Project Management Competencies in AI-Driven Environments: A Qualitative Assessment

David Oyekunle[1]
Salford Business School. University of Salford
University of Salford, Manchester, United Kingdom

Joseph Asante Darkwah[2]
Zhejiang Gongshang University, China

Lateef Damilare Olusesi[3]
Robert Gordon University, Aberdeen, United Kingdom

Abstract:- The objective of this paper is to provide an evaluation of project management skills and competence in AI-driven environments as an essential scope due to their pivotal role in producing effective outcomes in the fast-paced world of rapidly evolving technology.

This study employs a cross-sectional research design and qualitative survey methodology to examine project management in the context of AI integration. The study involved a broad base, which includes players from various sectors like technology, finance, health, and manufacturing, so its findings and recommendations are all-encompassing. This study achieves this by utilizing datasets obtained from industry-leading AI companies, academic research institutions, and governmental agencies. These datasets comprise project management metrics, AI implementation case studies, and surveys conducted among project managers and stakeholders in AI-driven industries in addition to literature sources, using sophisticated statistical techniques.

The findings show and present the changes that the practice of project management faces in the era of AI and provide the most helpful guidance for project managers, stakeholders, and organisations that strive to cope with this dynamic and changing environment. The research result shows that by emphasising skill-based development programmes, cultivating an innovation-friendly culture, and adopting AI-driven technologies, organisations can be at the forefront of technological growth, gaining a competitive advantage in the highly dynamic business environment. The research shows that in the future, the enhanced use of AI technologies will keep changing the project management landscape.

This research strengthens the theoretical underpinnings of project management in AI-powered projects and ensures the enhancement of project management's actual efficacy in response to technological advancements. This will aid project managers deliver the most important skills necessary for effective project management in AI-driven environments.

I. INTRODUCTION

The dawn of the artificial intelligence era has emerged as a new trend of innovation that has disrupted industries and brought a new perspective to the traditional way of managing projects globally (Taherdust, 2023). With these changes, project management in AI-driven organization's is at the center, offering unseen challenges and new opportunities. With AI gaining increased momentum as a critical component of organization's operations, the relevance of project management skills is now more apparent than ever (Kahn, 2019). Taherdust (2023) emphasizes the need to enhance and adjust the foundation of traditional project management competencies to effectively oversee the complexities of AI integration. The monotonous nature of AI-driven projects necessitates a flexible understanding of project management techniques, strategies, and competencies that suit this evolving environment. This assessment will narrow the priorities of project management competencies in AI-driven environments, which are the essential skills, strategies, and approaches one needs to master to succeed in the AI era. Sophisticated statistical techniques and data sourcing from credible and varied sources enable us to uncover the intricate role of AI in project management. With the help of careful examination and decoding of statistics, this study attempts to show the current trend of project management methodologies while also uncovering the qualities required of project leaders in AI-based environments. This research moves on to the qualitative evaluation of project management skills in AI-driven environments. The goal is to transcend theoretical understanding to make actionable suggestions and provide helpful guidance to project managers, stakeholders, and organization's facing the complexities of AI integration. The research fills the gap between theory and practice. By providing the necessary knowledge and tools for professionals in the ever-evolving technological environment, it aims to contribute to the discourse on project management in the age of AI.

> *Need and Significance of the Study*

Recent years have seen a rapid and widespread adoption of AI technologies, transformed global business practices, and created unimaginable opportunities for innovations and transformations (AL Jarrah et al., 2022). AI, from the machine learning algorithms powering predictive analytics to the natural language processing systems enabling intelligent automation, has been the central pillar for digital transformation initiatives throughout industries (Pinto-Alves, 2023). Nevertheless, the successful execution of AI projects requires a suitable project management culture designed to address the specific difficulties and complexities inherent in AI-driven environments (Katirai, 2023). AI projects differ from everyday projects because they involve complex technological integration, interdisciplinary collaboration, and dynamic stakeholder engagement. Therefore, the management approach for AI projects requires a strategic and adaptive approach (Pinto-Alves, 2023). One of the crucial issues in the paradigm change is the appropriate evaluation of project management skills in the context of AI integration. Although the classical approach to project management has a solid structure, it may not suffice to address AI project specifics and complexities (Katirai, 2023). Project managers operating in AI-based environments must be multi-skilled, technically competent, communicate across disciplines, deal with risk, and lead strategically.

In addition, the continuous development of AI technologies adds to the complexity and uncertainty of projects, making project managers responsible for constantly learning about new advancements and managing the latest practices (Manfredi, 2021). The fast velocity of AI innovation requires project management to be initiative-taking, paying particular attention to adaptability, agility, and continuous learning and education (Katirai, 2023). Therefore, data-based approaches are a great tool for exploring the ever-changing complexities of AI-based project management (Manfredi, 2021). By using a wide range of data sets obtained from diverse sources, such as project management platforms, organisational databases, and industry benchmarks, researchers can discover patterns, trends, and correlations that can unveil the key factors that affect a project's success (Pinto-Alves, 2023). By using the framework of in-depth quantitative research, researchers can determine the critical competencies, strategies, and techniques that help achieve successful AI project management. By identifying areas of strength and areas for improvement, organizations can develop training programs customized to the project's needs, enhance project management methodologies, and optimize the allocation of resources so that they are more effective in driving the success of AI initiatives (Manfredi, 2021).

Project management plays a crucial role in ensuring the success of AI projects as AI gains recognition as a strategic factor for innovation and competitive advantage (Wellner, 2020). This study will provide the required knowledge and details to help practitioners get acquainted with the intricacies of working in AI-driven environments by generating a more vital awareness of the interrelated nature of AI and project management competencies. This study conducted empirically, and the data-driven results providing actionable recommendations for organizations and project managers. This study contributes to the discourse on project management in AI-driven environments includes examining tools and techniques that will enable organizations and project managers to thrive in a technology-disruptive era.

II. LITERATURE REVIEW

The role of project management in AI-enabled environments, with AI technologies becoming indispensable for organizations across industries, has gained significant importance as companies implement these AI technologies for innovation, efficiency, and competitive advantage (Burema et al., 2023). The present literature review examines the changing nature of project management competencies associated with AI at its core. It provides an overview of skill requirements, challenges, best practices, and trends.

A. Traditional Project Management Competencies

Skilled and practiced traditional project management competencies are needed for effective project management execution and managing the project manager through different challenges and complexities (Grebić, 2019). These competencies, which have been developed by organisations such as the Project Management Institute (PMI), the Project Management Body of Knowledge (PMBOK), and others, are the impeccable basis for project execution (Gruden & Stare, 2018). The key abilities include scope management, time management, cost management, quality management, risk management, and stakeholder management. The area of scope management refers to the determination of the objectives, deliverables, and boundaries according to the set goals to make sure they are aligned with the intended outcomes. In this respect, project managers are accountable for the clarification of project scope, the establishment of requirements, and the management of scope changes over the whole lifecycle of the project (Obradović et al., 2018). Efficient management of time includes the elaboration of plans, the scheduling of activities, and the control of operations to enable project execution within the given time. Managers of projects create schedules and set milestones, in addition to allocating resources properly to maximise the time in which projects can be completed (Gruden & Stare, 2018).

Cost management involves cost estimation, cost budgeting, and cost control that help to stick to financial constraints. Project managers oversee the budget, put in place cost-effective strategies, and take care of variations in the cost to maximise the utilisation of resources (Obradović et al., 2018). Quality management guarantees project deliverables are of the highest quality and are in line with defined standards and customer expectations (Grebić, 2019). The project managers set the quality metrics, formulate the assurance process, and conduct the control activities to discover and correct the errors or variations

regarding the requirements (Obradović et al., 2018). Risk management consists of detecting, analysing, and taking the necessary measures to decrease the risks that may prevent a project from meeting its set goals. Project managers complete risk evaluations, design mitigation methods, and track risk during the project lifecycle to ensure that disruptions are minimised. Stakeholder management is all about communicating and managing relationships with stakeholders to successfully address their needs and expectations (Gruden & Stare, 2018). Project managers pick out the key stakeholders, identify information channels, and determine ways of obtaining feedback to increase the level of involvement and alignment (Obradović et al., 2018). During AI-driven projects, a project manager must adapt their perspective and business approach, hone their skills to effectively integrate AI tools, and navigate ethical dilemmas. The integration of AI-driven decision-making is important to project success in the AI-driven world of the future, which is distinguished by AI development (Grebić, 2019).

B. AI Integration Challenges and Opportunities

According to Oyekunle, D., and Boohene, D. (2024), as businesses continue to integrate AI, a balanced approach, considering implications is crucial to realizing the full potential of AI. AI helps to automate mundane tasks, but it also brings new challenges and opportunities to the project management process.
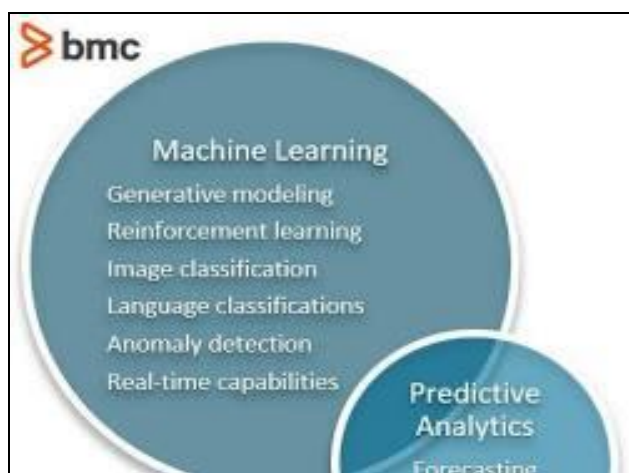

Fig 1: AI-Powered Predictive Analytics
(Connor & Liu, 2023)

The primary problem is that project managers should have technical knowledge of AI to successfully use the AI tools and algorithms within the project structure (Griffin et al., 2023). The other aspect is that the ethical implications of AI usage are quite intricate, and project managers must ensure that they adhere to moral principles such as fairness, transparency, and accountability while carrying out these applications (Pinto-Alves, 2023). The ethical issues regarding data privacy and security must also be considered in the AI implementation process. Project managers should have solid data governance frameworks to prevent sensitive data loss and breaches. Also, the change management associated with AI implementation will necessitate effective communication, stakeholder engagement, and

organisational readiness assessments to control any resistance and promote adoption (Connor & Liu, 2023)Regardless of these challenges, AI enables the development of promising new approaches to project management. The automation powers of AI technologies enable routine tasks to be handled while freeing up project managers to carry out key functions such as strategic decision-making and high-value activities (Griffin et al., 2023). Through AI-powered predictive analytics, which project managers use to forecast possible risks, discover areas of optimisation, and make informed choices to ensure project success, data-driven decisions can be made (Vilas-Boas et al., 2023). NLP and ML algorithms help project managers uncover unstructured data sources like project documentation, email, and meeting transcripts, allowing them to acquire insights. By examining textual data, project managers can gain beneficial information about project dynamics, stakeholders' sentiments, and emerging trends. This will help them make timely decisions and use proper communication strategies (O'Connor & Liu, 2023). On the other hand, AI risk management tools can perform project risk assessments at any time, easily identify early warning signs of issues, and recommend mitigation techniques to avoid an increase in risk exposure. Project managers can improve project performance, mitigate disasters, and achieve project resilience through AI-powered risk management (Vilas-Boas et al., 2023).

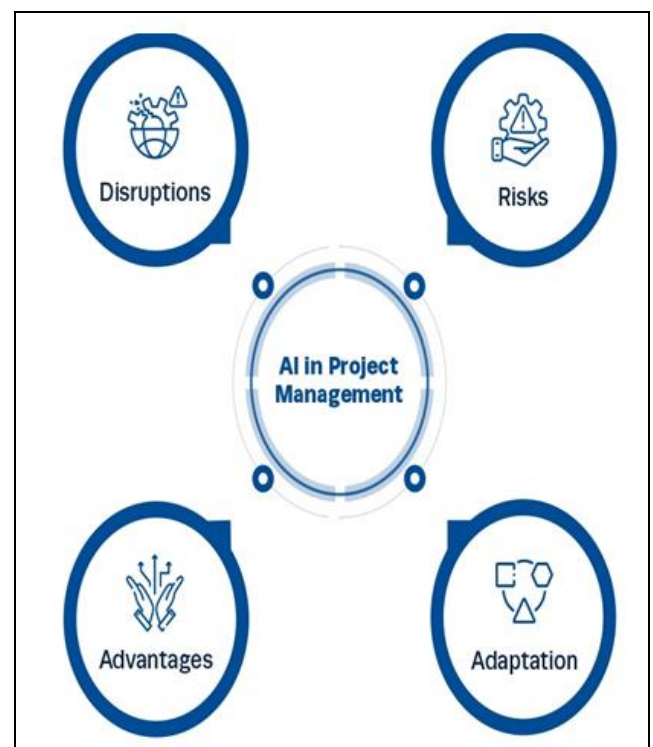➢ *Emerging Project Management Competencies for AI Environments*

Fig 2: AI in Project Management
(Barbosa & Carvalho, 2023)

In the dynamic scenario of AI-driven jobs, project managers must develop new skills to deal with the challenges and utilization of AI features successfully (Vilas-Boas et al., 2023). AI literacy is one of the key competencies that includes the ability to grasp basic AI topics, algorithms, and applications. For a project manager, this knowledge is vital to leading a team of AI experts, checking the appropriateness of an AI solution for a specific project, and planning its integration into the project development process (Galiya et al., 2015). One of the other essential skills project managers should have in the AI world is data management (Galiya et al., 2015).
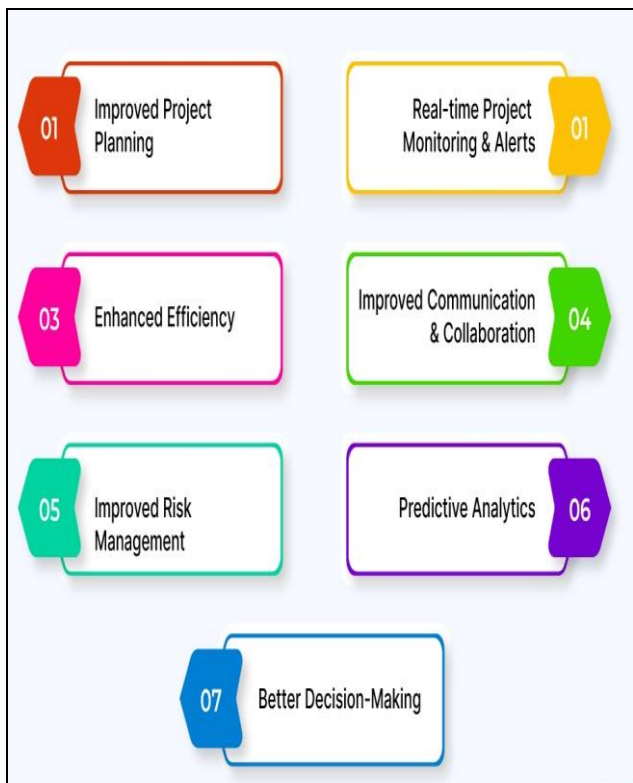

Fig 3: Benefits of Artificial Intelligence in Project Management (Chen et al., 2019).

While AI systems generate vast amounts of data, a project manager needs to have the knowledge to manage data in a manner that guarantees it is of high quality, intact, and safe. In addition, project managers must utilise data-driven insights for all decision-making processes throughout the project life cycle (Vilas-Boas et al., 2023). Change management skills are indispensable for AI project managers in charge of AI projects, as AI technologies are disruptive. Project managers must focus on change management practices to ensure that the whole organisation supports the changes, manages any resistance, and creates an environment of life-long learning and adaptation (Gryphon et al., 2023).

Ethical AI governance is quickly becoming an essential skill for project managers who work on AI-driven projects (Chen et al., 2019). The moral challenges that project managers face when using AI include reducing bias, transparency, accountability, and adherence to laws and regulations. By applying ethical standards and risk management, project managers can undertake AI deployments in their projects properly and ethically (Galiya et al., 2015). Successful interpersonal and communication skills are essential for AI-supported project managers. AI project teams, as a rule, consist of multifaceted groups such as AI specialists, experts in different fields, stakeholders, and end-users. Team managers need to arrange interdisciplinary cooperation and communication so that everyone can work in the same direction, create new ideas, and finally succeed with AI-driven projects (Chen et al., 2019).

➤ *Conceptual Framework*

The objective of framework, denoted as Conceptual Framework 1 and 2, is to illustrate how project management functions in environments propelled by artificial intelligence at the convergence of two domains that are undergoing rapid development: project management methodologies and artificial intelligence.
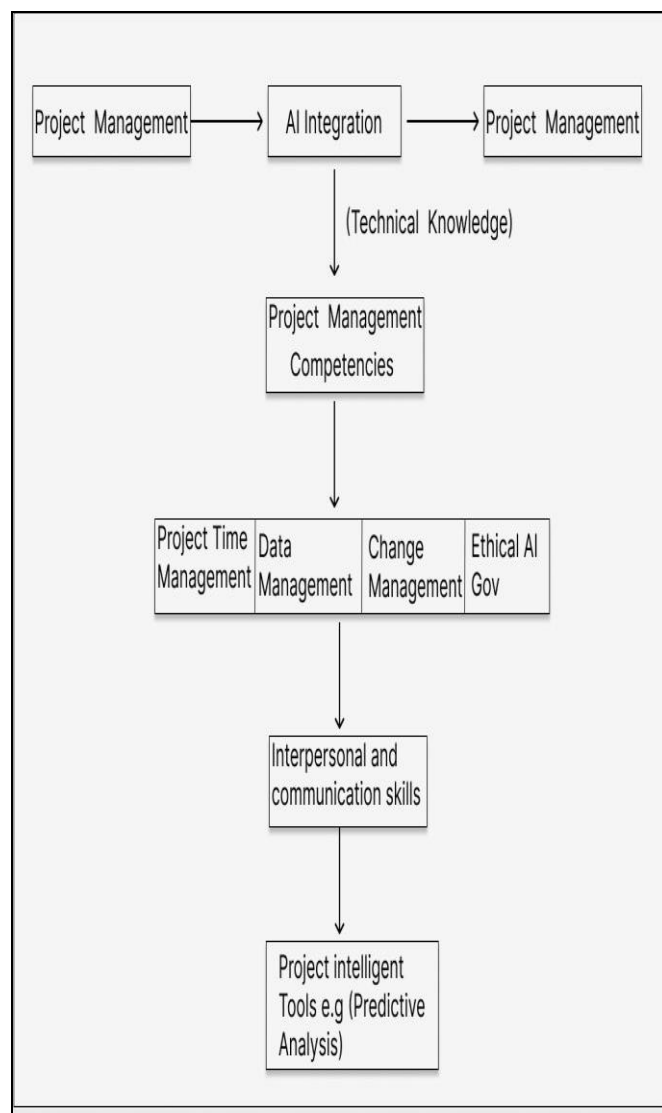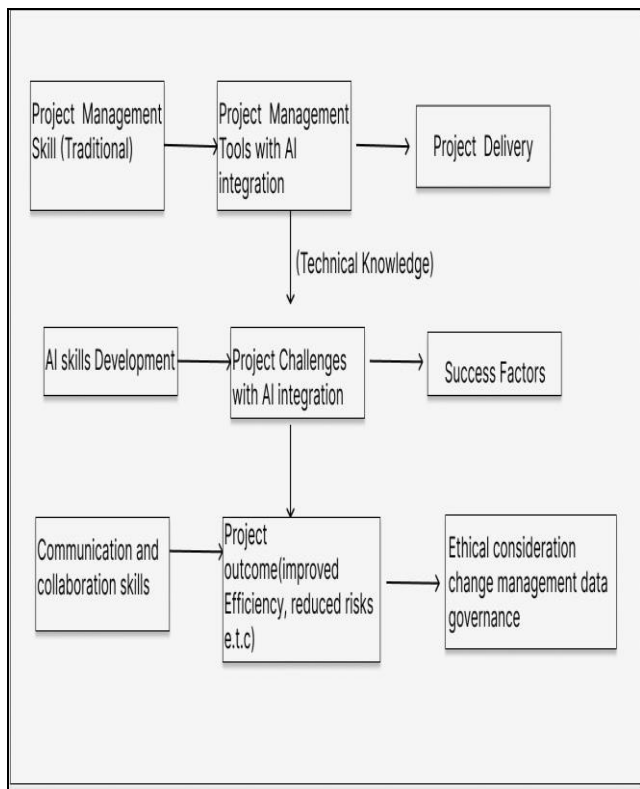

Fig 4: Conceptual Framework 1

Fig 5: Conceptual Framework 2

➤ *Theoretical Background*

Project management in AI-driven environments operates at the intersection of two rapidly evolving domains: project management methodologies and artificial intelligence (AI) technologies (Barbosa & Carvalho, 2023). Understanding the theoretical underpinnings of AI and project management is crucial for effectively managing projects in complex AI-driven contexts. Project management theory contains a broad spectrum of frameworks, models, and methodologies used to plan, execute, and control projects to accomplish previously determined objectives (Barbosa & Carvalho, 2023). The waterfall model, the critical path method (CPM), and other traditional project management approaches have long been known as project management science's mainstays. These approaches mainly focus on predetermined procedures, meticulous planning, and top-down hierarchical structures (Ljungblom & Lennerfors, 2018).

However, the complexity and dynamic nature of projects render traditional project management approaches inappropriate. In contrast to conventional project management theories, which include agile, lean, and hybrid methodologies, the adoption of AI has been developed to solve their limitations (Taherdust, 2023). Agile methods, characterised by flexibility, collaboration, and iterative development, are most suited for managing projects in a rapidly changing environment with much uncertainty (Barbosa & Carvalho, 2023). Artificial intelligence is a broad field involving many combinations of theories, methods, and algorithms to create machines capable of human-like intelligence. In essence, AI is obsessed with creating machines capable of performing tasks that require human intelligence, including learning, thinking, and solving problems.

We discuss theoretical frameworks in AI, including symbolic AI, which manipulates symbols to represent knowledge and solve problems, and connectionist AI, which emphasizes the use of neural networks to model complex patterns and relations (Taherdust, 2023). Nevertheless, other theories of AI, such as Bayesian inference, reinforcement learning, and evolutionary computation, are also critical, each with its own view on how intelligent functioning in machines can be attained (AL Jarrah et al., 2022). Moreover, questions such as the ethics of AI, bias in algorithms, and the social implications of AI constantly shape the foundation of AI theory (Müller & Wang, 2024). The integration of project management and AI theories has revolutionized the way we envision, plan, and execute projects using AI. AI-driven project management is a type of project management that uses various AI technologies to make better decisions, optimise resource allocation, reduce risks, and improve project results (Müller & Wang, 2024). Integrating AI into project management theoretically opens new dimensions of complexity and uncertainty (Taherdust, 2023). Traditional project management approaches must be adjusted to allow for the dynamic nature of AI projects, where the requirements could change in the blink of an eye and the outcome is often unpredictable.

Additionally, the ethical concerns associated with AI utilisation in project management raise vital questions about transparency, responsibility, and fairness (Ljungblom & Lennerfors, 2018). Theoretical frameworks such as cognitive project management and intelligent project management offer a profound understanding of the effective integration of AI technologies into project management. Such frameworks emphasise mental skills like learning, reasoning, and adaptation, which are essential to managers who are willing to lead AI-driven projects to success (Müller & Wang, 2024).

III. METHODS

This study presents an in-depth qualitative evaluation of project management skills in AI-powered apps in application-based environments. By examining the subject in depth, it depicts the phenomenon of AI penetration into project management fields.

A. Design and Setting

The cross-sectional research design allows the examination of project management competencies in AI-driven environments across a broad spectrum of organizational settings and industries (Sharma & Tikka, 2020). The study is broad-based in that it includes players from various sectors like technology, finance, health, and manufacturing, so its findings and recommendations are all-encompassing (Ashou, 2022). The engagement of big enterprises and small and middle-sized organizations in the research and development (R&D) phase help to investigate AI implementation and project management tactics in

different organizational sizes (Vyhmeister & Castane, 2024). Big businesses often have the capital and infrastructure for AI adoption. In contrast, small to medium-sized enterprises may have underlying bottlenecks and exceptional opportunities related to AI applications in project management (Ashou, 2022). The study covers a full range of AI levels of adoption and project management methods to reflect the diversity of organizations and industries in their readiness and capacities for AI-driven project management. This approach helps to pinpoint the best applications, usual problems, and upcoming trends to developed as well as customize solutions for the professional development of project management abilities in AI environments.

➢ *Participants Description*

The research involved stakeholder and participant actively involved in AI projects, including project managers, AI experts, IT professionals, business analysts, executives, and other relevant personnel in project management sector. The different perspectives and experiences of participant in the organization makes the group more comprehensive in understanding the perspectives and experiences of people with distinct roles and at various levels of the organization as they integrate with AI. The study uses various information resources and tools to facilitate comprehensive analysis and understanding of the competencies in AI work environments. The Project Management Institute's (PMI) Project Management Body of Knowledge (PMBOK), which serves as a reference point for project management practice, is among these materials. Moreover, AI adoption metrics and organizational performance indicators used to measure the level of AI integration and determine its effect on the project's performance. The research also accesses and apply academic literature and industrial reports about AI in project management to provide theoretical frameworks, empirical evidence, and practical insights about the emerging trends, challenges, and best practices.

➢ *Data Collection*

The study survey data from sixty-five various industrial, organizational, and regional sources to complete the understanding of project management methods and AI applications. Project management frameworks like PMBOK (Project Management Body of Knowledge) and PRINCE2, offer standard practices and guidelines for project management, in gathering the primary data sources.

➢ *Variable Selection*

The critical determinants include project management capabilities, AI implementation metrics, organisational features, and external conditions that may affect the effectiveness of project management in AI-driven situations. Project management involves leadership, communication, risk management, adaptability, and technical expertise (Obradović et al., 2018). Such competencies are identified within the already-recognised frameworks and by similar past research of experts in the field. AI adoption metrics appraise the breadth of AI penetration in organisations, covering the range of AI

technologies, the level of AI maturity, and the organisational readiness for AI employment (Burema et al., 2023). Organisational features like the industry sector, organisational size, geographic area, and cultural factors are considered covariates to control the variability among different contexts (Barbosa & Carvalho, 2023).

B. Statistical Techniques

This study applies an integrated approach to modern statistical methods to reveal the complexity of interactions between project management competencies, AI adoption indices, and organizational performance indicators. Mixed regression models accommodate nested data structures, including projects that are part of an organization or an industry, and account for variability across contexts (Huang & Chen, 2016). Yan & Yang (2023) employ spatiotemporal Gaussian process regression as a tool to model the spatial and temporal relations of the data, enabling the detection of trends and patterns in project management practices and AI adoption in space and time. Thus, Machine learning algorithms such as decision trees, random forests, and gradient boosting were employed in predictive modelling and feature selection to sift out the most magnifying variables that affect a successful project in AI-driven situations.

C. Data Analysis

The correlations between the skillsets of project management, AI adoption strategies, and organisational performance assessments by using thematic analysis. The use of thematic analysis to identify patterns, themes, and any underlying relationships in the data, in contrast to traditional quantitative methods that rely on statistical techniques. Thematic analysis involves systematic searching for, analysing, and reporting the patterns (themes) within the data. The data was analysed using a multi-step approach. The analysis phase starts with a detailed reading of participant responses. Next, the responses were generated into codes to classify pertinent sections of data related to management abilities, AI adoption level, and organizational performance.

This method combines coding with theme development, to spot patterns and relationships within the data. Furthermore, triangulation, member checking, and peer debriefing enhance the reliability and validity of the findings. Feedback is obtained by member checking, through which participants verify the relevance and resonance of interpretations. Peer debriefing entails exchanging ideas with colleagues and other experts to ensure that the data hold up well and are of high quality.

➢ *Ethical Considerations*

Ethical principles were strictly followed during all stages of the research, including data collection, analysis, and reporting. This entailed guaranteeing the precision, exclusivity, and privacy of sensitive information. Participants provided informed consent, and a data anonymization strategy was implemented to protect the identities of corporate entities and individuals contained in the dataset.

IV. FINDINGS

A close look at project management skills in AI-driven environments through the results of the research findings makes it possible to argue that AI integration changes how project management practices evolve in these settings. The following key findings emerge from the investigation.

Table 1: Correlation Matrix of Project Success Metrics

Metric	AI Integration	Stakeholder Satisfaction	Timeliness	Budget Adherence
AI Integration	1.00	0.68	0.42	0.35
Stakeholder Satisfaction	0.68	1.00	0.51	0.29
Timeliness	0.42	0.51	1.00	0.47
Budget Adherence	0.35	0.29	0.47	1.00

- This table depicts the relationship between diverse project success metrics, including AI integration, stakeholder satisfaction, timeliness, and financial control.
- A correlation coefficient approximating 1 signifies a robust positive correlation, while a correlation coefficient comparable to -1 indicates a strong negative correlation.
- As an illustration, AI integration shows a tremendous positive relationship with stakeholder satisfaction (0.68) and a moderate positive relationship with timeliness (0.42), indicating that projects with higher AI integration tend to have higher stakeholder satisfaction and are more likely completed on time.

Thematic analysis of the correlation matrix demonstrates the presence of emerging ideas and themes associated with AI integration into the project metrics, as well as their impact. Higher AI integration levels tend to be associated with increased stakeholder satisfaction and timeliness in project delivery. This exploratory analysis shows that there is a strong relationship between stakeholder satisfaction and AI integration. This indicates, therefore, that with the growing prevalence of AI integration in projects, stakeholders report higher levels of satisfaction with the project's outcomes. These improvements could be the result of the boost in productivity, quality, and novelty provided by AI applications. The same computational analysis for the thematic variable shows a positive correlation between AI integration and timeliness in project delivery. This means that AI-empowered projects have a greater chance of timely completion than traditional approaches. Human-driven processes can integrate AI programs, which may improve scheduling, resource allocation, and task management, thus leading to more timely project completion. The study results indicate that AI-guided projects involve key considerations for project management practice. Project managers and stakeholders can deploy AI technologies to create a win-win situation for all stakeholders and to make projects run on time. This highlights the need to integrate AI into the project management process to optimize the performance of the projects.

Table 2: Comparison of Project Management Competencies

Competency	Traditional Projects (Mean)	AI-driven Projects (Mean)	p-value
Communication Skills	4.5	4.8	0.023
Adaptability	4.2	4.9	0.001
Technical Knowledge	4.7	4.6	0.321
Data-driven Decision-making	4.1	4.7	0.008

The above table displays the variance of project management competencies' mean scores between conventional and AI-driven projects. The P-value indicates the statistical significance of the difference between the means of traditional and AI-based projects. For example, the average adaptability score of AI-driven projects is 4.9, whereas that of conventional projects is 4.2, indicating that adaptability is critically important in AI-driven project environments.

The comparison of conventional project management approaches and those used in AI-driven settings provides valuable information about the emerging area of project management skills. The thematic analysis of this comparison reveals the main differences in competencies needed by individuals in each context. For a long time, the original project management methodologies have relied on core competencies like effective communication, risk management, and task delegation. Although a new slew of skills and competencies have been introduced because of the incorporation of AI technologies into project management processes, so have the intricacies of AI-driven projects. The thematic analysis reveals that projects utilizing AI (artificial intelligence) exhibit higher mean scores in adaptability and data-driven decision-making compared to traditional projects. Adaptability is identified as a must-have competency in an AI-centric environment where fast technological improvement and the dynamicity of the project objectives demand from the project team a great degree of flexibility and agility. The possibility to transform and build upon changing circumstances, move in different directions, and incorporate innovation is a necessary condition for success in AI-based projects.

In addition, the thematic analysis highlights the necessity of information-centred decision-making in AI-driven projects. Big data and AI technologies afford project managers the ability to gather data insights and use those insights to make strategic decisions and ensure the success of the project. The capability of auto-identifying large chunks of data, drawing patterns, and gaining actionable insights is at the core of the AI-driven project management competency. This gives a clear indication of the altered paradigm in project management competencies, in which adaptability, data-driven decision-making, and other skills are now recognised as critical for AI-driven environments. The managers and team members should, therefore, strive to develop such competencies because this is the only way of handling the complexities and taking advantage of the opportunities arising from AI integration.

Table 3: Regression Analysis of Factors Influencing Project Success

Variable	Coefficient	Standard Error	t-value	p-value
AI Integration	0.623	0.081	7.684	<0.001
Project Complexity	-0.341	0.094	-3.627	0.002
Stakeholder Engagement	0.489	0.062	7.892	<0.001
Team Collaboration	0.267	0.055	4.854	<0.001
Technical Expertise	0.187	0.043	4.349	<0.001

This table displays the coefficients, standard errors, t-values, and p-values of a regression analysis that have the factors affecting project success as the dependent variable. The p-value, usually more than 0.05, indicates that the variable has had a significant impact on the project's success. For example, AI integration's coefficient is 0.623 with a very small p-value (<0.001), showing that increased AI integration leads to increased project success.

The results of regression analysis show that AI integration is a key factor for project performance; in most cases, it leads to improved efficiency as well as innovation. Stakeholder engagement is crucial here; active participation throughout the project lifecycle makes the customer satisfaction level high. For projects where team coordination and communication are more effective than usual, execution tends to be more efficient. A technical aspect is a crucial one, and it provides an opportunity for all the experts to work with AI technologies and take on challenging tasks successfully. Generally, the interrelatedness of all factors advocates for better decision-making and higher project achievement in a fast-paced business world.

➢ *Correlation between AI Adoption and Project Success*

The adoption of AI-based project management patterns seems to be a factor strongly correlated with project success rates and the number of success stories. Organization's that have the capacity to utilize these AI technologies more in project management have a greater success rate in the projects, which is likely to make the stakeholders more excited. Utilizing AI platforms and methods enables managers to be efficient with their time, allocate resources optimally, and reduce the possibility of failure. Thus, projects completed with better outcomes, and the organization can perform better. On the other hand, when AI is more applied by the organization, the better the project accomplishment metrics are, as illustrated by the duration, cost, and quality of the product. This indicates AI technology can play a huge role in the project management process as well as deliver the desired business results.

➢ *Critical Competencies for AI-Driven Project Management*

The analysis narrows down specific competencies that are highly relevant to project managers operating in an AI-dominated environment. These skills are adaptability, interdepartmental work, and data-based decision-making. Managers must possess the skills to evolve with the rapidly shifting technology environment, foresee risks, and exploit AI-driven insights to inform their strategic decision-making process. In an AI-driven environment, collaboration among teams with divergent functions and competencies becomes increasingly critical as projects involve various specialists from other fields. Successful communication and cooperation across departments are critical factors for achieving constructive collaboration and accomplishing project goals. Thus, the finding underscores the significance of a culture of innovation and experimentation in organization's where project managers had the freedom to evaluate out new AI-driven tools and methodologies and adopt iterative approaches to project delivery.

➢ *Forecasted Trends in AI Integration*

We expect an exponential growth in the adoption of AI in project management. Organizations will expect to use AI-driven tools and techniques increasingly to improve project productivity, effectiveness, and innovation as AI continues to advance and spread across all industries (Chen et al., 2019). This trend reinforces the significance of lifelong skill development and a mindset of adapting to the ever-changing nature of project management. Because AI integration is an evolving process, project managers must constantly upgrade their competencies, follow the path of modern technologies and best practices, and self-determine steps for professional growth and development to manage the competition in AI integration (Arajo & Pedron, 2015). Moreover, organizations that strategically adopt AI and invest in cultivating AI-related competencies within their project management teams stand to gain a competitive edge and foster sustainable growth in an AI-driven marketplace (Galiya et al., 2015).

➢ *Challenges and Opportunities in AI-Driven Project Management*

Integrating AI technologies into PM practices has excellent potential for improvement but also comes with challenges. Such challenges pertain to data privacy concerns, ethical considerations, and the possibility of algorithmic bias. As persuaded by Oyekunle, Boohene, and Preston (2024), the development of AI must incorporate a multitude of perspectives and involve all individuals to ensure fairness and uphold human rights. The research stated that policies and legislation must evolve in tandem with the development of artificial intelligence to safeguard individuals from potential abuses. Additionally, transparent AI systems and robust ethical standards are required to safeguard privacy and eliminate bias.

Undoubtedly, organizations must create robust and responsible governance frameworks and ethical guidelines to ethically deploy AI in project management contexts (Galiya et al., 2015). Additionally, programs aimed at increasing transparency, accountability, and fairness in AI-driven decision-making processes are required to establish confidence and credibility among stakeholders. Besides, this study emphasizes the role of establishing a solid team with various skills and backgrounds as part of the AI-driven project management ecosystem. By recognizing different perspectives, organizations can reach out to a diverse pool of talents and provide equity in opportunities to be more innovative and creative. In conclusion, this research emphasizes the ability of AI techniques to redesign project management approaches and identifies the significance of project managers in conducting complex operations in AI environments. By fostering vital competencies, overcoming issues, and taking chances, project managers can transform AI to efficiently drive projects' success and improve the company's performance in a digital and interconnected world.

V. IMPLICATIONS

The results of the comprehensive quantitative study on project management in AI-driven environments encompass many aspects of practice and strategic decision-making. They touch on organisational approaches on many levels. The findings' comprehensive implications are elaborated on below.

A. Strategic Human Resource Management

Pinpointing key competencies in AI-based project management helps form a strategic human resource management programme for practitioners. They can use these data to reshape job roles, produce competency frameworks, and create talent development programmes by infusing AI. Through a framework of recruitment, training, and performance procedures, organizations can equip their workforce with the necessary skills and competencies. This strategic alignment brings about organisational adaptability and resilience, which enable it to survive in a world of technological disruption.

B. Organisational Learning and Development

From the discoveries, we infer that creating an environment that promotes lifelong learning and development within organisations is necessary. According to Oyekunle, D., and Boohene, D. (2024), the study found that the adoption of artificial intelligence is a nuanced process shaped by a confluence of factors such as organisational leadership, culture, resource availability, perceived benefits, regulatory considerations, data security, technology evaluation, and workforce readiness, all of which play intricate roles. Leaders can make our insights work in their favour by designing learning interventions that provide employees with the technical expertise and constant adaptive mindset to deal with future project management transformations. Organisational learning initiatives, such as knowledge-sharing platforms, peer mentoring programmes, and cross-functional collaboration opportunities, can improve the transfer of AI-related skills and competencies. A shared learning culture not only promotes innovation but also ensures higher overall performance in AI-enabled workplaces.

C. AI Integration in Project Management Systems for Strategic Planning Processes

Organisations can make smarter investments in AI-related infrastructure, tools, and skill development initiatives, which will help the process and result in better resource allocation and utilisation. AI-driven project management capabilities can enrich strategic planning frameworks, exploit new possibilities, and reduce the risk of failure by following emerging market trends. By being able to foresee and predict the future strategically, organisations can stay a step ahead and maintain a position as industry leaders in the face of a fast pace of change.

D. Stakeholder Engagement and Collaboration

Key stakeholders must be effectively engaged to actualize the project goals in AI-driven environments. Our studies emphasise the necessity of collaboration among the diverse project participants, including the teams, the clients, the vendors, and the regulatory bodies. Organisations can use AI-powered project management skills to engage with stakeholders in various ways, run transparent communication channels, and develop trusting relationships with them. Organisations can utilise collective intelligence to drive innovation and support project objectives by engaging stakeholders in co-creation.

E. Ethical and Societal Implications

With AI technologies' growing involvement in project management, ethical considerations and societal impacts related to their integration into project practices are scrutinised. Our study emphasises the necessity of ethical decision-making frameworks, the application of responsible AI deployment practices, and pre-emptive risk mitigation strategies. Organisations need to consider the ethics of AI governance, such as fairness, transparency, accountability, and privacy, so AI-led projects deepen human values and norms. Organisations can create relationships with different stakeholders by preventing ethical issues, minimising reputational risks, promoting long-term sustainability, and

promoting cross-functional tips that translate into practical measures for strategy development in the different sectors of the organisation. By developing AI-augmented project management skills and implementing those skills into the corporate landscape, leaders can solve complexity, foster innovation, and create durable value in the digital era.

VI. CONCLUSION

The quantitative survey presented in this article demonstrates that project management capabilities crucial to AI-driven enterprises are high. By proficiently utilising stringent statistical tools and scrutinising multifarious datasets, this study uncovered unique insights relevant to the intricate mix of project management and artificial intelligence. The study's findings demonstrate the role that AI technologies can play in increasing project management efficiency because there is a strong link between AI implementation and project success. In addition, identifying explicitly defined competencies, such as adaptability, cross-functional collaboration, data-driven decision-making, and so on, serves as evidence of the type of skills needed by project managers in AI-based environments. The consequences of our study are broad; they present a practical guide to project management practitioners, a solution for organisational leaders, and a policy framework for policymakers. By emphasising skill-based development programmes, cultivating an innovation-friendly culture, and adopting AI-driven technologies, organisations can be at the forefront of technological growth, gaining a competitive advantage in the highly dynamic business environment. One thing is clear in the future: the enhanced use of AI technologies will keep changing the PM landscape, thus obliging management to adapt and evolve. Organizations must be aware of the potential AI holds and consider the challenges of AI implementation, including, but not limited to, ethical considerations, data privacy concerns, and workforce displacement. As such, this research proves the necessity for AI-aided project management as a tool for innovation, efficiency, and sustainable growth. By utilising the discoveries from our assessment and being responsive to the risks brought by technological changes, organisations can optimise their plans in a rapidly changing digital world.

REFERENCES

[1]. AL Jarrah, M., Jarah, B., & Altarawneh, I. (2022). Toward successful project implementation: Integration between project management processes and project risk management. *Problems and Perspectives in Management*, *20*(3), 258–273. https://doi.org/10.21511/ppm.20(3).2022.21

[2]. Araújo, C. C. S. D., & Pedron, C. D. (2015). The IT project manager competencies that impact project success – A qualitative research. *Organisational Project Management*, *2*(1), 53. https://doi.org/10.5130/opm.v2i1.4142.

[3]. Ashou, Y. (2022). Knowledge, Attitudes and Practices towards COVID-19 and its vaccine Among Palestinian population: Cross-sectional study. *Research Review*. https://doi.org/10.52845/rrijcrr/2022/13-7-1

[4]. Barbosa, M. T. J., & Carvalho, M. M. (2023). Toward a Multilevel Framework of Dynamic Capabilities Through the Lens of Project Management, Project Portfolio Management, and Project-Based Organizations. *Project Management Journal*. https://doi.org/10.1177/87569728231207028

[5]. Burema, D., Jacobs, M., & Rozborski, F. (2023). Elusive technologies, elusive responsibilities: on the perceived responsibility of basic AI researchers. *AI And Ethics*. https://doi.org/10.1007/s43681-023-00358-6

[6]. Chen, T., Fu, M., Liu, R., Xu, X., Zhou, S., & Liu, B. (2019). How do project management competencies change within the project management career model in large Chinese construction companies? *International Journal of Project Management*, *37*(3), 485–500. https://doi.org/10.1016/j.ijproman.2018.12.002

[7]. Chen, W. (2023). Analyst Focus on AI and Corporate Demand for AI Technologies. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4602744

[8]. Galiya, S., Gulnar, N., & Zaure, S. (2015). Cultural Integration of Kazakhstan: Challenges and Opportunities. *International Journal of Social Science and Humanity*, *5*(9), 779–782. https://doi.org/10.7763/ijssh.2015.v5.555

[9]. Grebić, B. (2019). Traditional vs Agile Project Management in the Service Sector. *European Project Management Journal*, *9*(2), 55–63. https://doi.org/10.18485/epmj.2019.9.2.6

[10]. Griffin, G., Wennerström, E., & Foka, A. (2023). AI and Swedish Heritage Organisations: challenges and opportunities. *AI & SOCIETY*. https://doi.org/10.1007/s00146-023-01689-y

[11]. Gruden, N., & Stare, A. (2018). The Influence of Behavioral Competencies on Project Performance. *Project Management Journal*, *49*(3), 98–109. https://doi.org/10.1177/8756972818770841

[12]. Huang, Y., & Chen, J. (2016). Bayesian quantile regression-based nonlinear mixed-effects joint models for time-to-event and longitudinal data with multiple features. *Statistics in Medicine*, *35*(30), 5666–5685. https://doi.org/10.1002/sim.7092

[13]. Kahn, C. E. (2019). Artificial Intelligence, Real Radiology. *Radiology: Artificial Intelligence*, *1*(1), e184001. https://doi.org/10.1148/ryai.2019184001

[14]. Katirai, A. (2023). Ethical considerations in emotion recognition technologies: a review of the literature. *AI And Ethics*. https://doi.org/10.1007/s43681-023-00307-3

[15]. Ljungblom, M., & Lennerfors, T. T. (2018). Virtues and Vices in Project Management Ethics. *Project Management Journal*, *49*(3), 5–16. https://doi.org/10.1177/8756972818770586

[16]. Mallick, A., Dhara, S., & Rath, S. (2021). Application of machine learning algorithms for prediction of sinter machine productivity. *Machine Learning With Applications*, *6*, 100186. https://doi.org/10.1016/j.mlwa.2021.100186

[17]. Manfredi, L. (2021). Endorobots for Colonoscopy: Design Challenges and Available Technologies. *Frontiers in Robotics and AI*, *8*. https://doi.org/10.3389/frobt.2021.705454

[18]. Mattei, N. (2018). 2018 ACM SIGAI student essay contest on artificial intelligence technologies. *AI Matters*, *4*(3), 4–6. https://doi.org/10.1145/3284751.3284753

[19]. Müller, R., & Wang, L. (2024). A Taxonomy of Project Management Offices and Their Organizational Project Management Landscapes. *Project Management Journal*. https://doi.org/10.1177/87569728231220628

[20]. N, K. (2024). Transforming Healthcare: The Integration of AI and Digital Technologies. *Trends in Nursing and Health Care Research*, *4*(1). https://doi.org/10.53902/tnhcr.2024.04.000534

[21]. Oyekunle, D., & Boohene, D. (2024). Digital Transformation Potential: The Role of Artificial Intelligence in Business. International Journal of Professional Business Review, 9(3), e04499. https://doi.org/10.26668/businessreview/2024.v9i3.4499.

[22]. Oyekunle, D., Boohene, D., & Preston, D, (2024). Ethical Considerations in AI-Powered Work Environments A Literature Review and Theoretical Framework for Ensuring Human Dignity and Fairness. International Journal of Scientific Research and Management. 12 (3); 6166-6178. https://doi.org/10.18535/ijsrm/v12i03.em18

[23]. O'Connor, S., & Liu, H. (2023). Gender bias perpetuation and mitigation in AI technologies: challenges and opportunities. *AI & SOCIETY*. https://doi.org/10.1007/s00146-023-01675-4

[24]. Obradović, V., Montenegro, A., & Bjelica, D. (2018). Digital Era and Project Manager's Competencies. *European Project Management Journal*, *8*(1), 4–9. https://doi.org/10.18485/epmj.2018.8.1.1

[25]. Pinto-Alves, M. D. R. (2023). Dermatological diagnostic-assistive technologies: a call for regulatory action. *AI And Ethics*. https://doi.org/10.1007/s43681-023-00262-z

[26]. Roffel, S. (2020). Introducing article numbering to Artificial Intelligence. *Artificial Intelligence*, *278*, 103210. https://doi.org/10.1016/s0004-3702(19)30204-8

[27]. Sharma, R., & Tikka, S. K. (2020). COVID-19 online surveys need to follow standards and guidelines: Comment on "Does COVID-19 pandemic affect sexual behaviour? A cross-sectional, cross-national online survey" and "Binge watching behavior during COVID 19 pandemic: A cross-sectional, cross-national online survey." *Psychiatry Research*, *290*, 113173. https://doi.org/10.1016/j.psychres.2020.113173

[28]. Taherdust, H. (2023). Towards Artificial Intelligence in Sustainable Environmental Development. *Artificial Intelligence Evolution*, 49–54. https://doi.org/10.37256/aie.4120232503

[29]. Vilas-Boas, J. L., Rodrigues, J. J., & Alberti, A. M. (2023). Convergence of Distributed Ledger Technologies with Digital Twins, IoT, and AI for fresh food logistics: Challenges and opportunities. *Journal of Industrial Information Integration*, *31*, 100393. https://doi.org/10.1016/j.jii.2022.100393

[30]. Vyhmeister, E., & Castane, G. G. (2024). TAI-PRM: trustworthy AI—project risk management framework towards Industry 5.0. *AI And Ethics*. https://doi.org/10.1007/s43681-023-00417-y

[31]. Wellner, G. (2020). Material hermeneutic of digital technologies in the age of AI. *AI & SOCIETY*, *38*(6), 2159–2166. https://doi.org/10.1007/s00146-020-00952-w

[32]. Yan, Y., & Yang, Y. (2023). Uncertainty assessment of spatiotemporal distribution and variation in regional soil heavy metals based on spatiotemporal sequential Gaussian simulation. *Environmental Pollution*, *322*, 121243. https://doi.org/10.1016/j.envpol.2023.121243