligence. Therefore, the findings above offer another justification for the concept of the augmentation view because it reinforces that AI is not to replace the management in the governance process but to complement the managerial functions.

C. Trends and Remaining Gaps

Multiple pathways of growth were observed, based on the literature. Initially, the current research, assessing technology adoptions, is investigating the outcome of technology integrations with analytics and automation, and the effect on governance capabilities. Roberts & Dived (2024) proposed this development as an example of a shift towards models of transformation based on capabilities. Second, the use of generative AI is more widely reported than ever in project planning and coordination cases. While the implications of generative systems on the long-term outcome of projects may be less understood, research indicates that these systems can be beneficial to experimentation, knowledge production, and speed of knowledge production.

Two perennial challenges that emerge in the successful implementation of digital transformation are capability gaps and organisational resistance. Moreover, Trust and Explain ability still need to be tackled. According to the theory of [13], because of the algorithms being invisible, managers' confidence is also reduced, and the way they implement the algorithm. Furthermore, Brown et al. 2025 showed that the quality of trust engendered plays a big role when it comes to acceptance and sustainable system use. Therefore, a suitable form of assessment for future scholarship should be selected, based on a longitudinal assessment, objective play measures and governance-focused evaluation.

D. Theoretical Contributions

The present study helps in the advancement of project management research by conceptualising the context of Artificial Intelligence as a decision intelligence capability rather than as a technical artefact. Moreover, the Review expands decision theory capabilities by revealing the complementary operation of the capabilities of algorithms and managerial judgment. While analytical accuracy benefits significantly from the use of AI, [14] revealed that AI supports decisionmaking but still retains its vulnerable nature to behavioural dynamics.

Additionally, the second paper is a theoretical paper on digital transformation theory. According to [1], factors contributing to the readiness of organisational change and the sequence of change implementation are more relevant to the outcomes than technological intensity. Therefore, the study is finally conceptualising the relationship between Industry 4.0 and the project governance domain, establishing a link between the three types of new coordination (predictive, adaptive and intelligent), and their effect on the project effectiveness.

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E. Practical Toolkit for Project Managers

The results lead to several management recommendations. Project management professionals must pay attention to the technology rollout these days, especially when it comes to planning. [17] Indicated that forecasting systems can make the best contribution when they are integrated into existing decision-making processes. Second, how governance is organised should be strengthened in order to promote explanations and accountability. As suggested by [13], the implementation of an acceptance-centred implementation framework is more effective when it is implemented within a trust-centred implementation framework.

Third, invest in people's capacity and decision-making adventures. [11] Highlighted the capacity to interpret and understand in an analytical manner and digital competence for the leaders of the future. For digital twin architectures, the provision of monitoring with greater accuracy leads to quicker corrective actions. Therefore, the power of AI seems more suited to augment and support the knowledge and skills of the manager.

## VI. CONCLUSION

A. Summary of Findings

The study was centred on the impact of AI decision intelligence on project management, both in terms of its role and in the context of increasingly complex projects and digital environments. This research aims to examine the impact of AI (Artificial Intelligence) in decision Intelligence on the performance of project management in increasingly complex and thirdly digitally connected projects and project environments. AI is not a significant solution but a tool that is becoming a vital component of the entire knowledge creation and utilisation process in the project lifecycle. The results of the paper reveal that traditional project management techniques still offer procedural discipline.

Moreover, the review mainly demonstrated that with efficiency is gained, so is predictive analytics, intelligent monitoring, adaptive planning, and more responsive resource allocation. This shift, dubbed redistributive AI agency by [22], represents not a technology's replacement for agency but a redistribution of agency that is neither solely nor exclusively AI-based. At the same time, data shows organisational and management level readiness and governance capabilities remain crucial to the success of their AI projects to provide a lasting impact on performance.

B. Managerial Implications

The outcomes are of crucial importance for organisations striving for intelligent systems to improve project results. Adopting AI should be treated not as a modernisation exercise but as a learning and capability-building path towards a change in the governance process and decision-making. [7] Findings indicated that nine dimensions of readiness are also factors related to the efficacy of the Industry 4.0 transformation and can stunt the implementation's scale.

Additionally, when implemented successfully, this demands a multifaceted approach in terms of investment in analysis skills, collaboration across disciplines, and building trust in AI-driven recommendations. [7] found that measures of efficiency were important, but so were stakeholder perceptions of the alignment, transparency and legitimacy of the decision-making process. Thus, Project leadership is now becoming more dependent on mastering the use of algorithms and also on involving human actions for the continuity of project performance.

C. Future Research Directions

Future studies need to progress from giving generic information about the implementation of AI towards explanatory knowledge to understand the impact of AI intelligent systems on the project performance in different institutional and industrial settings. Pointed out that there is a need to develop a more focused theory to better explain how emerging capabilities of AI reimagine management action and organisational results.

Moreover, the focus of future research should be on incorporating mixed methods and longitudinal research on how measurable project outcomes are related to behavioural and governance mechanisms. The considering the need to ensure reliable and sustainable implementation of AI as a means to achieve long-term sustainability, recommend the enhancement of the accountabilities and roles of ethical structures and institutional readiness within different contexts of AI implementations.

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## VII. LIMITATIONS OF THE STUDY

A. Publication bias

Peer-reviewed journal articles were studied only; other excessive sources, such as conference proceedings, industry reports, technical white papers and unpublished studies were not. This enhanced the methodological uniformity and the rigour of the study, but it could also have resulted in publication bias by favouring reported positive or significant implementation outcomes. The study by [4] found that there is publication bias with novel applications of AI, whether they were successful, published in indexed journals, or if they were unsuccessful. Thus, the benefits from the use of AI in education outlined in the introduction may be inflated.

B. Rapid technological change

The findings also need to be situated in the context of the fast-paced changes in technology. AI use is progressing more quickly than traditional scholarly publishing, and could make evidence synthesised from AI. Argue that the displacement of generative AI tools has seen short innovation cycles, threatening the temporal stability of systematic literature reviews. Therefore, the results included should be viewed as representing the state of development of project management powered by artificial intelligence over time.

C. Lack of longitudinal data

Another indicator is the presence of only a small number of cross-sectional and short-horizon studies within the weak evidence base. The impact of the AI implementation over time was hard to evaluate; pathways for organisational adaptation and the continuing productivity benefits were also minimal. [33] Identified a typical timeframe in which the outcomes of digital transformation are realised, and that short-term assessment designs may not reflect this. Thus, this hampers the ability of conclusions regarding sustained efficiency improvements.

D. SME and developing economy underrepresentation

Literature reviewed indicated that different research has been conducted by larger organisations, in a technologically advanced environment, and also found that fewer research studies were published by SMEs and developing economies. This work by [34] revealed that for organisations of different sizes and resources, there are important differences in the constraints related to the use of AI. Therefore, the conclusions based on the results are still premature in terms of the generalizability of the results under the different economic heterogeneities.

E. No meta-analysis possible

While a quantitative synthesis was considered, formal meta-analysis was not possible because there was considerable heterogeneity in the study objectives, methodological approaches, performance indicators and the degree to which these were reported across the studies. Non-standardised outcome measures are often used in AI management studies to restrict data aggregation. In this study, thematic synthesis and frequency analysis were undertaken as follows. Thus, thematic synthesis was performed to provide analytical consistency (based on the values to be drawn from in the narrative analysis), and frequency analysis was performed to determine the major patterns which arose from the evidence base.

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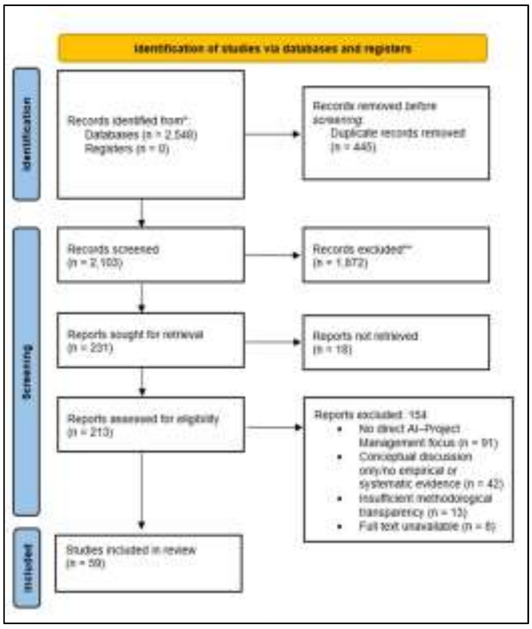
| Database | Search Adaptation | Purpose |
|---|---|---|
| ScienceDirect | Title–Abstract–Keywords | Primary retrieval |
| Scopus | TITLE-ABS-KEY | Validation and coverage expansion |
| Web of Science | TS= | Indexed evidence verification |
| IEEE Xplore | Abstract-based search | Technology-focused retrieval |

**INCLUSION AND EXCLUSION CRITERIA**

| Inclusion Criteria | Exclusion Criteria |
|---|---|
| AI in project environment | Pure technical AI |
| Performance or decision outcomes No | project management context |
| Peer-reviewed studies | Reports/editorials |
| Transparent methods | Limited methodological detail |




PRISMA 2020 Flow Diagram

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| Theme | Number of Studies | Percentage (%) |
|---|---|---|
| Integration Frameworks and Implementation Models | 11 | 18.6 |
| Decision Intelligence | 7 | 11.9 |
| Generative AI and Human–AI Collaboration | 5 | 8.5 |
| Ethical and Trust Considerations | 5 | 8.5 |
| Readiness and Skill Development | 5 | 8.5 |
| Agility and Transformation | 5 | 8.5 |
| Predictive Analytics and Forecasting | 4 | 6.8 |

FREQUENCY OF KEY THEMES ACROSS INCLUDED STUDIES

| Analytical Dimension | Dominant Observation |
|---|---|
| Research Orientation | Systematic reviews, empirical studies, and conceptual frameworks |
| Main Application Areas | Planning, forecasting, optimisation, innovation, monitoring |
| Industrial Context | Manufacturing, supply chain, engineering, digital business |
| Dominant Technologies | AI, analytics, ML, automation, generative AI |
| Emerging Focus | Trust, governance, readiness, human–AI collaboration |
| Conceptual Shift | From project control to intelligent project ecosystems |

DESCRIPTIVE CHARACTERISTICS OF INCLUDED STUDIES

| Theme | Interpretation | Relative Emphasis |
|---|---|---|
| Decision Intelligence | Data-driven decision support and forecasting | Very High |
| Efficiency & Optimization | Monitoring, automation, resource allocation | High |
| Organizational Readiness | Capability development and implementation | High |
| Human–AI Collaboration | Hybrid managerial decision-making | Moderate |
| Trust & Governance | Explainability, accountability, ethics | Moderate |
| Industry 4.0 Alignment | Digital integration and adaptive execution | Moderate |

FREQUENCY ANALYSIS OF KEY THEMES

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| AI Capability | Managerial Function | Expected Project Outcome |
|---|---|---|
| Predictive Analytics | Anticipating risks and outcomes | Improved planning accuracy |
| Intelligent Coordination | Dynamic resource allocation | Higher operational efficiency |
| Decision Augmentation | Scenario evaluation | Better decision quality |
| Continuous Learning | Feedback integration | Adaptive execution |
| Explainable AI | Transparent recommendations | Increased stakeholder trust |

MECHANISMS OF AI-DRIVEN DECISION INTELLIGENCE

| Dimension | Traditional PM | AI-Enabled PM |
|---|---|---|
| Decision Logic | Experience-driven | Intelligence-driven |
| Planning Style | Sequential | Adaptive |
| Information Flow | Periodic | Continuous |
| Risk Response | Reactive | Predictive |
| Resource Allocation | Static | Dynamic |
| Learning Mechanism | Historical | Continuous |

COMPARATIVE VIEW: TRADITIONAL PM VS AI-ENABLED PM