



University of
Chester

**INTELLIGENT PROJECT MANAGEMENT:
USING AI FOR AUTOMATION AND DECISION MAKING**

OZGUR OZBEK
2220666
J99775

October 2023
MSc – Programme and Project Management
SE7200 Research Dissertation

9915 Words

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Introduction

The adaptation of artificial intelligence (AI) into project management has introduced a paradigm shift in how projects are executed and managed in an era of accelerated technological advancement (Taboada et al., 2023). The incorporation of artificial intelligence (AI) into project management and its processes is investigated and current accomplishments in automation and informed decision-making are evaluated in the dissertation.

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The literature review section lays the groundwork by investigating conventional project management methodologies alongside the overarching ideas of artificial intelligence (AI) and machine learning. The focus is mostly on benefits and outcomes instead of the technicality of such complex systems. The literature review also identifies a variety of artificial intelligence (AI) applications in a variety of industries and investigates the potential effects of artificial intelligence (AI) on project management (Dam et al., 2019; Salleh & Aziz, 2022; Yawalkar, 2019).

Combining both qualitative and quantitative approaches, the methodology section describes the research design. Data collection includes published articles, case studies, public artificial intelligence (AI) models, and internet articles to glean insights from artificial intelligence (AI) integrated project management practitioners and stakeholders.

The dissertation investigates the incorporation of artificial intelligence (AI) into project management from multiple perspectives. It examines the automation aspect of routine duties for a project manager (Bhavsar et al., 2019) and demonstrates the potential for artificial intelligence (AI) driven decision support systems (Mahmood et al., 2023). Moreover, it explores the function of artificial intelligence (AI) in predictive analytics, resource allocation, risk management, and communication enhancement in depth.

Assessing the integration of artificial intelligence (AI) systems, initial observations of the study point to increases in productivity, precision, and reductions in human error (Taboada et al., 2023). A balanced perspective on the adoption of artificial intelligence (AI) in project management by shedding light on obstacles such as data privacy concerns and resistance to change is offered in future sections.

Real-world case studies illustrate a successful artificial intelligence (AI) implementation in project management and various estimations (Pospieszny et al., 2018). Furthermore, the explored case studies illustrate how artificial intelligence (AI) driven automation and decision support help a project succeed and impart insightful knowledge to prospective adopters (Dam et al., 2019; El Khatib & Al Falasi, 2021; Mahmood et al., 2023).

The discussion analyses and highlights similarities and differences of obstacles and limitations, paving the way for future directions of research, critically (Brendel et al., 2021;

Niederman, 2021). The emergence of AI-enhanced project management tools and their potential repercussions are also investigated due to project management being a dynamic field (Levitt & Kunz, 1987; Niederman, 2021).

The dissertation concludes by emphasising artificial intelligence's likely transformations in project management. It provides a thorough comprehension of how artificial intelligence (AI) integration improves project outcomes, streamlines processes, and enables proactive decision-making. This study intends to make a contribution to the existing body of knowledge on intelligent project management techniques and associated systems by providing solutions to challenges and evidence from the actual world.

Background and Rationale

The present dynamic and interconnected environment of business is grounds for the importance of successful project management which cannot be overstated for organisations that seek to efficiently and effectively attain their strategic objectives (Gido & Clements, 2014). Over the course of many years, traditional project management methodologies have proven to be dependable frameworks (Munns & Bjeirmi, 1996). However, with the emergence of highly accessible artificial intelligence (AI) systems, there arises a remarkable potential to augment and improve project management practices (Dam et al., 2019; Taboada et al., 2023). Artificial intelligence (AI) technologies, which include machine learning, natural language processing, and predictive analytics, have shown significant promise in automating repetitive tasks, enabling data-driven decision-making, and enhancing resource allocation in project settings (Dam et al., 2019; Drabble, 1995; Mahmood et al., 2023; Taboada et al., 2023). Examination of the intricate and mutually beneficial association between artificial intelligence (AI) and project management should be the priority when incorporating AI (Gil et al., 2021).

Research Objectives

The primary objective of this research study is to examine and assess the potential for integrating artificial intelligence (AI) into project management processes. Therefore, the aim is to delve deeper into the potential applications of artificial intelligence (AI) in the realms of decision-making and automation. In other words, the objective is to use AI technology's capabilities to improve decision-making quality and enable automation.

The use of artificial intelligence (AI) to improve decision support systems in modern project management has grown in importance (Mahmood et al., 2023). It is astonishing the potential revolutionary influence that introducing technology that uses artificial intelligence into decision support systems could have on the methods of decision-making that project managers engage in.

Artificial Intelligence has the capacity to analyse enormous volumes of data and derive important insights, which may be quite helpful to project managers when making decisions (Biesialska et al., 2021; Mahmood et al., 2023; Pospieszny et al., 2018). Analysing past project data allows AI systems to more effectively predict outcomes and crucial project management planning elements such as cost and time budgeting (Drabble, 1995; Levitt & Kunz, 1987; Taboada et al., 2023). An artificial intelligence (AI) model that was trained on past data is prone to repeating past mistakes, but with proper guidance, the same data can be used to avoid past mistakes (Dam et al., 2019; Hofmann et al., 2020; Taboada et al., 2023).

Conducting a thorough analysis is essential to fully assess the benefits, challenges, and limitations related to incorporating artificial intelligence (AI) into project management (Papadakis & Tsironis, 2020; Taboada et al., 2023). Papadakis et al. (2020) argue that

traditional project management methodologies are prone to be augmented with hybrid methodologies. This enhancement presents a rationale for the integration of artificial intelligence (AI) into hybrid project management approaches. A comprehensive examination of the benefits and challenges associated with practical implementations will facilitate a more profound understanding of the implications and potential outcomes of utilising artificial intelligence in the realm of project management (Auth et al., 2019; Niederman, 2021; Skinner, 2022).

There are a number of ethical issues and possible worries that should be taken into account while implementing artificial intelligence (AI) and data privacy. These factors centre on the need for responsibility and openness, the possibility of prejudice and discrimination, and the appropriate use of personal data (Brendel et al., 2021; Mujtaba & Mahapatra, 2019). First and foremost, preserving peoples' right to privacy is a crucial ethical factor (Helgadóttir, 2008). Concerns over the gathering, storing, and usage of personal data are intensifying as AI systems are used more and more (Brendel et al., 2021). It is essential for organisations to have comprehensive data protection protocols to secure confidential data and thwart illegal access (Brendel et al., 2021; Helgadóttir, 2008; Mujtaba & Mahapatra, 2019).

Scope and Limitations

While the potential applications of artificial intelligence (AI) in project management are vast and wide-ranging (Levitt & Kunz, 1987; Ong & Uddin, 2020), the scope of this research will be limited to specific areas where the integration of AI has demonstrated significant and noteworthy effects, with real-world examples. Including but not limited to the automation of routine project tasks (Auth et al., 2019), the development of AI-driven decision support systems, the use of predictive analytics for project planning (Bhavsar

et al., 2019), effective distribution of available resources (Skobelev, 2018), and the implementation of effective risk management strategies (Aziz & Dowling, 2019; Baryannis et al., 2019). The study acknowledges that the adoption of artificial intelligence (AI) in project management is constrained by several limitations. These limitations encompass resistance to change (Dam et al., 2019), concerns regarding data privacy (Mujtaba & Mahapatra, 2019), accuracy (Taboada et al., 2023), and the inherent complexity associated with integrating AI into pre-existing workflows (Yams et al., 2020). However, it is important to note that this research will not extensively explore the intricate technical aspects of artificial intelligence (AI) algorithms or place significant emphasis on specific programming implementations. It will, however, demonstrate simple interactions with pre-existing public models.

Methodology

Research Design

This study's methodology takes a comprehensive approach, including a wide variety of qualitative and quantitative elements. This mixed-methods methodology allows for an in-depth analysis of artificial intelligence's (AI) overall effectiveness and influence (Liaw et al., 2023) as well as its adoption in the project management field. Similarly, consulting natural language processing or generative pre-trained transformer tools for demonstrating examples and ease of use is also a part of the research design.

Data Collection

In order to obtain a comprehensive understanding, a diverse and multifaceted approach is utilised for the collection of data. One of the key components of this research project involves the extensive literature review, hailing from various industries, thereby enabling

a more comprehensive and inclusive viewpoint. In addition to the aforementioned point, it is important to note that the analysis of real-world case studies is conducted in order to acquire a comprehensive comprehension and practical knowledge of project management practices that are driven by artificial intelligence.

Data Analysis

Data analysis is commonly approached through categorization and topic to extract valuable and significant insights from the data (Biesialska et al., 2021). The process at hand entails the systematic categorization and interpretation of the qualitative information that has been gathered, with the aim of revealing patterns and recurring themes. Moreover, the patterns and approaches of artificial intelligence (AI) models are referenced and critically analysed in certain sections of the dissertations. The utilisation of this dual approach guarantees a comprehensive and thorough analysis that encompasses both the extensive and wide-ranging aspects of the research.

Ethical Considerations

The methodology, which includes a mixed-methods research design, a variety of data collection techniques from various sources, meticulous data analysis, and strict adherence to ethical standards, aims to provide a comprehensive and evidence-based examination of the incorporation of computer science and artificial intelligence (AI) in the field of project management including its diverging branches.

The initial exploration of ethical concerns in the field of artificial intelligence presents a highly relevant and significant topic that warrants further investigation and analysis (Helgadóttir, 2008).

Literature Review

This forthcoming literature review chapter will comprehensively explore the intersection of various industries, project management and its plausible adoption of artificial intelligence. With regard to the application of artificially augmented project management, establishing connections between multiple domains - such as computer science or construction engineering - will be possible with a perspective from the literature that has a good mix of various study areas or various settings (Winter et al., 2006). Various settings and applications can benefit project management and its systems to be more agile and intelligent (Cole, 2017; Zi, 2020).

Enhancing Traditional, Agile and Hybrid Methodologies

The integration of Artificial Intelligence (AI) is demonstrating its disruptive impact in the dynamic field of project management (Drabble, 1995; Said et al., 2022; Salleh & Aziz, 2022; Taboada et al., 2023). Although the Waterfall approach has historically offered stability and structure, it frequently has difficulties in meeting the requirements of contemporary dynamic projects (Van Casteren, 2017). Artificial intelligence (AI) plays a significant role in this context (Ong & Uddin, 2020). According to Ong and Uddin (2020), the application of artificial intelligence (AI) within the domain of project management acts as a catalytic component, thereby contributing to an increase in the efficacy and adaptability of project procedures.

One of the primary advantages of incorporating artificial intelligence (AI) into project management resides in the artificially intelligent system's capacity to efficiently analyse extensive quantities of data and deliver meaningful insights in a timely manner (Chowdhury & Sadek, 2012). This particular capacity effectively mitigates one of the constraints associated with conventional approaches, which significantly

depend on past data and predetermined plans (Papadakis & Tsironis, 2020; Zasa et al., 2020). AI-powered project management systems have the capability to analyse existing project data (Ong & Uddin, 2020), detect possible dangers (Aziz & Dowling, 2019), and provide adaptive tactics in real-time (Baryannis et al., 2019; Dam et al., 2019). For example, artificial intelligence algorithms have the capability to identify and analyse trends in the advancement of projects, so facilitating project managers in making timely and well-informed decisions (Dam et al., 2019; Kocaballi, 2023).

Moreover, artificial intelligence facilitates collaboration by enhancing the ability to utilise shared repositories of knowledge and facilitating seamless communication (Zerfass et al., 2020). The use of chatbots integrated with artificial intelligence and virtual assistants allows team members to efficiently acquire responses to their queries, hence reducing obstacles and enhancing productivity (Balatamoghna & Nagajayanthi, 2022; Brandtzaeg & Følstad, 2017). In Agile methodologies like as Scrum and Kanban, the use of artificial intelligence (AI) holds promise for automating repetitive tasks, allowing team members to redirect their focus towards more strategic and inventive aspects of their work (Auth et al., 2019; Levitt & Kunz, 1987; Versluis & Versluis, 2017). The concept of incremental progress, which is intrinsic to Agile techniques, aligns smoothly with the capability of artificial intelligence (AI) to attain continuous improvement (Versluis & Versluis, 2017).

Hybrid methodologies, which encompass the integration of conventional and Agile approaches, effectively amalgamate well-defined stages with flexible iterations in order to achieve a harmonious equilibrium between comprehensive planning and adaptability (Papadakis & Tsironis, 2020; Yams et al., 2020).

Key Concepts and Techniques

Artificial intelligence (AI) is a multidisciplinary domain that incorporates a range of methodologies, such as machine learning and neural networks, with the objective of emulating human-like intelligence in computational systems (Kok et al., 2009; Kühl et al., 2020). Machine learning encompasses the utilisation of algorithms that possess the capability to acquire knowledge from data and afterwards generate predictions (Kok et al., 2009; Kühl et al., 2020). Neural networks, which draw inspiration from the structure and functioning of the human brain, are employed to analyse patterns within datasets (Cheung et al., 2006; Kok et al., 2009). Decision trees provide a straightforward and easily comprehensible framework for making decisions (Dey, 2002; Kok et al., 2009).

The field of machine learning encompasses both supervised and unsupervised learning techniques (Brynjolfsson & Mitchell, 2017; El Naqa & Murphy, 2015). Supervised learning is a machine learning approach that relies on the availability of labelled data, where each data point is associated with a corresponding target value (Brynjolfsson & Mitchell, 2017; El Naqa & Murphy, 2015; Ozgur, 2004). In contrast, unsupervised learning is a technique that aims to identify and extract underlying patterns and structures from unlabelled data, without the guidance of pre-existing labels (Brynjolfsson & Mitchell, 2017; El Naqa & Murphy, 2015; Ozgur, 2004).

Recent Real-World Applications

One tangible real-world example would be the usage of OpenAI's ChatGPT Research Preview to come up with a project plan while simulating customers, product team and the project management board. ChatGPT being a conversational large language model has initiated change in a range of fields (Kocaballi, 2023). Kocaballi (2023) investigates how large language models can help simulate multiple

design problems and evaluate the product further. According to Kocaballi (2023), ChatGPT effectively performed the tasks assigned to it in regards to its role whether it was to design the product or act as the customer.

Moreover, Vakilzadeh et al. (2023) argue that text-generation models have been trained in a way that they can assist the project manager. Potential benefits from the most recent literature demonstrate effectiveness.

Debatably, there are demerits and limitations of using large language models due to the lack of output diversity, short-term memory and forgotten information, and partial or wrong responses due to bias or how conversational models display unwarranted confidence (Kocaballi, 2023; Said et al., 2022; Vakilzadeh & Pourahmad Ghalejoogh, 2023). With higher confidence, the perception of risk and benefit can be deceived (Said et al., 2022). Especially since project management is a dynamic field (Pollack, 2007), false confidence is a common problem with current large language models, such as ChatGPT or GPT4ALL (Kocaballi, 2023; Said et al., 2022), both of which require the user to be concise and specific (Ghazi, 2023).

AI in Project Management

The implementation of project operations has undergone a significant transition as a result of the remarkable automation capabilities of artificial intelligence (AI) (Goyal et al., 2023). AI-driven systems have taken over tasks that were previously dependent on human participation, such as data input and administrative activities (Balatamoghna & Nagajayanthi, 2022; Niederman, 2021). These systems provide increased accuracy and efficiency in doing these tasks (Taboada et al., 2023). Similarly, according to Niederman (2021), the compounding effect of the resulting decrease in the likelihood of human error is further amplified by the freeing of human resources, allowing for their deployment

towards strategic and innovative aspects of project management.

The systematic approach for creating AI use cases that have been suggested offers a greatly broadened focus and an angle to investigate new ideas (Hofmann et al., 2020). Apart from the technique itself, a thorough analysis of other use cases within project management or the use of artificial intelligence (AI) in other approaches may greatly improve understanding of AI's broad versatility. As discussed by Vakilzadeh et al. (2023), versatile artificial intelligence (AI) tools can offer assistance when it comes to the Project Management Institute's PMP test. In other words, this means a project manager following PMP can benefit from using artificially intelligent text-generation models (Vakilzadeh & Pourahmad Ghalejoogh, 2023).

Automation of Routine Tasks

The role of AI in project management becomes evident through its ability to automate routine tasks, thereby streamlining and enhancing operational efficiency (Taboada et al., 2023; Yawalkar, 2019). In the realm of project oversight, it is possible to assign routine tasks such as data entry and progress tracking to artificial intelligence (AI) systems (Niederman, 2021). This was tried and tested in multiple industries, whether it is construction (Korke et al., 2023), product management (Balatamoghna & Nagajayanthi, 2022), risk management (Dey, 2002), and software sector (Barenkamp et al., 2020). By doing so, human resources can then allocate their attention towards more strategic elements of project management (Levitt & Kunz, 1987; Niederman, 2021; Skinner, 2022; Taboada et al., 2023; Yams et al., 2020). Automation is a process that optimises operations by minimising the need for human intervention (Nof, 2009), thereby decreasing the likelihood of errors caused by human factors, and expediting the overall pace of task execution (Auth et al., 2019;

Bhavsar et al., 2019; Dam et al., 2019; Goyal et al., 2023).

Moreover, artificial neural networks offer an accurate alternative method when compared to predictive models (de Barcelos Tronto et al., 2008). They can be applied to improve project management processes (Kumar et al., 1994), but one caveat of this approach is the lack of documentation on the embedding of the novel neural network methodology, or how to mature it (Hakimpoor et al., 2011). According to Kumar et al. (1994), adapting a neural network has another key advantage, in that they are model-free and can be used much more dynamically when it comes to the dataset and derived prediction.

Additionally, public models such as LLaMa can be finetuned to improve communication and the ease of access to information (Yunxiang et al., 2023), GPT4ALL and ChatGPT can be used to act as agents that improve project planning, budgeting and scope phases for the project manager (Kocaballi, 2023). Furthermore, Google Bard, ChatGPT Turbo and other models can be compared and adapted depending on the requirements of the project or the needs of the project manager (Vakilzadeh & Pourahmad Ghalejoogh, 2023).

The ongoing and continuous discussion surrounding the concept of fairness in the context of machine learning and AI-based decision-making is in line with the central focus of this dissertation, which revolves around the examination and analysis of ethical considerations, ranging from the bias on gender to disability (Leavy, 2018; Mujtaba & Mahapatra, 2019; Nelson, 2019).

The capacity of artificial intelligence (AI) to optimise resource allocation in accordance with project demands holds considerable potential for the field of project management (Korke et al., 2023). The aforementioned concept of using public models serves as a catalyst for delving

deeper into the complexities inherent in AI-powered resource allocation models (Li et al., 2023; Skobelev, 2018). Skobelev (2018) shows that considering adaptive resource management via agents results in increased resource efficiency in the management of factories, mobile teams, supply chains, aerospace and railways. It is very necessary to conduct an in-depth analysis of the levels of accuracy, efficiency, and flexibility displayed by the AI models being considered for use in the field of project management when one is contemplating the introduction of artificial intelligence (AI) into this sector (Kumar et al., 1994; Levitt & Kunz, 1987; Papadakis & Tsironis, 2020; Skobelev, 2018).

The initial stage in integrating artificial intelligence (AI) into task automation involves the identification of job roles that are suitable for automation (Guo & Zhang, 2022). Project managers are capable of directing their focus and exerting their efforts towards the intricate and strategic operations that possess more importance and worth, as the mundane and recurring duties are meticulously allocated and dispersed (Mölsä, 2017). The use of advanced algorithms inside artificial intelligence (AI) is crucial for optimising the task allocation process (Geetha & Parthasarathy, 2021). Artificial intelligence (AI) has the potential to significantly enhance the efficiency of these processes by effectively aligning individuals' talents with the unique demands of individual job tasks (Yawalkar, 2019).

Decision Support Systems

Artificial intelligence (AI) plays a pivotal role as a catalyst in facilitating and expediting decision-making processes (El Khatib & Al Falasi, 2021; Mahmood et al., 2023). These artificially intelligent systems aid in the assessment of different options, the prediction of probable results, and finally, the identification of the most beneficial courses of action (El Khatib & Al Falasi,

2021; Mahmood et al., 2023). These sophisticated systems have the capability to convert raw data into valuable insights that can be used to make informed decisions and effectively steer the course of various projects (Biesialska et al., 2021; Mahmood et al., 2023; Ong & Uddin, 2020).

The integration of artificial intelligence (AI) into resource allocation processes presents a highly compelling avenue for significantly enhancing project management capabilities (Papadakis & Tsironis, 2020; Yams et al., 2020). However, a critical inquiry arises concerning the accuracy and efficiency of artificial intelligence-driven resource allocation models (Skobelev, 2018). It is important to examine and evaluate the extent to which these models are able to accurately and efficiently allocate resources (National Academies of Sciences & Medicine, 2020). This notion prompts a comprehensive and thorough exploration of the effectiveness of these models in comparison to traditional methods (Tambe et al., 2019). Through the implementation of empirical assessments and comparative analyses, a comprehensive understanding of the reliability and performance of artificial intelligence (AI)-based resource allocation models within various project contexts can be provided (National Academies of Sciences et al., 2023; Tambe et al., 2019).

Furthermore, delving into the predictions made by Cearley et al. (2016) regarding the significant potential for automation that artificial intelligence (AI) possesses in the field of project management has been realised (Tambe et al., 2019). The referenced study nudges researchers to thoroughly examine the various tasks that artificial intelligence (AI) has the capability to efficiently automate, thereby significantly altering and transforming the workflows of project management (Cearley et al., 2016). The dissertation can effectively incorporate these valuable insights to thoroughly discuss and

analyse the notable shift that has occurred in project management roles, as well as the various opportunities that arise from the integration of artificial intelligence (AI) in streamlining and optimising routine tasks. One example of this would be the predicted removal of reporting and the supportive role of the project management office (Belharet et al., 2020).

Artificial intelligence (AI) plays a crucial role in enabling the continuous and instantaneous monitoring of various project variables (De Wit, 1988; Taboada et al., 2023; Van Besouw & Bond-Barnard, 2021). Deviations from the originally planned milestones have the ability to trigger responses by the artificially intelligent project management system, which in turn facilitates the prompt implementation of corrective measures (Van Besouw & Bond-Barnard, 2021). Project managers are able to receive valuable and practical insights, which in turn enable them to make agile adjustments in order to ensure that projects stay on track (De Wit, 1988).

Predictive Analytics

Predictive analytics, which is considered a crucial artificial intelligence capability (Gad-Elrab, 2021), provides project managers with the valuable capability to forecast future trends by leveraging historical data (Fauser et al., 2015). This particular capability enables individuals to engage in proactive decision-making processes, such as estimating the project timeline, allocating resources, and identifying potential risks (Dam et al., 2019; de Barcelos Tronto et al., 2008; Fauser et al., 2015; Filippetto et al., 2021; Gad-Elrab, 2021).

Artificial intelligence-infused tools have the capability to enable the tracking and reporting of progress in real time (Niederman, 2021). The data that is generated from the various activities of the project undergoes a processing phase in order to provide visual representations and valuable insights (Bento et al., 2022; Drabble, 1995). Project managers are able to gain a

comprehensive and multifaceted overview of their projects, which allows them to effectively and seamlessly monitor the overall health and performance of the projects (Bento et al., 2022; Drabble, 1995).

The framework that has been proposed for AI-powered marketing solutions (Mölsä, 2017) provides significant and valuable insights that can greatly contribute to the exploration of the dissertation. More specifically, one result Mölsä (2017) explores is how AI saves time in the business case planning phase in a multicultural team.

Furthermore, the concept of automating scheduling tasks (Aytug et al., 1994) and optimising decision-making (E Diekmann, 1992; Mahmood et al., 2023) is in line with the central focus of the dissertation, which is the integration of artificial intelligence (Yams et al., 2020). Within the context of agile project management, a comprehensive understanding of the tangible manifestations of AI's capabilities when it comes to optimizing project workflows is apparent. Change management tools benefiting from artificial intelligence (AI) in construction (Arefazar et al., 2022) and, the benefits of artificial intelligence (AI) in scope and change management (Marnada et al., 2022) are tangible examples. Additionally, the formation of a more agile team when it comes to project management and communication as proposed by Lorio et al. (2019) can benefit from having artificially intelligent systems as a part of its communications cycle (Loiro et al., 2019; Zerfass et al., 2020).

Moreover, Korke et al. (2023) delve into the relevance of AI in optimising construction project planning, highlighting its significance in the field. Their approach has the potential to be seamlessly integrated in order to further explore and discuss the specific applications of artificial intelligence (AI) within the realm of project planning, especially when paired with a smart

construction site system (Korke et al., 2023; Zi, 2020).

The exploration of artificial intelligence (AI) integration aligns with the current emphasis on big data analytics as a strategy to improve efficiency (Allam & Dhunny, 2019). Through a comprehensive examination of the convergence of Big Data and Artificial Intelligence (AI), the literature significantly enhances project managers’ understanding and analysis of how data can be effectively utilised to facilitate informed decision-making in the realm of project management (El Khatib & Al Falasi, 2021; Ong & Uddin, 2020). One strong example is the current large language models, as they are trained in large sets of data with billions of parameters (OpenAI, 2023b). The next paragraph is an excerpt from a ChatGPT log, demonstrating its capabilities for informed decision-making.

Input

X is a project manager adopting PRINCE2 and using you as a decision-making tool. X has problems regarding budget and X can't figure out which vendor is the best option. There are overseas vendors and local vendors. Local vendors are more expensive working with a range of 100 to 200 units and, overseas vendors work with a range of 50 to 250 units. Moreover, overseas shipping can cost 20 to 100 units. What type of vendor should X choose, and what should they consider knowing they are adopting PRINCE2? Is X missing anything?

ChatGPT September 25 Version Response

In the context of project management, selecting the appropriate vendor is a pivotal decision. This response outlines the considerations and steps that X, a project manager adhering to the PRINCE2 methodology, should take when faced with a choice between local and overseas vendors for a project with budgetary concerns.

X's decision-making process should encompass the following key aspects:

- Project Requirements: X should clearly define the project's product or service requirements, ensuring they align with the project's objectives.
- Cost Analysis: Calculate the total cost of working with local and overseas vendors, factoring in product/service costs, shipping expenses, and associated costs.
- Risk Assessment: Identify and evaluate potential risks tied to each vendor option, including supply chain disruptions, quality control, currency fluctuations, and geopolitical factors.
- Quality and Standards: Assess the quality and adherence to industry standards by both vendor types, emphasizing quality control measures.
- Time Constraints: Consider lead times associated with each vendor choice, recognizing potential delays in projects due to shipping and customs.
- Communication: Evaluate the effectiveness of communication with the selected vendor, taking into account potential language barriers and other challenges.
- Sustainability and CSR: If relevant, assess whether vendors align with sustainability and corporate social responsibility criteria.
- Scalability and Flexibility: Consider whether the vendors can accommodate potential changes in project requirements.
- Legal and Contractual Aspects: Consult with legal experts to ensure vendor contracts are legally sound, especially in international dealings.
- Stakeholder Input: Solicit input from project team members and end-users to consider their preferences and insights regarding vendor selection.
- Decision Criteria: Create a structured decision-making framework with weighted

criteria to objectively evaluate and compare vendors.

Vendor Selection: Based on the evaluation and scoring, make an informed decision that aligns with the project's objectives, budget, and risk tolerance.

Ongoing Vendor Management: Implement a vendor management strategy to oversee the vendor's performance and promptly address any issues.

This structured approach to vendor selection ensures that X's decision is well-informed, aligns with PRINCE2 principles, and mitigates potential risks associated with vendor choice.

(OpenAI, 2023a)

Input

What kind of vendor should X choose?

ChatGPT September 25 Version Response

The choice between local and overseas vendors depends on the specific project requirements, constraints, and the evaluation of the factors mentioned earlier. Here's a simplified decision-making approach based on common scenarios:

Choose a Local Vendor When:

Budget allows for a slightly higher cost.

Quality and reliability are paramount, and local vendors have a proven track record.

Time constraints are tight, and local vendors can provide faster delivery.

The project requires frequent communication and customization, and language barriers are a concern.

The project emphasizes sustainability and supporting local businesses.

Choose an Overseas Vendor When:

Budget is a critical concern, and cost savings from overseas vendors outweigh additional shipping costs.

The project has a longer timeframe, allowing for extended lead times associated with overseas shipping.

The product or service is standardized and doesn't require frequent customization or communication.

Quality control measures and international standards are met by the overseas vendor.

Risks associated with currency fluctuations or geopolitical factors can be mitigated or tolerated.

Ultimately, the vendor choice should align with the project's specific goals and constraints. Careful consideration of cost, risk, quality, time, communication, and other relevant factors will lead to the most appropriate vendor selection.

(OpenAI, 2023a)

As demonstrated, the large language model, generative pre-trained transformer introduced multiple complex points of view that may help to make a better decision. It also did not mention any pricing or specific industry, which leads to forgotten or unnecessary information being cut from the response (Kocaballi, 2023; Vakilzadeh & Pourahmad Ghalejoogh, 2023). Furthermore, when asked again, it did not pick one choice at random, but instead provided some guidelines for "X" to follow. This shows that ChatGPT -when provided with some information- can demonstrate informed decision-making and consult its vast database to provide some sort of guidance to the project manager. Of course, this is a very limited and simple example, but research shows that with more data from the project manager, the business, the project or from the training with human feedback (Stiennon et al., 2020), as well as increasing

parameters and training time, these artificial intelligence (AI) models scale to be more accurate (Chowdhery et al., 2022; Gad-Elrab, 2021; Ong & Uddin, 2020; Radford et al., 2019; Shoeybi et al., 2019).

Project management is currently undergoing a significant transformation due to the emergence of artificial intelligence (AI) and its ability to enable real-time monitoring and analysis of performance (Fridgeirsson et al., 2021; Niederman, 2021; Taboada et al., 2023). This idea warrants a comprehensive and in-depth examination of AI-powered metrics and analytics, which would allow project managers to thoroughly evaluate project progress and performance with an unprecedented level of precision and accuracy (Belharet et al., 2020; Weng, 2023). The incorporation of artificial intelligence (AI) in the evaluation of project performance provides a thorough and all-encompassing comprehension of how the real-time insights offered by AI are transforming the supervision and administration of projects to a more successful direction (Dam et al., 2019; Pospieszny et al., 2018; Taboada et al., 2023).

Artificial intelligence (AI) plays a crucial role in enhancing project planning by leveraging the power of predictive analytics (Drabble, 1995; Levitt & Kunz, 1987). The analysis of historical project data is conducted in order to make predictions about project timelines and budgets (Bento et al., 2022; Drabble, 1995; Levitt & Kunz, 1987; Taboada et al., 2023). Artificial intelligence (AI)-derived predictions have the ability to enhance project planning by reducing uncertainties in execution, thereby refining the overall process (Bento et al., 2022; Drabble, 1995; Levitt & Kunz, 1987; Taboada et al., 2023).

Artificial intelligence's optimisation algorithms have the capability to significantly improve the allocation of resources (National Academies of Sciences & Medicine, 2020; Skobelev, 2018). According to the National Academies of Sciences

& Medicine (2020), in order to determine the most effective allocation strategies, a thorough analysis is conducted on the project requirements, constraints, and the resources that are available. This practice ensures that resources are utilised in a prudent manner, thereby preventing the occurrence of bottlenecks (Drabble, 1995; El Khatib & Al Falasi, 2021).

Risk Management

The incorporation of artificial intelligence (AI) in risk management confers benefits owing to its adeptness in processing data (Aziz & Dowling, 2019; Baryannis et al., 2019). In the field of artificial intelligence, the analysis of large datasets plays a crucial role in identifying patterns and anomalies that may be efficiently utilised for the purposes of risk assessment and mitigation (Aziz & Dowling, 2019; Dam et al., 2019; Filippetto et al., 2021). The utilisation of efficient risk management strategies results in an enhancement of the overall effectiveness of risk management measures (Aziz & Dowling, 2019; Dam et al., 2019; Dey, 2002; E Diekmann, 1992; Filippetto et al., 2021).

Artificial intelligence's advanced analytical capabilities greatly enhance the process of decision-making by offering valuable insights based on data-driven analysis, particularly in the context of risk assessment (Aziz & Dowling, 2019; Dey, 2002; Felländer et al., 2022). Complex data sets are meticulously analysed in order to identify and assess potential risks, including their probabilities of occurrence and the potential impacts they may have (Aziz & Dowling, 2019; Dey, 2002; Hodge, 2020). This capability allows project managers to develop and implement proactive measures to mitigate risks (Hodge, 2020).

Communication Enhancement

It cannot be overstated that effective and concise communication is extremely important. Artificial intelligence (AI) plays a crucial role in

enhancing communication processes (Liaw et al., 2023). It achieves this by automating repetitive tasks such as regular updates, translating complex technical terminology for stakeholders, and promoting efficient collaboration among teams that are geographically separated (Taboada et al., 2023; Yawalkar, 2019; Zerfass et al., 2020).

An in-depth and broad investigation of the potential influence of artificial intelligence (AI) on project management processes, with the goals of revolutionising and changing those processes, requires the inclusion of several viewpoints, encompassing a variety of dimensions and aspects (Auth et al., 2019; Hofmann et al., 2020; Niederman, 2021). This should serve as the foundation for a study on the improvement of communication, focusing on the impact of the changes in communication rather than the specific methods employed to increase it.

Furthermore, within the context of human-centred design, the particular topic of interest is congruent with the overarching goal of the dissertation. Yawalkar et al. (2019) declare that artificial intelligence (AI) will reduce the burden on the human workforce, increase employee engagement, and overcome certain human limitations.

Effectiveness of AI Integration

The present chapter undertakes an evaluation of the consequences that arise from integrating artificial intelligence (AI) into the various processes and themes involved in project management. Additionally, it looks into the ways in which artificial intelligence (AI) can play a significant role in enhancing business' operational efficiency, increasing the precision of decision-making, and mitigating the occurrence of human errors and biases.

Furthermore, the end of this chapter explores the various obstacles that emerge during the

implementation of artificial intelligence (AI) in the field of project management.

Improved Efficiency and Productivity

Project teams often focus on undertaking large-scale projects and leverage the capabilities of artificial intelligence (Bloch et al., 2012) to automate mundane tasks and improve the allocation of resources (Arachchi & Perera, 2018; Goyal et al., 2023). AI technology plays a pivotal role in optimising project timelines and attaining unparalleled levels of operational effectiveness and efficiency (Taboada et al., 2023).

Input
During project planning, the project team rigorously defined the project scope. During project execution, a senior engineer calls the project manager and suggests a simpler and more efficient design which could benefit the project.
What should the project manager do next?
Taken from PrepCast (2020); Qid 6110083, Scope Management, 2. Process, 4.5 Monitor and Control Project Work (PrepCast., 2020, November 16)

ChatGPT September 25 Version Response
The project manager should convene a meeting with relevant stakeholders to evaluate the senior engineer's suggestion and assess its potential impact on the project.
(OpenAI, 2023a)

The hinted answer to this question is to ask the engineer to submit a change request, to evaluate the engineer's suggestion (PrepCast., 2020, November 16). Building upon the decision-making example, artificially intelligent chatbots can fill in the gap for mundane tasks and answer mundane questions such as the one above. Albeit a little wrong, since the project manager

first needs a change request to direct this information to the stakeholders (Guide, 2008), the key idea is correct. Hence, the approach of using artificial intelligence to improve task management efficiency is a considerable one.

Moreover, on task management, AI-powered project management solutions exhibit remarkable effectiveness in automating tasks that were previously typified by a significant amount of manual labour and time consumption (Dam et al., 2019; Taboada et al., 2023). Artificial intelligence (AI) algorithms have demonstrated a high level of proficiency in effectively and accurately executing repetitive activities (Bhbosale et al., 2020), such as data entry, status reporting, and progress tracking (Dam et al., 2019; Shekhar, 2019). The use of automation technologies relieves project managers and team members from the monotonous and repetitive portions of administrative work, allowing them to focus their attention on activities that need creativity, critical thinking, and problem-solving talents (Taboada et al., 2023).

Furthermore, artificial intelligence (AI) can enhance productivity by using the specialist knowledge of individual team members to manage repetitive activities for the members. This leads to a heightened level of focus that may allow staff members to make substantial progress towards project goals, hence supporting the accelerated completion of projects (Bhavsar et al., 2019; Goyal et al., 2023; Guo & Zhang, 2022).

Reduction of Human Error and Bias

The implementation of AI technology has been shown to significantly decrease the occurrence of human errors (Dam et al., 2019), which are frequently caused by factors such as fatigue or oversight (Shappell & Wiegmann, 2000). Furthermore, through the utilisation of data-driven insights, artificial intelligence effectively

reduces the impact of subjective biases that have the potential to influence the process of decision-making (El Khatib & Al Falasi, 2021). The utilisation of an objective approach in project management promotes the establishment of consistency and impartiality (Turner, 2022).

Providing a comprehensive analysis of the potential long-term ramifications that may arise from opposing the progress of artificial intelligence (AI) requires a specific focus on its implications within the field of project management (Engel et al., 2021). The project manager needs this perspective not only to keep up with the actively changing field of project management but also to enhance their workflow and improve project success. The statement underscores the significance of managers who actively adopt AI integration, as they are positioned to achieve superior performance compared to those who neglect AI (Ong & Uddin, 2020; Taboada et al., 2023). The implications that arise from the utilisation of AI-driven decision support and automation in project management practises, enhance and elevate these practices (Balatamoghna & Nagajayanthi, 2022; Drabble, 1995; Hakimpoor et al., 2011; Hofmann et al., 2020; Levitt & Kunz, 1987; Niederman, 2021; Ong & Uddin, 2020; Skobelev, 2018; Vakilzadeh & Pourahmad Ghalejoogh, 2023; Weng, 2023; Yams et al., 2020), and are welcome as it seems.

Challenges in AI Integration

Data Privacy and Security Concerns

As artificial intelligence (AI) heavily depends on data, it is of utmost importance to address concerns related to data privacy and security (Dilmaghani et al., 2019). In order to effectively protect sensitive project data from unauthorised access and breaches, it is imperative to implement stringent measures that adhere to data protection regulations (Dilmaghani et al., 2019; Mitrou, 2018).

Moreover, there is the concern of bias. According to Nelson (2019), bias in AI is amply evident. AI models and algorithms are developed and trained by individuals which reflect themselves in the model (Nelson, 2019). This becomes a challenge when data is not secure enough and the model performs poorly due to bias, which demands variety and further training (Mujtaba & Mahapatra, 2019).

Resistance to Change

The implementation of artificial intelligence (AI) in project management may potentially face resistance from stakeholders who are accustomed to conventional practices (Hofmann et al., 2020). The ongoing transition towards the integration of artificial intelligence (AI) necessitates the implementation of robust change management strategies that effectively tackle concerns and promote widespread acceptance (Meske et al., 2022).

AI systems are also interchangeable. For example, an algorithm trained in image processing and classification by Google can be used to observe CT scans (Nelson, 2019). This hyperbole of change requires thorough explanation and adaptation (Hofmann et al., 2020), which may distance the technology from the end-user, stakeholders or the project manager due to complexity.

Risk Management and Soft Skills

The dynamic project risk management and mitigation area find a transformative ally within artificial intelligence (AI) systems (Aziz & Dowling, 2019). The previously mentioned concept of risk management in literature and how risk management processes can be improved when benefiting from an artificially intelligent system serves as a catalyst for an in-depth investigation into the vast potential of artificial intelligence (AI) in completely transforming the existing risk management strategies (Aziz & Dowling, 2019; Baryannis et al., 2019; Dam et al., 2019; Dey,

2002; E Diekmann, 1992). This dissertation has demonstrated examples of risk management with artificial intelligence, but there is still the need for individuals to interpret and convey risk information properly, using soft skills (Carvalho & Rabechini Junior, 2015). Crucially, artificial intelligence can also help in this area as it does with closing language gaps (Kim et al., 2021). The soft skills training deficit gap can be closed by the solutions AI provides (Schutt et al., 2017), which in turn can help convey risk management information better (Carvalho & Rabechini Junior, 2015).

Technical Limitations

While artificial intelligence (AI) presents significant potential for transformation, it is important to acknowledge that it is not immune to various technical limitations. When considering the limitations of AI, it is important to take into account various factors that can impact its performance. These limitations encompass algorithmic bias, which refers to the potential for AI systems to exhibit discriminatory behaviour due to biased training data or flawed algorithms (Nelson, 2019). Additionally, inadequate data quality can hinder the accuracy and reliability of AI models, as they heavily rely on high-quality and representative data for optimal performance (Gudivada et al., 2017). Lastly, limitations in AI capabilities should be acknowledged, as AI systems may not possess the same level of reasoning, understanding, or decision-making abilities as humans in certain contexts (Niederman, 2021). In order to effectively manage expectations, it is crucial to possess a comprehensive understanding of these constraints.

The benefits encompass a wide range of areas, including but not limited to the enhancement of efficiency and the mitigation of errors (Niederman, 2021; Taboada et al., 2023). Concurrently, it is imperative to recognise the inherent difficulties associated with the

integration of artificial intelligence (AI) (Skinner, 2022), thereby emphasising the significance of attaining a comprehensive comprehension of both its capabilities and constraints.

Discussion

This chapter delves into a discussion on the consequences of incorporating artificial intelligence (AI) into project management. It does so by examining and analysing real-world case studies to gain valuable insights. Furthermore, this section of the text also serves to acknowledge and discuss the various challenges and limitations that have been identified in the preceding chapters. Additionally, it provides a brief insight into the potential future trends that are expected to be adopted by AI-driven project management.

Comparative Analysis of Case Studies

The juxtaposition of various real-world case studies effectively highlights the multitude of ways in which the integration of artificial intelligence (AI) affects the field of project management. These cases serve to highlight the wide range of advantages that AI provides, encompassing everything from the optimisation of resources to the mitigation of risks.

There are several examples from companies such as Google, IBM, Amazon and OpenAI, and many more (Dwivedi et al., 2021). ABB and IBM are working together to utilize IBM's Watson to build an artificially intelligent platform (Helo & Hao, 2022). This combination provides real-time insights for utilities and transport (Helo & Hao, 2022). Moreover, IBM and ABB also find inferiorities of assets using real-time image processing and real-time manufacturing line data to avoid critical failures (Helo & Hao, 2022).

Similarly, Google's Generative AI Studio also provides tools for project managers. Especially tracking and monitoring tools to avoid poor decision-making, scope changes and budgeting

changes regarding goals (Taulli, 2023). Start-up Kids Campus also utilizes Google's tools to manage the project, further enhancing it with generative AI and similar content automation strategies, which include tools from Google's Generative AI Studio (Embaye et al., 2023).

Google's platform's extensive availability emphasises the extensive range of applications that the platform offers. The Model Garden encompasses more than 100 distinct models curated for businesses and individuals, including enterprise-ready models, open-source models, and specific models from Google and 3rd parties (Google, 2023). This broad selection of models serves to stimulate discourse regarding the various alternative tools and technologies that are accessible for the integration of artificial intelligence within the realm of project management. The potential of the platform to optimise various project management processes can be further explored and analysed.

Studying multiple case studies in the field of construction, critical chain management and scheduling concerns were minimized using artificially intelligent frameworks (Ma et al., 2014). Assessing uncertainties and measuring them minimizes risk and optimizes buffer times (Ma et al., 2014). Existing buffer sizing methods were outperformed by an agile approach, proving effectiveness on scheduling (Ma et al., 2014).

Similarly, a case study undertaken in South Korea mentions sustainability concerns regarding fall accidents (Kim et al., 2022). Using deep learning and artificially intelligent algorithms, predicting and avoiding these fall accidents was possible, addressing a big chunk of construction risks including health, fall damage, time concerns and sustainability (Kim et al., 2022).

Through a comprehensive analysis of the similarities and disparities observed among different cases, a more intricate and detailed comprehension of the adaptability of artificial

intelligence (AI) within diverse contexts can be acquired. This could be necessary for the project manager, as every project is different and no one model is capable of handling everything, including custom scopes and diverse teams across industries. The work can be split across multiple artificially intelligent systems, hence the need for further research on the project managers' end.

Future Trends in AI-Driven Project Management

The anticipation of the future envisions a landscape for project management, that is driven by artificial intelligence (Niederman, 2021; Ong & Uddin, 2020). This landscape is characterised by significant advancements in predictive analytics, natural language processing, and automation (Cheung et al., 2006; de Barcelos Tronto et al., 2008). The role of AI as a strategic advisor to project managers is increasingly prominent, as it provides real-time insights that facilitate proactive decision-making processes (El Khatib & Al Falasi, 2021; Niederman, 2021). In addition, it is worth noting that the incorporation of artificial intelligence (AI) into emerging technologies such as blockchain and the Internet of Things (IoT) has the potential to significantly transform project management paradigms (Sandner et al., 2020). According to Sandner et al. (2020), a research funded by Germany and implemented by the Project Management Agency Karlsruhe paves the way for digitization using blockchain technology. This type of structure could also be useful for project management improve data security, and provide the ability to monitor the artificially intelligent system.

The accessibility to consult the project management knowledge bodies and predict the direction artificial intelligence-driven project management may take has its roots in past research regarding artificial intelligence. Researchers, whether dated (de Barcelos Tronto

et al., 2008; Drabble, 1995; E Diekmann, 1992; Levitt & Kunz, 1987; Pollack, 2007) or recent (Goyal et al., 2023; Korke et al., 2023; Mahmood et al., 2023; Taboada et al., 2023; Weng, 2023) state or realize the grounds, that convergence of artificial intelligence (AI) and project management is anticipated to bring about a significant transformation in the fundamental aspects of project conception, execution, and management.

Conclusion

The final chapter of this dissertation serves as a comprehensive summary, encompassing the fundamental aspects of the research. It effectively combines the main discoveries, explores the potential impact on project management practises, emphasises the contributions made to the field, and provides more suggestions for further investigation in the future.

Summary of Key Findings

The integration of artificial intelligence (AI) into project management has been shown to have a substantial influence, as evidenced by empirical case studies mentioned throughout the dissertation, benefiting companies such as Google, IBM, Amazon, and OpenAI. The aforementioned case studies showcase several advantages, including the optimisation of resources, the mitigation of risks, the collection of real-time insights, and the provision of decision assistance (Dam et al., 2019; Embaye et al., 2023; Helo & Hao, 2022; Kim et al., 2022; National Academies of Sciences & Medicine, 2020).

The partnership between IBM and ABB exemplifies the practical implementation of artificial intelligence (AI) in the utilities and transportation sectors (Helo & Hao, 2022). This cooperation leverages IBM's Watson technology to effectively monitor assets and provide up-to-date information in real time (Helo & Hao, 2022).

Furthermore, Google offers a variety of essential tools inside its Generative AI Studio that are valuable in the management and monitoring of projects (Google, 2023). These materials play a crucial role in facilitating informed decision-making and effective budgeting strategies (El Khatib & Al Falasi, 2021). Incorporating artificial intelligence (AI) into project management procedures facilitates the examination and assessment of various tools and technologies (Helo & Hao, 2022).

Moreover, an examination of case studies within the construction industry demonstrates the efficacy of artificial intelligence (AI) in addressing notable challenges such as scheduling complexities, optimisation of buffer time, management of vital chains, and sustainability concerns (Ma et al., 2014). AI algorithms and deep learning techniques are illustrative instances of advanced methodologies employed for this purpose (Guo & Zhang, 2022; Kim et al., 2022; Korke et al., 2023; Ma et al., 2014; Zi, 2020).

The versatility of artificial intelligence (AI) has been demonstrated in many project contexts as explored earlier, underscoring the need for project managers to possess a comprehensive understanding of AI's adaptability. A comprehensive comprehension of this concept is vital in effectively overseeing heterogeneous teams and customising project scopes, which may need the utilisation of several artificial intelligence systems (Engel et al., 2021; Van Besouw & Bond-Barnard, 2021).

The field of project management, propelled by artificial intelligence, anticipates progress in the domains of automation (Goyal et al., 2023), natural language processing (Li et al., 2023; Vakilzadeh & Pourahmad Ghalejoogh, 2023), and predictive analytics (de Barcelos Tronto et al., 2008). Artificial intelligence (AI) assumes the role of a strategic adviser by providing timely insights that facilitate proactive decision-making (Vakilzadeh & Pourahmad Ghalejoogh, 2023).

When integrated with upcoming technologies such as blockchain and the Internet of Things (IoT), artificial intelligence (AI) has the capability to fundamentally revolutionise traditional project management paradigms (Sandner et al., 2020).

The existing aforementioned body of research, as well as retrospective studies, collectively suggest that the integration of artificial intelligence (AI) with project management approaches will lead to substantial changes in the way projects are conceptualised, executed, and managed.

Artificial intelligence (AI) plays a significant role in enhancing productivity and efficiency within the realm of project management (Ghazi, 2023; Taboada et al., 2023). This is achieved through enhancing operational efficiency (Taboada et al., 2023; Yawalkar, 2019), optimising resource allocation (Geetha & Parthasarathy, 2021; Skobelev, 2018; Yawalkar, 2019), and using automation in various processes (Shekhar, 2019; Versluis & Versluis, 2017). As a result, project teams may allocate a greater proportion of their time and resources towards tasks that need the application of critical and creative thinking, so facilitating the timely accomplishment of projects (Auth et al., 2019; Levitt & Kunz, 1987; Versluis & Versluis, 2017).

Furthermore, an important benefit of artificial intelligence (AI) lies in its ability to mitigate human mistakes and biases (Dam et al., 2019; Niederman, 2021; Taboada et al., 2023). This particular quality proves to be quite advantageous as it effectively addresses errors that arise from causes such as weariness and oversight (Niederman, 2021).

Nevertheless, the integration of artificial intelligence (AI) still presents some challenges. The importance of data privacy and security has significantly increased as a result of the critical issue of safeguarding sensitive project data from unauthorised access and breaches (Dilmaghani

et al., 2019). Hence, it is imperative to establish stringent protocols to ensure the safeguarding of confidential information (Dilmaghani et al., 2019; Mitrou, 2018). The mitigation of bias in artificial intelligence (AI) models necessitates the implementation of enduring regulations pertaining to secure data practices and continuous training (Mitrou, 2018; Mujtaba & Mahapatra, 2019).

The broad implementation of artificial intelligence (AI) faces a significant obstacle in the form of resistant stakeholders, particularly those who are accustomed to conventional practises, which requires these artificially intelligent systems to be better conveyable (Hofmann et al., 2020; Meske et al., 2022). The implementation of effective change management methods is crucial for the successful resolution of these issues and the cultivation of acceptance (Arefazar et al., 2022; Engel et al., 2021).

The demand for employees possessing soft skills to evaluate and communicate risk-related information remains constant, irrespective of the advancements in artificial intelligence (AI) that augment risk management practices (Carvalho & Rabechini Junior, 2015). Artificial intelligence (AI) has the potential to function as a supplementary instrument for addressing deficiencies in the development of soft skills (Schutt et al., 2017).

Moreover, it is vital to get a comprehensive comprehension of the technical limitations enforced by artificial intelligence (AI), including algorithmic bias, substandard data quality, and restraints in cognitive processes and decision-making in contrast to human capacities as discussed in earlier sections. Effectively managing expectations requires a deep level of understanding.

Various practical aspects associated with the integration of artificial intelligence (AI) into the field of project management, such as risk management, decision-making, monitoring and

analysis of performance, and other overall predictive analytics have been thoroughly explored and analysed. The potential of AI in enhancing project outcomes is evident, as it can automate routine tasks, provide data-driven decision support, and enable predictive analytics.

Implications for Project Management Practices

Practitioners in the domain of project management are presently encountering a distinctive and auspicious prospect to leverage the capabilities of artificial intelligence (AI) in order to enhance and augment the overall execution of projects (Belharet et al., 2020). The recent advancement of artificial intelligence (AI) technologies represents a noteworthy progression in the realm of project administration (Bhavsar et al., 2019; Skobelev, 2018). The intended metamorphosis of project managers will entail a shift away from the previously emphasised task-oriented responsibilities (Dam et al., 2019) and towards assuming a more strategic position as supervisors and communicators (Zerfass et al., 2020). The integration of artificial intelligence (AI) will enable the ease of this transition by equipping project managers with real-time insights and predictive capabilities (Van Besouw & Bond-Barnard, 2021; Zerfass et al., 2020). The integration of human experience with artificial intelligence augmentation leads to the establishment of a mutually beneficial collaboration (Tambe et al., 2019; Yawalkar, 2019) that may magnify and improve the results of diverse undertakings.

Addressing Challenges and Limitations

The scope of the discussion expands to encompass the comprehensive examination and analysis of the various challenges and limitations that arise during the process of integrating artificial intelligence (AI) into different systems and contexts. This analysis delved into various

strategies that can be employed to effectively navigate the complex landscape of data privacy concerns. Throughout the examination, a strong emphasis on the criticality of ethical data handling practises was placed. In order to address and reduce resistance to change, it is important to emphasise certain approaches, such as promoting active involvement and participation of stakeholders, as well as ensuring the provision of sufficient training opportunities. Technical limitations are widely recognised as dynamic and ever-changing domains that necessitate ongoing investigation and advancement.

Contribution to the Field

This dissertation presents insights by skilfully investigating perspectives from the domains of artificial intelligence technology and practical implementation to programme and project management. This is achieved via establishing connections between abstract concepts and tangible occurrences in the empirical realm, using case studies and examples as well as references to certain repetitive claims. Assessing integration methodologies, monitoring progress and recent approaches, and conducting thorough examinations of case studies are valuable approaches for acquiring a comprehensive comprehension of the potential applications of artificial intelligence (AI) in the domain of project management, as well as the constraints and barriers associated with this technology.

Recommendations for Further Research

As the synergy between AI and project management continues to evolve (Levitt & Kunz, 1987; Orellana, 2017), new opportunities for further research and exploration arise. The examination of the ethical implications related to the implementation of artificial intelligence within the realm of project management necessitates a more thorough and all-encompassing investigation. (Brendel et al., 2021; Helgadóttir, 2008; Mujtaba & Mahapatra, 2019; Nelson, 2019). Exploring the intricate dynamics of artificial intelligence (AI) within diverse project management methodologies and industries can yield valuable and nuanced insights (Goyal et al., 2023; Salleh & Aziz, 2022; Taboada et al., 2023; Yawalkar, 2019). In addition to the aforementioned points, it is worth considering the potential research avenues that arise from exploring the influence of artificial intelligence (AI) on team collaboration and stakeholder engagement (Biesialska et al., 2021; Orellana, 2017).

In conclusion, this dissertation provides a thorough examination and analysis of the integration of artificial intelligence (AI) into the field of project management. Further examining benefits, challenges, adaptation and other consequences. This fusion of advanced technological capabilities and practical wisdom of project managers and its scientific body is on the verge of revolutionising the ways projects are planned, conceived, implemented, and managed. It is important to recognise that the advance is merely commencing, and the domain of project management propelled by artificial intelligence holds vast potential for exploration and groundbreaking advancements, positioned at the brink of this significant transformation.

References

- Allam, Z., & Dhunny, Z. A. (2019). On big data, artificial intelligence and smart cities. *Cities*, 89, 80-91.
- Arachchi, S. A. I. B. S., & Perera, I. (2018, 30 May-1 June 2018). Continuous Integration and Continuous Delivery Pipeline Automation for Agile Software Project Management. 2018 Moratuwa Engineering Research Conference (MERCon),

- Arefazar, Y., Nazari, A., Hafezi, M. R., & Maghool, S. A. H. (2022). Prioritizing agile project management strategies as a change management tool in construction projects. *International Journal of Construction Management*, 22(4), 678-689.
- Auth, G., JokischPavel, O., & Dürk, C. (2019). Revisiting automated project management in the digital age—a survey of AI approaches. *Online Journal of Applied Knowledge Management (OJAKM)*, 7(1), 27-39.
- Aytug, H., Bhattacharyya, S., Koehler, G. J., & Snowdon, J. L. (1994). A review of machine learning in scheduling. *IEEE Transactions on Engineering Management*, 41(2), 165-171.
<https://doi.org/10.1109/17.293383>
- Aziz, S., & Dowling, M. (2019). Machine learning and AI for risk management. *Disrupting finance: FinTech and strategy in the 21st century*, 33-50.
- Balatomoghna, B., & Nagajayanthi, B. (2022). Enhancement of Productivity Using Chatbots. *Futuristic Communication and Network Technologies: Select Proceedings of VICFCNT 2020*,
- Barenkamp, M., Rebstadt, J., & Thomas, O. (2020). Applications of AI in classical software engineering. *AI Perspectives*, 2(1), 1.
- Baryannis, G., Validi, S., Dani, S., & Antoniou, G. (2019). Supply chain risk management and artificial intelligence: state of the art and future research directions. *International Journal of Production Research*, 57(7), 2179-2202.
- Belharet, A., Bharathan, U., Dzingina, B., Madhavan, N., Mathur, C., Toti, Y.-D. B., Babbar, D., & Markowski, K. (2020). A Study on the Impact of Artificial Intelligence on Project Management.
- Bento, S., Pereira, L., Gonçalves, R., Dias, Á., & Costa, R. L. d. (2022). Artificial intelligence in project management: systematic literature review. *International Journal of Technology Intelligence and Planning*, 13(2), 143-163.
- Bhavsar, K., Shah, V., & Gopalan, S. (2019). Business Process Reengineering: A Scope of Automation in Software Project Management Using Artificial Intelligence. *International Journal of Engineering and Advanced Technology (IJEAT)*, 9(2), 3589-3595.
- Bhbosale, S., Pujari, V., & Multani, Z. (2020). Advantages and disadvantages of artificial intelligence. *Aayushi International Interdisciplinary Research Journal*, 77, 227-230.
- Biesialska, K., Franch, X., & Muntés-Mulero, V. (2021). Big Data analytics in Agile software development: A systematic mapping study. *Information and Software Technology*, 132, 106448.
<https://doi.org/https://doi.org/10.1016/j.infsof.2020.106448>
- Bloch, M., Blumberg, S., & Laartz, J. (2012). Delivering large-scale IT projects on time, on budget, and on value. *Harvard Business Review*, 5(1), 2-7.
- Brandtzaeg, P. B., & Følstad, A. (2017). Why people use chatbots. *Internet Science: 4th International Conference, INSCI 2017, Thessaloniki, Greece, November 22-24, 2017, Proceedings 4*,
- Brendel, A. B., Mirbabaie, M., Lembcke, T.-B., & Hofeditz, L. (2021). Ethical Management of Artificial Intelligence. *Sustainability*, 13(4).
- Brynjolfsson, E., & Mitchell, T. (2017). What can machine learning do? Workforce implications. *Science*, 358(6370), 1530-1534.
- Carvalho, M. M. D., & Rabechini Junior, R. (2015). Impact of risk management on project performance: the importance of soft skills. *International Journal of Production Research*, 53(2), 321-340.
- Cearley, D., Burke, B., Searle, S., & Walker, M. J. (2016). Top 10 strategic technology trends for 2018. *The Top*, 10, 1-246.
- Cheung, S. O., Wong, P. S. P., Fung, A. S., & Coffey, W. (2006). Predicting project performance through neural networks. *International journal of project management*, 24(3), 207-215.
- Chowdhery, A., Narang, S., Devlin, J., Bosma, M., Mishra, G., Roberts, A., Barham, P., Chung, H. W., Sutton, C., & Gehrmann, S. (2022). Palm: Scaling language modeling with pathways. *arXiv preprint arXiv:2204.02311*.

- Chowdhury, M., & Sadek, A. W. (2012). Advantages and limitations of artificial intelligence. *Artificial intelligence applications to critical transportation issues*, 6(3), 360-375.
- Cole, C. (2017). Project management evolution to improve success in infrastructure projects. *Management Dynamics in the Knowledge Economy*, 5(4), 619-640.
- Dam, H. K., Tran, T., Grundy, J., Ghose, A., & Kamei, Y. (2019, 25-31 May 2019). Towards Effective AI-Powered Agile Project Management. 2019 IEEE/ACM 41st International Conference on Software Engineering: New Ideas and Emerging Results (ICSE-NIER),
- de Barcelos Tronto, I. F., da Silva, J. D. S., & Sant'Anna, N. (2008). An investigation of artificial neural networks based prediction systems in software project management. *Journal of Systems and Software*, 81(3), 356-367.
- De Wit, A. (1988). Measurement of project success. *International journal of project management*, 6(3), 164-170.
- Dey, P. K. (2002). Project risk management: a combined analytic hierarchy process and decision tree approach. *Cost Engineering*, 44(3), 13-27.
- Dilmaghani, S., Brust, M. R., Danoy, G., Cassagnes, N., Pecero, J., & Bouvry, P. (2019). Privacy and security of big data in AI systems: A research and standards perspective. 2019 IEEE International Conference on Big Data (Big Data),
- Drabble, B. (1995, 30-30 Oct. 1995). Artificial intelligence for project planning. IEE Colloquium on Future Developments in Projects Management Systems,
- Dwivedi, Y. K., Hughes, L., Ismagilova, E., Aarts, G., Coombs, C., Crick, T., Duan, Y., Dwivedi, R., Edwards, J., & Eirug, A. (2021). Artificial Intelligence (AI): Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. *International Journal of Information Management*, 57, 101994.
- E Diekmann, J. (1992). Risk analysis: lessons from artificial intelligence. *International journal of project management*, 10(2), 75-80. [https://doi.org/https://doi.org/10.1016/0263-7863\(92\)90059-I](https://doi.org/https://doi.org/10.1016/0263-7863(92)90059-I)
- El Khatib, M., & Al Falasi, A. (2021). Effects of Artificial Intelligence on Decision Making in Project Management. *American Journal of Industrial and Business Management*, 11(3), 251-260.
- El Naqa, I., & Murphy, M. J. (2015). *What is machine learning?* Springer.
- Embaye, T., Bogdanović, Z., & Belay, S. I. (2023). Digital Project-Based Learning for Kids: A Case Study of Start-up Kids Campus. E-business technologies conference proceedings,
- Engel, C., Ebel, P., & van Giffen, B. (2021). Empirically exploring the cause-effect relationships of AI characteristics, project management challenges, and organizational change. *Innovation Through Information Systems: Volume II: A Collection of Latest Research on Technology Issues*,
- Fausser, J., Schmidthuysen, M., & Scheffold, B. (2015). The prediction of success in project management. *Predictive Project Analytics. Projektmanagement aktuell*, 26, 66-74.
- Felländer, A., Rebane, J., Larsson, S., Wiggberg, M., & Heintz, F. (2022). Achieving a data-driven risk assessment methodology for ethical AI. *Digital Society*, 1(2), 13.
- Filippetto, A. S., Lima, R., & Barbosa, J. L. V. (2021). A risk prediction model for software project management based on similarity analysis of context histories. *Information and Software Technology*, 131, 106497.
- Fridgeirsson, T. V., Ingason, H. T., Jonasson, H. I., & Jonsdottir, H. (2021). An Authoritative Study on the Near Future Effect of Artificial Intelligence on Project Management Knowledge Areas. *Sustainability*, 13(4), 2345. <https://www.mdpi.com/2071-1050/13/4/2345>
- Gad-Elrab, A. A. (2021). Modern business intelligence: Big data analytics and artificial intelligence for creating the data-driven value. *E-Business-Higher Education and Intelligence Applications*, 135.
- Geetha, R., & Parthasarathy, V. (2021). RETRACTED ARTICLE: An advanced artificial intelligence technique for resource allocation by investigating and scheduling parallel-distributed

- request/response handling. *Journal of Ambient Intelligence and Humanized Computing*, 12(7), 6899-6909.
- Ghazi, S. (2023). Unlocking the Power of Large Language Models: Strategies for Efficient Usage, ChatGPT as Example.
- Gido, J., & Clements, J. (2014). *Successful project management*. Cengage Learning.
- Gil, J., Martinez Torres, J., & González-Crespo, R. (2021). The application of artificial intelligence in project management research: a review.
- Google. (2023). *Model Garden*. Google.
- Goyal, S., Jha, H., & Gupta, A. (2023). Automation in Project Management 4.0 with Artificial Intelligence. Proceedings of 3rd International Conference on Recent Trends in Machine Learning, IoT, Smart Cities and Applications: ICMISC 2022,
- Gudivada, V., Apon, A., & Ding, J. (2017). Data quality considerations for big data and machine learning: Going beyond data cleaning and transformations. *International Journal on Advances in Software*, 10(1), 1-20.
- Guide, P. (2008). *A guide to the project management body of knowledge*.
- Guo, K., & Zhang, L. (2022). Multi-objective optimization for improved project management: Current status and future directions. *Automation in Construction*, 139, 104256.
- Hakimpoor, H., Arshad, K. A. B., Tat, H. H., Khani, N., & Rahmandoust, M. (2011). Artificial neural networks' applications in management. *World Applied Sciences Journal*, 14(7), 1008-1019.
- Helgadóttir, H. (2008). The ethical dimension of project management. *International journal of project management*, 26(7), 743-748.
- Helo, P., & Hao, Y. (2022). Artificial intelligence in operations management and supply chain management: An exploratory case study. *Production Planning & Control*, 33(16), 1573-1590.
- Hodge, N. (2020). The evolution of the risk manager. *Risk Management*, 67(2), 24-29.
- Hofmann, P., Jöhnk, J., Protschky, D., & Urbach, N. (2020). Developing Purposeful AI Use Cases-A Structured Method and Its Application in Project Management. *Wirtschaftsinformatik (Zentrale Tracks)*,
- Kim, H.-S., Cha, Y., & Kim, N. Y. (2021). Effects of AI chatbots on EFL students' communication skills. *영어학*, 21, 712-734.
- Kim, J.-M., Lim, K.-K., Yum, S.-G., & Son, S. (2022). A Deep Learning Model Development to Predict Safety Accidents for Sustainable Construction: A Case Study of Fall Accidents in South Korea. *Sustainability*, 14(3), 1583.
- Kocaballi, A. B. (2023). Conversational ai-powered design: Chatgpt as designer, user, and product. *arXiv preprint arXiv:2302.07406*.
- Kok, J. N., Boers, E. J., Kusters, W. A., Van der Putten, P., & Poel, M. (2009). Artificial intelligence: definition, trends, techniques, and cases. *Artificial intelligence*, 1, 270-299.
- Korke, P., Gobinath, R., Shewale, M., & Khartode, B. (2023). Role of Artificial Intelligence in Construction Project Management. *E3S Web of Conferences*,
- Kühl, N., Goutier, M., Hirt, R., & Satzger, G. (2020). Machine learning in artificial intelligence: Towards a common understanding. *arXiv preprint arXiv:2004.04686*.
- Kumar, S., Krishna, B. A., & Satsangi, P. S. (1994). Fuzzy systems and neural networks in software engineering project management. *Applied Intelligence*, 4, 31-52.
- Leavy, S. (2018). Gender bias in artificial intelligence: The need for diversity and gender theory in machine learning. Proceedings of the 1st international workshop on gender equality in software engineering,
- Levitt, R. E., & Kunz, J. C. (1987). Using artificial intelligence techniques to support project management. *AI EDAM*, 1(1), 3-24. <https://doi.org/10.1017/S0890060400000111>

- Li, Y., Li, Z., Yang, W., & Liu, C. (2023). RT-LM: Uncertainty-Aware Resource Management for Real-Time Inference of Language Models. *arXiv preprint arXiv:2309.06619*.
- Liaw, S. Y., Tan, J. Z., Lim, S., Zhou, W., Yap, J., Ratan, R., Ooi, S. L., Wong, S. J., Seah, B., & Chua, W. L. (2023). Artificial intelligence in virtual reality simulation for interprofessional communication training: Mixed method study. *Nurse Education Today*, 122, 105718.
- Loiro, C., Castro, H., Ávila, P., Cruz-Cunha, M. M., Putnik, G. D., & Ferreira, L. (2019). Agile Project Management: A Communicational Workflow Proposal. *Procedia Computer Science*, 164, 485-490. <https://doi.org/https://doi.org/10.1016/j.procs.2019.12.210>
- Ma, G., Wang, A., Li, N., Gu, L., & Ai, Q. (2014). Improved critical chain project management framework for scheduling construction projects. *Journal of Construction Engineering and Management*, 140(12), 04014055.
- Mahmood, A., Al Marzooqi, A., El Khatib, M., & AlAmeemi, H. (2023). How Artificial Intelligence can Leverage Project Management Information System (PMIS) and Data Driven Decision Making in Project Management. *International Journal of Business Analytics and Security (IJBAS)*, 3(1), 184-195.
- Marnada, P., Raharjo, T., Hardian, B., & Prasetyo, A. (2022). Agile project management challenge in handling scope and change: A systematic literature review. *Procedia Computer Science*, 197, 290-300.
- Meske, C., Bunde, E., Schneider, J., & Gersch, M. (2022). Explainable artificial intelligence: objectives, stakeholders, and future research opportunities. *Information Systems Management*, 39(1), 53-63.
- Mitrou, L. (2018). Data protection, artificial intelligence and cognitive services: is the general data protection regulation (GDPR)'artificial intelligence-proof'? *Artificial Intelligence and Cognitive Services: Is the General Data Protection Regulation (GDPR)'Artificial Intelligence-Proof*.
- Mölsä, M. (2017). Success factors when implementing AI-powered marketing solutions.
- Mujtaba, D. F., & Mahapatra, N. R. (2019, 15-16 Nov. 2019). Ethical Considerations in AI-Based Recruitment. 2019 IEEE International Symposium on Technology and Society (ISTAS),
- Munns, A. K., & Bjeirmi, B. F. (1996). The role of project management in achieving project success. *International journal of project management*, 14(2), 81-87.
- National Academies of Sciences, E., & Medicine. (2020). Case Studies in Cross-Asset, Multi-Objective Resource Allocation.
- National Academies of Sciences, E., Medicine, National Academies of Sciences, E., Medicine, National Academies of Sciences, E., Medicine, National Academies of Sciences, E., Medicine, National Academies of Sciences, E., Medicine, National Academies of Sciences, E., Medicine, National Academies of Sciences, E., Medicine, National Academies of Sciences, E., Medicine, National Academies of Sciences, E., & Medicine. (2023). Artificial Intelligence to Assist Mathematical Reasoning: Proceedings of a Workshop.
- Nelson, G. S. (2019). Bias in artificial intelligence. *North Carolina medical journal*, 80(4), 220-222.
- Niederman, F. (2021). Project management: openings for disruption from AI and advanced analytics. *Information Technology & People*, 34(6), 1570-1599. <https://doi.org/10.1108/ITP-09-2020-0639>
- Nof, S. Y. (2009). Automation: What it means to us around the world. *Springer handbook of automation*, 13-52.
- Ong, S., & Uddin, S. (2020). Data science and artificial intelligence in project management: the past, present and future. *The Journal of Modern Project Management*, 7(4).
- OpenAI. (2023a). ChatGPT (September 25 version) [Large language model]. <https://chat.openai.com/chat>. In.
- OpenAI. (2023b). *GPT-4 Technical Report*.

- Orellana, S. (2017). Digitalizing Collaboration. *Research-Technology Management*, 60(5), 12-14.
<https://doi.org/10.1080/08956308.2017.1348125>
- Ozgur, A. (2004). Supervised and unsupervised machine learning techniques for text document categorization. *Unpublished Master's Thesis, İstanbul: Boğaziçi University*.
- Papadakis, E., & Tsironis, L. (2020). Towards a hybrid project management framework: A systematic literature review on traditional, agile and hybrid techniques. *The Journal of Modern Project Management*, 8(2).
- Pollack, J. (2007). The changing paradigms of project management. *International journal of project management*, 25(3), 266-274.
- Pospieszny, P., Czarnacka-Chrobot, B., & Kobylinski, A. (2018). An effective approach for software project effort and duration estimation with machine learning algorithms. *Journal of Systems and Software*, 137, 184-196. <https://doi.org/https://doi.org/10.1016/j.jss.2017.11.066>
- PrepCast., T. P. (2020, November 16). *Free PMP® practice exam questions 120 sample test questions*.
<https://www.project-management-prepcast.com/PMP-Practice-Exam-Questions-Sample-Test>
 The PM PrepCast.
- Radford, A., Wu, J., Child, R., Luan, D., Amodei, D., & Sutskever, I. (2019). Language models are unsupervised multitask learners. *OpenAI blog*, 1(8), 9.
- Said, N., Potinteu, A.-E., Brich, I., Buder, J., Schumm, H., & Huff, M. (2022). An Artificial Intelligence Perspective: How Knowledge and Confidence Shape Risk and Opportunity Perception.
- Salleh, M. H., & Aziz, K. A. (2022). Artificial Intelligence Augmented Project Management. *International Conference on Technology and Innovation Management (ICTIM 2022)*,
- Sandner, P., Gross, J., & Richter, R. (2020). Convergence of blockchain, IoT, and AI. *Frontiers in Blockchain*, 3, 522600.
- Schutt, S., Holloway, D., Linegar, D., & Deman, D. (2017). Using simulated digital role plays to teach healthcare 'soft skills'. 2017 IEEE 5th International Conference on Serious Games and Applications for Health (SeGAH),
- Shappell, S. A., & Wiegmann, D. A. (2000). The human factors analysis and classification system--HFACS.
- Shekhar, S. S. (2019). Artificial intelligence in automation. *Artificial intelligence*, 3085(06), 14-17.
- Shoeybi, M., Patwary, M., Puri, R., LeGresley, P., Casper, J., & Catanzaro, B. (2019). Megatron-Lm: Training multi-billion parameter language models using model parallelism. *arXiv preprint arXiv:1909.08053*.
- Skinner, L. J. (2022). How Will AI Transform Project Management? *ITNOW*, 64(2), 14-15.
<https://doi.org/10.1093/itnow/bwac040>
- Skobelev, P. (2018). Towards autonomous AI systems for resource management: applications in industry and lessons learned. *Advances in Practical Applications of Agents, Multi-Agent Systems, and Complexity: The PAAMS Collection: 16th International Conference, PAAMS 2018, Toledo, Spain, June 20–22, 2018, Proceedings 16*,
- Stiennon, N., Ouyang, L., Wu, J., Ziegler, D., Lowe, R., Voss, C., Radford, A., Amodei, D., & Christiano, P. F. (2020). *Learning to summarize with human feedback*
https://proceedings.neurips.cc/paper_files/paper/2020/file/1f89885d556929e98d3ef9b86448f951-Paper.pdf
- Taboada, I., Daneshpajouh, A., Toledo, N., & de Vass, T. (2023). Artificial Intelligence Enabled Project Management: A Systematic Literature Review. *Applied Sciences*, 13(8).
- Tambe, P., Cappelli, P., & Yakubovich, V. (2019). Artificial intelligence in human resources management: Challenges and a path forward. *California Management Review*, 61(4), 15-42.
- Taulli, T. (2023). Introduction to Generative AI: The Potential for This Technology Is Enormous. In *Generative AI: How ChatGPT and Other AI Tools Will Revolutionize Business* (pp. 1-20). Springer.
- Turner, J. R. (2022). *The handbook of project-based management*. Prentice Hall.

- Vakilzadeh, A., & Pourahmad Ghalejoogh, S. (2023). Evaluating the Potential of Large Language Model AI as Project Management Assistants: A Comparative Simulation to Evaluate GPT-3.5, GPT-4, and Google-Bard Ability to pass the PMI's PMP test. *Evaluating the Potential of Large Language Model AI as Project Management Assistants: A Comparative Simulation to Evaluate GPT-3.5, GPT-4, and Google-Bard Ability to pass the PMI's PMP test (August 1, 2023)*.
- Van Besouw, J., & Bond-Barnard, T. J. (2021). Smart project management information systems (SPMIS) for engineering projects-project performance monitoring & reporting.
- Van Casteren, W. (2017). The Waterfall Model and the Agile Methodologies: A comparison by project characteristics. *Research Gate*, 2, 1-6.
- Versluis, G., & Versluis, G. (2017). Why an automated pipeline? *Xamarin Continuous Integration and Delivery: Team Services, Test Cloud, and HockeyApp*, 1-5.
- Weng, J. C. (2023). *Putting Intellectual Robots to Work: Implementing Generative AI Tools in Project Management*.
- Winter, M., Smith, C., Morris, P., & Cicmil, S. (2006). Directions for future research in project management: The main findings of a UK government-funded research network. *International journal of project management*, 24(8), 638-649.
- Yams, N. B., Richardson, V., Shubina, G. E., Albrecht, S., & Gillblad, D. (2020). Integrated AI and innovation management: the beginning of a beautiful friendship. *Technology Innovation Management Review*, 10(11).
- Yawalkar, M. V. V. (2019). a Study of Artificial Intelligence and its role in Human Resource Management. *International Journal of Research and Analytical Reviews (IJRAR)*, 6(1), 20-24.
- Yunxiang, L., Zihan, L., Kai, Z., Ruilong, D., & You, Z. (2023). Chatdoctor: A medical chat model fine-tuned on llama model using medical domain knowledge. *arXiv preprint arXiv:2303.14070*.
- Zasa, F. P., Patrucco, A., & Pellizzoni, E. (2020). Managing the hybrid organization: How can agile and traditional project management coexist? *Research-Technology Management*, 64(1), 54-63.
- Zerfass, A., Hagelstein, J., & Tench, R. (2020). Artificial intelligence in communication management: a cross-national study on adoption and knowledge, impact, challenges and risks. *Journal of Communication Management*, 24(4), 377-389.
- Zi, Y. (2020). Application of Smart Construction Site System in Construction Project Management. *智能建筑与工程机械*, 2(12), 73-74.

This work is original and has not been previously submitted in support of any other course or qualification.

Ozgur Ozbek, October 2023