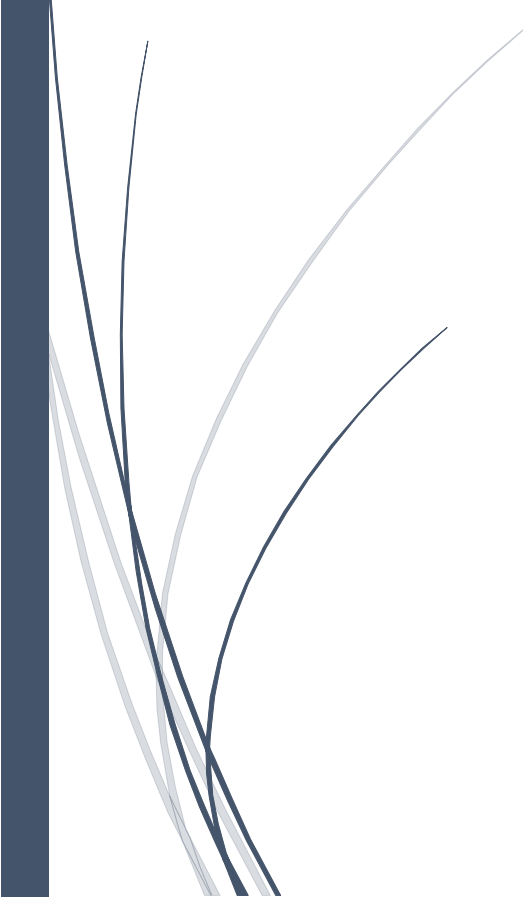




Final Project 2

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Artificial Intelligence and Its Impacts on Project Management

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Abstract

The primary reason for doing this research was due to the fast-paced nature of the technology sector and the significant progress that has been made in project management. As AI technologies continue to evolve and become more accessible, it is increasingly important for project managers to understand the potential benefits and challenges that AI can bring to their work. This study reviews existing literature on AI and project management, analyzes case studies of AI adoption in project management, and provides insights into how AI can be integrated into project management practices. The study concludes that AI has the potential to improve project planning, resource allocation, risk management, and decision-making but also highlights the need for project managers to address the ethical and social implications of AI. Overall, this dissertation offers a comprehensive analysis of the intersection of AI and project management, providing valuable insights for practitioners and researchers.

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1. Chapter 1: Introduction

Systems that allow face recognition. AI proponents believe that intelligent computers are the only way to ensure the long-term survival of the human race, while opponents of the technology, sometimes known as skeptics, are concerned ab Technology is being used across various sectors to enhance efficiency and effectiveness while making it possible for management to be trustworthy, secure, and acquiescent. Integrating human skills and technology systems has resulted in improved performance and driven culture, with everyone participating, ensuring continual progress (Munir, 2019). Project management is another field that has found applications for integrating technological and human skills (Edkins, 2017). Project management is distinguished by three pillars, which are as follows:

- The presence of project managers who are competent and powerful.
- Providing project managers with an atmosphere that is favorable to the completion of their work.
- Ensuring that everyone across the company is held accountable.

AI is increasing the capacities of humans. This dissertation investigated the advantages of incorporating artificial intelligence into project management while studying the function that artificial intelligence

plays in project management, including how it may be used in project management. In addition, it investigated how AI might improve performance in project management. Project managers have access to various AI-based solutions, such as Chatbots, Stratejos, ZiveBox, Rescoper, Click Up, Clarizen, and PolyOne, to aid them in managing a variety of activities (Lahmann et al., 2018). For example, they assisted the manager in putting together the team working on the project and delegating tasks and duties to each team member (Butt, 2018).

AI technologies are important in ensuring project managers efficiently manage and stick to AI AND ITS IMPACTS ON PROJECT MANAGEMENT 12 deadlines, which is another benefit of using these tools.

The use of Artificial intelligence provides project managers with a variety of advantages. To begin, AI is helpful to project managers because machines lighten the load and relieve some of the strain associated with project management. AI is also beneficial in supplying project managers with correct results since the jobs conducted using AI do not include mistakes or errors due to the absence of human intervention (McCarthy, 2007). Additionally, the use of AI assists project managers with gaining insights and developing strategies. For instance, software that uses AI suggests alternate or extra procedures for project managers working on challenging projects. In addition to assisting project managers in carrying out the activities mentioned above, it improved both effectiveness and efficiency, increasing their productivity. This is accomplished by fostering the managers' creative potential while boosting their emotional intelligence (Abduh & Soemardi, 2002). The fourth industrial revolution, more often known as Industry 4.0, is causing substantial shifts within the human race. Advances in technology are bringing about these shifts. The introduction of coal-powered steam engines marked the first industrial revolution, while the widespread adoption of electrification and automation characterized the second. Subsequently, the third industrial revolution emerged with digitization, closely tied to the rise of the internet (Brettel et al., 2014). According to Rüßmann et al. (2015), the critical aspects upon which Industry 4.0 is being nurtured and

developed include technical developments in digitalization, artificial intelligence, augmented reality, big data analytics, and the internet of things, to name a few others. In this new age, there have already been successful tests of self-driving automobiles and robots that mimic human behavior in the real world. As a result of the ongoing digital volution, human-machine contact inside businesses is becoming an unavoidable reality for the future. Consequently, there has been a rapid shift in the requirements placed on the future workforce in light of the real prospect that people and robots may collaborate on specific projects.

For businesses to maintain their competitiveness in a market often shaken up by the introduction of novel products and services, they need to re-evaluate their business methods. According to Albach et al. (2015), managers must adjust their firms under perpetual change, and they state that late arrivals struggle to keep up with the quick speed of changes in the industry. Therefore, the solution is to keep ahead of the curve by studying the possibilities of integrating new solutions, such as those brought on by artificial intelligence, into day-to-day company operations. This artificial intelligence is the key to success.

1.1. Research Background

Within computer science, the subfield known as artificial intelligence is a field in which researchers aim to generate higher levels of intelligence inside computer systems (Nilsson, 2010). AI was defined by Russel and Norvig (1995) as the art of developing computers that execute activities that need intelligence when performed by humans. One possible interpretation of this definition is that it has unparalleled potential for the future of human-machine collaboration; there has been a huge increase in the amount of money invested in research and development within this

sector in the last several years. In the first half of 2016, the market was responsible for funding 200 AI-related businesses for USD 1.5 billion (Pan, 2016). Artificial intelligence's practical applications are quite diverse and may range anywhere from clever personal assistants to intelligent out the unanticipated and uncontrolled adverse effects of AI (Gurkaynak et al., 2016). According to Gurkaynak et al. (2016), the three known categories (rule-based, learning-based, cognitive) are used in the scientific classification of artificial intelligence systems. Rule-based systems use a set of predetermined rules to make decisions.

Learning-based systems use machine learning algorithms to learn from data and improve their performance over time.

Cognitive systems aim to replicate human-like intelligence and perception, including the ability to reason, understand language, and recognize objects.

1.2. Research Problem

The primary reason for doing this research was due to the fast-paced nature of the technology sector and the significant progress that has been made in project management. Because project managers' work is so vital, this work must be carried out as effectively and efficiently as possible (Vesma, 2009). As a result of technological advances, several technical improvements explicitly aimed at assisting project managers in this area have been produced (Anastasi et al., 2011). As a result, this research aimed to investigate how AI benefits managers.

1.2.1. Theoretical Gaps

Within computer science, the subfield known as artificial intelligence is a field in which researchers aim to generate higher levels of intelligence inside computer systems

(Nilsson,2010). AI was defined by Russel and Norvig (1995) as the art of developing computers that execute activities that need intelligence when performed by humans. One possible interpretation of this definition is that it has unparalleled potential for the future of human-machine collaboration.

1.2.2. Practical Gaps

In the first half of 2016, the market was responsible for funding 200 AI-related businesses for USD 1.5 billion (Pan, 2016). Artificial

intelligence's practical applications are quite diverse and may range anywhere from clever personal assistants to intelligent systems that allow face recognition.

AI proponents believe that intelligent computers are the only way to ensure the long-term survival of the human race, while opponents of the technology, sometimes known as skeptics, are concerned about the unanticipated and uncontrolled adverse effects of AI (Gurkaynak et al., 2016). According to Gurkaynak et al. (2016), the three known categories (rule-based, learning-based, cognitive) are used in the scientific classification of artificial intelligence systems. Rule-based systems use a set of predetermined rules to make decisions. Learning-based systems use machine learning algorithms to learn from data and improve their performance over time. Cognitive systems aim to replicate human-like intelligence and perception, including the ability to reason, understand language, and recognize objects.

How is AI impacting project management?

1.3. Research Significance

Various applications of artificial intelligence have been created to make the job of project managers easier.

1.3.1. At the theoretical level

It is anticipated that the use of a variety of AI technologies by project managers would render project management simpler than it has ever been before. According to McCarthy (2007), the idea that the limitations and assumptions presented to the project team at the beginning of the project do not alter during the project's lifetime has traditionally been accepted as a given. Since then, this is not the case, and now tracking of all constraints and assumptions must occur for the whole of a project's lifespan; this is where AI finds greater utility (Abduh & Soemardi, 2002). For example, executives seldom know when exactly they will be able to step in and help throughout the process of putting a project into action.

1.3.2. At the practical level

It is anticipated that the use of a variety of AI technologies by project managers would render project management simpler than it has ever been before. According to McCarthy (2007), the idea that the limitations and assumptions presented to the project team at the beginning of the project do not alter during the project's lifetime has traditionally been accepted as a given. Since then, this is not the case, and now tracking of all constraints and assumptions must occur for the whole of a project's lifespan; this is where AI finds greater

utility (Abduh & Soemardi, 2002). For example, executives seldom know when exactly they will be able to step in and help throughout the process of putting a project into action.

1.4. Research Questions

The primary research questions of the study were built around the benefits and challenges of IT project management in implementing AI solutions. The research aimed to study the impacts of AI on Project Management itself.

RQ1: What are the most significant challenges that the project team members face while working on the project?

RQ2: When managing a project, do project team members use any AI-based tools? What are the current processes you follow to manage a project?

RQ3: Do project team members believe that AI agents will be effective for their daily activities? If so, what are the areas in the project team that believe AI might give more effective assistance for project management?

1.5. Research Objectives

The primary reason for doing this research was due to the fast-paced nature of the technology sector and the significant progress that has been made in project management. Because project managers' work is so vital, this work must be carried out as effectively and efficiently as possible (Vesma, 2009). As a result of technological advances, several

technical improvements explicitly aimed at assisting project managers in this area have been produced (Anastasi et al., 2011). As a result, this research aimed to investigate how AI benefits managers.

1.6. Research Hypotheses

Real-world applications of artificial intelligence are already being used in businesses, where they are automating corporate operations to provide superior customer service. When it comes to commercial applications, on the other hand, the study identified an increasing number of urban legends. The assumptions made for the study are as follows. I. A single AI solution would not work for all use cases, and questions should be asked about what consumers are trying to accomplish. II. The terms Artificial intelligence and machine learning cannot be interchanged. Artificial intelligence (AI) combines robotic process automation (RPA) and machine learning. III. The importance of data cannot be overstated in comparison to that of algorithms. The design of an algorithm is dictated by the data structure they are designed to operate with, which means that, in practice, data is more essential than the algorithm itself.

1.7. Research Model

The current research study utilized the qualitative approach to learn the impacts of Artificial Intelligence (AI) on Project Management methodologies. Qualitative researchers operate under the assumption that people's actions hold deeper meanings beyond what may be apparent on the surface. According to Willig and Rogers (2017), probing into these meanings can offer a greater understanding of pertinent social and psychological processes. This methodology investigates how individuals comprehend and give meaning to their experiences and how their interpretations intersect with broader social and cultural

narratives. This study aimed to understand the impact of AI on project management utilization in organizations. Chapter Three of the study presents a synopsis of this project's research methodology and design. It delves into the research paradigm, methodology, design, sample, materials, instruments, and data collection and analysis procedures. Additionally, this chapter briefly touches on the significance of data trustworthiness and ethical considerations.

1.8. Scope of The Study

Project management Artificial intelligence (AI) refers to incorporating a system that can manage a task independently of any support from a human being. Making use of the potential of AI does not imply automating activities; instead, it requires concluding a variety of insights, which results in the formulation of process suggestions, the conclusion of project-related matters, and the disclosure of team insights (Schreck et al., 2018). For instance, because of advances in technology, in the not-too-distant future, there will most likely be a certain kind of technology that can match the appropriate level of expertise and responsibility with the appropriate level of resources. The departments of human resources have been investing more money in technology in recent years, intending to make their recruiting procedures more efficient. The Technology Acceptance Model (TAM) was first proposed by Fred Davis in 1986 in his seminal paper - A Technology Acceptance Model for Empirically Testing New End-User Information Systems: Theory and Results (Davis, 1986). The main purpose of the TAM is to provide a theoretical framework for understanding and predicting user acceptance and adoption of new technologies. It specifically focuses on end-users' attitudes toward using technology and how these attitudes influence their behavioral intention to use it. Since then, the model has been widely used in information systems and technology research to understand how users adopt and use new technologies.

The TAM is based on the idea that user acceptance of technology depends on two main factors: perceived usefulness and perceived ease of use (Davis, 1986). Perceived usefulness refers to the degree to which a user believes a particular technology will help them perform their tasks more effectively. On the other hand, perceived ease of use refers to the extent to which a user believes the technology will be easy to learn and use. With the increasing use of Artificial Intelligence (AI) in project management, it is important to consider how the TAM can be applied to study the impacts of AI on project management. One of the key factors in the TAM is perceived usefulness, which refers to the extent to which a user believes that technology will help them perform their tasks more effectively. In the context of AI in project management, perceived usefulness could refer to how AI can assist with tasks such as project scheduling, risk assessment, and resource allocation. For example, an AI system that can analyze project data and generate optimized schedules could be seen as highly useful by project managers (Zhang et al., 2021). Another important factor in the TAM is perceived ease of use, which refers to the degree to which a user believes that technology will be easy to learn and use. In the context of AI in project management, perceived ease of use could refer to how easy it is for project managers to interact with AI systems and integrate them into their workflows. For example, an AI system that has a user-friendly interface and can easily integrate with existing project management software could be seen as highly easy to use by project managers (Venkatesh et al., 2003). In addition to perceived usefulness and ease of use, the TAM also considers other factors that may influence user acceptance, such as social influence and cognitive instrumental processes. Social influence refers to the impact that the opinions and behaviors of others may have on a user's decision to adopt a technology. In contrast, cognitive instrumental processes refer to the mental processes a user goes through when evaluating the benefits and costs of using technology (Venkatesh et al., 2003). In the context of AI in project management, social influence could refer to how other project managers' or industry experts' opinions and experiences can influence a manager's decision to adopt AI tools.

Cognitive instrumental processes could refer to project managers' mental processes when weighing the benefits and risks of using AI tools in project management (Zhang et al., 2021). Overall, the TAM provides a useful framework for studying the impacts of AI on project management. By considering factors such as perceived usefulness, perceived ease of use, social influence, and cognitive instrumental processes, researchers can better understand how AI tools are adopted and used by project managers and the potential benefits and risks of using AI in project management. According to Helsgaun (2008), businesses that use AI in their recruiting procedures are anticipated to enjoy a 20 percent boost in employee performance. This prediction is based on the findings of a study that was conducted in 2008. On the other hand, Auth et al. (2019) believed that using AI in recruiting leads to a 4% increase in revenues while simultaneously resulting in a 35% reduction in employee turnover rate. This is essential to significantly reduce the amount of time employees waste sitting around doing nothing. Using AI, project managers can examine the output of their teams' members and frequently allocate work depending on the capabilities of each team member. This eliminates the need for the project managers to put in additional effort. AI is also beneficial in developing a knowledge management ecosystem, which is vital in saving information that can be used even after an employee has left the firm. This is another situation in which keeping this knowledge is essential. According to (Passenheim, 2002), AI is also helpful in aggregating behavioral patterns in the workplace while centralizing employees' knowledge.

1.9. The Project Structure

Real-world applications of artificial intelligence are already being used in businesses, where they are automating corporate operations to provide superior customer service. When it comes to commercial applications, on the other hand, the study identified an increasing number of urban legends. The assumptions made for the study are as follows. I. A single AI solution would not work for all use cases, and questions should be asked about what consumers are trying to accomplish. II. The terms Artificial intelligence and machine learning cannot be interchanged. Artificial intelligence (AI) combines robotic process automation (RPA) and machine learning. III. The importance of data cannot be overstated in comparison to that of algorithms. The design of an algorithm is dictated by the data structure they are designed to operate with, which means that, in practice, data is more essential than the algorithm itself. Artificial intelligence lacks an essential characteristic of human employees and brings unique qualities, such as empathy and judgment, which machines do not possess. V. Anticipate a change in both culture and capabilities. The widespread use of AI in workplaces will increase the number of jobs handled by apps that are part of a system of record. VI. AI is a disruptive technology that can potentially transform project management practices and processes. VII. The adoption of AI in project management is likely to increase in the future. VIII. AI can improve project outcomes by enhancing efficiency, accuracy, and decision making. IX. The benefits of AI in project management outweigh the potential risks and challenges. X. Project managers and other stakeholders are open to adopting and integrating AI into project management practices.

2.Chapter 2: Literature Review

2.1. Introduction

Artificial Intelligence has been surfacing for the last few decades, and it is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to biologically observable methods. The statement emphasizes that artificial intelligence (AI) is a scientific and engineering field focusing on creating intelligent machines and brilliant computer programs. AI aims to enable machines to perform tasks that require human intelligence, such as recognizing patterns in data, making decisions, and understanding natural language. AI is closely related to the study of human intelligence, as both fields share a common goal of understanding and replicating intelligent behavior. However, AI does not have to confine itself to biologically observable methods, such as studying the brain and cognitive processes. Instead, AI can use various computational methods and techniques to achieve intelligent behavior.

One of the key approaches to achieving AI is through machine learning algorithms, which enable the system to learn from data and improve its performance over time. Machine learning algorithms can be applied to various tasks, including speech recognition, image recognition, and natural language processing. Another important aspect of AI is its ability to interact with the environment and make decisions based on

incomplete or uncertain information. This is achieved through probabilistic reasoning and decision theory, which enable the system to make optimal decisions in complex and dynamic environments.

Overall, the statement highlights the broad scope of AI as a field that encompasses a range of techniques and methods that can be used to create intelligent machines. While AI is related to studying human intelligence, biological constraints do not limit it. It can use various computational methods to achieve intelligent behavior (McCarthy, 2004). The work of Artificial Intelligence started with computer machinery and intelligence, now known as Turing Test, where a human interrogator would distinguish the response between a human and a computer. This test has undergone significant scrutiny since it was published, but this remains an integral part of the history of Artificial Intelligence. Artificial Intelligence can be distinguished into different approaches; one would be Human Approach which involves systems that think like humans and systems that act like humans. The ideal approach should include systems that think and act rationally (Turing, 1950).

Artificial Intelligence (AI) combines computer science and datasets used for problem solving. AI refers to developing computer systems that can perform tasks requiring human intellect, such as visual perception, speech recognition, decision-making, and language translation. One of the primary subfields of AI is machine learning, which involves using algorithms that can learn from data without being explicitly programmed. In machine learning, the computer system is trained on a dataset and then uses that training to make predictions or decisions about new data. This approach is particularly useful when the rules for decision making are difficult to define or where traditional programming methods are ineffective. Another important subfield of AI is deep learning, a specific machine learning approach involving artificial neural networks. In deep learning, the computer system is trained on large amounts of data using a hierarchical approach, allowing it to learn and extract features. This approach is instrumental in image and speech recognition tasks, where traditional machine learning approaches may be less effective. AI is not just a single technology but a

combination of different techniques and approaches. By combining computer science and large datasets, researchers and developers can create intelligent systems that can solve complex problems and perform tasks that were once thought to be the exclusive domain of human beings.

Overall, AI in modern technology and its subfields of machine learning and deep learning help solve complex problems. With the continued development of AI, intelligent systems are expected to become even more sophisticated and capable in the years to come (Nadikattu, 2016).

Artificial Intelligence can be mainly of two types of Weak Artificial Intelligence, also called Narrow AI, or Artificial Narrow Intelligence (ANI). In ANI, artificial intelligence is trained and focused on performing certain tasks. This is the primary type of AI that drives the world today and has been used in robust applications, Voice Assistant technologies like Alexa, Siri, and Google Home, and Robot Vacuums like Irobots and Roborocks (Johnson, 2021). The next type of artificial intelligence mainly consists of artificial generic intelligence (AGI) and artificial superintelligence (ASI). AGI is where a machine would have intelligence equivalent to that of humans and will have self-aware consciousness, which also can solve problems, learn, and plan for the future (Brown, 2022).

ASI is where a machine would have superintelligence that goes beyond human intelligence and is entirely theoretical. ASI surpasses human intelligence in all respects. This would mean that machines with ASI would have the ability to understand and solve problems that are currently beyond human comprehension. Unlike human intelligence, which is limited by factors such as biological constraints, ASI has the potential to be infinitely more powerful and versatile. This infinite potential means that machines with ASI could learn and adapt at an unprecedented rate, making them capable of solving complex problems within fractions of how much a human being would take. However, it is important to note that no practical examples of ASI exist. Major advances have been made in AI, but we are still far from achieving a superintelligence level beyond human intelligence. The concept of ASI raises important

questions about the potential implications of creating machines that are more intelligent than humans. Some experts have expressed concerns about the risks of creating machines beyond human control, while others argue that the benefits of ASI could far outweigh any potential risks. While there is currently no practical example of ASI, it remains an essential area of research in AI (IBM Cloud Education, 2020).

Artificial Intelligence has become an integral part of many industries, which include information technology, healthcare, cybersecurity, and art. AI mainly works on set of algorithms for the execution of a problem or a situation, and an algorithm is a set of instructions that a computer can run. Artificial intelligence algorithms can learn from previous cases' data and can be evolved by learning new strategies. Artificial Intelligence has been impacting the lives of people in modern society. It has been helping people in many ways, which include reading out the text loud, auto switch and switching off lights, getting directions to the unknown place, being directed to newer routes when the current routes have high traffic, shopping recommendations, and movie recommendations (Nadikattu, 2016).

2.2. The independent variable

By understanding the main activities, the project manager can allocate resources effectively and ensure the project is completed on time and within budget.

Furthermore, the project manager should have a clear understanding of the potential revenue that the project is going to generate. This includes identifying the key performance indicators (KPIs) that will be used to measure the project's success. By clearly understanding the potential revenue, the project manager can allocate resources effectively and ensure that the project is financially viable. Finally, the project manager should use

discretion for changing the budget details. This involves establishing clear guidelines for making changes to the budget and ensuring that any changes are communicated effectively to all stakeholders. By defining discretion for changing budget details, the project manager can ensure that the project remains financially stable and that any changes are made transparently and effectively. A project manager should have a clear understanding of the financial aspects of the project, including the source of funding, the main activities on which the money can be spent, the potential revenue that the project will generate, and discretion for changing details of the budget. By clearly understanding these aspects, the project manager can ensure the project is completed on time, within budget, and meets the desired goals and objectives (Sajja, 2021). Project scope is defined in the planning stages of any project, and scope greatly helps manage the expectations of clients and stakeholders. Well-defined scope in any project will help to avoid frequent changes to the requirements. The outcomes of the project not being satisfactory, overrunning of the budgets, and the project not being completed within provided timeline and scope will help to analyze what should be allowed in a project and what needs to be executed. (Dontigney, 2017). Scope management helps establish control factors that can address elements that result in changes during the project's lifecycle. Project scope is a crucial component of project management. Project scope refers to the specific tasks, deliverables, and objectives that must be achieved as part of a project. Without a clear understanding of the project scope, project managers may not be able to accurately estimate the time and budget required to complete the project. Project scope forms the basis for every decision that needs to be taken during the project. It provides a clear understanding of what needs to be achieved and helps project managers to prioritize tasks, allocate resources, and make informed decisions about project changes. For example, suppose a new task or requirement arises during the project. In that case, project managers can evaluate it against the project scope and determine whether it aligns with its objectives and priorities. The project scope also helps to define the project's boundaries and limitations. This includes identifying any constraints, risks, and assumptions associated with the project. By understanding these limitations, project managers can decide how to allocate

resources based on project risks. Furthermore, project scope helps ensure that all stakeholders clearly understand what the project aims to achieve. This includes defining the project's goals and objectives and the specific deliverables that need to be produced. By clearly communicating the project scope to all stakeholders, project managers can ensure everyone is working towards the same goals and objectives. Project scope is critical for project management because it helps project managers to understand the time and budget required to complete the project, forms the basis for every decision taken during the project, defines the project's boundaries and limitations, and ensures that all stakeholders have a clear understanding of the project's goals and objectives (Team Clarizen, 2021).

Quality factors are applied to a project's inputs, outputs, and processes. Quality factors refer to the standards or criteria used to measure the quality of the raw materials, the results produced, and the processes used to convert inputs into outputs. By maintaining the quality of these factors, project managers can ensure that the project meets its objectives and delivers value to stakeholders. One of the key benefits of maintaining project quality is that it can significantly reduce costs in the later stages of the project. Investing upfront in high-quality raw materials or components can help prevent issues down the line, such as defects, rework, or delays, which can be costly to address.

By ensuring that quality standards are met at every project stage, project managers can minimize the risk of costly errors or defects and prevent waste. In addition, maintaining quality in a project can help boost stakeholders' confidence in the project's success.

If stakeholders are confident in the quality of the project's inputs, outputs, and processes, they are more likely to support and invest in its success. This can help secure funding, attract new stakeholders, and improve the project's reputation. Maintaining quality in a project can also improve efficiency and effectiveness in the project's lifecycle. Project managers can use high quality raw materials and components to ensure that the project runs at peak efficiency and that processes are optimized for maximum effectiveness. This can help reduce the time and resources required to complete the project and improve the overall

productivity of the project team. Furthermore, maintaining project quality is critical for delivering value to stakeholders and meeting project objectives. By applying quality factors to inputs, outputs, and processes, project managers can reduce costs, boost stakeholder confidence, and improve efficiency and effectiveness in the project lifecycle (Sajja, 2021)

2.3. The dependent variable

A project manager cannot solve all the problems about a project; innovative ways and technology will significantly help solve most of the problems the project manager faces. The size and complexity of the projects that are worked on make it essential to use technology. New technology capabilities will help lead to more expectations from customers and senior management, and results can be achieved less quickly than before with proper technology usage (Sajja, 2021). Project managers always focus on communication as the most crucial part of project success. The technology used in the project will help ensure proper communication between all the team members and stakeholders. Using cloud-based project management software that is not only cost-effective but can also be easily managed, allows for mobile access, and helps in precise solutions for the project manager that match the overall project.

Gathering updates for a project is a critical and essential task for a project manager, and after the updates, a project plan is prepared accordingly. The latest reports should be distributed to project team members, and using cloud-based project management software helps project managers check the task status, update project documentation, and send alerts to team members when necessary. In the past days, it was believed that a project team

worked effectively only when the team members met face to face. Today with the improvement in technology and the development of new software for project management, organizations can build project teams with employees and contractors across the globe in different time zones. This helps to enhance the speed at which the project is completed. Project team members can use technology to organize all the interactions and share ideas with the broader audience, which helps complete tasks faster (Clarizen, 2019). According to William (2005), businesses are becoming increasingly project-oriented, and the annual global project expenditure has been rising and hitting billions of dollars. The companies primary focus is setting up related factors that can influence the success of a project. Information technology is pivotal in managing a project and helps store a large amount of data. A study reveals that humans are slower when compared to technology systems when converting data into information (William,2005). Major organizations around the globe have been investing in new technologies which can help in perform better and help them compete better. We can say that technology has a positive impact on business performance. Technology must be carefully applied to areas in the organization that will help in performing business operations and helps increase the performance of the business (Prieto & Revilla 2004). Technology usage in projects also depends on how well the technology has been designed. While creating new technological systems, we should always consider designing them according to the project's individual needs (Anantatmuula & Kanungo, 2005).

There are various problems when managing the projects, including failure to meet set targets, time and money, ethics involved while managing the projects, and poor communication skills and relations.

Technology can help effectively tackle these issues (Sajja, 2021). Strong and effective leadership is key to project success. With the help of technology, the tasks associated with the project can be automated, which takes some burden off the project manager. Technology helps automate tasks, send alerts, capture and store data, review historical data, and provide necessary projections. According to Anantatmula (2008), technology is pivotal

in helping project managers perform their job effectively and efficiently. Many studies are focused on the importance of the leadership style of project managers. Research conducted by Anantatmula in 2008 gathered structured personal interviews to study the relation amount people-related factors in project management, and a model was developed using interpretive structural modeling methodology. This model helped determine the role of the project manager in managing the project and improving project performance. Results indicated that both leadership and management roles are equally important. This study helped the project manager understand the supportive function of technology to help improve project performance. Technology plays a crucial role in project management by providing various tools and programs that aid in efficient project completion. With the help of technology, project teams can easily collaborate, share information, and manage their tasks, thereby improving their productivity and overall project outcomes. The benefit of using AI technology in project management is the ability to streamline communication between team members. With the help of collaboration software, project teams can easily communicate with one another, share information, and receive feedback in real-time. This not only speeds up the decision-making process but also helps in avoiding miscommunication and errors. Project management programs also provide various features that help manage tasks and responsibilities. For instance, they allow team members to set deadlines, assign tasks to specific individuals, and track progress. This ensures that each team member knows their roles and responsibilities and can work towards achieving the project's objectives effectively. In the coming decade, we expect to see further improvements in project management techniques that will significantly enhance project teams' ability to manage various tasks and responsibilities.

For example, we can expect more artificial intelligence-based tools to automate routine tasks and help predict potential issues during the project's lifecycle. Additionally, we can expect to see more advanced data analytics tools that will provide project teams with insights into project performance, enabling them to make informed decisions. Overall, the role of technology in project management is essential, and we can expect to see further

advancements in the future that will help project teams achieve their goals more efficiently and effectively (The Editorial Team, 2019).

2.4. The relationship between the independent and the dependent variables

The world is undergoing numerous changes, with technology constantly evolving and improving people's life. Different organizations are implementing project management technologies that will help improve efficiency and effectiveness while enabling management to be dependable and providing a secure environment. Artificial Intelligence in project management can be viewed as a system that can help activities associated with the project without much human intervention (Edkins, 2017). Artificial Intelligence (AI) has revolutionized the way organizations handle projects. It has the potential to streamline project management by automating mundane and repetitive tasks, which allows project managers and team members to focus on more critical tasks. One of the significant benefits of AI in project management is its ability to analyze data and provide valuable insights. AI algorithms can process vast amounts of data from various sources, such as project management software, social media, and other databases, to identify patterns and correlations. By analyzing this data, AI can help project teams gain insights into project performance, identify potential risks and opportunities, and make informed decisions (Lahmann et al., 2018). Moreover, AI can help automate many routine tasks in project management, such as scheduling, resource allocation, and budget tracking. AI not only saves time but also helps reduce errors and improve accuracy.

Another essential application of AI in project management is its ability to provide process recommendations. Based on the analysis of historical project data, AI can recommend

process improvements that can help streamline project workflows and increase efficiency. For example, AI can identify bottlenecks in the project timeline and recommend solutions to overcome them (William,2005).

Additionally, AI can unveil team insights by analyzing team communication and behavior patterns. This can help project managers identify potential issues within the team and take appropriate steps to address them. AI can also help identify high-performing team members, enabling project managers to allocate tasks more effectively. AI in project management can help automate tasks, make inferences from insights, provide process recommendations, make decisions, and unveil team insights.

It has the potential to significantly improve project outcomes by increasing efficiency, reducing errors, and providing valuable insights. With further advancements in AI, we can expect to see even more benefits in project management in the coming years (Schrek et al.,2018). Developing a new technology will help match the right skills and responsibilities assigned to resources in the project. Investing in new technology has increased interest, which will help organizations reach their goals. One of the significant benefits of using AI in project management is its ability to help project managers assign tasks to team members based on their capabilities. AI algorithms can analyze data on the skills and capabilities of team members, including their past performance, training, and qualifications, to identify the best candidate for a particular task. By using AI to analyze the capabilities of team members, project managers can ensure that tasks are assigned to the right person, which can lead to better project outcomes. For example, if a team member has shown excellent problem-solving skills, the AI algorithm can suggest that they be assigned to a task that requires similar skills (Anantatmuula & Kanungo, 2005). Moreover, AI can help project managers study the output of team members, which can help identify areas where additional training or support may be required.

For instance, if a team member consistently produces work below the expected standard, the AI algorithm can identify this and suggest that they be given additional training or support to improve their performance. AI can also help predict team members'

performance, which can help project managers plan effectively for resource allocation. For example, suppose the AI algorithm predicts that a particular team member will take longer to complete a task. In that case, the project manager can allocate additional resources or adjust the timeline accordingly. Using AI in project management can help project managers assign tasks to team members based on their capabilities, study the output of team members, and predict team performance. This AI usage can lead to better project outcomes, improved efficiency, and more effective use of resources. As AI continues to develop and become more advanced, we can expect to see more benefits in project management in the future (The Role of Artificial Intelligence in Improving Project Management | LIGS University, 2020). AI is beneficial in creating a knowledge management ecosystem that can be very helpful when an employee is leaving an organization. According to Passenheim (2002), artificial intelligence is beneficial in aggregating workplace behavior patterns and centralizing employee knowledge, which helps improve quality and consistency regarding project management. Artificial Intelligence (AI) has gained widespread popularity among different sectors, and project management is no exception. AI in project management involves using technology and algorithms to automate repetitive and time consuming tasks, analyze data, and make predictions based on historical data. AI can be used in project management to improve behavior in the workplace by automating certain tasks and helping employees to focus on more strategic and creative work. For instance, AI can explore data to identify patterns and trends, which can be used to make more learned decisions.

This can help project managers to identify potential issues before they become major problems, allowing them to take proactive steps to address them. In addition, AI can help to centralize workers' knowledge by creating a knowledge base that all employees can access. This can help to improve collaboration and communication between team members, leading to better decision-making and increased productivity.

Furthermore, AI can also help improve quality and consistency in project management. By analyzing data and identifying patterns, AI can help to identify areas where quality is lacking and provide recommendations for improvement. This can help to ensure that all

projects are completed to the same high standards, improving consistency across the organization. Overall, the use of AI in project management can revolutionize how we work. By automating specific tasks, centralizing knowledge, and improving quality and consistency, AI can help improve workplace behavior and drive success across the organization (Edkins, 2017) AI also helps detect warning signs for projects requiring different working conditions and will help prevent mishaps during project implementation. Artificial intelligence (AI) machines are designed to mimic or replicate some of the cognitive functions of human beings. One such function is making decisions and solving problems, which are crucial skills for project managers. Project management involves overseeing complex operations, coordinating resources, and ensuring that projects are completed on time and within budget. AI machines can assist project managers in various ways, such as providing real-time data analysis, identifying potential risks, and recommending actions based on data insights. AI machines can also help project managers automate routine tasks, freeing more time to focus on strategic decision-making (Prieto & Revilla 2004). Moreover, AI machines can learn from past project management experiences and data, which can help them make better future decisions. Machines can become more sophisticated and effectively perform project management tasks over time. However, it is important to note that while AI machines can replicate some cognitive functions of humans, they cannot replicate all of them. For example, AI machines may lack the emotional intelligence and creativity that human project managers possess. Therefore, it is important to balance using AI machines to support project management and relying on human expertise to make strategic decisions. AI machines can copy some cognitive functions of project managers, including decision-making and problem solving capabilities. By using AI machines to support project management, project managers can save time, reduce costs, and improve the quality of their work.

However, it is important to acknowledge that AI machines are not a substitute for human expertise and creativity but should complement human skills (Lahmann et al., 2018). The employment of AI tools in project management has made project management work more

accessible, while the project management team gives the constraints and assumptions. Executives are sometimes unaware when an objection might stop a project implementation, and AI tools, when employed by an organization, will have crisis dashboards and, with the help of the executives, identify issues faced by different projects (Tonchia, 2018).

In this manner, AI helps executives identify projects that require immediate actions, and project managers work towards resolving them. This helps reduce the response time for the project issues putting them into an acceptable range (The Role of Artificial Intelligence in Improving Project Management | LIGS University, 2020). It becomes difficult for executives to determine the amount of work that should be done without having labor constraints. AI can play a crucial role in project portfolio management, which involves selecting and prioritizing projects to align with the organization's strategic objectives. Project portfolio management aims to increase the value of the project portfolio while optimizing the use of resources, including people, time, and budget. With the help of AI algorithms, project managers can analyze large volumes of data and identify patterns and trends that can inform decision making. AI algorithms can help select the best projects for the organization by assessing the potential risks and rewards associated with each project. AI algorithms can also help identify the best resource management practices for the project portfolio. For example, AI can optimize resource allocation across multiple projects, identifying where resources are over-allocated or under-utilized. This helps project managers ensure that resources are used efficiently and effectively, leading to better project outcomes. Moreover, AI can assist in forecasting the impact of potential changes to the project portfolio, such as the addition or removal of projects. This helps project managers to understand the potential consequences of decisions before they are implemented; reducing the risk of negative outcomes. AI can be highly beneficial in project portfolio management by analyzing data, identifying trends, and optimizing resource allocation.

By utilizing AI algorithms, project managers can improve the project's probability, increasing the organization's value while ensuring that the best resource management practices are in place. This helps organizations to achieve their strategic objectives and

remain competitive in the market (Salini et al., 2015). The following literature review depicts a few types of research done to know problems faced in project management and suggestions for reducing them. AI's growing popularity has led organizations to incorporate AI tools into project management processes and software systems. Still, using these capabilities has created a few challenges for project managers using intelligent project management tools. A study by the author Weese explored the challenges project managers encountered while using artificial intelligence tools and technologies to manage project work. The research was conducted by sampling experienced PMP-certified project managers by interviewing them on the current usage of artificial intelligence tools, adaption to changes, time of adoption of new technology, level of artificial intelligent knowledge, project data, and knowledge management. Project managers were also interviewed about integrating artificial intelligence tools and advising new project managers. The research concluded that project managers encounter numerous problems and individual challenges when using artificial intelligence tools and technologies to manage projects. Exploring these challenges can lead to developing new best practices, methods, and additional knowledge for project managers (Weese,2022).

Erin Brown (2013) studied data-driven decision-making as a tool for improving software development productivity. The author collected worldwide project failure rates based on survey information on project managers' views on user satisfaction, quality of the product, and staff productivity. The result was 24% - 36% of software project success has not kept pace with advances in the hardware.

Software managers have limited knowledge about data-driven decision-making in agile-driven software development projects. Research conducted by Erin Brown mainly focuses on how software managers can use data-driven decision-making to improve productivity.

The study was primarily based on three critical dimensions of software organization productivity improvement: people, processes, and tools. The author concluded that positive change could lead to a better understanding of data-driven decision-making in agile environments, which can help organizations create more products, offer more jobs, and

help better compete in the global economy. Jagtiani (2017) conducted a study focusing on enhancing software project outcomes. Many factors influence technology factors were. Some can be known during the planning phase, and others require a real-time gathering and analysis that can last through the project's lifecycle. The data collected is often neglected, misclassified, and misinterpreted during the project execution, which will cause project delays, elevated project risk, and missed business opportunities. Project managers overseeing these projects tend to be given inputs provided by technical leads, which tend to be more technical. In this case, project managers tend to perform more arduous tasks; therefore, more research should go into developing new processes which can help in the proper utilization of real-time project execution data to help project managers attain the outcomes. Davahli's (2020) study investigated the current state of artificial intelligence (AI) applications in project management. The study reviewed 652 articles from various databases and classified them based on the PM knowledge areas, processes followed by project managers, and AI techniques used. The study concluded that the application of AI in project management is in its early stages, and many opportunities remain untapped. Most studies reviewed focused on applying AI to the planning, scheduling, and risk management processes. However, the AI models have not been applied to process groups of stakeholder management, procurements management, and communication management of the project, indicating a gap in the literature. Moreover, the study found that machine learning, natural language processing, and expert systems were the most common AI techniques used in project management. These techniques were used to predict project outcomes, optimize schedules, and identify risks. However, research on other AI techniques, such as fuzzy logic and genetic algorithms, is absent in project management. Overall, the study highlights the potential benefits of applying AI in project management, such as improving project performance, reducing costs, and increasing efficiency.

Nevertheless, more research is needed to explore the application of AI in all PM knowledge areas and processes, especially those related to stakeholder management, procurement

management, and communication management (Sajja, 2021). The usage of AI in project management can also raise some ethical challenges.

In the article written by Prieto (2019), research was conducted on projects where a proper scope was provided. Specific AI algorithms have been given where transparency and verification processes are essential for using AI to predict project estimates and performance. Prieto (2019) points out that while significant efforts have been made to apply artificial intelligence (AI) in project management, much of this work focused on performance prediction rather than understanding the changing role of project management within an AI system. As a result, there is a need for more research that addresses the impact of AI on project management systems. The author argues that the role of the project manager is changing due to AI and that there is a need for a better understanding of how project management systems can adapt to these changes. For example, AI systems may automate certain aspects of project management, such as risk assessment or scheduling, which can free up project managers to focus on more strategic tasks. However, this also means that project managers must be trained in new skills, such as understanding and working with AI systems. Prieto also notes a need to understand better how AI can improve project management processes beyond performance prediction. For instance, AI could optimize resource allocation, improve communication and collaboration between team members, or identify and mitigate project risks. Overall, Prieto highlights the need for more research to understand better the changing role of project management in AI systems and to identify how AI can improve project management processes beyond performance prediction. This research will be crucial in helping organizations adapt to the changing landscape of project management and take full advantage of AI's benefits (Prieto, 2019) Gil et al. (2021) highlight the growing importance of artificial intelligence (AI) in various fields, such as science, finance, and engineering.

The authors state that AI has been experiencing tremendous growth in recent years, with many models in the research and development phases. They also note that hybrid computational models of learning techniques are currently in the early development stages

and require significant improvement. The authors emphasize that analyzing AI techniques in the current scenario can serve as a starting point for research on AI and product leadership and management. They suggest that AI can enhance decision-making processes, improve product design and development, and increase efficiency in various aspects of product management. Furthermore, the authors argue that AI can enhance customer experience and satisfaction by providing personalized recommendations, predictive analytics, and intelligent automation. They also highlight the importance of understanding ethical considerations related to AI in product management and leadership. In summary, Gil et al. suggest that AI has the potential to transform product leadership and management by providing advanced decision-making capabilities, improving product design and development, enhancing customer experience, and increasing efficiency. Nonetheless, they also stress the need for further research to develop and enhance hybrid computational models of learning techniques and to address ethical considerations related to AI in product management and leadership (Sajja, 2021).

2.5. Conclusion

This literature review has analyzed project management, artificial intelligence, and various studies on applying AI in project management. As the implementation of artificial intelligence (AI) in project management continues to grow, it is important to recognize that many challenges are associated with its implementation. One of the main challenges is that AI is still a relatively new technology, and a great deal of research needs to be done to fully understand how it can be effectively applied in project management. AI is being used primarily to automate routine tasks and optimize resource allocation.

For example, AI can be used to study great amounts of data to identify patterns and trends, which can help project managers make more informed decisions about resource allocation and project scheduling. Additionally, AI can automate tasks such as data entry or report generation, freeing project team members to focus on more strategic tasks. Despite its potential benefits, AI's use in project management has limitations. One of the main limitations is that human interaction is often necessary for a project to succeed. This is particularly true with regard to stakeholder management, which is a critical aspect of project management. Effective stakeholder management requires human interaction and communication to build relationships, manage expectations, and address concerns. Furthermore, there is a risk that over-reliance on AI could result in a loss of critical thinking and creativity, which are essential for solving complex problems and making innovative decisions. This is because AI is programmed to follow predefined rules and algorithms. In contrast, humans can think outside the box and come up with creative solutions to

unexpected challenges. In conclusion, while AI can significantly benefit project management, many challenges must be addressed before AI can be effectively implemented. Further research is needed to understand how AI can be applied to project management to maximize its potential benefits while recognizing the limitations and the importance of human interaction and critical thinking. The next Chapter overviews this project's research methodology and design.

Specifically, the Chapter discusses the research paradigm, methodology, design, sample, material, instruments, and data collection and analysis procedures. Further, the Chapter briefly discusses the importance of data trustworthiness and ethical considerations.

3. Chapter 3: Research Methodology

3.1. Introduction

The current research study utilized the qualitative approach to learn the impacts of Artificial Intelligence (AI) on Project Management methodologies. Qualitative researchers operate under the assumption that people's actions hold deeper meanings beyond what may be apparent on the surface. According to Willig and Rogers (2017), probing into these meanings can offer a greater understanding of pertinent social and psychological processes. This methodology investigates how individuals comprehend and give meaning to their experiences and how their interpretations intersect with broader social and cultural narratives. This study aimed to understand the impact of AI on project management utilization in organizations. Chapter Three of the study presents a synopsis of this project's research methodology and design. It delves into the research paradigm, methodology, design, sample, materials, instruments, and data collection and analysis procedures. Additionally, this chapter briefly touches on the significance of data trustworthiness and ethical considerations.

3.2. Operational definitions for research variables

Qualitative methodology is an effective research approach for investigating complex phenomena that cannot be easily quantified, such as the social and cultural implications of AI and the challenges of project management. This methodology explores subjective experiences and meanings, providing a more nuanced understanding of these phenomena (Willig & Rogers, 2017). In the context of AI research, qualitative methodology can be used to examine people's attitudes and beliefs about AI and the ethical and societal implications of AI adoption (Bryman, 2016). Qualitative research can also help identify potential biases and limitations of AI algorithms and systems (Kitchin et al., 2015). Similarly, qualitative methodology can be applied to project management research to explore the social and cultural dimensions of project success and failure. For example, researchers can use qualitative methods to investigate the impact of cultural differences on project teams' communication and collaboration (Geraldi et al., 2011). Additionally, qualitative research can help identify factors contributing to project failure, such as poor stakeholder engagement and communication (Kerzner, 2013). When conducting qualitative research, it is essential to consider data trustworthiness and ethical considerations (Willig & Rogers, 2017). To ensure data trustworthiness, researchers must demonstrate that their findings are credible, transferable, dependable, and confirmable (Lincoln & Guba, 1985). Ethical considerations must also be addressed, such as obtaining informed consent from research participants, ensuring confidentiality and anonymity, and avoiding harm to participants (Willig & Rogers, 2017).

3.3. Research design (research onion)

An exploratory design was utilized to provide a theoretical perspective for this study, as limited research was conducted on combining artificial intelligence, information technology, and project management. This gap in the literature is filled by using the

qualitative research paradigm. According to Creswell and Creswell (2018), the exploratory design model is advantageous when there is little prior research or theory. It involves collecting data through various methods and analyzing it through techniques such as coding and clustering. The study emphasized the importance of reflexivity throughout the research process, as the study biases and assumptions can shape the interpretation of the data.

3.4. Research population & Sampling methods and technique

In the subsequent sub-sections, a comprehensive discussion on the sources of data collection, such as participants and sample size, materials and instrumentation, data collection procedure, and ethical considerations, is provided. The population for the qualitative study was working professionals with a minimum of three years in the project management field.

Participants/Sample

Qualitative research emphasizes a detailed investigation of a specific phenomenon rather than generalizing to a larger population. As a result, the sample size in qualitative research is usually smaller than in quantitative research. Guest et al. (2006) state that data saturation can be attained with a relatively small sample size, typically between 12 and 15 participants. Considering various factors, such as the research questions, study scope, research methodology, and data analysis techniques, the decision was made to gather data from 15-20 research participants. In implementation research, qualitative data collection is a critical process that requires careful consideration of the sampling technique used. Palinkas et al. (2015) assert that purposeful sampling is a beneficial approach for this type of research. Purposeful sampling involves selecting participants based on specific criteria relevant to the research questions and objectives. This technique enabled the study to collect data from participants likely to provide valuable insights into the implementation

process. Purposeful sampling allowed the study to select participants with diverse perspectives and experiences related to the implementation process. By doing so, the study can comprehensively understand the factors that influence the implementation of a program or intervention. Palinkas et al. (2015) also suggest that purposeful sampling is beneficial in implementation research because it helps to overcome the challenge of limited access to study participants. By selecting participants most relevant to the research questions, a researcher can collect high-quality data even when the target population is small or difficult to access.

Materials and Instrumentation

The primary data collection method used a questionnaire created on a Microsoft Forms web-based application. This platform enables users to design and distribute questionnaires seamlessly. In qualitative research, the role of the study researcher in the data collection process is central. According to Usher and Jackson (2014), the study researcher is the primary data collection tool in qualitative research. This means the study researcher is responsible for collecting and analyzing data through various techniques such as questionnaires, observations, and document analysis. The study serves as the primary data collection tool in qualitative research. This approach allows for a more nuanced understanding of the research topic and emphasizes the importance of reflexivity in maintaining the rigor and trustworthiness of the research findings.

Role of the Researcher

In qualitative research, the study researcher assumes an active role within the study, serving as a vital instrument in interpreting the research data (Sutton & Austin, 2015). In this investigation, the principal investigator interprets and codes the participants' words and experiences concerning artificial intelligence (AI) and its impact on project management. Project management professionals' written responses to the interview protocol are carefully examined and analyzed through the principal investigator's lens. This qualitative study provides insights into their perspectives, worldviews, and biases through reflexivity. This approach grants readers valuable context for understanding data interpretation. By acknowledging subjectivity, the study ensures a comprehensive and transparent representation of the research data (Sutton & Austin, 2015).

3.5. Data collection method

Before collecting data, approval from the University's Institutional Review Board (IRB) was obtained to ensure the research study complied with ethical standards (refer to Appendix A). Once approval was granted, the study used snowball sampling to recruit participants. The current research study used LinkedIn's social networking platform to identify potential participants.

specific criteria were applied in selecting IT industry professionals with at least three (3) years of relevant experience. The collection of data continued until the point of data saturation was reached in the qualitative research study. This term refers to the point where no new information or perspectives arise from the data collected. The interview responses were thoroughly examined, and when there were repeated keywords and themes in the responses, the interview link was paused, and the responses were checked for data saturation. The interview link for data collection was kept active until it was determined

that no new insights or information could be gained. All the research responses were securely stored on a password-protected weblink that only the researcher could access. The data collected will be retained for three (3) years from the data collection date and will not be disclosed to any other parties.

3.6. Types of data

Reliability

This concept relates to the consistency of a study's research design, which is often connected to the question of whether or not the findings of a study can be replicated (Bryman & Bell, 2015). Stability is one of the most important aspects to consider when determining whether a measurement can be trusted. There should ideally be little or no difference in outcomes if the same study technique is applied to the same group at two different times as long as both times the same approach is used (Bryman & Bell, 2015, p. 158). When it comes to quantitative research methodologies, these aspects are almost always considered potential quality measures. The results of the online interviews carried out as part of this investigation consisted of answers collected over two months. As a result of the fact that the respondents were not given any new information on the research throughout this time, it is possible to conclude that this measure is dependable. However, suppose the online poll was redone a year later; it is possible that the respondents' understanding of AI systems would have evolved over that time. As result, their responses will be different at the new point in time. This is something that may be contested. This indicates that the stability of this particular research metric cannot be maintained.

Replicability

According to Bryman and Bell (2015), dependability is strongly connected to replicability, which may be defined as the ease with which the research techniques employed in one study can be replicated to perform a different investigation. In this sense, it will be hard for

another researcher to reproduce the study if the first researcher does not explain the research procedure sufficiently. The research strategy, methodology, and procedure used in this investigation have been described extensively in various sections of this report. The interview guide is made accessible to other researchers so they may use them in their work. As a result, the research findings may be regarded as very dependable and reproducible.

Validity

Bryman and Bell (2015) define validity as pertaining to the inquiry of whether an indicator crafted to evaluate a concept genuinely measures that concept. This notion is also used in a more particular sense to explain the concept of measurement validity. If a measurement cannot be relied upon, it cannot be considered legitimate since the two concepts are intricately intertwined. It is possible to assert that the validity of this research may be simultaneously asserted because the reliability of this study was successfully proven earlier in this section. At the study's conclusion, it was determined that the research methods used to answer the primary research question were effective and conclusive in answering the question.

3.7. Statistical analysis procedures

Thematic analysis is an adaptable and versatile method used to analyze various types of data and research questions. This method involves reviewing responses to open-ended questions and detecting recurring patterns or phrases to develop overarching themes. By identifying these themes, the study can obtain a more comprehensive understanding of the data and develop meaningful conclusions to inform future research and practice. Braun and Clarke (2013) suggest that thematic analysis is a flexible and adaptable method that can be applied to a wide range of research questions and data types. Braun and Clarke (2013) proposed a six-phase methodological framework for conducting thematic analysis. The first phase involves becoming familiar with the data, the second phase generates initial codes, the third phase involves searching for themes, the fourth phase reviews themes, the

fifth phase defines and names themes, and the final phase is creating the report. This approach provides a structured and comprehensive framework for analyzing qualitative data, emphasizing the importance of carefully reviewing and interpreting the data to identify meaningful themes and patterns. By following these six phases, the study ensured the analysis was rigorous, systematic, and transparent (Braun & Clarke, 2013).

The survey results were processed using NVivo 14, facilitating a comprehensive examination of participants' responses and their interrelationships. This critical step ensured an optimal environment for reviewing and analyzing the gathered data. To organize the data effectively, nodes were established in NVivo 14, each corresponding to participants' responses to specific questions. In this context, a node serves as a grouping mechanism for references that revolve around a particular theme, circumstance, or connection. Relevant references are gathered and organized cohesively by coding the data sources to these nodes. The study can create and manage various types of nodes, such as topic, case, and relationship nodes, to gather evidence and insights regarding the connections between different components of the projects. NVivo 14's nodes play a crucial role in the research process, as they centralize pertinent information in one location, making it easier to track and analyze emerging trends and ideas. This feature enhances the efficiency of using NVivo 14 and enables the study to comprehensively understand the data at hand (NVivo, n.d.).

3.8. Conclusion

In the final step of the methodology section, the respondents are questioned regarding whether or not they have previously interacted with AI agents, whether or not they have used AI agents in projects, whether or not they have used AI agents to manage resources in projects, and whether or not they believe it would be beneficial to have an AI agent supporting their daily tasks in projects. The utility of a particular technology is contingent upon how its users perceive it, and their perceived ease of use plays a pivotal role in determining their intention to adopt and utilize that technology. This perceived ease of use is a moderator, influencing the perceived usefulness of the technology. The experience that they have had with AI is a condition that determines whether AI could be useful for projects. Using the technology for Project Resource Management may be advantageous for a user who has previously used AI solutions for other areas. However, users who have not previously used this technology may have some reservations about adopting it. The subsequent Chapter delved into the data collection and analysis procedures and a detailed discussion of the ethical considerations and conflict resolution approaches used in this study. Thematic analysis was performed on the collected data after the participants met the inclusion and exclusion criteria and were interviewed. The following Chapter will provide an indepth analysis of the study's findings, addressing the research questions.

4. Chapter 4: Statistical Analysis & Findings discussion

4.1. Introduction

This qualitative study explored the participants' perspectives regarding using artificial intelligence (AI) in information technology (IT) project management. The study participants included professionals related to project management in the IT domain of an organization. Exploring the perspectives could inform IT professionals of the impacts of AI on the project management function. Then, IT professionals can potentially utilize AI models to improve project management in the organization. The following chapter provides a review of the research findings. More specifically, the chapter begins with a review of the data collection procedure, a description of the study participants, the data analysis procedure used, and the thematic analysis findings.

Improvements in the field's inherent dynamism, workforce, and unpredictability will follow the widespread use of AI across all industries. To help traditional operations thrive in the face of increasing digitalization and automation, AI may play a crucial role in prediction, growth, and decision-making. Machine learning algorithms are used to understand the aggregation of data that would be put into PM software to aid in decision-making and insights analysis instead of depending on human intuition alone. Data-driven methods force these viewpoints to zero in on the issues plaguing the Project at hand, allowing project managers to dig deeper and uncover the undiscovered gems of wisdom buried within their projects' histories. Drones and sensors may replace laborious, error-prone human monitoring by taking pictures and videos for enhanced data visualization whenever on-site tracking is required. The next part provides an analysis of the AI AND ITS IMPACTS ON PROJECT MANAGEMENT 89 data, beginning with a description of the respondent population and continuing with a statistical examination of the variables and commentary on these results. Project managers/Technical Experts were targeted for this poll, with no restrictions placed on the size of their Company, the industry they work in, or their specific roles within the Projects department with the sector they work in specific to Information Technology. Questions on the respondents' prior Experience with Projects and with the management of Human and Physical Resources were included to ensure the reliability and validity of the responses. Those who replied No were disregarded

since they could not have provided a valid response for the made-up research because they lacked the necessary expertise in either Project management or Resource management. The primary research questions that guided this dissertation included the following: • What are the most significant challenges the project team members face while working? • When managing a project, do members of the project team make use of any AI-based tools? What are the current processes you follow to manage a project? • Do project team members believe AI agents will be effective for daily activities? If so, what are the areas in the project team believe AI might give more effective assistance for project management? The empirical results of this study are presented in Chapter Four of the dissertation, based on these research questions. It provides a comprehensive account of the study's findings, describing its participants and context. The results of the study are then dissected in depth. Specifically, it achieves this by systematically addressing each issue. In the next section, the findings of the research are summarized.

4.2. Sample profile (descriptive statistics for research sample)

The people included in a study and from whose data is gathered are known as the study population (Bazeley & Jackson, 2013). Events, individuals, groups, institutions, or even documents might all make up a study's population. Business-level project management experts were the intended participants. In Grbich's (2012) view, reaching a large audience is a formidable challenge while researching a dissertation. This is why employing a subset of the population rather than the whole is more appropriate. To conclude, let us discuss the people who participated in this research. As they are in charge of the Project's day-to-day operations, project managers are vital to any unit analysis. Managers know all aspects of a project's lifecycle, time, people, money, and methods. The dissertation was conducted by utilizing qualitative surveys and interviews with the participants. These surveys and interviews were used to acquire data for the dissertation. The research used a method known as purposive sampling. According to Longhurst (2003), purposive sampling aims to identify study participants who will benefit the research subject. For this specific research, project team members served as the primary focus, and their contributions to the investigation were valuable because they supplied information based on the projects they had handled in the past. The dissertation used 15 project team members until the data was saturated, and after the 15 interviews, nothing else could be gained. Table 3 below lists the demographics of the research participants.

Table 3*Participant Demographics – Job Title and Qualification*

<i>ID</i>	<i>Current Position</i>	<i>Educational Qualification</i>	<i>Experience</i>
1	Project Control Manager	Master in Business Administration	25
2	Product Manager	Masters in Information Systems	10
3	CEO Founder	Masters I. Organizational management	20
4	Product Data Scientist	Currently pursuing PH.D.	3
5	Technical Lead	B Tech	0
6	Business Architect and Head of Product Innovation	Masters	10
7	Senior Business Development Manager	M.S	11
8	Program Manager	Masters	2
9	AI & RD dept. Manager	MSc	15+
10	Councillor	Masters	Not more than two years
11	Data Scientist	Masters	3
12	Engineering Project Manager	Masters	4
13	Product Owner	Master in Business Administration	6
14	Lead Data Scientist	MS (Master of Science)	3
15	Senior Technical Project Manager	Masters	11

4.3. Validity & reliability tests for the questionnaires

As mentioned in chapter three, Braun and Clarke's (2006) six-phase thematic analysis was used to analyze the qualitative data. After conducting the preliminary analysis, all transcripts were uploaded to NVivo 14 software program for further analysis. NVivo 14 is better suited for qualitative data analysis. After being uploaded into NVivo 14, the initial

coding process began, involving the segmentation of participants' comments into specific codes, which were subsequently organized into themes. Each theme underwent a thorough evaluation for relevance and was compared with other participants' responses. Throughout this analysis, efforts were made to minimize redundancies in theme identification. Once the key themes emerged, they were precisely defined and presented in this chapter. In the first step of Thematic Analysis, all the data and the survey responses were reviewed and analyzed for meaning. In the initial review, 20 codes were identified as meaningful experiences for AI's impact on project management professionals. The subsequent reviews of the data codes were merged, split, or eliminated, resulting in six themes for the research questions – 1, 2 & 3. Thus, the analysis and coding determined twelve themes around the challenges of AI and the effectiveness of AI. Table 4 outlines the themes generated.

Table 4

Research Questions - Themes

Research Question	Themes
What are the most significant challenges that the members of the project team face while working on the project?	Awareness Changes Communication Documentation Scope Creep Time
When managing the project, do members of the project team make use of any AI-based tools? What are the current processes you follow to manage a project?	Analysis Agile Scrum Execution PM Tools
Do members of the project team believe that AI agents will be effective for the activities they do daily? If so, what are the areas in the project team that believe AI might give more effective assistance for project management?	Automation Monitoring Prediction Resource optimization Technology Time management

Familiarization with the Data

Familiarization with the data began with reviewing the survey responses. A thorough review of the participant's responses was conducted to identify potential codes and themes.

The research team identified similarities between the participant's responses to each questionnaire and grouped all responses under their respective questions. The responses were reviewed both within and between each group. The study began the familiarization process by examining each group's responses separately before analyzing them collectively. The study identified recurring words that helped generate common themes during the review process. As a result, a list of themes was generated for each questionnaire response. As previously mentioned, the survey results were imported into NVivo 14 to facilitate a comprehensive examination of participants' responses in relation to one another. This step ensured optimal conditions for reviewing and analyzing the data. Nodes were created in NVivo 14 based on participants' responses to each question. A node is a group of references that discuss a single theme, circumstance, or connection. By coding the source to a node, the references are assembled. One can develop and organize topic, case, and relationship nodes to gather evidence of the connections between the project components. Nodes are essential to using and comprehending NVivo 14 because they enable collecting relevant information in one location and searching for developing trends and ideas (NVivo, n.d.). During the review of participants' responses, recurring words were identified to establish common themes and generate corresponding theme nodes. A theme node represents a collection of references within a file relevant to a specific subject, topic, idea, or experience. These nodes can be either analytical or descriptive. Through the initial exploration of the research, key topics emerged, which were subsequently coded to unveil the evolving themes (NVivo, n.d.).

4.4. Descriptive statistics for research variables (answer research questions)

In project management, several factors contribute to successful project execution. Awareness of the project's objectives, scope, and stakeholder needs is essential. Additionally, designing a user-friendly interface that meets user requirements can enhance the overall project experience and user satisfaction. Clearly defining roles and responsibilities for team members is crucial for effective project management. Clear role definition helps avoid confusion, duplication of efforts and improves collaboration. A thorough understanding of project requirements, constraints, and objectives is vital for

success. This project's success includes analyzing user needs, conducting feasibility studies, and designing a solution that aligns with project goals. Investing time in understanding and designing the project upfront can minimize rework and ensure a more efficient implementation. Tracking team members' time on specific tasks or activities is crucial for resource management. It allows project managers to monitor resource utilization, identify bottlenecks or areas where additional support may be needed, and make informed decisions to optimize resource allocation. Project timelines and deliverables can be better controlled by effectively managing available resources. Providing adequate training to team members on new tools, technologies, or processes is essential for project success. Proper training ensures team members have the necessary skills and knowledge to perform their tasks efficiently. It reduces the likelihood of errors, boosts productivity, and enhances the overall quality of project deliverables. Lack of communication among team members or stakeholders can lead to misunderstandings and delays. Budget restrictions can limit resources and affect project scope or quality. Unclear goals can cause confusion, hinder progress, and result in unsatisfactory outcomes. Addressing these challenges requires effective communication, proactive budget management, and precise goal setting. Efficient resource planning ensures personnel, equipment, and materials are available throughout the project. This involves identifying resource requirements, estimating availability, and appropriately scheduling resources. Effective resource planning helps prevent resource shortages, optimizes resource utilization, and minimizes project delays. Project managers can improve project outcomes, enhance team collaboration, and increase project success rates by focusing on these aspects

4.5. Testing Hypotheses & Findings Discussion

Additionally, this project has produced additional themes that are reported below.

Theme: Project Management. According to the findings of this research, the following essential parts of project management were identified to be the most troublesome areas:

- Planning the Project,
- Managing the Resources,
- Managing the Budget,
- Managing the Quality of the Project, and
- Change Management

This segment of the interview was designed with many purposes in mind, including the following:

- To get an understanding of how the respondents handle projects at present.
- To locate essential issues in the project management and handling procedures, and so on.

Throughout the in-depth talks of each of the five process areas related to Project management stated above, a few themes most relevant to the present issues they faced at work emerged as the most frequent among the respondents. The primary ideas are broken down into subsections and then explained in the order shown above.

4.6. Conclusion

managing available resources. Providing adequate training to team members on new tools, technologies, or processes is essential for project success. Proper training ensures team members have the necessary skills and knowledge to perform their tasks efficiently. It reduces the likelihood of errors, boosts productivity, and enhances the overall quality of project deliverables. Lack of communication among team members or stakeholders can lead to misunderstandings and delays. Budget restrictions can limit resources and affect project scope or quality. Unclear goals can cause confusion, hinder progress, and result in unsatisfactory outcomes. Addressing these challenges requires effective communication, proactive budget management, and precise goal setting. Efficient resource planning ensures personnel, equipment, and materials are available throughout the project. This involves identifying resource requirements, estimating availability, and appropriately scheduling resources. Effective resource planning helps prevent resource shortages, optimizes resource utilization, and minimizes project delays. Project managers can improve project outcomes, enhance team collaboration, and increase project success rates by focusing on these aspects. Second, chatbots or virtual project assistants based on artificial intelligence may further assist project managers with tasks like planning, budgeting, and managing available resources. AI-based apps such as Fireflies and Stratejos already exist to service the particular process aspects without interconnection, even though no documented use cases have evolved that may permit the usage of these features in one application. The next step is to combine these AGI tools into a comprehensive suite that project managers can use. This method can potentially improve how project managers can set priorities among competing tasks and projects. Furthermore, autonomous project management (PM AI) will aim to fulfill the bigger objective of taking over project management operations by assessing the project environment and the actions of key stakeholders. While there is still some time until AI systems become an actively helpful element for today's project management workforce, formulating and executing strategies based on the recommendations above will guarantee a successful and painless transfer into the new era.

5. Chapter five: Research limitations, Recommendations & Conclusion

5.1. Research Limitations & Future Research

In this chapter, a review of the results of the dissertation, analysis, and explanation in terms of the theoretical framework followed. Major takeaways from the inquiry were discussed, and specific suggestions for the future were derived from them. This dissertation explored the use of AI in managing different types of projects. As was said in the preceding chapters, AI can completely transform how project managers carry out their duties. In the second chapter of the dissertation, related studies were examined. In this chapter, we examined a variety of AI algorithms that have been used before to aid in the administration of various projects. In the third chapter, we discussed several potential methods for conducting this study. This strategy would then be used to get outcomes. Chapter Three dissects and describes the methodologies utilized throughout the study to uncover, select, and assess the many ways Artificial Intelligence is applied to Project Management. These techniques are used to learn about, choose, and assess AI applications. Chapter Four of the research study presents the dissertation's empirical results. In the dissertation's fifth and last chapter, the previous chapters' findings are discussed, and conclusions are drawn. This is the last section of the dissertation.

The research centered on examining how AI affects the project management field. However, the study findings might lose relevance overtime due to the rapid evolution of AI, leading to the constant evolution. Ongoing debates in the industry revolve around the computational power required for advanced AI and its long-term benefits.

Many problems were uncovered throughout this investigation. Further research in this area is encouraged, considering the difficulties uncovered in this investigation. Based on the findings, further academic investigation into AI applications like project management is needed. As a result of the widespread belief that AI solutions or other technologies will aid many existing occupations in the near future, this field has been identified as one that requires more study. As such, the first advice for future research is to take a thoroughly scientific approach to studying AI-based solutions for specific tasks. There are also no scientific ideas or data to assist us in making sense of technology like AI. Science has no theories to help people comprehend technology that is not entirely developed or integrated. Even so, they may affect numerous processes that depend on more conventional means or the mental effort of people. Also, it is suggested that a theory be developed to aid in comprehending the consequences of such technology on such functions. There are also very few AI-based solutions that cater to the requirements of niche professions like project management. Thus, an AI-based solution is suggested to meet these requirements. In addition, the research did not consider the varying priorities of various managerial tiers when creating and deploying AI-based solutions for specific business processes. A further suggestion stemming from this is to investigate the feasibility of using such technologies

in the workplace by doing research that considers both the top-down and bottom-up management styles already in use within a particular firm. The paper also identifies potential dangers that may hamper such an effort. These suggestions open up several avenues for further research in this area of concentration within artificial intelligence systems for project management. When appropriately used in the future, it has the potential to greatly assist people in learning how to operate productively with this technology.

5.2. Research Recommendations

Throughout this inquiry, several obstacles came to light. They will be described, and the motivation they provide will be utilized to create the foundation for some suggestions for future investigations, which are as follows. A significant gap in scientific research is being conducted concerning developing AI solutions for specific tasks, such as project management. This area requires more attention, primarily because an increasing number of employment functions are anticipated to be supported by technology in some form or another. This is an area that needs more attention. As a result, the primary suggestion that can be made for future research is to investigate AI-based solutions for certain functions entirely from a scientific point of view. Currently, only a few AI-based solutions are available to meet the requirements of specific job tasks, such as those of a project manager. A second proposal in this respect is to establish an AI-based solution for certain tasks, such as those identified within project management in this research. In this regard, the study recommends that this be done. No scientific theory can explain how a technology that has not been completely figured out or created yet may genuinely alter functions that have historically depended on cognitive input or human interactions. This is because there is not enough information available. As a result, developing a theory to assist in comprehending technologies' influence on such functions is the subject of the third proposal. In this research, the viewpoints of Management were not considered when it came to designing and deploying AI-based solutions for specific roles inside a business. A study should be conducted within a particular organization considering both topdown and bottom-up approaches to look at how AI-based solutions could be implemented and what threats or hindrances could arise towards doing so. This brings us to our fourth recommendation: conduct such a study.

5.3. Conclusion

This investigation aimed to find an answer to the following research question: How many artificial intelligence systems assist project managers in becoming more effective in their everyday work? The underlying goal was to investigate and gain an understanding of the challenges that project managers face in the modern era, as well as to investigate and lay a foundation for the areas of opportunity in which AI systems could support project managers in overcoming these challenges, as well as bring attention to the challenges that are associated with this area. The findings of the investigation showed that these objectives could be accomplished. Based on the findings of the study methodology that included a variety of methods, it was possible to pinpoint five aspects of project management that have the greatest potential to benefit from assistance from AI systems.

- Project Planning
- Resource Management
- Budgeting
- Quality Management
- Change Management

In addition, the following is a list of the four most significant challenges that project managers confront concerning the five aspects above:

- Activities That Are Manual or Repeated
 - Continual Monitoring and Adjustments
 - Establishing Priorities Among Many Different Projects and Activities
 - Internal Systems and Process Flows That Are Not Working Effectively
- When further studied, these data demonstrated various potential inside project management that may be turned into AI systems that would benefit project managers. All of the different project managers that were questioned for this research agreed that this must be done. It was also

discovered that an existing AI solution for project management could be utilized for risk analysis and risk management. Ultimately, this solution may be used to enhance the business case in favor of the development and usage of AI in other aspects of project management. Throughout this research, several significant discoveries about the perspectives and levels of familiarity that project managers have with AI systems were made. One of the most notable findings of this research is that the project managers who participated in it strongly preferred using AI systems in their day-to-day work. As a result, there is a significant amount of demand from businesses. Another conclusion pertains to the community of project managers' general lack of information about AI systems, which has the potential to greatly impede future systematic use of AI for a particular function. Businesses need to address this issue by providing AI training to their project managers and hiring AI scientists who can develop their technology strategy to ensure good growth in the approaching digital era for project management. Businesses need to establish and implement strategies specially tailored for allowing the digitization of workplaces if they are to realize their goals of effectively implementing AI-based solutions and ensuring effective human-machine cooperation in the future. In this sense, the currently available AI solutions for project management provide a solid foundation to construct scalable models for the foreseeable future. It is unavoidable that people and robots will be colocated in the workplace of the future, and the only way for companies to ensure their continued existence is to accept this rapidly shifting environment as soon as possible to be able to manage it successfully.

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Appendix

Information Technology Project Management Professionals

Interview Questions

About the Individual and Background

1. What is your highest level of education?
2. What is your current position?
3. Please state roles and responsibilities in your current role.
4. Total years of experience working in project management?

Company Background

1. Please explain the type of firm's business you currently work in.
2. Company's vision in the next five years?

Project Management Questions

1. Describe your level of knowledge of AI and PM concepts.
2. When managing the Project, do you make use of any AI-based tools?
3. What are the current processes you follow to manage a project?
4. Do you believe that AI agents will be effective for the activities they do daily?
5. What are the areas you believe AI might give more effective assistance for project management?
6. What are the most significant challenges that you or members of the Project Team face while working on the Project?