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## **Application of Artificial Intelligence in Project Management**

Hikesh Hasmukh

## **Master in Digital Technologies for Business**

Supervisor:  
PhD, Rúben Filipe de Sousa Pereira, Assistant Professor,  
ISCTE-IUL

January 2024



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*"I dedicate this work to my son Vihaan and my wife Honey and thank them for their unconditional love and support at all times."*



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## Resumo

Esta dissertação pretende apresentar uma abordagem disruptiva aos processos da gestão de projetos, com a aplicação de tecnologias de inteligência artificial (IA). O objetivo é explorar os benefícios da aplicação de técnicas e ferramentas de IA no contexto da gestão de projetos. Este trabalho também se propõe a identificar as oportunidades e os desafios relacionados com a integração da IA nas várias fases da gestão de projetos, incluindo a planificação, a execução, a monitoria e o fecho.

O estudo irá identificar as atuais práticas de gestão de projetos em diferentes projetos pertencentes a diferentes áreas de negócio, identificando potenciais desafios e oportunidades em que a integração da IA pode trazer melhorias.

Em termos de visibilidade para o negócio tenciona explorar o potencial das tecnologias de IA para por exemplo, fornecer estimativas mais precisas, simplificar os fluxos de trabalho, automatizar tarefas repetitivas e tomar decisões baseadas em dados.

**Palavras-chave:** Inteligência Artificial na Gestão de Projetos, IA na Gestão de Projetos, Inteligência Artificial, Gestão de Projetos, Desenvolvimento de Software



## Abstract

*This dissertation aims to present a disruptive approach to project management processes, with the application of artificial intelligence (AI) technologies. The goal is to explore the benefits of applying AI techniques and tools in the context of project management. This work also proposes to identify the opportunities and challenges related to the integration of AI in the various phases of project management, including planning, execution, monitoring, and closure.*

*The study will identify the current project management practices in different projects belonging to different business areas, identifying potential challenges and opportunities where the integration of AI can bring improvements.*

*In terms of visibility to the business it intends to exploit the potential of AI technologies to for example provide more accurate estimates, simplify workflows, automate repetitive tasks, and make data-driven decisions.*

**Keywords:** *Artificial Intelligence in Project Management, AI in Project Management, Artificial Intelligence, Project Management, Software Development*



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# Glossary of Abbreviations and Acronyms

## Abbreviations Definitions

AI	Artificial Intelligence
ChatGPT	Chat Generative Pre-Trained Transformer, developed by Open AI, an AI research company. It is an Artificial intelligence chatbot technology that can process natural human language and generate a response.
EASE	Evaluation and Assessment in Software Engineering
ELIZA	Early natural language processing computer program
ERP	Enterprise resource planning
GAN	Generative Adversarial Networks
GPT	Generative Pre-trained Transformer
INFRA	Infrastructure
IT	Information Technology
ITPM	Intelligent Project Management
JIRA	Proprietary product developed by Atlassian that allows bug tracking, issue tracking and agile project management
LOW-CODE	Software development methodology that allows organizations to build applications faster and fosters collaboration between IT and businesspeople
ML	Machine Learning
MLR	Multivocal Literature Review
NLP	Natural Language Processing
PM	Project Management
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
PMP	Project Management Professional
ROI	Return on Investment
SLR	Systematic Literature Review
SW	Software
XAI	Explainable Artificial Intelligence



# CHAPTER 1

## INTRODUCTION

In today's world Project Management (PM) is pivotal for nearly every business and strategic initiatives. In an economy increasingly based on projects, companies from all sectors turn into efficient and effective PM practices to plan, coordinate, and control their activities. Starting from the creation of a new product, the implementation of organizational changes, to the development of complex IT (Information Technology) Systems, PM allows companies to turn their strategic vision into tangible results. However, many projects, especially in IT and particularly in Software Development, face significant challenges – failure, delays, or do not achieve the expected results. According to the Project Management Institute (PMI) report of 2020, approximately 11.4% of the investment is wasted due to poor project performance [1]. This reality highlights the need to modernize project management to improve the success rate of IT Projects.

The traditional methodologies of project management, often based on manual and sequential processes, have proven to be inadequate to deal with the complexity and dynamic of current IT projects and the speed of change of the business[2]. Problems such as delays, incorrect estimation, lack of effective communication, and business requirements changes are frequent in this context [3]. To address these challenges, the IT industry has been looking for more flexible and adaptive solutions, such as the Agile methodology, emphasizing collaboration, responsiveness to change, and continuous value delivery [4]. However, even these approaches have their limitations and do not guarantee project success [5].

Artificial Intelligence (AI) provides substantial value across a wide range of domains because of its ability to learn autonomously, adapt, and execute complex tasks. By automating routine tasks/operations, it can considerably improve efficiency, allowing humans to focus on more complex or creative tasks. Moreover, AI's predictive analytics capabilities offer unprecedented accuracy in forecasting, a vital aspect in areas such as finance, supply chain, and healthcare [6]. Its ability to analyze large datasets and identify patterns enables organizations to extract valuable insights, informing strategic decision-making processes and potentially uncovering new opportunities [7]. Artificial Intelligence (AI) has emerged as a potentially revolutionary area that can bring a new dimension to project management [8]. AI may help deal with the complexity and uncertainty of IT projects, improve decision-making, automate repetitive tasks, and provide predictive insights for early detection of problems or deviations in projects.

Project management in Software Development is a complex process, full of uncertainties and unpredictability. Traditional PM methodologies are often unable to effectively deal with the dynamic nature of modern software development contexts, leading to project delays, poorly sized budgets, and unfulfilled objectives. Recent advances in AI technology can bring promising solutions that can help overcome some of these challenges, offering the possibility to automate and simplify some of the PM tasks and lead the Project Manager and team to make informed decisions based on data-driven knowledge, which with the tools currently available to the PM, is still quite laborious and difficult to achieve. The application of AI in this domain is still at an early stage, and additional research is necessary to understand the benefits, limitations, and practical aspects of this type of approach. This

research aims to contribute to this emerging field by exploring the potential of AI to improve the management of software development projects.

The objective of this research is to explore the application of AI in IT project management and assess the possible benefits, challenges, impacts, and develop a blueprint to assist companies in integrating AI into their PM practices. To achieve this goal, the following research questions will be addressed: (i) What is the role and current application of Artificial Intelligence in project management? (ii) What are the benefits of integrating artificial intelligence into IT project management phases, and how do they contribute to improved project outcomes? (iii) What challenges arise from implementing artificial intelligence in IT project management, and how do these challenges influence the overall project performance and success? (iv) What is the future of the role of AI in PM, including changes to PM responsibilities, effective adoption strategies, and the impact of emerging AI trends?

This document is structured into six main chapters. Chapter 1 is the introduction, where the motivation, background to the topic, the definition of the problem, and the objective of the research are presented. Chapter 2 is the state of the art, where the context is established and the topics of the work are explored: Artificial Intelligence, Project Management, and the application of AI in Project Management. Chapter 3 describes the research methodology, covering the methodological approach, the multivocal literature review (MLR), and the use of interviews. Chapter 4 presents the results and discussion, where the data collected on this research is presented, and an analysis and discussion of the obtained results. Finally, Chapter 5 presents the conclusion, that includes limitations and future work.

# CHAPTER 2

## STATE OF THE ART

This section provides a theoretical basis for this study, drawing upon literature gathered during the research phase, and will also incorporate insights from reputable sources to help in the understanding of foundational aspects of this research project and its associated objectives.

### 2.1 Background

#### 2.1.1 Artificial Intelligence

##### (i) Definition and History of Artificial Intelligence

AI is a field of computer science dedicated to developing systems capable of performing tasks that traditionally require human intelligence. These tasks include reasoning, learning, visual perception, understanding natural language, interaction, and adaptation to complex environments. AI seeks to create systems that can function autonomously or semi-autonomously, processing information and making decisions in a similar way to human intelligence[9].

It is described as the search for mapping intelligence into mechanical hardware and structuring systems to formalize thought. It is viewed as the study of human intelligence such that it can be replicated artificially. Russell and Norvig categorize AI definition into systems that think and act like humans, think and act rationally, and learn new concepts and tasks [10]. This leads to a refined definition: "Artificial Intelligence is the study of human intelligence and actions replicated artificially, such that the resultant bears to its design a reasonable level of rationality" [9].

The evolution of AI is a story of remarkable innovation and growth, over several decades. Initially conceptualized in the 1950s, AI's journey began with foundational ideas like the Turing Test and the formal introduction of the term "Artificial Intelligence" by John McCarthy. The subsequent decades saw significant developments, in 1960s introduced early AI programs like ELIZA, showcasing basic natural language processing, in 1980s marked a significant shift towards machine learning, highlighted by the development of backpropagation algorithms for neural networks. The years 1990s and 2000s were characterized by AI's growth with the internet boom and the advent of big data, leading to advanced machine learning techniques and deep learning. In 2010s brought AI into the mainstream with IBM's Watson and DeepMind's AlphaGo, demonstrating AI's exceptional capacity for complex tasks [7]. A recent significant milestone of this era is the introduction of ChatGPT by OpenAI, a sophisticated language model that revolutionized natural language processing and generation [11]. This journey continues today, now with increasing concerns with ethical and societal considerations, shaping its future trajectory and integration across various fields.

Figure 1 is an infographic that offers an overview of the history of AI, it presents the main advances in the field over the years, highlighting significant milestones and developments. The image begins with the first theories about AI, such as the Turing Test, which evaluates a machine's ability to simulate human behavior, other important advances such as NLP (natural language processing), are illustrated, showing AI's progress in understanding and using human language. The evolution of thought and technological application is contrasted with traditional learning methods, the logo in the corner of the

image indicates the expansion of AI into various sectors, emphasizing its growing importance and integration into different areas [12].

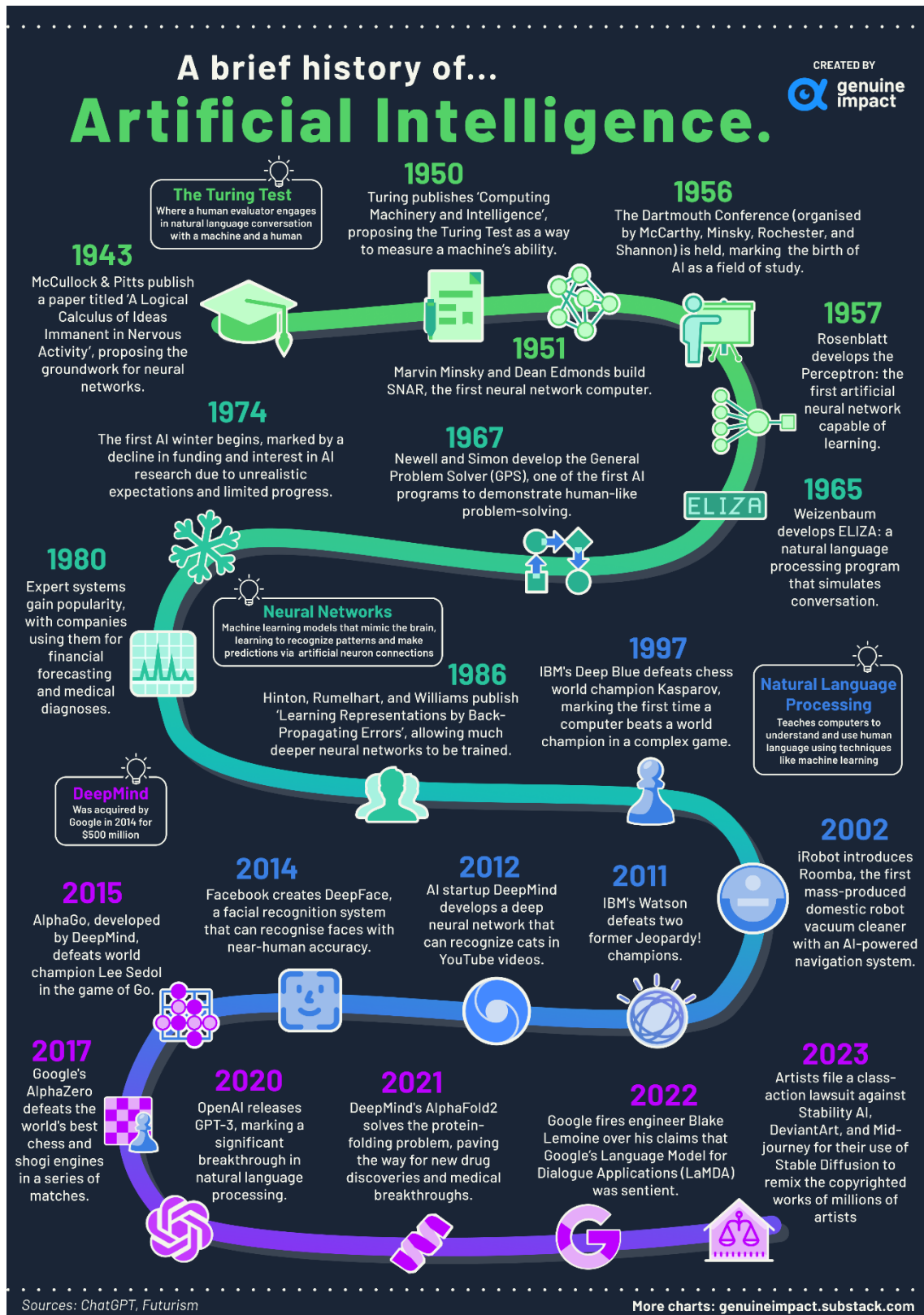


Figure 1. A Brief History of Artificial Intelligence [12]



## (ii) AI Principles and Technologies

The field of AI is vast and encompasses a variety of concepts, technologies, and applications. In this section, the main concepts and current technologies in AI are presented. [10]

- **Machine Learning** is considered the core of many AI applications, as it enables computers to improve their performance on a specific task based on past data or experiences, without being explicitly programmed for it. There are three main types of machine learning: Supervised learning, Unsupervised learning, and Reinforcement learning [13].
- **Neural Networks and Deep Learning** - Neural networks are inspired by the functioning of the human brain and are powerful in processing large amounts of complex data. Deep learning is a subset of neural networks and uses many layers of processing to extract high-level features and patterns from data [14].
- **Natural Language Processing (NLP)** allows machines to understand, interpret, and respond to human language in a useful way, including tasks like automatic translation, sentiment analysis, and virtual assistants [15].
- **Knowledge-Based Systems and Reasoning** are systems that use explicit knowledge about the world to make decisions or draw conclusions. They are often used in medical diagnostic systems, legal systems, and other decision-making systems.
- **Robotics** combines AI with mechanical and electrical engineering to create machines that can act in the physical world, this includes everything from industrial robots to autonomous vehicles and drones.
- **Computer Vision** is the area that deals with the ability of machines to interpret and understand the visual world, from object recognition to scene analysis and spatial navigation [16].
- **Intelligent Agents** are a central concept in AI, where an agent is any entity that perceives its environment through sensors and acts upon that environment through actuators. The study of intelligent agents includes understanding how to make decisions, learn, and interact with other agents.
- **Generative AI and Large Language Models and Foundations Models** are distinct yet overlapping terms in the AI field, as explained by Helen Toner in her May 12, 2023, article [17]. Generative AI broadly refers to AI systems designed to create content, such as images, text, or code, the examples include popular image generators like *Midjourney*, language models like GPT-4, and audio tools like VALL-E.

LLMs, a subset of generative AI, specifically deal with language processing and are characterized by their large number of parameters, leading to improved performance; the most famous examples are GPT-4 and Google's PaLM. Foundation Models, popularized by Stanford University, are versatile AI systems that provide a base for building more specialized applications, like ChatGPT was built upon GPT-3.5. While these terms are often used compatible, they each point to specific aspects of AI systems. Generative AI emphasizes content creation, LLMs focuses on language processing, and Foundation Models highlight adaptability for various applications.

## 2.1.2 Project Management

### (i) Fundamentals of Project Management

The Project Management Institute (PMI) defines PM as "the application of knowledge, skills, tools, and techniques to project activities to meet project requirements" [16], emphasizing five process groups: initiation, planning, execution, monitoring and controlling, and closure. The fundamentals of PM are essential for understanding how to organize, plan, and execute projects efficiently and effectively.

The basic principles, models, and methodologies of PM according to the PMBOK guide are mentioned below [16].

#### 1. Basic Principles

PM is centered on achieving specific objectives within defined timelines and budgets. It's important to clearly define the project's scope, available resources, and the goals to be achieved. Effective communication is crucial at all stages of the project.

#### 2. Project Management Models

There are various models that can be applied in project management, including:

- **Traditional:** Based on sequential phases such as initiation, planning, execution, monitoring and controlling, and closing.
- **Agile:** Focused on adaptability and quick response to changes, with iterative and incremental development.
- **Lean:** Emphasizes efficiency, eliminating waste and maximizing customer value.

#### 3. Project Management Approaches [18]

- **PMBOK:** Offers a set of standard practices for project management, including knowledge areas such as integration, scope, time, costs, quality, human resources, communications, risks, procurements, and stakeholder management.
- **Scrum:** An agile methodology that uses sprints, daily meetings, and defined roles (Scrum Master, Product Owner, Team) to promote agility and collaboration.
- **Kanban:** Another agile approach, focused on work visualization, limiting work in progress, and continuous flow.

#### 4. Process groups according to PMBOK [16]

- **Initiation:** Defining objectives, identifying stakeholders, and developing the project charter.
- **Planning:** Developing a detailed project plan, including scope, schedule, costs, quality, resources, communications, risks, and procurements.
- **Execution:** Implementing the project plan, coordinating people and resources.
- **Monitoring and Controlling:** Tracking, reviewing, and regulating the progress and performance of the project, identifying necessary changes.
- **Closing:** Completing all activities, delivering the project, and evaluating performance.

## (ii) Current Challenges in Project Management

PM faces a range of complex challenges, in this section some of the common problems and challenges faced by individuals and organizations working in projects are explored [2] [19], [20].

**Increasing Complexity of Projects:** Modern projects often span multiple disciplines, industries, and technologies and this complexity demands comprehensive planning that considers various interdependent factors, like diverse technology platforms, cross-functional teams, and regulatory environments.

**Change Management:** Projects today must be flexible enough to accommodate rapid changes, this includes adapting to shifting market demands, evolving customer/business needs, and unexpected project hurdles.

**Effective Communication:** With teams often spread across different locations and time zones, ensuring clear and consistent communication is challenging, specially today with the remote work being a part of our new reality.

**Risk Management:** Identifying potential risks early and developing mitigation strategies is crucial, this involves predicting common risks like budget overruns and scope creep and anticipating new risks posed by emerging technologies and market changes.

**Resource Constraints:** Balancing quality, scope, and cost in the face of limited resources (like budget, personnel, and materials) is a continuous challenge. Efficient resource allocation, prioritization of tasks, and optimizing productivity are key skills needed to navigate these constraints.

**Stakeholder Expectations:** Diverse stakeholders often have varying, and sometimes conflicting, expectations, balancing these demands while maintaining the project's vision and goals requires negotiation and diplomacy skills, and the ability to clearly articulate project benefits and compromises.

**Sustainability and Social Responsibility:** Projects are increasingly expected to adhere to environmental and social governance standards, this means integrating sustainable practices and considering the social impact of the project, and this requires a broader understanding of the subject.

**Adoption of New Technologies:** Keeping pace with rapid technological advancements and integrating them into project processes can be challenging, this means Project managers must stay informed about relevant technologies and assess how to best incorporate them to guarantee project efficiency and innovation.

**Leadership and Team Development:** Effective leadership is about motivating and guiding diverse teams towards a common goal, it involves developing skills like conflict resolution, team motivation, and promoting a collaborative environment.

**Compliance and Governance:** Projects, especially in regulated industries, need to follow a multitude of laws, regulations and standards, and effective governance structures must be in place to ensure compliance, manage risks, and maintain project integrity.

### 2.1.3 Applications of AI in Project Management – Related Work

PM is a critical practice that involves making decisions in the face of uncertainty at various points. The combination of project managers' knowledge, intuition, and experience, along with effective tools and guidelines, can lead to either the success or failure of a project. In the initial planning phase of PM, AI and ML techniques can be employed to plan schedules, allocate resources, and develop risk management strategies. During the project's implementation phase, project managers can utilize AI/ML-based tools and predictive analytics to accurately forecast the project's completion timeline based on current progress. These instances are just a few examples of the significant role AI and ML can play in both the planning and execution phases of PM [21].

AI also has the potential to assist project managers and team members by automating routine, high-volume tasks. This automation facilitates project analytics for estimation and risk forecasting, offers practical recommendations, and can even assist in making decisions [22].

Currently, numerous project teams struggle with short-term planning for a variety of similar, straightforward yet intersecting projects, where team members often work part-time on projects that don't have a physical presence. Most users of PM software fall into this category. Managers overseeing these types of projects have attempted to modify existing PM software tools to suit their needs [23].

ML and AI are widely used in the industry. It's well understood that the key abilities of AI include rapid data processing, identifying patterns, learning from data, and prediction. AI's unique ability to monitor specific trends and predict project outcomes and scenarios makes it an increasingly popular trend in the realm of PM [24].

The evolution AI in PM, as described in Figure 2, can be summarized in four main phases, (1) Integration and Automation, where standardized project tasks are automated and integrated into systems; (2) Chatbot Assistants, which use AI to perform routine tasks and interact with the project team; (3) Machine Learning-Based PM, introducing predictive analysis and advice to optimize PM; and (4) Autonomous PM, picturing a future where AI systems manage projects with minimal human intervention. This progression reflects an increase in the complexity and autonomy of AI, aimed at improving efficiency and effectiveness in PM, and maintaining a balance with human supervision [25].

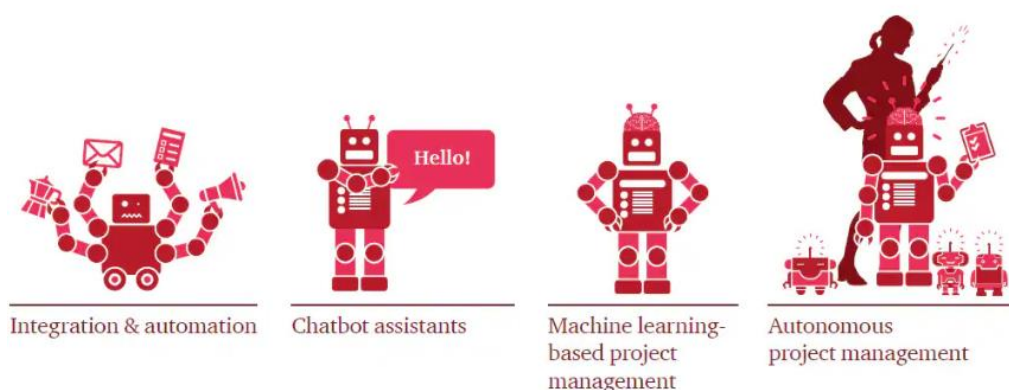


Figure 2. Evolution of AI in Project Management [25]

The exploration of various research papers on the application of AI in PM uncovers several key findings that are of significant relevance to the thesis topic. The integration of AI in PM is a complex domain, involving various methodologies, key findings, and potential applications that can transform the field of PM. This discussion synthesizes the insights from the analyzed papers to provide a comprehensive understanding of the current state and future potential of AI in PM.

The Integration of AI in Project Management is a common theme across the papers is the transformative role AI can play in PM. From improving decision-making processes to optimizing resource allocation, AI is depicted as a pivotal tool in enhancing the efficiency and effectiveness of PM. The authors in [26] and [27] emphasize AI's potential in automating routine tasks and contributing to more accurate project planning and execution.

Methodological Approaches in these papers range from systematic literature reviews to the development of theoretical frameworks and proposals for practical AI applications in PM. For instance, [28], offers a structured approach to integrating AI in PM, which is particularly insightful for this research in particular for the research question (iii) that explores the benefits of applying AI into PM which is incorporated into the proposed framework with the benefit dimension, as companies measure the application of AI in PM by the contribution to value creation. This diversity in methodologies reflects the multifaceted nature of AI in PM research and provides a robust foundation for further exploration in the thesis.

Challenges and Opportunities of implementing AI in PM are highlighted in several papers, such as the need for domain-specific knowledge and the balance between AI automation and human supervision. These challenges are crucial considerations for the thesis, as they provide a realistic perspective on AI's application in PM. The paper [29] offer insights into the potential and limitations of AI, ensuring a balanced view in the thesis.

Specific AI Applications in PM, such as AI's role in agile PM, as discussed in [22], the document outlines the transformative impact of AI on agile PM, emphasizing enhanced decision-making, risk management, and operational efficiency. It also highlights how AI automates routine tasks, provides predictive insights for better planning and risk assessment, and optimizes resource allocation. These capabilities lead to more accurate project planning, increased adaptability, and improved success rates, offering valuable insights for this research.

The papers collectively suggest a strong future trajectory for AI in PM, with potential impacts on various PM knowledge areas and the emergence of new AI-driven methodologies. This forward-looking perspective is essential for the thesis, as it not only contextualizes the current state of AI in PM but also provides a vision for future developments and innovations.

*Table 1. Summary of Selected Papers, with the research focus and key findings*

Author(s)	Year	Title	Research Focus	Key Findings
Taboada, Ianire et al.[30]	2023	“Artificial Intelligence Enabled Project Management: A Systematic Literature Review”	Exploring the role of AI in PM through the lens of PM Performance Domains (PMPDs)	AI, predominantly machine learning, is significantly useful in PM, especially in planning, measurement, and uncertainty domains
Odeh, Muhammad [31]	2023	“The Role of Artificial Intelligence in Project Management”	The role of AI in PM, focusing on its impact as a driver for innovation and change in PM approaches	AI is accelerating innovation in PM, needing changes in approach, and enhancing the capacity to meet evolving stakeholder expectations

Author(s)	Year	Title	Research Focus	Key Findings
Sravanthi, Jakkula et al [27]	2023	“AI-Assisted Resource Allocation in Project Management”	The application of AI techniques such as linear programming, genetic algorithms, and neural networks to optimize resource allocation in PM	AI can optimize resource allocation, improve project scheduling and completion times, reduce costs, and enable predictive analysis for future resource needs
Anoop Mishra, Abhishek Tripathi, Deepak Khazanchi [21]	2022	“A Proposal for Research on the Application of AI/ML in ITPM: Intelligent Project Management”	Application of AI and ML in IT PM, focusing on how AI/ML can support various PM tasks and processes	AI/ML approaches can support various PM tasks, emphasizing the automation of routine tasks and the use of AI/ML for complex decision-making in PM
Vusumuzi Maphosa, Mfowabo Maphosa [32]	2022	“Artificial Intelligence in Project Management Research: A Bibliometric Analysis”	Bibliometric analysis of AI in PM research, identifying trends, hotspots, and future research directions	Highlights the growing research interest in applying AI in PM, with a focus on accuracy, decision-making, efficiency, and risk management in various fields
Manuel Otero Mateo et al. [33]	2022	“Artificial Intelligence and Project Management. Prospective Analysis in Decision Making”	The role of AI in optimizing PM processes, improving information analysis in projects, and optimizing decision-making	Emphasizes the advantages of AI systems in optimizing management processes, improving the analysis of information generated in projects, and optimizing project manager decision-making
Bento, Sofia et al. [26]	2022	“Artificial Intelligence in Project Management: Systematic Literature Review”	Analysis of AI's potentialities and limitations in PM, with a focus on recent scientific community interest	Demonstrates increased interest in AI within PM, with a focus on areas such as decision support systems, human resources management, and construction
Oszkar Dobos and Agnes Csiszarik-Kocsir [34]	2022	“The Role of Project Management in Cyber Warfare with the Support of Artificial Intelligence”	Exploring the role of PM in cyber warfare and how AI can support PM in this context	The study examines how AI can be integrated into PM methodologies, particularly in the context of cyber warfare, highlighting the need for AI in decision-making and risk assessment
Todorovic, Rea [35]	2022	“A Framrwork for Leveraging Artificial Intelligence in Project Management”	Exploring the application of AI in PM, particularly in small and medium enterprises (SMEs), and proposing a framework for AI implementation in daily PM tasks	The study proposes a framework for implementing AI in PM, addressing challenges and opportunities. It emphasizes AI's potential in improving PM processes, budgeting, planning, and resources
Ben D. Radhakrishnan [36]	2021	“Explainable Artificial Intelligence (XAI) in Project Management Curriculum: Exploration and Application to Time, Cost, and Risk”	Integration of AI in PM education, particularly XAI, and its application to critical aspects like time, cost, and risk	AI, specifically XAI, offers significant potential in improving PM outcomes, particularly in aspects like time and cost estimation

Author(s)	Year	Title	Research Focus	Key Findings
Asma Alshaikhi, Mashael Khayyat [29]	2021	“An Investigation into the Impact of Artificial Intelligence on the Future of Project Management”	Investigating the impact of AI on the future of PM, focusing on AI's capabilities and how it affects PM tasks and activities	AI has the potential to automate various PM tasks, but it requires human oversight for effective operation. AI can aid in decision-making, risk assessment, and eliminate redundant information.
Thordur Vikingur Fridgeirsson et al. [37]	2021	“An Authoritative Study on the Near Future Effect of Artificial Intelligence on Project Management Knowledge Areas”	Exploration of AI's potential effect on PM knowledge areas as defined in the PMBOK	AI is very useful for processes where historical data is available for estimation and planning. AI will have a high impact on project cost management, schedule management, and risk management, while having less impact in areas requiring human leadership skills.
Gunnar Auth, Jan Jöhnk, et al. [28]	2021	“A Conceptual Framework for Applying Artificial Intelligence in Project Management”	Developing a framework to apply AI in PM, focusing on mutual requirements of AI and PM	The framework demonstrates AI's potential in PM, emphasizing the need for understanding both technology and domain for successful AI deployment.
Jesús Gil Ruiz, Javier Martínez Torres, Rubén González Crespo [38]	2021	“The Application of Artificial Intelligence in Project Management Research: A Review”	Review of learning techniques aimed at PM and classification of different areas within PM where AI is applied	AI tools are more precise than traditional tools in PM, yet they remain somewhat complementary to traditional approaches.
Oana Bălan-Budoiu [39]	2021	“The Evolution of Arts Entrepreneurship - "Two-door" – A New AI Prototype for Project Management”	Development of "Two-door," an AI software prototype for managing artistic projects. The focus is on computerized support in writing, implementing, and reporting outcomes of music PM	Introduces "Two-door," an AI software for assisting in artistic PM. The software aims to provide support in the administrative tasks of managing artistic projects
Peter Hofmann, Jan Jöhnk, Dominik Protschky, Nils Urbach [40]	2020	“Developing Purposeful AI Use Cases - A Structured Method and Its Application in Project Management”	Developing a structured method to create organization-specific AI use cases in PM	The study proposes a five-step method for developing AI use cases, emphasizing the importance of understanding the context, identifying domain problems and AI solutions, and matching AI functions with domain context
Belharet, Adel et al. [41]	2020	“Report on the Impact of Artificial Intelligence on Project Management”	Investigating the impacts of AI on PM and how it will reshape the profession between 2020 and 2030	AI is emerging as a key factor in transforming PM. It has potential impacts in areas such as decision support, project risk management, and resource allocation. AI is not expected to replace the human aspect in PM completely

Author(s)	Year	Title	Research Focus	Key Findings
Hoa Khanh Dam, Truyen Tran, John Grundy [22]	2019	“Towards Effective AI-powered Agile Project Management”	How AI technologies can support managing agile projects, with a focus on automation of tasks, project analytics for estimation and risk prediction	AI can assist project managers and team members in agile PM by automating repetitive tasks and providing actionable recommendations and analytics-driven risk predictions
Feng Xu and Shao-Pei Lin [42]	2016	“Theoretical Framework of Fuzzy-AI Model in Quantitative Project Management”	Developing a theoretical framework for integrating fuzzy logic with AI in quantitative PM	Presents the "Fuzzy-AI model" for managing fuzzy information in PM, offering digital support to decision-making. Demonstrates the application of this model in various PM scenarios
RYNSKA Dagny E. [23]	2002	“A Project Management Perspective – Utilization of Artificial Intelligence Techniques”	The utilization of AI techniques in PM, with an emphasis on the learning process required for management programs and the potential of AI to fulfill this need	AI techniques are crucial for the 'learning process' in PM. The paper anticipates the transformational potential of AI in PM, especially in terms of information and decision-making processes
Raymond E. Levitt, John C. Kunz [43]	1987	“Using Artificial Intelligence Techniques to Support Project Management”	The use of AI techniques as aids in engineering PM, focusing on planning detailed subtasks and executive-level project planning	The paper proposes that domain-specific planning tools are needed for work package or executive-level project planning. Hybrid computer systems combining AI with procedural techniques can be valuable in PM

After an analysis of the various papers presented in Table 1, it becomes clear that the application of AI in PM is a constantly evolving field with significant undeveloped potential. Although the studies address a variety of aspects, from the optimization of PM processes such as resource management, risk management and planning to the integration of AI in agile projects, there is an emerging consensus on the transformative impact of AI in this area. However, it is also clear that the field is far from being a closed or fully understood domain.

Research indicates that AI plays a crucial role in improving efficiency, accuracy and decision-making in projects, but also highlights the need for a deeper understanding of the interactions between AI and human processes in PM. Topics such as the effective integration of AI systems into existing project environments, the management of organizational changes resulting from the adoption of AI, and the development of specific skills to manage these new tools still require further research.

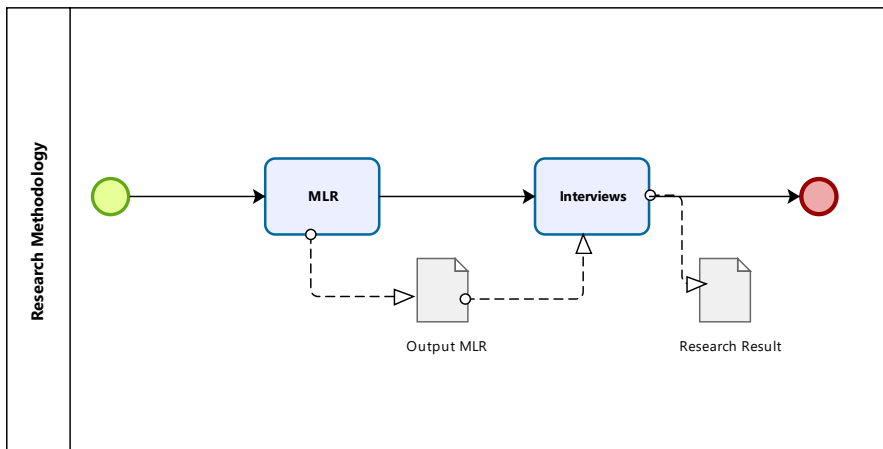
Based on this, the research aims to contribute to a deeper understanding of how AI can be applied more effectively in PM. Through a critical analysis of existing gaps and the exploration of new possibilities and approaches, this study aims to enrich the existing theoretical basis, and offer insights that can be applied in the field of PM. Therefore, it is hoped that this research will shed light on still nebulous aspects of the relationship between AI and PM and pave the way for future research and innovation in this dynamic and constantly evolving area.



# CHAPTER 3

## RESEARCH METHODOLOGY

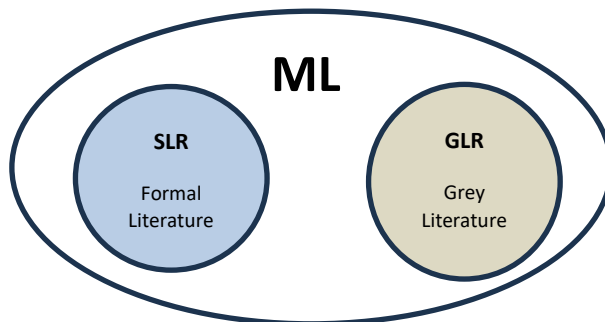
The research methodology chosen for this thesis is a combination of Multivocal Literature Review (MLR) and interviews with experienced project managers, particularly in the IT and Consulting fields, this combination is effective due to its ability to enhance the reliability, applicability across different contexts, and overall accuracy of the research, as represented in Figure 3. The number of conducted interviews aligns with the principles of data saturation, allowing for a diverse range of perspectives while ensuring that the research captures a comprehensive understanding of the integration of Artificial Intelligence (AI) into IT project management [44].



*Figure 3. Representation of the Research Methodology*

### 3.1 Multivocal Literature Review

A MLR is a form of a Systematic Literature Review (SLR) which includes the grey literature like blog posts, webpages, videos, and white papers, in addition to the published formal literature such as journal and conference papers. MLRs are useful for both researchers and practitioners since they provide summaries both the state-of-the art and practice in a given area, it's described in Figure 4 [45].



*Figure 4. Relation between SLR, GLR and MLR [45]*

MLR, by incorporating both academic literature and grey literature sources, provides a comprehensive and updated understanding of the field of AI applied to PM, it allows access to a variety of perspectives and insights, including recent findings and innovations that may not be available in the traditional

academic publications. This approach is particularly relevant in the field of AI where developments occur at a rapid pace and may not be readily captured in conventional academic literature[45].

Complementing MLR with interviews offer the opportunity to explore in depth the experiences, perceptions, and insights of professionals and experts in the field. This enriches the data obtained from the literature review and provides context and practical application to theoretical findings. Interviews help identify common themes and develop process models that are relevant and applicable to the reality of PM [46].

Therefore, the combination of MLR and interviews allows a more profound and diversified analysis, essential for understanding how AI can be effectively applied and managed in the context of PM. This methodology provides a holistic view, balancing theoretical rigor with practical insights, essential for comprehensive and relevant research in the dynamic field of AI and PM.

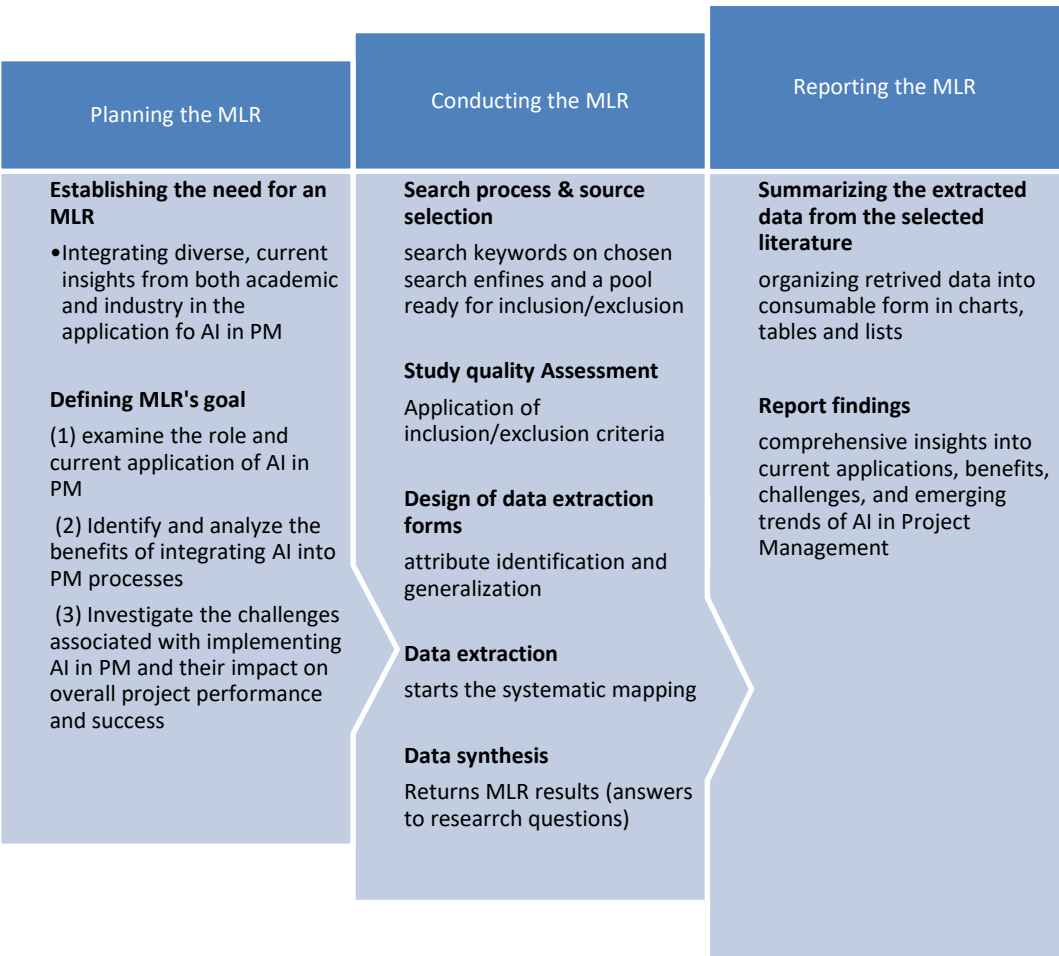


Figure 5. Multivocal Literature Review - MLR steps adopted in this research [45]

### 3.1.1 Planning the Review

This represents the first phase of the MLR implementation and starts with the motivation that led this subject to be studied, then the objectives and research questions. Refer to the Figure 5 to understand all the steps adopted for the MLR.

## (i) Motivation

This research aims to address the growing complexity and challenges faced in PM, especially in software development, where traditional methodologies often fail to meet current market dynamics. With significant investment wasted on unsuccessful projects, as reported by PMI, there is a need to explore new approaches. AI presents itself as a promising solution, with the potential to revolutionize PM by automating routine tasks, improving decision-making and providing predictive analysis [6].

## (ii) Review Protocol

The review protocol followed in this research is mentioned in Figure 6.

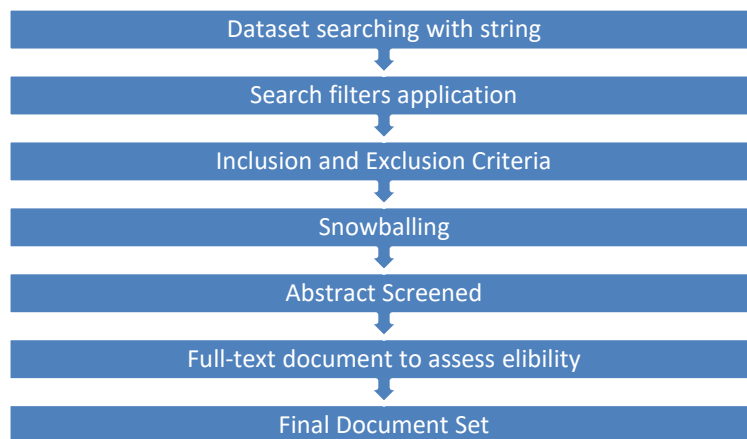
To find other studies related to this research, that can provide answers to the proposed research questions, a search was conducted in September 2023.

**Keywords:** Artificial Intelligence in Project Management, AI in Project Management, Artificial Intelligence, Project Management, Software Development

**Search String:** ((“Artificial Intelligence” OR “AI”) AND “Project Management”)

### Datasets:

- Scopus (<https://www.scopus.com>)
- Web of Science (<https://apps.webofknowledge.com>)
- IEEE (<https://ieeexplore.ieee.org>)
- ACM (<https://dl.acm.org>)
- Springer (<https://www.springer.com>)
- Google Search (<https://www.google.com>)



*Figure 6. Review protocol performed in this research*

To facilitate the google search, the first 20-page results were exported to a excel file and a manual analysis was performed to obtain reports, lectures, video/audio, or blogs from reputable sources with recognized industry practices, checking if the information was accessible as well. The exclusion criteria are: unidentified authors, without publication date, advertisement or job posts. The inclusion criteria are: written in English, text accessible and mentioning the keywords.

### 3.1.2 Conducting the review

This section describes how the review is conducted; it is the second phase of the SLR. The search is performed in the selected databases using the search query and there is an analysis of the data extracted from each of the databases.

#### (i) Selection of Studies

This section describes how the filtering of articles was done and the result of the documents, including figures and tables to represent the extraction process.

#### (ii) Data Extraction Analysis

Table 2 presents the filters used in the MLR protocol and the number of articles found after applying each filter.

*Table 2. Filters used in the MLR Protocol*

Database	Filter 1	Filter 2	Filter 3	Filter 4	Filter 5	Filter 6	Filter 7	%
Scopus	31 064	1 925	332	44	<b>40</b>	<b>36</b>	<b>16</b>	<b>35%</b>
Web Of Science	980	239	131	17	15	5	4	<b>9%</b>
IEEE	6 176	1 130	63	10	6	3	1	<b>2%</b>
ACM	1 785	1 455	10	1	1	-	-	<b>0%</b>
Springer	2 866	2 866	2 866	46	30	-	-	<b>0%</b>
Google	201	69	69	69	25	25	25	<b>54%</b>
Total	43 072	7 684	3 471	187	117	69	46	<b>100%</b>

Filter 1	All Fields
Filter 2	Article Title, Abstract, Keywords
Filter 3	Abstract
Filter 4	Title
Filter 5	Criteria of Inclusion or Exclusion (Relevance to the current Study)
Filter 6	Duplicate Articles
Filter 7	Manual Analysis to Remove not Relevant Articles

In the Figure 7. Distribution of the final documents per Database, it's possible to see the databases with the corresponding number of articles in terms of contribution.

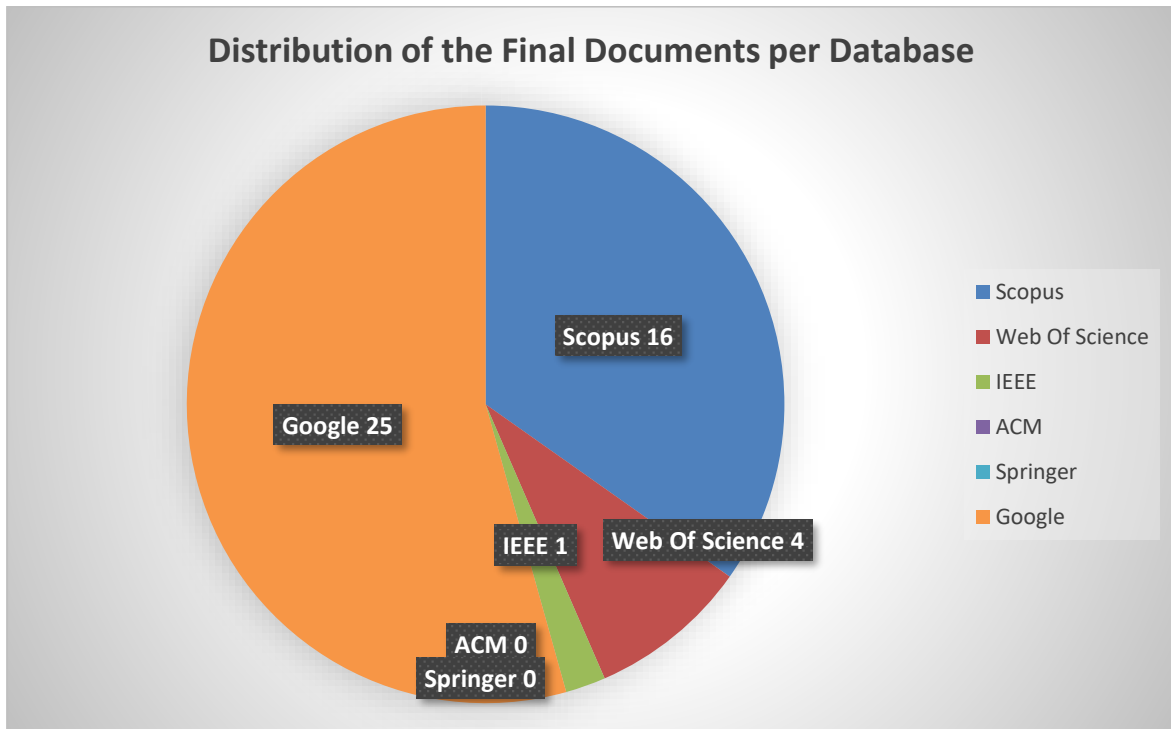


Figure 7. Distribution of the final documents per Database

### (iii) Reporting the MLR

Table 3, provides the list of AI applications mentioned in the publications selected for this research. From this information it was possible to extract information to compose an interview guide for the interviews to the project managers to understand the current state of AI in the field.

Table 3. Summary of contributions for AI Application in PM in research papers

AI Application in PM	Reference to Publication
Automation and Efficiency	[21], [22], [26], [30], [31], [33], [36], [40]
Decision Making and Analytics	[21], [22], [26], [30], [31], [33], [36], [40]
Risk Management	[21], [22], [26], [30], [31], [36], [40]
Strategic Planning and Execution	[21], [22], [26], [30], [31], [36], [40]
Human-AI Collaboration	[21], [22], [26], [30], [31], [36], [40]
Future Outlook and Challenges	[21], [22], [26], [30], [31], [36], [40]
Training and Adaptation	[21], [22], [26], [30], [31], [36], [40]
Ethical and Practical Considerations	[21], [22], [26], [30], [31], [33], [36], [40]

## 3.2 Interviews

The criteria to select project managers was having relevant experience in PM, at least 5 years across a variety of projects and sectors, including professionals from various types of organizations such as large companies, banks, consulting companies and Information Technology companies from different geographical regions in Portugal, Brazil, and Mozambique.

The research target group include professionals in different PM contexts, from the highly structured, phase-based approach of the Waterfall methodology to the more iterative, flexible, and adaptive framework of Agile methodologies.

These contacts, recommended by professors and professional project managers, provided a rich and varied perspective on the subject.

The interview questions were carefully designed to align with the research objectives and research questions, facilitating a thorough examination of AI's use, benefits, challenges, and future impact in IT project management.

**For Research Question (i):** What is the role and current application of Artificial Intelligence in project management? The Questions 1 to 3 explore the current use of AI in PM across various organizations and industries. These questions aim to understand how AI is transforming traditional project management practices and provide a clear picture of AI's role and variations in its application.

**For Research Question (ii):** What are the benefits of integrating artificial intelligence into IT project management phases, and how do they contribute to improved project outcomes? Questions 4 to 6 focus on the specific benefits AI has introduced to PM, such as improved efficiencies, enhanced productivity, and better decision-making and risk assessment. These questions help quantify the positive impact of AI on project outcomes.

**For Research Question (iii):** What challenges arise from the implementation of artificial intelligence in IT project management, and how do these challenges influence the overall project performance and success? Questions 7 to 10 address the challenges and obstacles encountered with AI integration in PM, including changes in team roles and ethical concerns. Responses to these questions will shed light on the barriers to AI adoption and how they can be overcome to enhance project success.

**For Research Question (iv):** How can organizations prepare for the evolving role of AI in project management, including changes to project manager responsibilities, effective adoption strategies, and the impact of emerging AI trends? Questions 11 to 15 investigate forward-looking aspects of AI in PM. They inquire about expected changes in project manager roles, current and future AI adoption strategies, and emerging trends likely to affect PM practices. These questions are vital for understanding how organizations can strategically adapt to and benefit from AI's evolving role in PM.

This structured approach ensures the interviews capture essential insights into how AI is reshaping project management today and in the future.

The interview process was designed to provoke thorough and thoughtful responses, allowing for a deeper comprehension of the practical applications, possibilities, and concerns associated with implementing AI in PM across various cultural and professional backgrounds. The aim of collecting this qualitative data was to enhance the insights gained from the Multivocal Literature Review, providing a well-rounded view of both the present and future impact of AI in PM.

There was a total of 17 interviews conducted in this research, the justification for this number is the saturation level, as presented in section 4.5, the amount of new data added in each interview reached its saturation point [47].

### 3.2.1 Demographic and Professional Background Information

The interviewees have diverse backgrounds in PM coming from various industries, such as consulting, banking, health AI, and energy. This diversity suggests that AI in PM is not industry-specific and has broad applications, this data is presented in Figure 8.

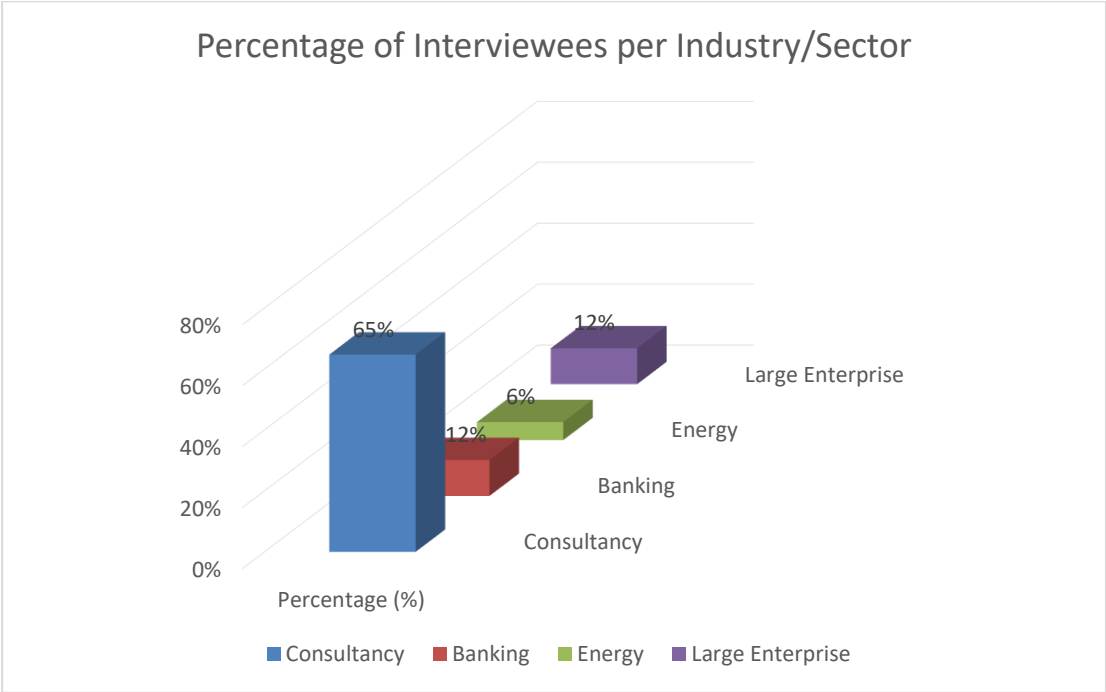


Figure 8. Percentage of Interviewees per Industry/Sector

There is a noticeable gender gap in this sample, with more male (thirteen) than female (four) participants as presented in Figure 9, this can reflect broader industry trends or be specific to the regions and sectors sampled.

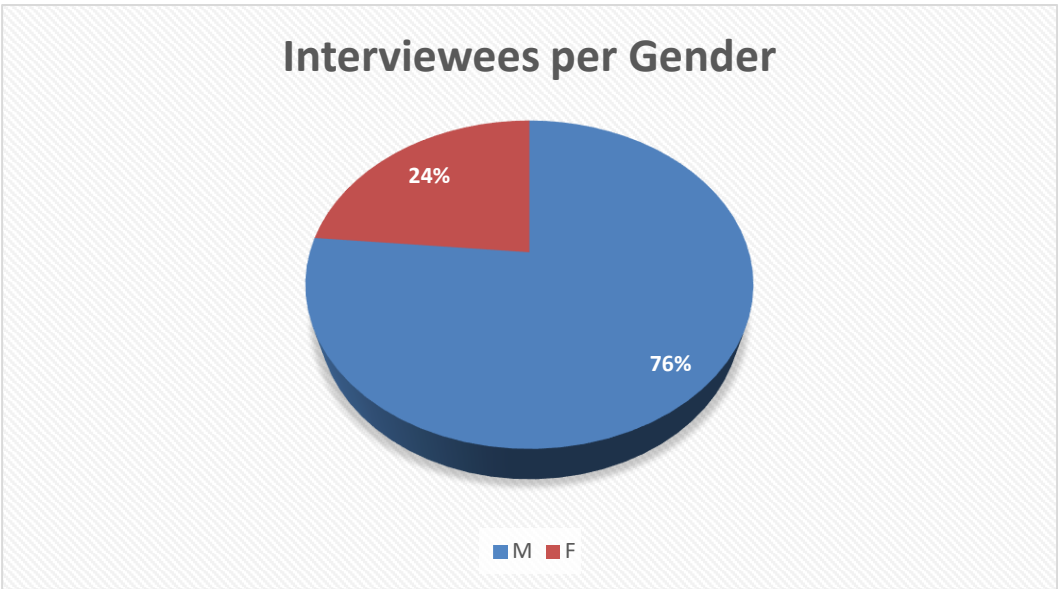


Figure 9. Interviewees per Gender

The age range of 32 to 63 indicates a relatively experienced group of professionals. Most had substantial professional experience ranging from 12 to 40 years, with significant experience specifically in PM ranging from 5 to 32 years, this is displayed in Figure 10. This level of experience provides a mature perspective on the integration of AI into PM.

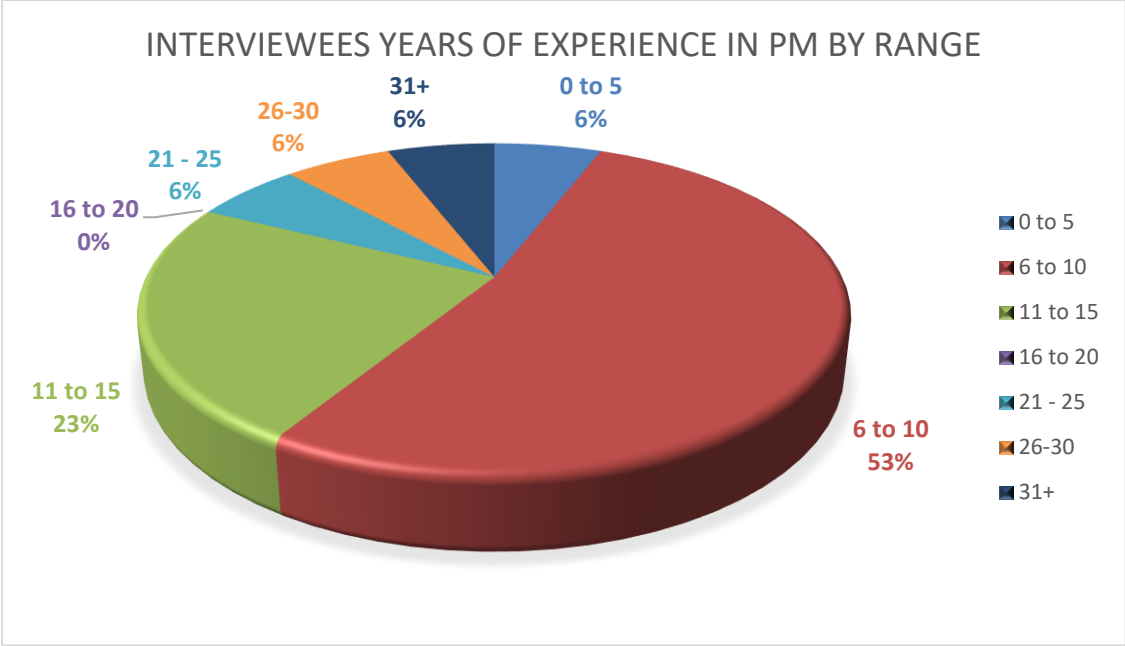


Figure 10. Interviewees Years of Experience in PM

In terms of educational background, there was a strong emphasis on higher education, with most interviewees holding master's degrees or higher. The fields of study include Information Technology, Computer Science, Engineering, and Business, all of which are relevant to both PM and AI.

In terms of professional certifications, many interviewees had professional certifications such as PMP and Scrum Master. This is a clear indication of formal recognition of PM skills by industry and region.

The types of projects managed by these professionals are diverse, including software development, infrastructure, ERP, and IT projects, suggesting that AI applications in PM could be versatile across different project types, more details can be found in Table 4.

PM methodologies used Agile, Waterfall, hybrid and Custom, with Waterfall and Agile being the minority as shown in Figure 11. The diversity of approaches can influence the integration of AI tools into PM processes. AI tools might be used differently in agile projects in tasks related to sprint planning, backlog prioritization in comparison to waterfall projects for risk assessment or schedule forecasting.



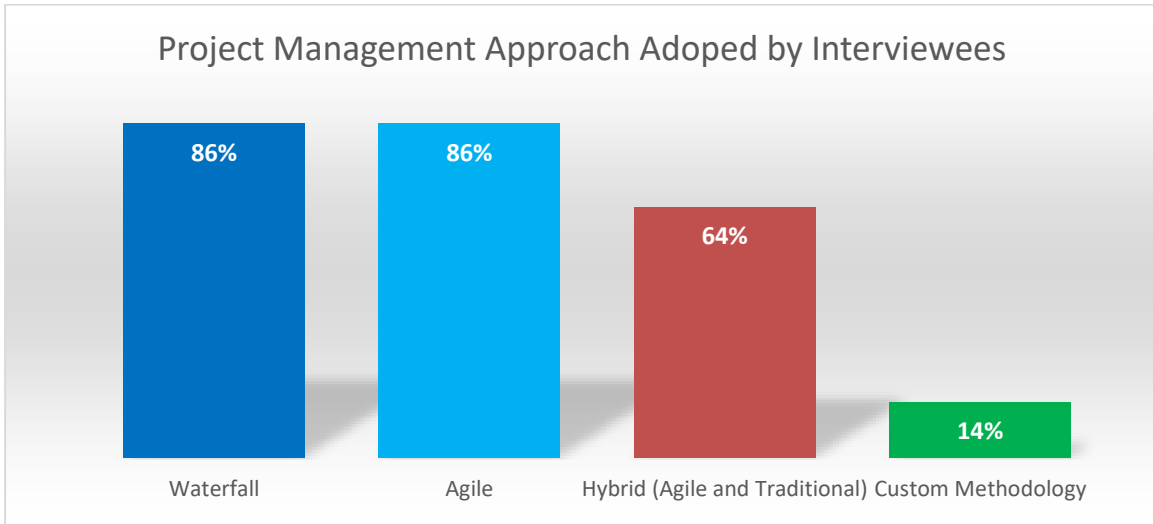


Figure 11. PM Approach Adopted by Interviewees

The interviewees were from Portugal, Brazil, and Mozambique, the percentages are presented in Figure 12. Cultural and regional factors in these countries might influence the adoption and perception of AI in PM, as they are all Portuguese speaking.

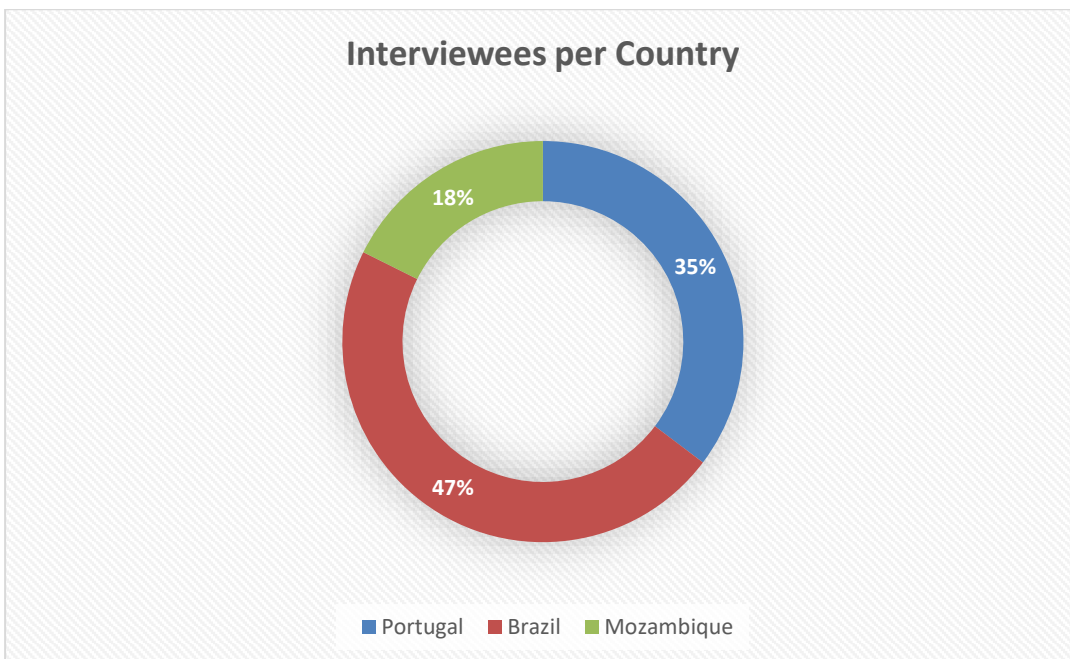


Figure 12. Interviewees per Country

Table 4. Interviewees' details

#	Gender	Age	Industry/ Sector	Current Role	Years of Experience	Years of Experience in PM	Types of Projects (SW/INFRA/LOW-CODE/ERP)	PM Approach (Agile/Traditional)	Academic and Professional Background	Nationality
1	F	42	Consultancy/ Banking	Project Controller - PM	24	14	Infrastructures/Architecture/Banking client projects	Waterfall in Projects and Agile in Development	Master's degree in Computer Science and Management; Prince 2 training	Brazil
2	M	40	Consultancy	PM	18	10	Portal Implementation	A mix of Agile and Waterfall	Executive Masters in PM, Scrum certification	Portugal
3	F	35	Consultancy	Product Owner	12	5	Software (SAAS and Custom)	Waterfall and Agile	Degree in Management Informatics	Portugal
4	M	46	Consultancy	PM, PO, SM	20	12	SW, ERP, Low-code	Hybrid and Agile	Master's in Computer Science and Management	Brazil
5	M	42	Consultancy	PM	15	6	SW, ERP	More waterfall projects, modernizing to agile	Master's in Computer Science & Business management	Portugal
6	M	45	Banking	PM	22	22	SW, Construction, Banking, Oil and Gas	Agile and traditional	Civil Engineering + Master's in PM and Executive MBA + PMP+Prince 2+P scrum master	Mozambique
7	M	40	AI for Health	Researcher/ CEO	15	8	SW, ML Architectures	Custom methodology adapted to each project	PhD in Biomedical Engineering	Portugal
8	M	38	Energy	PM and ICT Coordinator	15	10	IT: Customized SW, ERPs, CMS	Agile and traditional	MSc Eng, SW + PMP + Cert Agile	Mozambique

#	Gender	Age	Industry/ Sector	Current Role	Years of Experience	Years of Experience in PM	Types of Projects (SW/INFRA/LOW-CODE/ERP)	PM Approach (Agile/Traditional)	Academic and Professional Background	Nationality
9	F	46	Consultancy/ Banking	Team manager	28	10	SW	Waterfall	High School	Portugal
10	M	47	Large Company	PM	33	15	SW/Systems Implementation/MS/BI/CRM/Auto mation/ERPs	Waterfall+Hybrid	Various PG and (Mkt, Business), Degree in Computer Science	Brazil
11	M	48	Large Company	Director/PMO	30	15	SAP/Enterprise Systems/Industrial Systems	Hybrid, Agile and Waterfall	Bachelor + PG +Masters PMP + Scrum Master	Brazil
12	M	58	Consultancy	Consultant/ Researcher	36	26	Training, Industrial, Engineering, IT, SAP, PMO	Hybrid, Own Methodology	MSc, MBA, PG+PMP	Brazil
13	M	50	Consultancy	Program/ Project Manager	27	8	Industrial Software	Waterfall and Agile	Masters and Bachelor Degree+PMP+ Scrum	Portugal
14	M	32	Banking	PM	12	8	Software, Infrastructure, Integration and Products	Waterfall and Agile	Bachelor Degree + PMP+Scrum	Mozambique
15	F	45	Consultancy	PM	16	6	Payment Platforms, Products, Low- code, integration, Data-Driven	Agile	Bachelor Degree System Analysis+Scrum Masters	Brazil
16	M	59	Consultancy	Agilist	30	10	Software for various industries	Waterfall, Hybrid, Agile	Bachelor and MBA	Brazil
17	M	63	Consultancy	Executive PM	40	32	Software for various industries	Waterfall / Hybrid	MBA in PM and Processes	Brazil



## CHAPTER 4

# RESULTS AND DISCUSSION

The research problem in this study identified in the introduction chapter, centers on the significant challenges faced in the PM, especially in IT projects like software development or in large projects that involve many business processes, departments, multiple software, and integrations. PM plays a pivotal role in transforming strategic visions into business outcomes, but according to statistics provided by experts the failure rates of projects are still significant [48], with issues like delays, unachieved goals with significant financial losses. The traditional PM approaches are often inadequate for the complexity and dynamics of modern IT projects. While agile methodologies have offered some improvements, they also have limitations and do not guarantee success.

This research aims to explore the role of AI in improving PM. Given the ability of AI with self-learning, adaptation, and handling a large volume of information, handling complex tasks, and its ability to automate processes, and offer predictive analysis, position it in a potentially transformative and game-changing element in PM.

The objectives of this research are to (1) examine the role and current application of AI in PM, (2) Identify and analyze the benefits of integrating AI into PM processes and how these benefits contribute to improved project outcomes, (3) Investigate the challenges associated with implementing AI in PM and their impact on overall project performance and success and (4) Look forward for the evolution of AI in PM, potential shifts in job roles and strategies of effective AI adoption in PM.

Based on the interviews conducted with project managers, there is a guide of the interview in the **Appendix A – Interview Script**, this chapter describes the findings of each part of the interview which seeks to answer the research questions on this project. The primary focus of the interviews is to gather insights about several key aspects that derive from the research questions of this study, the following section describes the focus of the interviews.

- **Perspectives on AI in PM**

This part of the interview focused on gathering insights from participants on how AI is currently being utilized in their PM practices. This directly addresses the research question regarding the role and application of AI in PM.

- **Benefits of Applying AI in PM**

Participants were asked to highlight specific benefits they have observed or predict from using AI in PM. Their responses provide empirical data to answer the research question on the benefits of integrating AI into PM and its impact on improving project outcomes.

- **Challenges in Implementing AI in PM**

The interviews explored the challenges faced by organizations when incorporating AI into PM. These insights are critical for addressing the research question related to the challenges of AI implementation and how they affect the overall success and performance of projects.

- **Future Perspectives on AI in PM**

Finally, participants were challenged to offer their perspectives on the future trends of AI in PM, including potential shifts in responsibilities and strategies for effective adoption. This discussion is aimed at answering the research question about the future role of AI in PM and its implications.

### 4.1 Perspectives on AI in PM

This section aims to understand the current usage of the use of AI in the interviewee's organization or industry and the questions focus on the current state, its importance, and examples of AI tools in use. The aim is to gain insights into the practical integration and perception of AI in PM.

#### 4.1.1 The Current State of AI in PM

The current state of AI in PM presents a contrasting scenario, as presented in Table 5, 47% of the responses indicate limited and cautious use, mainly due to concerns about security and data privacy. Around 29% of responses point to an emerging and exploratory phase, where organizations are beginning to adopt AI to improve productivity in specific tasks. Innovative but specific application is reported by 12%, focusing on the use of AI to gain insights in selected projects. Finally, 12% of responses reflect uncertainty and challenges, including uncertainty about the usefulness of AI, high investment costs and a lack of technological development in some contexts. This panorama shows a varied adoption of AI in PM, oscillating between cautious innovation and emerging exploitation, with significant challenges still to be overcome.

Table 5. Status of Application of AI in PM.

Current Status	Percentage (%)
Limited and Cautious Use	47%
Emerging and Exploratory Stage	29%
Innovative but Specific Application	12%
Uncertain and Challenging	12%

This reflects a scenario where caution and innovation coexist. The limited and cautious use of AI highlights concerns about security and data privacy, as well as hesitation on the return on investment and integration with existing processes.

The emerging and exploratory phase indicates a growing interest and recognition of AI's potential, with organizations experimenting it in selected projects to gain insights and improve productivity. Currently, most companies do not formally use AI in PM, according to the majority of interviewees responses, there is a personal investment from the project managers to use and explore AI tools to increase productivity, but the use of such tools is very limited in specific companies that are concerned about their privacy.

#### 4.1.2 Importance of AI in PM

The interviews reveal a variety of perceptions about the importance of AI in the field, one can visualize this in Figure 13, around 29% of respondents reveal that AI is at an early stage, used mainly for basic and support tasks, while in another 29% AI improves or speeds up specific tasks, showing a moderate impact. Around 18% consider AI as essential for strategic tasks, reflecting deeper integration into their projects. Finally, 24% of respondents consider AI as fully integrated or critical, indicating the most advanced phase of adoption.

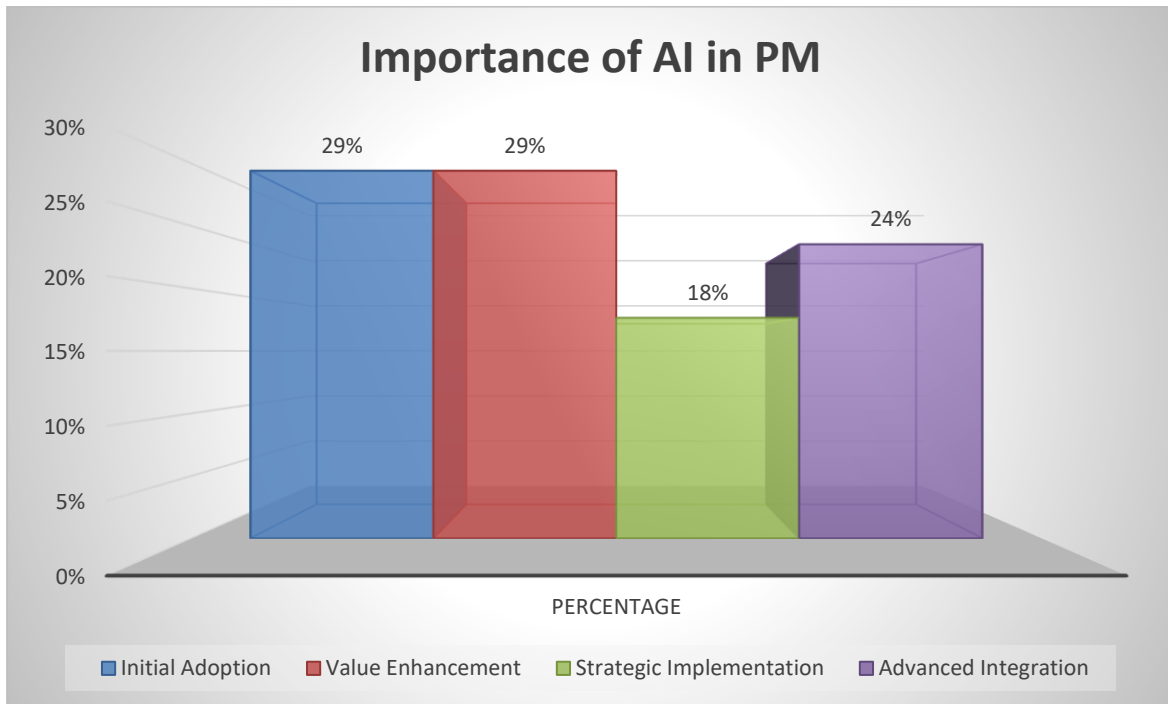


Figure 13. Graphic representing the Importance of AI in the Interviewees Organizations

This diversity of opinions highlights not only the varied stage of AI adoption in PM, but also points to the need for a deeper understanding of how AI can be strategically implemented to maximize its value in different PM contexts.

There should be a focus on aligning AI capabilities with specific PM needs, considering the barriers to its adoption and exploring strategies for its effective integration.

#### 4.1.3 Use of AI Tools in PM Tasks

There is a growing trend in the use of tools. These tools are used for a variety of purposes, including assisting with documentation, planning, communication, data analysis, task automation and other activities presented in Table 6, the referred activities are placed in phases where they most commonly occur, but it's important to note that some activities can span multiple phases.

ChatGPT stands out for its versatility, being used to write user stories, build test cases, generate reports, and even create project plans, other applications include analyzing large volumes of information, suggesting training, and supporting project development strategy, which brings great versatility, improvement in efficiency.

But the growing reliance on AI tools raises concerns about the replacement of human skills and the need to balance automation with human judgment and creativity. The issues on reliability and ethics in AI are crucial and require transparency and limitations of the tools.

AI requires PM professionals to adapt and develop new skills to use these technologies effectively.

Table 6. AI Tools Currently used for PM Activities by Project Phases and PM Activities

Project Phases	Project Management Activities	AI Tools	Interview Reference
Initiation	Exploring AI Tools for PM	Various AI Tools	6, 10
	Market and Technical Context Understanding	ChatGPT, Bard	15
	Project Prioritization	Various AI Tools	4
Planning	User Stories Creation	ChatGPT, Notion, JIRA with AI	1, 2, 12, 15
	Test Cases Development	ChatGPT, Notion, JIRA with AI	1, 2, 12
	Task Estimation	ChatGPT, Notion, JIRA with AI	1, 2, 12
	Gantt Chart Creation	Notion, JIRA with AI	2
	Resource Leveling	Notion, JIRA with AI	2
	Communication Planning	ChatGPT, Notion, JIRA with AI	1, 2, 7, 8, 12, 13, 15, 16
Execution	Data Analysis	Various AI Tools	3, 4, 5, 9, 10, 14
	Risk Analysis	Various AI Tools	3, 4, 5, 9, 10, 14
	Monitoring and Reporting	ChatGPT, Various AI Tools	3, 4, 13, 15
	Technical Support	Various AI Tools	3, 4, 5, 6, 9, 10, 14
	Training and Development Suggestions	Various AI Tools	4
Closing	Documentation and Reporting	ChatGPT, Other Commercial Tools	1, 2, 7, 16
	Post-Project Analysis	Various AI Tools	4, 14
	Strategy Development	Various AI Tools	3, 4, 5, 6, 9, 10, 14
	Market Analysis	Various AI Tools	3, 4, 5, 6, 9, 10, 14

## 4.2 Improvements and Benefits

The purpose here is to identify the benefits and improvements brought by integrating AI into PM processes. The questions investigate the specific improvements observed, the impact on team efficiency and productivity, and the role of AI in decision-making and risk assessment. This section seeks to quantify and qualify the positive results of adopting AI in PM.

### 4.2.1 Improvements Observed with AI

The Table 7. Improvements observed with AI, reveals that time savings and efficiency were highlighted in 8 of the 17 responses, highlighting AI as a crucial factor in optimizing processes. Improved productivity was mentioned in 7 responses, while improved quality and accuracy appeared in 6. Improved communication was noted in 4 responses, and the automation of routine tasks in 6, underlining the efficiency brought about by AI. Comprehensive support for PM was acknowledged in 3 responses, demonstrating the versatility of AI in various areas of PM.



Table 7. Improvements observed with AI

Project Management Phase	Activities of the Phase	Improvements Observed	Interview References
Initialization	Project setup	Time-saving and efficiency	1, 2, 3, 13
		Automation of routine tasks	8
	Initial task facilitation	Time-saving and efficiency	1, 2, 3, 13
Planning	Project planning	Improved Communication	7, 8, 15
		Streamlined Decision-Making Processes	7, 8, 15
		Increased Project Transparency	7, 8, 15
		Improved Risk Management	4, 17
		Proactive Issue Identification and Resolution	4, 17
Execution	Task execution	Enhanced productivity	5, 6, 14
		Real-time Reporting and Monitoring	5, 6, 14
		Enhanced Collaboration and Team Engagement	5, 6, 14
		Automation of routine tasks	8
		Improved quality and accuracy	6
		Improved Risk Management	4, 17
		Proactive Issue Identification and Resolution	4, 17
		Comprehensive PM Support	4, 17
Closing	Communication with stakeholders	Enhanced productivity	5, 6, 14
		Real-time Reporting and Monitoring	17
		Enhanced Collaboration and Team Engagement	17
	Project review	Comprehensive PM Support	4, 17
		Proactive Issue Identification and Resolution	4, 17
		Improved Risk Management	4, 17
		Improved quality and accuracy	6
		Automation of routine tasks	8

AI contributes significantly to saving time and efficiency, improving productivity by freeing project managers from repetitive tasks and allowing focus on strategic activities.

AI also improves the quality and accuracy of deliverables and facilitates efficient communication between stakeholders.

The automation of routine tasks and comprehensive support in various areas of knowledge in PM highlight the potential of AI to transform PM, making it more integrated and efficient.

These results point to a future where AI will be an essential component in PM.

### 4.2.2 Impact of using AI on efficiency and productivity

According to the data presented in Table 8, many interviewees indicate significant increases in productivity, ranging from 50% to over 150%. AI is seen as an accelerator that improves efficiency in task management, contributes to more accurate technical estimates and has a notable impact on complex tasks, automating processes and freeing project managers to focus on more critical aspects. However, there are also challenges, such as the difficulty in defining parameters to measure the impact of AI and the lack of clear benchmarks for its measurement, indicating that, in some cases, the adoption of AI is still at an early or experimental stage.

Table 8. Impact of using AI on Efficiency and Productivity

Common Insights	Description	% Interviews Reflecting Insight
<b>Increase in Productivity</b>	AI significantly boosts productivity, with some interviews noting increases of 50% to over 150%	59%
<b>Enhanced Efficiency in Task Management</b>	AI improves the management of tasks, leading to faster workflows and fewer errors	47%
<b>Automation and Task Liberation</b>	AI automates routine tasks, freeing up project managers for other critical tasks	29%
<b>AI as an Accelerator</b>	AI is seen as an accelerator for PM work, enhancing the speed of task completion	18%
<b>Lack of measurable impact</b>	No data to measure the impact	18%
<b>Improved Technical Estimations</b>	AI aids in providing more accurate technical estimations for projects	12%
<b>Impact on Complex Tasks</b>	AI shows a significant impact on managing and executing complex project tasks	12%
<b>Progress Measurement Challenges</b>	Initial challenges in setting up AI for analysis, but ongoing progress measurement is noted	6%
<b>Enhancement of PM Competencies</b>	AI has the potential to enhance the competencies of project managers	6%

The impact of AI on efficiency and productivity reveals a mixed picture, on one hand there is significant recognition of the benefits of AI, with reports of notable increases in productivity, efficiency in task management and improvement in estimation, but on the other hand, the discussion also shows challenges, especially in the initial phase of AI adoption.

To bring effective efficiency and productivity there is a need of time investment into exploring the tools and find the best way to integrate into the organization processes.

### 4.2.3 Contribution of AI in Decision Making and Risk Assessment

The interviews indicate that AI significantly improves decision-making by offering advanced analytical capabilities, improving the quality of projects, and providing strategic support and predictive insights. However, they also highlight the need for a cautious use of AI, given its limitations, emphasizing the importance of a steady integration of AI in PM, Table 9, highlights the capabilities recognized by the Interviewees.

There is balance between AI’s significant advantages and the need for caution. While AI improves decision-making through advanced analytics, predictive insights, and strategic support, raising the efficiency and quality of projects, there are also concerns about its limitations.

It is emphasized that AI must complement, not replace, human judgment, indicating the need for a balanced and responsible integration of technology into PM, where human experience remains a vital component.

Table 9. Contribution of AI in Decision Making in PM

Aspect of Decision-Making	Frequency of Mention	Percentage	Notes
Analytical Capabilities	High	65%	AI enhances data analysis and projection capabilities
Strategic Support	Medium	71%	AI aids in strategic planning and benchmarking
Quality Improvement	Medium	53%	AI improves the accuracy of project outputs
Broad Applicability	Medium	53%	AI is versatile across various PM functions
Predictive Insights	Medium	41%	AI offers predictive analytics for proactive decision-making
Cautious Use	Low	29%	Highlights the need for cautious use of AI in decision-making due to its limitations

As presented in Table 10, AI enhances the ability to identify, analyze and manage risks more effectively, leading to better project outcomes, however there is a need of human judgment for effective risk management.

AI shows significant potential in improving risk identification and analysis, offering predictive insights, and raising the quality of risk assessment in projects.

These capabilities allow project managers to take a more informed and proactive approach, potentially leading to more successful outcomes.

There are also limitations to AI, which leads to the importance of thoughtful and conscious application.

Table 10. Contribution of AI in Risk Assessment in PM

Risk Assessment	Percentage	Description
Risk Identification and Analysis	53%	AI is used for identifying and analyzing various types of risks, including financial, operational, and legal risks
Predictive Risk Management	41%	AI provides predictive insights on potential risks, aiding in proactive risk management
Quality Assurance in Risk Management	41%	AI improves the quality and accuracy of risk assessment processes
Strategic Risk Assessment	35%	AI aids in strategic risk assessment, considering privacy, cross-sector comparisons, and project planning
Cautious Use in Risk Assessment	29%	Highlights the need for cautious use of AI in risk assessment due to its limitations

### 4.3 Challenges

This part addresses the challenges and obstacles encountered when implementing AI in PM. It includes questions about the impact on PM roles and responsibilities, ethical and privacy concerns, and strategies for overcoming these challenges. The focus is on understanding the difficulties faced and how they are being managed.

#### 4.3.1 Impact of AI on Roles and Responsibilities

The results of the interviews are presented in Table 11. Impact of AI in Roles and Responsibilities, they reveal varied perceptions, varying from low to high or transformative impact. Some answers indicate that AI is still in the experimental stages, focused on repetitive tasks and automation, and others point to a significant impact, improving transparency, productivity, and efficiency in projects. There is also a view that AI can transform the role of the project manager, potentially leading to additional projects to manage or a more technical role.

Table 11. Impact of AI in Roles and Responsibilities

#	Impact Measure	Description
5	High	Suggests a potential shift in the PM role, either to managing more projects or a transition to technical teams
2	High	Significant impact noted, but contingent on investment in knowledge and tools
4	High	Notable increase in transparency and productivity, with automation of several tasks
6	High	AI is seen as enhancing effectiveness and competitiveness of PMs and institutions
7	High	Significant impact with a warning that non-adoption could lead to falling behind
12	High	Work will demand a higher level of skill, real-time project progress tracking will change PM responsibilities.
13	High	AI makes PMs more efficient, brings new ideas, and frees them from time-consuming tasks.
11	Moderate	AI will change hiring practices and may lead to PMs handling more tasks, requiring adaptation, and leveraging of AI tools.
8	Moderate	Impact is limited due to the current narrow scope of AI use
9	Moderate	Highlights the limitation of AI in human aspects of PM, emphasizing the continued importance of human skills
10	Moderate	AI aids in resource management, but the human element in understanding and managing teams is highlighted as key
17	Moderate	AI can aid in resource management for projects.
1	Low	AI is in experimental stages, indicating initial exploration with minimal changes to current roles
3	Low	AI used experimentally; potential for greater impact is acknowledged
14	Low	AI's impact is low, mainly used for repetitive and automation tasks.

#	Impact Measure	Description
15	Low	AI has a low impact currently but has potential to improve various aspects of PM.
16	Low	AI's impact is currently low, focused on repetitive and automation tasks.

The scale used to measure the impact is classified from low to high. AI is predominantly used in automation tasks and is in its experimental stages, its potential to transform the role of the project manager is clear. There is need to invest in the right knowledge and tools is crucial to fully exploit this potential. It's important to maintain a balance between AI capabilities and human skills, especially in managing teams and understanding the complexity of PM.

This suggests a future evolution in which AI not only optimizes processes but also collaborates with human skills to achieve more efficient PM.

### 4.3.2 Obstacles/Challenges in AI Implementation

The results of the interviews on obstacles in the implementation AI in PM revealed significant challenges, as the Table 12 presents. These include concerns about the trust and reliability of AI tools (41%), problems with accuracy and the potential for errors. Data privacy and security emerged as a major concern (47%), reflecting the fear of inappropriate handling of sensitive information. Resistance to change and fear of job loss is also significant (35%), and financial constraints and the difficulty of justifying the return on investment (24%). The need for knowledge and training in AI is evident (35%), indicating a skills gap among PM professionals. Cautious adoption in sensitive areas such as health (24%) and challenges in managing change (29%) are also highlighted.

Table 12. Challenges/Obstacles in the Implementation of AI in PM

Identified Challenges	Description	Percentage (%)
<b>Data Privacy and Security</b>	Issues related to the handling and confidentiality of sensitive information	47%
<b>Trust and Reliability Concerns</b>	Concerns about the reliability and accuracy of AI tools, potential for errors	41%
<b>Resistance to Change and Job Loss Fears</b>	Resistance to adopting AI due to fears of job displacement and role redundancy	35%
<b>Need for Knowledge and Training</b>	Lack of familiarity with AI tools among PM professionals, highlighting the need for training	35%
<b>Challenges in Change Management</b>	Managing the transition to AI-enabled processes and addressing workforce concerns	29%
<b>Financial Constraints and ROI (Return on Investment) Justification</b>	High costs of AI tools and difficulty in measuring ROI, especially in non-core areas	24%
<b>Cautious Adoption in Sensitive Areas</b>	Need for careful adoption in industries like healthcare or large enterprises due to high-impact risks	24%

There are still many challenges/obstacles to AI implementation. The reliability of AI tools and concerns about data security are the main obstacles, reflecting the need for mechanisms to ensure data privacy and regulations to protect companies and individuals.

Resistance to change and fear of job loss highlight the importance of sensitive approaches to change management, emphasizing the need for effective communication and training.

There is a need for a careful assessment of the cost-benefit of AI.

For a successful implementation of AI in PM, a holistic strategy that addresses both technical, human, and organizational concerns is essential.

### 4.3.3 Ethical or Privacy Concerns

The interviews revealed predominant concerns in five main areas described in Table 13. Data Privacy and Security (82%), Transparency and Trust (35%), Risk of Dehumanization (12%), Ethical Use and Compliance (35%), and Responsibility and Accountability (12%). Most of the respondents expressed strong concern about data privacy and security, emphasizing the need to protect sensitive information and maintain confidentiality. Transparency in AI operations and building trust were also highlighted, as was the importance of ethical use and compliance with legal standards.

Table 13. Ethical and Privacy Concerns

Key Insight	Description	Percentage (%)
Data Privacy and Security	Concerns about protecting sensitive and critical business information	82%
Ethical Use and Compliance	Importance of ensuring ethical use of AI and adherence to compliance standards to prevent misuse.	35%
Transparency and Trust	The need for transparency in AI data handling and building trust among users	35%
Accountability	Addressing who is accountable for decisions made influenced by AI	12%
Risk of Dehumanization	Concerns about AI leading to a loss of human-centric approaches in the workplace.	12%

The concerns about data privacy and security are the most prominent, reflecting the critical importance of protecting sensitive information.

Transparency is also key, highlighting the need for clarity in the use and management of data.

The risk of dehumanization raises questions about maintaining a balance between technological efficiency and human elements in PM.

The ethical use and compliance with legal standards highlight the need for a robust ethical framework and clear accountability mechanisms, ensuring that AI is used responsibly.

This underlines the importance of addressing these concerns in an integrated way, ensuring an effective and responsible AI implementation.

### 4.3.4 Strategies for Overcoming Challenges/Obstacles

The key strategies for overcoming challenges in implementing AI are shown in Table 14, they include an emphasis on training and awareness, highlighting the need to develop skills and acceptance of AI among PM professionals. Security and privacy are one of the primary concerns, underlining the importance of trust and security compliance. A human-centered approach is seen as essential to maintain human judgment and interaction. Effective communication and coaching are crucial to facilitate understanding and buy-in to AI. A gradual implementation of AI is recognized as a prudent strategy to mitigate risks and adapt to new technologies, allowing for adjustments based on continuous feedback and learning.

Table 14. Strategies proposed to overcome obstacles with priority levels

Strategy Category	Priority Level	Impact
<b>Effective Communication and Coaching</b>	High	Facilitates user acceptance and integration of AI into PM processes
<b>Experimentation and Contextual Relevance</b>	High	Tests AI's applicability and impact, helps understand practical benefits and limitations
<b>Gradual Implementation</b>	High	Reduces risks by allowing for incremental adoption and adjustment of AI tools in PM
<b>Security and Privacy</b>	High	Critical for building trust and compliance, essential for data protection
<b>Training and Awareness</b>	High	Foundational for successful AI implementation, equips PM professionals for effective AI use
<b>Efficiency Justification</b>	Medium	Gains management support and investment by demonstrating AI's business benefits
<b>Human-Centric Approach</b>	Medium	Balances technology with human skills, ensures AI supports human decision-making
<b>Regulation and Objective Assessment</b>	Medium	Important for long-term sustainable and ethical AI use

### 4.4 Future

The final section looks to the future, exploring predictions about the future role of the PM in environment with AI, ongoing AI initiatives, emerging trends, and recommendations for the implementation of AI in the PM. This part of the interviews aims to collect thoughts on the evolution of PM with AI and advice for organizations looking to adopt AI in their PM practices.

#### 4.4.1 Predictions for the AI-Powered PM Role

As the Table 15. Predictions on AI role in PM reveals, the role of project managers is expected to evolve significantly with the integration of AI. AI promises to revolutionize efficiency and productivity by automating routine tasks and providing advanced analytics, allowing project managers to focus on more strategic and decision-making functions.

Most agree that the human element, with its interpersonal skills and ability to manage ethical and emotional complexities, remains irreplaceable.

The most likely scenario seems to be a hybrid working environment, where project managers and AI collaborate, complementing each other, with AI as a support tool rather than a substitute for human management.

Table 15. Predictions on AI role in PM

Prediction	Description	Most Relevant AI Roles in Future PM
<b>AI as a Supportive Tool</b>	AI enhances PM capabilities, aiding efficiency, and productivity, but not replacing PMs	Data Analysis, Efficiency Optimization, Decision Support
<b>Shift Towards Strategic Roles</b>	PMs will evolve from repetitive tasks to strategic, knowledge-intensive activities, facilitated by AI	Strategic Planning, Business Intelligence, Risk Management
<b>Automation of Routine Tasks</b>	AI could automate technical or routine aspects of PM, potentially leading to a shift in PM responsibilities.	Task Automation, Scheduling, Reporting
<b>Hybrid Roles and Collaboration with AI</b>	Future PM roles might involve working in tandem with AI, forming hybrid roles where AI handles lower-risk tasks.	Collaborative Decision-Making, Process Optimization
<b>Diverse Opinions on AI Replacing PMs</b>	Some see AI as a potential replacement for PMs, while others view it as a transformative tool.	Project Coordination, Resource Management
<b>Importance of Human Element</b>	The human aspect of PM, especially in managing people and complex decisions, remains crucial despite AI's influence	Team Leadership, Stakeholder Engagement, Ethical Decision-Making
<b>Enhanced Decision-Making Capabilities</b>	AI is expected to significantly improve decision-making capabilities in PM by providing data-driven insights and predictions	Data-Driven Advisor, Predictive Analyst
<b>Increased Focus on Interpersonal Skills</b>	As AI takes over more technical tasks, PMs may need to focus more on developing and using interpersonal skills.	Coach, Team Dynamics Facilitator



### 4.4.2 Ongoing AI Projects/Initiatives

The integration of AI in PM is at various stages across different organizations/sectors, we can observe in Table 16. Insights on Projects or Initiatives of using AI in PM, that some organizations are still looking at AI as a future endeavor, while others are actively exploring its potential through educational programs, task automation, and tool exploration. The results are mixed, with some projects showing promise and others identifying challenges. The approach ranges from individual efforts by a big percentage of project managers to more formalized organizational strategies, with a general recognition of the need for AI to handle complex and large project data.

There is a diverse and evolving landscape, while most organizations are still in the exploration and evaluation phase of AI, there are organizations already implementing AI in PM, indicating a growing movement.

This trend suggests a growing recognition of AI's potential to improve efficiency and effectiveness in PM, although it also highlights caution with a balanced approach.

The diversity in initiatives points to the need for personalized and adaptive strategies, considering the specificities of each organization, as well as the importance of AI education and training to facilitate a smooth and effective transition to these new technologies.

Table 16. Insights on Projects or Initiatives of using AI in PM

Insight	Description	Percentage (%)
<b>Early Exploration</b>	Organizations are in the early stages of exploring AI for PM.	65%
<b>Assessing AI's Value</b>	Assessing the potential value and impact of AI in PM.	41%
<b>Strategic Planning for AI Integration</b>	Long-term strategic planning for AI integration in PM processes.	35%
<b>Active Implementation</b>	Active initiatives with varying degrees of success and improvement.	29%
<b>Exploratory and Educational Approaches</b>	Exploring AI capabilities and educating employees about AI.	29%
<b>Focus on Automation and Data Management</b>	AI applied for task automation and managing large volumes of information.	29%

### 4.4.3 Emerging Trends in AI for PM

The trends of AI for PM are moving towards more reliable, efficient, and user-focused tools. Major players in the industry are driving this innovation, with AI increasingly being used for decision-making, problem-solving, and operational efficiency. Mostly, large enterprises are leading in adoption, but the market is also becoming saturated with a variety of AI tools from entrepreneurs, highlighting the need for specialization and professional use. Project managers experienced in AI are positioned to

gain a competitive edge, as they can bring their advanced knowledge into their organizations. Table 17 presents the trends mentioned by Interviewees and their impact in PM.

Table 17. Trends on AI Implementation and Impact on PM

Trend	Description	Impact on PM
<b>Increased Adoption and Integration</b>	AI adoption in PM is rising due to integration by major players and increasing reliability of AI tools.	Broader and more effective use of AI in PM, leading to industry-wide changes in practices.
<b>Enhancement of Operational Efficiency</b>	AI enhances operational efficiency through automation and improved decision-making.	Improved efficiency in operations, reporting, and decision-making processes in PM.
<b>Need for Specialization and Standardization</b>	A trend towards more specialized and regulated AI development to ensure value addition and adherence to standards.	Professionalization of AI applications in PM, ensuring they are effective, reliable, and standardized.
<b>AI as a Competitive Advantage</b>	Familiarity with AI is becoming increasingly important, offering a competitive edge to PMs.	PMs with AI experience or knowledge are at an advantage, bringing valuable insights and innovations to organizations.
<b>Hybrid Roles and Collaboration with AI</b>	Future PM roles might involve working in tandem with AI, forming hybrid roles where AI handles lower-risk tasks.	Collaboration between AI and PMs in hybrid roles, optimizing processes and decision-making.
<b>Big Tech Driving Market Trends</b>	Big Tech's investment in AI shapes market trends, integrating more AI functionalities to facilitate user tasks.	Influence of major tech companies in shaping the adoption and application of AI in PM.
<b>Specialization of AI Tools</b>	Development of specialized AI tools tailored for specific areas or functions within PM.	Customized AI solutions enhancing specific aspects of PM, leading to more efficient and targeted applications.

The growing integration of AI in PM is transforming the field, with major technology players driving the adoption and reliability of AI tools, leading to extensive changes in industry practices.

This evolution significantly improves operational efficiency through automation and enhanced decision-making. A need arises for specialization and standardization in AI to ensure effective and reliable applications.

Familiarity with AI is becoming a competitive advantage for project managers, bringing valuable innovations to organizations. PM roles are evolving into hybrid collaborations with AI, optimizing processes and decisions. Large technology companies' investment in AI is shaping market trends, influencing the adoption and application of AI in PM.

#### 4.4.4 Recommendations for Implementing AI in PM

The recommendations for implementing AI in PM (Table 18) involve a combination of strategic planning, professional training, experimentation, and continuous learning. A top-down approach, coupled with practical trials and a focus on data privacy, is advised. Most of the contributions highlighted that companies should be encouraged to be open to experimentation, gradually invest in AI, and stay informed about market trends and competitors' strategies and their evolution with AI. Establishing a dedicated committee to oversee AI integration and developing a clear roadmap are also considered key strategies.

Table 18. Recommendations for Implementing AI in PM with levels of priority

Recommendations	Description	Priority Level
<b>Experimentation and Innovation</b>	Encourage experimenting with AI in various areas	High
<b>Gradual and Contextual Adoption</b>	Adopt AI in a gradual and context-specific manner, starting with pilot projects and expanding as value is demonstrated.	High
<b>Training and Awareness</b>	Focus on training professionals and raising awareness about AI in the business context	High
<b>Building a Supportive Culture</b>	Foster a culture of continuous learning and openness to new technologies	Medium
<b>Collaborative AI Development</b>	Engage in collaborative development and customization of AI tools to meet specific PM needs.	Medium
<b>Communication and Sponsorship</b>	Communicate the objectives and benefits of AI clearly and have strong sponsorship within the organization	Medium
<b>Regular Review and Adaptation</b>	Regularly review AI implementations and adapt strategies based on feedback and evolving needs.	Medium
<b>Strategic Implementation</b>	Implement AI through top-down decision-making, create clear roadmaps, and gradual investment	Medium
<b>Data Privacy and Security</b>	Consider information privacy and employ mechanisms to protect data	Low
<b>Learning from Others</b>	Share success stories, learn from market examples, and use them to inform AI strategies.	Low

There are many recommendations resulting from the interviews.

The need for experimentation and innovation emerges as a central theme, highlighting the importance of proactively exploring AI capabilities in various PM contexts.

The emphasis on training and awareness reflects the critical need to prepare PM professionals for the changes brought about by AI, addressing both technical skills and cultural adaptation.

Strategic implementation, supported by effective communication and strong leadership, suggests that the success of AI in PM depends on both organizational commitment and clarity in objectives and expected benefits.

The gradual and contextual adoption of AI, along with continuous learning and adaptation based on feedback, indicates a recognition of the evolving nature of AI and the need for flexible and adaptable approaches in PM.

### 4.4.5 Additional Aspects/Final Comments

The implementation of AI in PM is seen as beneficial, especially in terms of productivity, it comes with challenges and considerations. These include the pace of adoption, security and privacy concerns, potential impacts on employment, the need for specialized tools, and legislative barriers. Additionally, there are concerns about responsibility and accountability in decision-making when AI is involved. Staying updated with the latest developments in AI research and actively experimenting with various tools are recommended strategies for address these challenges.

The interviews reflect a cautious optimism about AI in PM, recognizing its potential to significantly enhance productivity and decision-making while also acknowledging the challenges in adoption, integration, and the broader impacts on the workforce and legal frameworks.

### 4.5 Presentation of the Saturation Level of the Interviews

The interview data analyzed considering the references on theoretical saturation in qualitative research reveal a typical pattern of high saturation in the first interviews, progressively decreasing in subsequent ones. This suggests that the initial interviews were effective in capturing most of the relevant information, reaching a point of theoretical saturation, where little or no significant new information is added [49]. The variation in saturation levels between different questions indicates the varying relevance of the topics to the interviewees. In the final interviews, the frequent presence of 0% saturation corroborates the idea that the saturation point had already been reached, in line with empirical estimation for sizing saturation in qualitative research [47]. This pattern reflects the cumulative nature of data collection in qualitative research, where the value of additional information decreases as the research progresses [50]. This information can be viewed in Table 19, the levels of saturation for each of the interviews for the sections analyzed, and Figure 14. Visualization of the Dynamic of Saturation from the interviews.

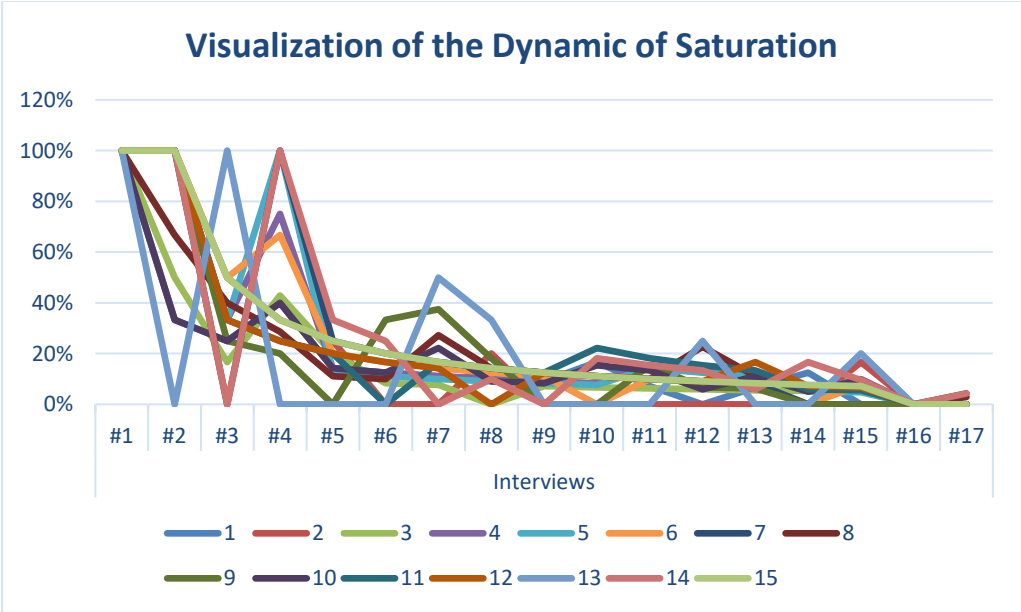


Figure 14. Visualization of the Dynamic of Saturation from the interviews

Table 19. Levels of Saturation per Interview

Categories		Interviews																
		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15	#16	#17
Perspectives on AI in PM	1	100%	33%	25%	40%	14%	13%	11%	10%	9%	17%	7%	0%	7%	13%	0%	0%	0%
	2	100%	100%	50%	33%	25%	0%	0%	20%	0%	0%	0%	0%	0%	0%	17%	0%	0%
	3	100%	50%	17%	43%	20%	8%	8%	0%	7%	7%	6%	6%	6%	5%	5%	0%	0%
Benefits	4	100%	100%	33%	75%	14%	13%	11%	10%	9%	8%	15%	13%	12%	5%	10%	0%	0%
	5	100%	100%	33%	100%	13%	11%	10%	9%	8%	8%	14%	13%	11%	5%	5%	0%	0%
	6	100%	100%	50%	67%	20%	17%	14%	13%	11%	0%	10%	9%	8%	0%	8%	0%	0%
Challenges	7	100%	100%	0%	100%	25%	20%	17%	14%	13%	11%	10%	9%	8%	0%	0%	0%	0%
	8	100%	67%	40%	29%	11%	10%	27%	14%	13%	11%	10%	23%	11%	7%	6%	0%	3%
	9	100%	100%	25%	20%	0%	33%	38%	18%	0%	0%	15%	7%	6%	0%	0%	0%	0%
	10	100%	33%	25%	40%	14%	13%	22%	9%	8%	15%	13%	6%	11%	5%	10%	0%	4%
Future	11	100%	100%	33%	25%	20%	0%	17%	14%	13%	22%	18%	15%	13%	6%	6%	0%	0%
	12	100%	100%	33%	25%	20%	17%	14%	0%	13%	11%	10%	9%	17%	7%	7%	0%	0%
	13	100%	0%	100%	0%	0%	0%	50%	33%	0%	0%	0%	25%	0%	0%	20%	0%	0%
	14	100%	100%	0%	100%	33%	25%	0%	10%	0%	18%	15%	13%	6%	17%	10%	0%	4%
	15	100%	100%	50%	33%	25%	20%	17%	14%	13%	11%	10%	9%	8%	8%	7%	0%	0%
Total of new facts mentioned		26	21	14	28	15	14	18	15	12	16	20	21	20	14	16	0	3

### 4.6 Presentation of Data from Grey Literature

The application of AI in PM has shown significant results in several areas, as revealed by the research. According to the data compiled in Table 20, AI has contributed to a notable improvement in the automation of repetitive tasks and operational efficiency, being mentioned in 80% of the sources analyzed. Around 70% of sources emphasize its role in improving decision-making and data analysis, and risk management, mentioned in 60% of sources. AI also plays a crucial role in strategic planning and project execution, as well as fostering collaboration between humans and machines.

The integration of AI into PM presents challenges, including ethical considerations and the need to train and adapt professionals, as indicated by 25% of the sources.

Summarizing, AI is transforming PM, increasing efficiency and effectiveness, while raising important questions about its implementation and ethical use.

Table 20. Aspects of AI in PM mentioned in the Articles from the Grey Literature

Category	Occurrence in Sources	Description
<b>Automation and Efficiency</b>	80%	This category is the most frequently mentioned, emphasizing AI's role in automating routine tasks, enhancing overall efficiency, and optimizing resource allocation in PM.
<b>Decision Making and Analytics</b>	70%	A significant focus is placed on AI's capability to enhance decision-making processes and provide advanced analytics, including data analysis for better planning and execution of projects.
<b>Risk Management</b>	60%	This theme covers AI's application in predicting, managing, and proactively handling project risks, indicating the importance of AI in identifying and mitigating potential project pitfalls.
<b>Strategic Planning and Execution</b>	50%	AI's contribution to strategic aspects of PM, such as planning and execution, is highlighted, underscoring the role of AI in guiding the strategic direction of projects.
<b>Human-AI Collaboration</b>	40%	This category discusses the synergy between AI and human skills in PM, focusing on AI complementing human capabilities and providing human-like interactions.
<b>Future Outlook and Challenges</b>	30%	This theme deals with the future transformative potential of AI in PM and the challenges it presents, including ethical and practical implementation considerations.
<b>Training and Adaptation</b>	25%	The need for training and adaptation in the context of AI integration in PM is highlighted, emphasizing the importance of preparing project professionals for AI-driven changes.
<b>Ethical and Practical Considerations</b>	20%	This category involves discussions on the ethical aspects and practical challenges of implementing AI in PM, reflecting growing awareness of AI's broader implications.

## 4.7 Interpretation of Interview Data

The interview script explores the relationship between AI and PM, it's organized into five distinct sections, it begins by collecting basic information about the interviewee, covering aspects such as demographic profile, professional background, overall experience and with PM, education and types of projects managed. The second part focuses on the interviewee's views on the current use and potential of AI in PM. The third section seeks to understand the improvements and advantages recognized with the adoption of AI in PM processes, assessing its impact on the effectiveness and productivity of teams, as well as its role in decision-making and risk management. The fourth part of the interview explores the challenges of adopting AI in PM, including changes in roles and responsibilities, ethical or privacy issues and recommendations to overcome the challenges. Finally, the discussion turns to the future, addressing predictions about how AI might change PM role, ongoing AI-related projects, emerging trends, and recommendations for the effective implementation of AI in PM. The interview ends with an opportunity for the interviewee to share additional experiences related to the use of AI in PM or other aspects not discussed during the interview.

About the role and current application of AI in PM, the interviews indicate that the adoption of AI in PM is still in its early stages, with most organizations experimenting AI for data analysis, routine task automation, and operational efficiency enhancement. This early adoption stage is significant as it reflects a growing interest in AI within the PM domain, yet also underscores a cautious approach due to AI's emerging nature in this field. The primary application areas identified include risk assessment, resource allocation, and predictive analytics, suggesting that AI's potential is recognized particularly in enhancing decision-making and foresight in PM.

About the benefits of integrating AI into PM, one of the key benefits, as revealed by the interviews, is the enhancement of efficiency and productivity. AI's ability to automate repetitive tasks allows project managers to focus more on strategic aspects, optimizing time management and resource allocation. Additionally, AI's data-driven insights contribute to more accurate and timely decision-making, reducing errors and enhancing project outcomes. Predictive analytics is another significant benefit that enables project managers to forecast project risks and outcomes, allowing proactive measures and better readiness.

There are also challenges in Implementing AI in IT PM, such as, inaccuracies in complex calculations and integration issues with existing systems, those were frequently mentioned. These technical challenges highlight the need for ongoing development and refinement of AI tools in PM. Another major challenge is organizational resistance, including cultural barriers to AI adoption and fears of job displacement among employees. This resistance emphasizes the importance of effective change management and stakeholder engagement strategies in the successful integration of AI. Ethical and privacy concerns, particularly regarding data privacy and the ethical implications of decision-making by AI systems, also emerged as significant challenges. These concerns raise critical questions about governance, ethical standards, and legal implications in the use of AI.

Discussing the impact on project performance and success, the interviews suggest that AI can significantly enhance efficiency and decision-making in PM, the above-mentioned challenges can impede project success if not addressed properly. This situation calls for a balanced approach in AI integration, where the benefits of AI are leveraged while actively addressing its limitations. Such an approach is crucial for realizing AI's full potential in improving project outcomes and ensuring the overall success of IT projects.

### 4.8 Insights from this research

The insights from the collection of papers and interviews contributed for the creation of a comprehensive guide as represented in Figure 15. Blueprint to Implement AI in Project Management, it charts out a multi-step process for integrating AI into PM. The process must start with strategic assessment and planning, followed by the careful selection of AI technologies suited to organizational needs, the guide then advises on the execution of pilot projects to refine AI strategies, underpins the importance of training for skill development, and emphasizes robust data management for insightful analytics. Additionally, it underlines the necessity of adhering to ethical guidelines and implementing security measures to ensure responsible use of AI. The process is designed to be iterative, with ongoing integration, scaling, and continuous monitoring to adapt to new developments and feedback, engaging a range of professionals from project managers to IT specialists throughout the journey.

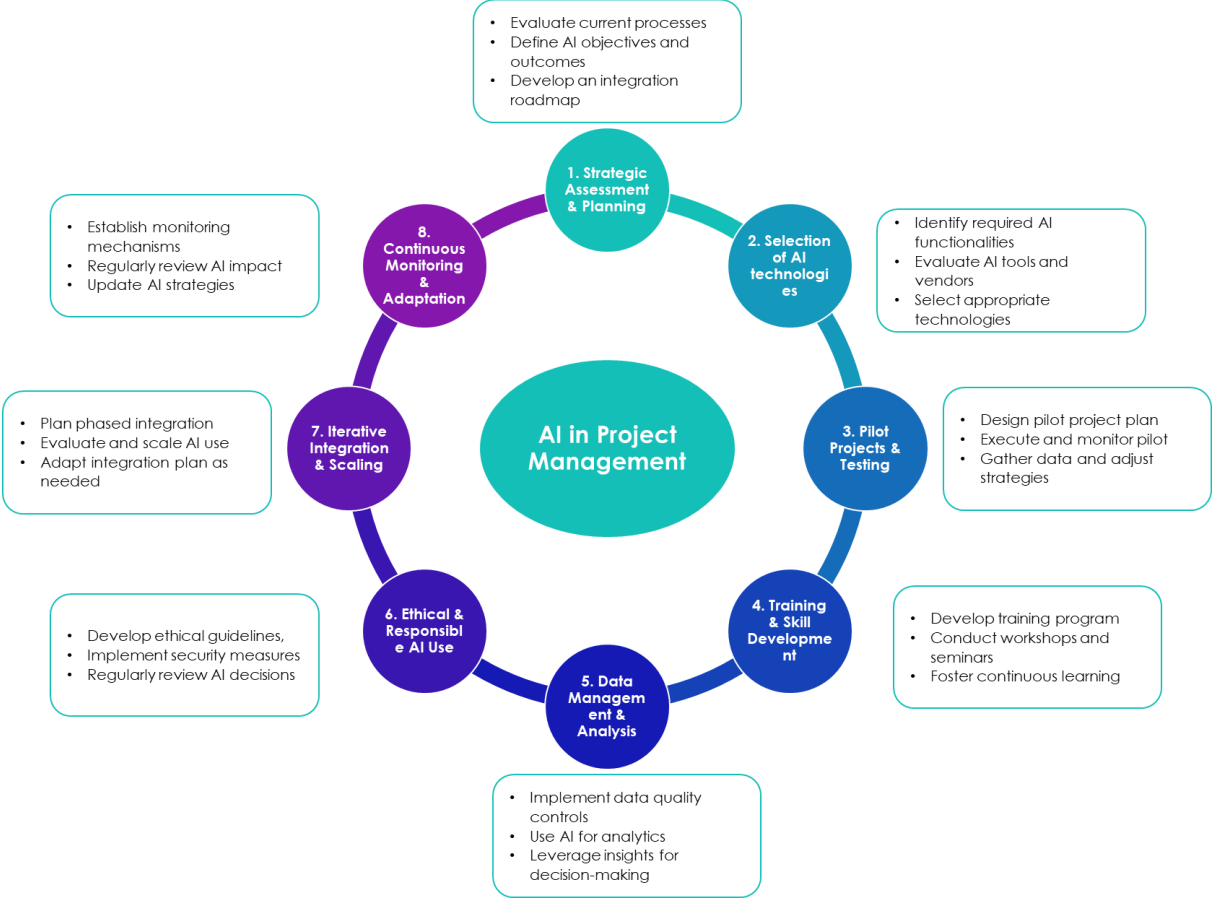


Figure 15. Blueprint to Implement AI in Project Management

The blueprint is described in detail in Table 21, it is an output resulting from the findings of this study, a guide for companies looking to integrate AI into their PM practices, it can serve as a roadmap, detailing a step-by-step approach to effectively combine AI with existing PM methodologies to enhance efficiency, decision-making, and overall project outcomes.



Table 21. Detail of the Blueprint for integrating AI into PM

Step	Key Actions	Tools/Resources	Human Resources Needed
<b>1. Strategic Assessment &amp; Planning</b>	<ul style="list-style-type: none"> <li>▪ Evaluate current processes</li> <li>▪ Define AI objectives and outcomes</li> <li>▪ Develop an integration roadmap</li> </ul>	SWOT analysis, Project management software	<ul style="list-style-type: none"> <li>– Project Managers</li> <li>– Strategic Planners</li> <li>– Business Analysts</li> </ul>
<b>2. Selection of AI Technologies</b>	<ul style="list-style-type: none"> <li>▪ Identify required AI functionalities</li> <li>▪ Evaluate AI tools and vendors</li> <li>▪ Select appropriate technologies</li> </ul>	AI market research reports, Vendor evaluation checklists	<ul style="list-style-type: none"> <li>– AI Specialists</li> <li>– IT Procurement Managers</li> <li>– Technology Consultants</li> </ul>
<b>3. Pilot Projects &amp; Testing</b>	<ul style="list-style-type: none"> <li>▪ Design pilot project plan</li> <li>▪ Execute and monitor pilot</li> <li>▪ Gather data and adjust strategies</li> </ul>	Pilot project templates, Monitoring and evaluation tools	<ul style="list-style-type: none"> <li>– Project Managers,</li> <li>– Data Analysts,</li> <li>– Pilot Project Teams</li> </ul>
<b>4. Training &amp; Skill Development</b>	<ul style="list-style-type: none"> <li>▪ Develop training program</li> <li>▪ Conduct workshops and seminars</li> <li>▪ Foster continuous learning</li> </ul>	Training modules, E-learning platforms	<ul style="list-style-type: none"> <li>– Training and Development Personnel</li> <li>– HR Specialists</li> <li>– External Trainers</li> </ul>
<b>5. Data Management &amp; Analysis</b>	<ul style="list-style-type: none"> <li>▪ Implement data quality controls</li> <li>▪ Use AI for analytics</li> <li>▪ Leverage insights for decision-making</li> </ul>	Data management systems, Analytics software	<ul style="list-style-type: none"> <li>– Data Scientists</li> <li>– Database Administrators</li> <li>– Data Analysts</li> </ul>
<b>6. Ethical &amp; Responsible AI Use</b>	<ul style="list-style-type: none"> <li>▪ Develop ethical guidelines,</li> <li>▪ Implement security measures</li> <li>▪ Regularly review AI decisions</li> </ul>	Ethical standards checklist, Security protocols	<ul style="list-style-type: none"> <li>– Compliance Officers</li> <li>– Legal Advisors</li> <li>– Ethical AI Advocates</li> </ul>
<b>7. Iterative Integration &amp; Scaling</b>	<ul style="list-style-type: none"> <li>▪ Plan phased integration</li> <li>▪ Evaluate and scale AI use</li> <li>▪ Adapt integration plan as needed</li> </ul>	Integration roadmap, Scaling strategy documents	<ul style="list-style-type: none"> <li>– Change Managers</li> <li>– IT Specialists</li> <li>– Project Management Office (PMO) Staff</li> </ul>
<b>8. Continuous Monitoring &amp; Adaptation</b>	<ul style="list-style-type: none"> <li>▪ Establish monitoring mechanisms</li> <li>▪ Regularly review AI impact</li> <li>▪ Update AI strategies</li> </ul>	Performance tracking tools, Feedback and review systems	<ul style="list-style-type: none"> <li>– Operations Managers,</li> <li>– Continuous Improvement Teams,</li> <li>– IT Support Staff</li> </ul>

The *Table 22* outlines the frequency with which specific steps for integrating AI into project management are mentioned across different interviews. Each step, such as "Strategic Assessment & Planning," "Selection of AI Technologies," and "Ethical & Responsible AI Use," is associated with a list of interview numbers where these topics were mentioned. This organization provides insights into how often each step in the proposed AI integration framework is addressed, indicating the areas of emphasis and concern across a series of interviews related to project management.

*Table 22. Guide Phases mentioned by each Interview*

Phases from the Proposed Guide	Interviews that mention the Concept
1. Strategic Assessment & Planning	1, 3, 5, 7, 10, 12, 14
2. Selection of AI Technologies	1, 2, 5, 6, 9, 11, 13
3. Pilot Projects & Testing	2, 4, 7, 8, 10
4. Training & Skill Development	3, 5, 6, 7, 9, 11, 12, 15
5. Data Management & Analysis	4, 8, 9, 12, 14
6. Ethical & Responsible AI Use	2, 5, 6, 7, 13, 14, 15, 17
7. Iterative Integration & Scaling	3, 5, 7, 8, 10, 12
8. Continuous Monitoring & Adaptation	4, 6, 9, 10, 11, 13

Table 23 summarizes the concepts mentioned by each Interviewee, organized in key actions, tools, and human resources needed for integrating AI into PM across the proposed steps. Each entry in the table identifies specific key actions required, such as evaluating processes, planning integration phases, and developing training programs. It also lists corresponding tools and resources like project management software, and data management systems, tailored for each action. Additionally, the table specifies the human resources needed for these tasks, including Project Managers, AI Specialists, Data Analysts, and Legal Advisors among others.

*Table 23. Guide Concepts mentioned by each Interview*

#	Key Actions	Tools/Resources	Human Resources Needed
1	Evaluate current processes, Define AI objectives and outcomes	SWOT analysis, Project management software	Project Managers, Strategic Planners, Business Analysts
2	Identify required AI functionalities, Evaluate AI tools and vendors	AI market research reports, Vendor evaluation checklists	AI Specialists, IT Procurement Managers, Technology Consultants
3	Define AI objectives and outcomes	None	Project Managers, Strategic Planners, Business Analysts
4	Design pilot project plan, Execute and monitor pilot, Gather data and adjust strategies	Pilot project templates, Monitoring and evaluation tools	Project Managers, Data Analysts, Pilot Project Teams
5	Develop training program, Conduct workshops and seminars, Foster continuous learning	Training modules, E-learning platforms	Training and Development Personnel, HR Specialists, External Trainers

#	Key Actions	Tools/Resources	Human Resources Needed
6	Implement data quality controls, Use AI for analytics, Leverage insights for decision-making	Data management systems, Analytics software	Data Scientists, Database Administrators, Data Analysts
7	Develop ethical guidelines, Implement security measures, Regularly review AI decisions	Ethical standards checklist, Security protocols	Compliance Officers, Legal Advisors, Ethical AI Advocates
8	Plan phased integration, Evaluate and scale AI use, Adapt integration plan as needed	Integration roadmap, Scaling strategy documents	Change Managers, IT Specialists, Project Management Office (PMO) Staff
9	Establish monitoring mechanisms, Regularly review AI impact, Update AI strategies	Performance tracking tools, Feedback and review systems	Operations Managers, Continuous Improvement Teams, IT Support Staff
10	Evaluate current processes, Define AI objectives and outcomes, Plan phased integration	SWOT analysis, Project management software, Integration roadmap	Project Managers, Strategic Planners, Change Managers
11	Identify required AI functionalities, Evaluate AI tools and vendors	AI market research reports, Vendor evaluation checklists	AI Specialists, IT Procurement Managers, Technology Consultants
12	Implement data quality controls, Use AI for analytics, Leverage insights for decision-making	Data management systems, Analytics software	Data Scientists, Database Administrators, Data Analysts
13	Identify required AI functionalities, Evaluate AI tools and vendors	AI market research reports, Vendor evaluation checklists	AI Specialists, IT Procurement Managers, Technology Consultants
14	Plan phased integration, Evaluate and scale AI use	Integration roadmap	Change Managers, IT Specialists
15	Develop training program, Conduct workshops and seminars, Foster continuous learning	Training modules, E-learning platforms	Training and Development Personnel, HR Specialists, External Trainers
16	None	None	None
17	Develop ethical guidelines, Implement security measures, Regularly review AI decisions	Ethical standards checklist, Security protocols	Compliance Officers, Legal Advisors, Ethical AI Advocates

Table 24 provides an overview of the strategic steps for integrating Artificial AI into PM, as discussed across various papers. It identifies eight key steps such as strategic assessment, technology selection, and continuous adaptation, each supported by references from specific documents, this summary shows how these steps are addressed in the literature.

Table 24. Guide Phases mentioned by the Papers

Phases from the Proposed Guide	Key References	Total Mentions
1. Strategic Assessment & Planning	[21], [26], [30], [31], [32]	5
2. Selection of AI Technologies	[21], [30], [31]	3
3. Pilot Projects & Testing	[21], [30], [32]	3
4. Training & Skill Development	[30], [31]	2
5. Data Management & Analysis	[21], [30], [31], [32]	4
6. Ethical & Responsible AI Use	[21], [30], [32]	3
7. Iterative Integration & Scaling	[21], [30], [31]	3
8. Continuous Monitoring & Adaptation	[21], [30], [31], [32]	4

Table 25 summarizes the concepts mentioned by literature, organized in key actions, tools/resources, and human resources needed for integrating AI into PM across the proposed steps.

Table 25. Guide concepts mentioned in the Papers

Paper	Key Actions	Tools/Resources	Human Resources Needed
[21]	Design pilot project plan, execute and monitor pilot, gather data and adjust strategies	Pilot project templates, Monitoring and evaluation tools	Project Managers, Data Analysts, Pilot Project Teams
[26]	Develop ethical guidelines, implement security measures, regularly review AI decisions, Plan phased integration, evaluate and scale AI use, adapt integration plan as needed	Ethical standards checklist, Security protocols, Integration roadmap, Scaling strategy documents	Compliance Officers, Legal Advisors, Ethical AI Advocates, Change Managers, IT Specialists, Project Management Office (PMO) Staff
[36]	Establish monitoring mechanisms, regularly review AI impact, update AI strategies	Performance tracking tools, Feedback and review systems	Operations Managers, Continuous Improvement Teams, IT Support Staff
[30]	Evaluate current processes, define AI objectives and outcomes, develop integration roadmap	SWOT analysis, Project management software	Project Managers, Strategic Planners, Business Analysts
[31]	Identify required AI functionalities, evaluate AI tools and vendors, select appropriate technologies	AI market research reports, Vendor evaluation checklists	AI Specialists, IT Procurement Managers, Technology Consultants
[32]	Develop training program, conduct workshops and seminars, foster continuous learning	Training modules, E-learning platforms	Training and Development Personnel, HR Specialists, External Trainers
[33]	Implement data quality controls, use AI for analytics, leverage insights for decision-making	Data management systems, Analytics software	Data Scientists, Database Administrators, Data Analysts

## 4.9 Comparison between the Interviews, grey literature, and papers findings

This section provides a comparison between the interview responses, outcomes from the grey literature and the findings of the academic papers.

Table 26. Comparison between interviews, grey literature and paper findings

Category	Academic Literature	Grey Literature	Interviews
<b>Automation and Efficiency</b>	Studies such as those by Taboada et al. (2023) [30] and Hoa Khanh Dam et al. (2019) [22], also highlight AI in the optimization of tasks and processes.	80% of the sources emphasize automation and efficiency, in line with the interviews.	AI is seen as a tool to automate repetitive tasks and improve efficiency.
<b>Decision Making and Analytics</b>	Odeh (2023) [31] and Manuel Otero Mateo et al. (2022) [33]. highlight the importance of AI in optimizing decision-making.	70% of the sources focus on AI's ability to improve decision-making and analysis, which is consistent with the interviews.	AI is recognized for its potential to help with decision-making and data analysis.
<b>Risk Management</b>	Research such as that by Vusumuzi Maphosa and Mfowabo Maphosa (2022) [32], highlights AI in risk management.	60% of the sources address the application of AI in risk management, in line with the interviews.	AI is seen as a useful tool in risk assessment and management.
<b>Strategic Planning and Execution</b>	Studies such as Feng Xu and Shao-Pei Lin (2016) [51], explore the application of AI in strategic planning.	50% of the sources discuss AI's contribution to strategic planning, suggesting an area of greater focus in the literature than in the interviews.	Less emphasis is placed on strategic planning and execution.
<b>Human-AI Collaboration</b>	Researchers such as Jesús Gil Ruiz et al. (2021) [38], address collaboration between humans and AI.	40% of the sources talk about the synergy between humans and AI, a topic less explored in the interviews.	Few times mentioned directly, but implicit in the discussion of task automation.
<b>Future Outlook and Challenges</b>	Authors such as Belharet et al. (2020) [41], discuss the future impacts of AI on GP.	30% of the sources deal with the transformative potential of AI and the challenges presented, in line with the interviews.	Emphasize the practical challenges and strategic adoption of AI.
<b>Training and Adaptation</b>	Studies such as Ben D. Radhakrishnan's (2021) [36], emphasize the integration of AI in GP education.	25% of sources highlight the importance of training, in line with the interviews.	The need for training and adaptation is recognized.
<b>Ethical and Practical Considerations</b>	Researchers such as Raymond E. Levitt and John C. Kunz (1987) [43], address the ethical implications of AI in GP.	20% of the sources discuss ethical and practical aspects, reflecting the concerns of the interviews.	Privacy and ethical concerns are mentioned.

There is a notable congruence between the results of the interviews, the grey literature, and the academic literature, especially on topics such as automation, efficiency, decision-making and analysis, and risk management. The interviews tend to reflect practical and immediate concerns, while the academic literature offers a deeper, research-based analysis, and the grey literature serves as a middle ground, addressing both practical applications and emerging trends. Together, these sources provide a comprehensive view of the current and future role of AI in PM.

There is also an evolution in the field of AI tools and resources that are evolving, many vendors are adding AI capabilities to their tools, vendors like Clarizen, Zoho Projects, JIRA by Atlassian, Asana and Trello [52]. Some AI-powered assistants are being tested and made available, some of them are PMotto (<https://www.pmotto.ai>) and a PMI initiative denominated PMI Infinity (<https://aiassistant.pmi.org>) that's available in a beta version.



## CHAPTER 5

# CONCLUSION

The research conducted provides an in-depth analysis of the integration of AI into PM, exploring its current applications, benefits, challenges, and potential future developments. This conclusion draws connections between these findings and the research questions initially posed, highlighting the important contributions made by this research. The revision of the literature together with the insightful interviews with PM professionals and an exploration of the grey literature has established a foundation for a deeper understanding of this constantly progressing field.

The role and current application of AI in PM have been identified as predominantly experimental but growing rapidly, the interviews with project management professionals and reviews of both published and grey literature indicate an increasing enthusiasm for using AI to enhance decision-making and operational efficiency in project environments. As the use of AI in PM is still in its early stages, and there is still a lot of work to be done to explore its true potential, many industry tech giants and researchers are already working in tools and models that will be disruptive and will transform the way projects are managed.

Integrating AI into PM offers numerous advantages, this research highlights how AI can substantially improve project results by enhancing data-driven decision-making and automating routine and repetitive tasks. This enables project managers to focus on more strategic elements of project governance, thus boosting success rates and stakeholder satisfaction. The empirical evidence from tech industry leaders also reinforces the idea that AI can augment emotional intelligence, creativity, and bias reduction in project decision-making processes.

The research investigates the challenges associated with implementing AI in PM, the key challenges identified include concerns related to privacy, data security, and ethical considerations such as bias and accountability in decision-making. This discussion around the challenges is further being deepened by examining regulatory frameworks, such as the proposed Artificial Intelligence Act by the European Union, which seeks to regulate the ethical application of AI technologies [53].

The future role of AI in PM is seen as transformative, the research suggests that AI will revolutionize not only how projects are managed but will also change the essential skills and responsibilities of project managers. This evolution suggests a shift towards a hybrid management approach where AI complements human expertise, especially in areas like risk management and predictive analytics. The potential future is yet to be realized, and there are opportunities in various areas such as agile and scrum, where the way teams work is the focus, and can undergo significant changes.

Overall, incorporating AI into PM can result in improved project results and satisfaction among stakeholders. The emotional intelligence, creativity, and capacity of project managers to overcome personal biases in their decision-making processes have all seen significant enhancement [27].

AI tools greatly assist project managers in controlling and monitoring projects. However, the limitations and flaws present in many of the examined models suggest that project managers should still rely on their expertise when interpreting results. The practice of integrating various AI tools remains prevalent, allowing the strengths of one to offset the weaknesses of another. This method is returning the most effective outcomes, indicating a clear direction for the future [38].



The research presents a detailed overview of how the role of AI can improve PM across several key areas, offering a comprehensive vision for its application. Firstly, AI significantly enhances operational aspects by improving data-driven decision-making and automating routine tasks, this revolutionizes traditional PM methodologies like Agile and Waterfall. Secondly, AI's analytical capabilities are excellent to improve risk management with predictive analytics, allowing proactive risk assessment and customized project solutions and strategies. Thirdly, the human aspect of PM is reshaped by AI, as it facilitates communication and collaboration. Finally, the study addresses the larger context of AI adoption, focusing on ethical concerns, governance, and the evolving roles and skills required in PM, pointing to a future where strategic thinking and AI proficiency are crucial.

The integration of AI in PM is not just an enhancement of the existing practices, it represents a evolving shift that can redefine the entire core of PM. AI can significantly transform PM by boosting productivity and enhancing the success rates of projects [22].

This thesis contributes to the field of AI in PM by introducing new perspectives and methodologies, the development of a blueprint for integrating AI into PM processes offers a structured approach for companies looking into applying AI in PM, the contributions serve as a starting point for future research and practice, bridging the gaps in existing literature and providing a fresh perspective into the domain.

For organizations looking to integrate AI into their PM processes, a gradual, structured and informed approach is recommended prioritizing training and awareness among PM professionals and employees will be key to a successful transformation.

This research is the beginning of a journey into the integration of AI in PM, the potential for AI to transform this field is substantial, and this work can be a starting point for future explorations into this dynamic and promising field.

## **5.1 Limitations**

One of the limitations of this research is the existence of few scientific publications on the subject following the recent major advancements in Generative AI, as the interest of application of AI in the field of PM now getting more popular.

We can also point out that since most organizations have not yet adopted AI in PM, it is not possible to measure its impact, nor have information on the benefits and limitations of its implementation in the real-world projects.

The rapid evolution of AI technology can make some of the findings outdated, as new developments and applications are quickly emerging in the field.

Bearing in mind that few of the interviewees were project managers working in more conservative sectors, it is possible that their vision is limited to the policies/specificities or limitations of their sector.

The research discussed the future potential of AI in PM, however, given the rapid evolution of the AI field, these predictions can be considered speculative and can be subject to uncertainty.

## 5.2 Future Work

Considering all the work carried out in this research, it would be interesting to continue this research and further explore organizations that use AI to improve their projects, in this context some proposals for future work are presented below.

Case studies in specific organizations or sectors that have already implemented AI in PM and seek to understand how AI is applied in practice, study the real challenges, and the benefits and measure the impact in a project context.

Development of AI frameworks or tools that integrate into PM areas based on gaps and challenges identified in a specific sector or organization.

Implement AI in a project or product led organization and document the entire process from specification, implementation, rollout and understand the impact on team productivity and how it has managed to add value to the business.

Developing predictive and risk analysis models for PM in specific sectors based on information from previous projects, improving the ability to predict and mitigate potential problems.

Another future work can be the development of a framework for the integration of AI into various PM methodologies, expanding upon the findings of the current study.



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# Appendixes

## Appendix A – Interview Script

### Part 1 - General Information

- Gender
- Age
- Industry/Sector in which you work
- Job Title
- Years of Professional Experience and Years of Experience in PM
- Experience with what type of projects (SW/INFRA/LOW-CODE/ERP)
- PM Methodology (Agile, Traditional, or other)
- Academic and Professional Background (Bachelor's/Master's/Areas, PMP, Prince2, Scrum Master)

### Part 2 - Perspectives on AI in Project Management (PM)

1. How would you describe the current state of application of AI in PM in your organization/industry? How has AI changed the approach to PM in your organization?
2. How do you think AI can be instrumental in the field of PM?
3. Could you give examples of AI tools you have used and at what stages or for what type of tasks you have used them?

### Part 3 - Improvements or Benefits?

4. What improvements have you seen since integrating AI into your PM processes?
5. What impact has the use of AI had on the efficiency and productivity of project teams?  
Do you have any indicators showing progress with the use of AI tools in PM?
6. How has AI contributed to decision-making and risk assessment in your IT projects?

### Part 4 - Challenges

7. How has the introduction of AI affected the roles and responsibilities of PMs and project teams?
8. What obstacles/challenges have you encountered when implementing AI in your PM practices?
9. Do you have any ethical or privacy concerns arisen from the use of AI in your projects?
10. What strategies have you adopted, or do you propose to overcome these obstacles/challenges?

### Part 5 - Future

11. How do you foresee the role of the PM evolving with AI? Could AI replace the PM?
12. Are there any projects or initiatives underway in your organization to adopt AI in PM?
13. What emerging trends in AI do you believe will have a significant impact on PM in the coming years?
14. What recommendations would you give to companies in the sector implementing AI in PM (Strategic, Technical or Implementation)?
15. Are there any additional aspects you'd like to share about your experiences of applying AI in PM that were not discussed until now?