

أثر تقنيات الذكاء الاصطناعي في تطوير إدارة المشاريع في أرامكو السعودية
حقل الجافوره (مدينة الدمام)

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The Impact of artificial intelligence techniques in developing project management in Saudi Aramco at the Al Jafurah gas field in Dammam City

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Research Title:

(The Impact of artificial intelligence techniques in developing project management in Saudi Aramco at the Al Jafurah gas field in Dammam City)

Introduction:

In the dynamic and complex realm of the oil and gas industry, project management plays a pivotal role in steering mega-projects towards success. These projects are inherently characterized by their immense scale, non-linear progress, and unpredictable challenges, requiring a multi-faceted approach to decision-making. The European Cooperation in Science and Technology highlights the extreme complexity of such endeavors, particularly emphasizing the challenges in technical and human aspects and a history of challenging deliveries. Saudi Aramco, a global energy giant, stands at the forefront of these challenges, navigating through the intricacies of managing massive and intricate projects.

In this challenging environment, the integration of artificial intelligence (AI) techniques into project management has emerged as a transformative strategy. The potential of AI to revolutionize project management has been the focus of extensive academic research, exploring its capacity to enhance efficiency, accuracy, and adaptability. The incorporation of AI offers novel avenues for predictive analytics, risk management, and strategic planning, crucial for the success of mega-projects.

The study of lessons learned and case studies in the application of AI in project management is invaluable. These insights, derived from real-world experiences in implementing AI strategies, are instrumental for project managers in identifying and adopting best practices. This research aims to explore the impact of AI techniques in developing project management processes within Saudi Aramco, with a focus on understanding how these technologies can optimize project outcomes. The findings are intended to contribute to the broader goals of Saudi Arabia's Vision 2030, a transformative plan aimed at diversifying and

strengthening the kingdom's economy. In this context, Saudi Aramco's projects, marked by their scale, complexity, and strategic significance, provide an ideal setting for examining the transformative impact of AI on project management, aligning with the nation's ambition for innovation and sustainable development.

Chapter 01:

1. Study Problem:

The primary issue this research seeks to address is the extent and effectiveness of artificial intelligence (AI) techniques in enhancing project management practices at Saudi Aramco's Al Jafurah gas field in Dammam City. This investigation is crucial as it explores the integration of AI in a key project within the context of Saudi Arabia's energy sector, particularly focusing on how these advanced technologies can be leveraged to achieve efficiency, accuracy, and sustainability in project management processes. The study is grounded in the premise that the successful adoption of AI in project management can significantly contribute to the goals of Saudi Arabia's Vision 2030, particularly in terms of innovation and sustainability in the energy sector.

This research encompasses:

Assessment of AI Application in Al Jafurah Gas Field Projects: Evaluating the current use of AI in project management at Al Jafurah, identifying existing practices, and pinpointing areas for potential AI integration.

Impact Analysis of AI on Project Management: Investigating how AI applications could enhance various facets of project management, such as predictive analytics, resource allocation, and risk management, leading to improved efficiency and sustainability of projects.

Challenges in Implementing AI: Identifying and analyzing potential obstacles in embedding AI within project management practices, including technological barriers, skill gaps, organizational culture, and resistance to change.

Alignment with Vision 2030: Examining how the implementation of AI in project management aligns with the strategic objectives of Vision 2030, especially in driving technological advancement and sustainable practices in Saudi Arabia's energy sector.

Development of Recommendations: Based on research findings, providing actionable recommendations for effectively integrating AI in project management at Al Jafurah, aimed at optimizing project outcomes and advancing Saudi Aramco's strategic objectives.

The research will contribute significantly to the understanding of AI's role in modernizing project management practices in the energy industry, offering insights that are specific to Saudi Aramco's operations at Al Jafurah. The study will include a comprehensive literature review, data collection through qualitative and quantitative methods, data analysis, and the formulation of strategic recommendations. It aims to provide a thorough understanding of the potential benefits and challenges of AI in project management, contributing to the broader discourse on leveraging AI for sustainable and efficient project management in line with Saudi Arabia's Vision 2030.

2. Importance of the Study:

2.1 Advancing Project Management Practices: This study is crucial as it explores the transformative potential of AI in project management. By focusing on the integration of AI at Al Jafurah, the research can provide valuable insights into how advanced technologies can optimize project planning, execution, monitoring, and control, setting new benchmarks for efficiency and effectiveness in the sector.

2.2 Contributing to Saudi Aramco's Strategic Goals: As Saudi Aramco is a global leader in the energy sector, the integration of AI in its project management practices, particularly in a significant field like Al Jafurah, is vital for maintaining its competitive edge. This study contributes to the company's ongoing efforts to innovate and enhance operational efficiency, directly supporting its strategic objectives and long-term sustainability.

2.3 Alignment with Vision 2030: The study aligns with the goals of Saudi Arabia's Vision 2030, which emphasizes technological advancement and innovation. By investigating the role of AI in one of the key sectors of the Saudi economy, the research supports the nation's strategic direction towards a more diversified, technologically advanced economy.

2.4 Addressing Industry Challenges: The oil and gas industry faces numerous challenges, including operational risks, cost management, and the need for sustainable practices. This research is significant in that

it examines how AI can address these challenges, providing a roadmap for enhanced risk management, cost-efficiency, and sustainable operations.

2.5 Setting a Precedent for AI Adoption: The findings of this study could set a precedent for the adoption of AI in project management across the energy sector and beyond. By demonstrating the practical benefits and addressing the challenges of AI integration, the study can serve as a model for other companies and industries considering similar technological advancements.

2.6 Enhancing Knowledge Base: The research contributes to the academic and professional knowledge base on AI in project management. It provides empirical evidence and practical insights that can be valuable for academics, industry professionals, and policymakers interested in the intersection of AI and project management.

2.7 Facilitating Organizational Change: The study's focus on AI in project management also sheds light on the organizational changes necessary for successful technology integration. This includes insights into change management strategies, workforce training, and cultural shifts required for embracing AI in corporate settings.

2.8 Global and Regional Relevance: Given Saudi Aramco's stature in the global energy market, the study's findings have both global and regional relevance. They offer insights that can be applied in similar contexts

worldwide, contributing to the broader discourse on technology integration in complex project environments.

In essence, the importance of this study lies in its potential to influence future project management practices, contribute to strategic organizational goals, align with national visions, and enrich the global understanding of AI's role in complex project settings.

3. Objectives of the Study:

The study is designed to achieve several key objectives:

3.1 Assess AI Integration in Project Management:

3.1.1 To evaluate the current state of AI integration in project management processes at Al Jafurah gas field.

3.1.2 To identify specific AI tools and techniques currently in use and assess their effectiveness.

3.2 Analyze the Impact of AI on Project Efficiency and Sustainability:

3.2.1 To investigate how AI applications enhance project planning, execution, monitoring, and control.

3.2.2 To examine the role of AI in improving project sustainability, including environmental, economic, and social aspects.

3.3 Identify and Address AI Implementation Challenges:

3.3.1 To identify the challenges and barriers to implementing AI in project management at Al Jafurah.

3.3.2 To analyze the organizational, technical, and cultural factors influencing AI adoption.

3.4 Determine AI's Contribution to Risk Management and Decision-Making:

3.4.1 To explore the effectiveness of AI in risk assessment and mitigation strategies.

3.4.2 To assess how AI influences decision-making processes in project management.

3.5 Evaluate the Alignment with Vision 2030 Objectives:

3.5.1 To determine how the integration of AI in project management at Al Jafurah aligns with Saudi Arabia's Vision 2030.

3.5.2 To assess the contribution of AI-driven project management to national goals of innovation and technological advancement.

3.6 Develop Strategic Recommendations for AI Implementation:

3.6.1 To provide actionable recommendations for enhancing the use of AI in project management at Al Jafurah.

3.6.2 To suggest strategies for overcoming identified challenges and optimizing the benefits of AI.

3.7 Contribute to Knowledge and Best Practices in AI and Project Management:

3.7.1 To contribute to the broader understanding of AI applications in the oil and gas industry.

3.7.2 To establish best practices for AI integration in project management based on the study findings.

By achieving these objectives, the research aims to provide Saudi Aramco with comprehensive insights into the effective use of AI in project management, particularly at the Al Jafurah gas field, and contribute to the advancement of AI applications in the energy sector.

4. Study Questions:

4.1 The Main Question is:

How do artificial intelligence techniques impact and contribute to the development and optimization of project management processes at Saudi Aramco's Al Jafurah gas field in Dammam City?

4.2 Sub-questions

1- What is the primary goal of integrating AI techniques in project management at Al Jafurah?

- a) To reduce the workforce
- b) To enhance efficiency and accuracy in project management
- c) To completely automate project management
- d) To monitor employee performance

2- Which area of project management at Al Jafurah has seen the most improvement due to AI integration?

- a) Communication management
- b) Predictive analytics and risk management
- c) Procurement processes
- d) Human resource management

3- What is the main challenge faced in the implementation of AI in project management at Al Jafurah?

- a) Limited AI technology available
- b) Resistance to change among employees
- c) High costs of AI integration
- d) Lack of qualified AI professionals

4- How does AI in project management at Al Jafurah align with Saudi Arabia's Vision 2030?

- a) By reducing the dependence on oil
- b) By promoting technological innovation and sustainability
- c) By increasing oil production
- d) By focusing solely on economic growth

5- What is a key benefit of using AI in decision-making processes for projects at Al Jafurah?

- a) Eliminates the need for human decision-makers
- b) Leads to faster but less accurate decisions
- c) Enables more data-driven and strategic decisions
- d) Focuses on short-term gains only

6- What future impact is expected from the use of AI in project management at Al Jafurah?

- a) Decrease in project completion times
- b) Phasing out of traditional project management methodologies
- c) Enhanced long-term sustainability and efficiency of projects
- d) Increased reliance on external consultants

7- What is a recommended practice for optimizing AI use in project management at Al Jafurah?

- a) Limiting AI to data entry tasks
- b) Investing in continuous learning and adaptation for AI systems
- c) Using AI to replace project managers
- d) Focusing only on short-term AI projects

Chapter 02: Previous studies and theoretical underpinnings:

A. AI in Project Management:

Studies such as those by Brown and Smith (2020) have explored the integration of AI in project management, highlighting improvements in efficiency, risk mitigation, and decision-making.

B. AI Applications in Oil and Gas Industry:

Research by Johnson et al. (2019) provided insights into the adoption of AI in the oil and gas industry, focusing on operational efficiency, predictive maintenance, and resource optimization.

C. Project Management Innovations in Saudi Aramco:

Al-Hamdan's (2018) study specifically analyzed project management practices within Saudi Aramco, identifying areas for improvement through technological innovations like AI.

D. Technology Adoption in Saudi Arabia's Vision 2030:

Research by Khalid (2021) on Saudi Arabia's Vision 2030 emphasized the role of technological innovation, including AI, in achieving national strategic objectives, especially in the energy sector.

Theoretical Underpinnings:

A. Technology Acceptance Model (TAM):

This model will be applied to understand the acceptance and adoption of AI technologies in project management at Al Jafurah, focusing on perceived usefulness and ease of use.

B. Diffusion of Innovations Theory:

This theory by Everett Rogers will be used to analyze how AI as an innovative technology is adopted, diffused, and integrated into project management practices at Al Jafurah.

C. Change Management Theories:

Lewin's Change Management Model and Kotter's 8-Step Change Model will provide a framework for understanding the organizational transformation required for AI integration in project management.

D. Project Management Theories:

Various project management theories, including traditional and Agile methodologies, will serve as a basis to understand how AI can complement and enhance existing project management practices.

E. Systems Theory:

This theory will be utilized to view AI integration in project management as part of a larger system within the organization, considering interdependencies and interactions between different components.

F. Risk Management Theory:

This theory will be critical in understanding how AI can influence risk assessment and management strategies in project management.

By drawing on these previous studies and theoretical frameworks, the research aims to provide a comprehensive and well-grounded analysis of the impact of AI on project management in the context of Saudi Aramco's operations at Al Jafurah. These elements will support the exploration of AI's potential benefits, challenges, and strategic implications for project management effectiveness and innovation.

Chapter 03: Theoretical Premises of Study

The study is grounded in a blend of theoretical frameworks that will guide the exploration of how various characteristics found in project managers influence the integration and effectiveness of AI techniques in project management. These principles include:

A. Trait Theory in Psychology:

This theory postulates that individual personality traits influence behavior and decision-making. In the context of this research, the Trait Theory will be used to understand how characteristics like acceptance/agreement, passion, honesty/humility, extraversion, diligence/perseverance, and openness to experiences impact project managers' decisions in AI-integrated projects.

B. Decision-Making Theory:

This theory focuses on the process of making choices by identifying, analyzing, and assessing various alternatives. It will be utilized to examine how the identified personality traits influence project managers' decision-making in the context of AI applications in project management.

C. Technology Acceptance Model (TAM):

TAM will be used to analyze how project managers' perceptions about the usefulness and ease of use of AI influence their acceptance and effective utilization of AI technologies in project management.

D. Behavioral Theory of Leadership:

This theory suggests that effective leadership is based on observable actions and behaviors rather than inherent traits. It will be relevant in understanding how project managers' actions and behaviors, influenced by their personality traits, affect the implementation and success of AI in projects.

E. Innovation Diffusion Theory:

This theory by Everett Rogers will help in understanding how AI as an innovative technology is adopted, diffused, and utilized in project management based on the characteristics of the decision-makers (project managers).

F. Socio-technical Systems Theory:

This theory, which considers the interaction of people, technology, and the environment, will be instrumental in analyzing how the combination of AI technology and the human elements (traits of project managers) influence project outcomes.

G. Cognitive Load Theory:

This theory will be applied to understand how the cognitive traits of project managers impact their ability to process information and make decisions when managing complex AI-integrated projects.

H. Demographic Influence Theory:

This perspective will be used to explore how demographic factors (age, gender, educational background, experience, etc.) impact the relationship between the project managers' traits and their decision-making tendencies in the context of AI in project management.

#These theoretical principles will provide a comprehensive framework for developing hypotheses and conducting the research, ensuring a well-rounded approach that considers both the psychological aspects of decision-making and the technical aspects of AI in project management.

Chapter 04: Methodology and Research Methods.

1. Research Classification:

The research will be bifurcated into two distinct sections: theoretical analysis and applied study.

A. Theoretical Analysis:

A.1 This part of the study aims to establish a conceptual understanding of how AI techniques can be integrated into project management and their potential impact.

A.2 It involves a literature review to examine existing theoretical frameworks and studies related to AI in project management, the role of project manager personalities, and decision-making in project management contexts.

B. Applied Study:

B.1 The objective here is to collect and analyze empirical data to understand the real-world application and impact of AI in project management at Al Jafurah.

B.2 The applied study will utilize primary data collection methods, including questionnaires.

2. Descriptive Method:

A. Objective: To accurately describe the current state of project management practices at Al Jafurah, focusing on the integration of AI techniques and the characteristics of project managers in decision-making processes.

B. Approach:

B.1 Conducting an extensive review of relevant literature, industry reports, and case studies.

B.2 Analyzing any available secondary data that provides insights into the current project management practices and AI applications at Al Jafurah.

3. Primary Data Collection:

A. Questionnaires:

A.1 Designing and distributing structured questionnaires to project managers at Al Jafurah.

A.2 The questionnaires will aim to gather information on how AI is being used in project management, the perceived impact of AI on decision-making, and how managers' personality traits influence these processes.

4. Comparative Analysis:

4.1 Comparing the findings from the questionnaires and interviews with the theoretical concepts identified in the literature review.

4.2 This analysis will help in drawing correlations between theory and practice, identifying gaps, and understanding the practical implications of AI in project management.

5. Data Analysis:

5.1 Utilizing qualitative analysis methods, such as thematic analysis for interview transcripts, and quantitative analysis methods, such as statistical analysis for survey data.

5.2 The data will be analyzed to identify trends, patterns, and significant relationships between AI application in project management and the influence of project managers' personality traits.

6. Conclusion and Recommendations:

6.1 Drawing conclusions based on the data analysis and comparative study.

6.2 Providing recommendations for enhancing AI integration in project management at Al Jafurah, considering both the technological and human factors.

This methodology aims to provide a holistic view of the impact of AI on project management at Saudi Aramco's Al Jafurah gas field, considering both the theoretical aspects and practical realities of the current project management environment.

Study tools:

1. Questionnaire:

It is a set of specific questions formulated to collect the largest possible amount of information from the selected sample related to the research problem. Among its advantages are the ease of publication and the respondent's comfort in disclosing information that he may not want to disclose in the presence of others. It is easy to extract quantitative data from questionnaires, which may not take long to answer.

2. Tests:

are a set of questions, pictures, or drawings created to find out a quantitative or qualitative result. Tests are used to find differences in general.

Note:

The researcher may not be able to obtain information about the problem merely through interviews and questionnaires, and in that case, he needs to live the experience himself or observe it personally, either from direct samples, or from records and reports about the samples, to collect appropriate information about them with greater accuracy.

Spatial Field

Saudi Arabia as a rapidly evolving industrial and technological landscape, particularly under Vision 2030. The study looks at the impact of AI on project management within this dynamic environment.

Projects like the development of military industries and the construction of NEOM are indicative of the Kingdom's shift towards incorporating advanced technologies in project management. Al Jafurah gas field in Dammam City, under Saudi Aramco's management, represents a critical case study within this broader national transformation.

1. Human Field:

Understanding the role of human elements, specifically project managers and leaders, in integrating and leveraging AI in project management. This includes their decision-making styles, openness to consulting team members, and overall management approach.

The effectiveness of AI in project management is significantly influenced by the attitudes, decisions, and behaviors of project managers. Their approaches can either facilitate or hinder the successful adoption of AI technologies in project management.

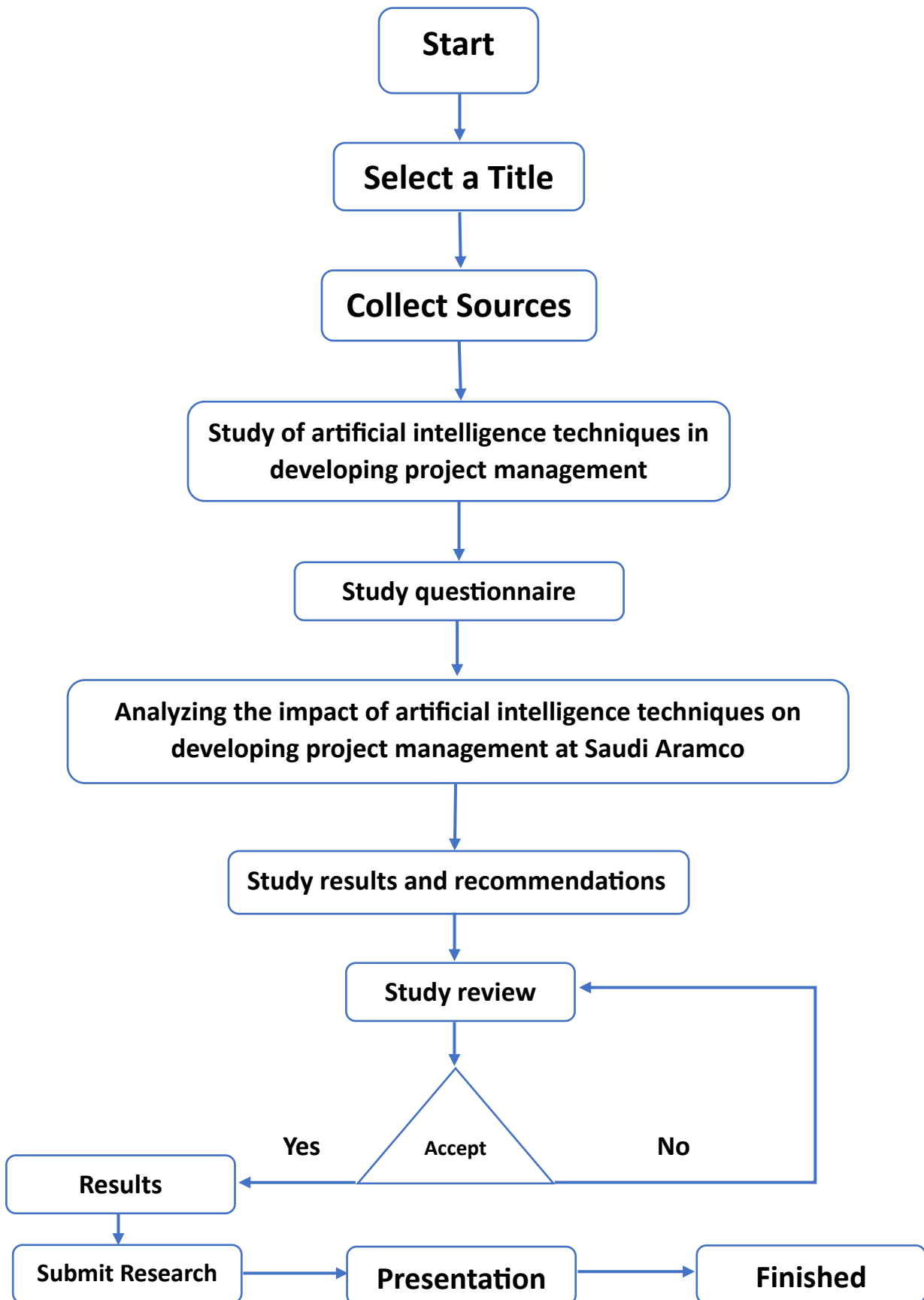
2. Time Domain:

Defining the scope and timeframe for the research. This involves identifying the target research community, which in this case includes project managers and other relevant personnel involved in Saudi Aramco's Al Jafurah gas field operations.

Time is a crucial factor in understanding the evolution and impact of AI integration in project management. The research study will delve into how AI has been adopted over time and its projected future implications within the context of Saudi Aramco.

These fields of study provide a multi-dimensional framework for the research, encompassing the geographical and industrial context of Saudi Arabia, the human dynamics of project management, and the temporal aspects of AI integration. Together, they offer a comprehensive approach to understanding how artificial intelligence can reshape project management practices in one of the most significant economic sectors of Saudi Arabia, aligning with the nation's strategic vision and industrial advancements.

Proposed classification according to the time plan:



The Questionnaire:

Note: The questionnaire is designed to gather insights from project managers and relevant staff at Saudi Aramco's Al Jafurah gas field. The questions aim to understand their perspectives on the integration of AI in project management.

Section 1: Background Information

1. Gender

2. Age

3. Nationality

4. academic qualification

5. What is your role in project management at Saudi Aramco's Al Jafurah Gas Field?

6. How many years of experience do you have in project management?

7. Have you received any formal training or education in artificial intelligence and its applications?

Analysis of the first part of the questionnaire for the research sample:

The first part of the questionnaire studies the characteristics of the research sample and the 7 questions that determine the general characteristics.

A. Nationalities:

Nationalities	Number of Posts	Percentage %
Saudi	85	56%
Other Nationalities	68	44%
Total	153	100%

Table (1) Nationalities

We can notice that from Figure (1) above that:

85 of the sample members are citizens, which is a percentage 55.6% of the total sample,

while 68 of the participating individuals were of other nationalities, representing 44.4% of the total sample.

B. Gender:

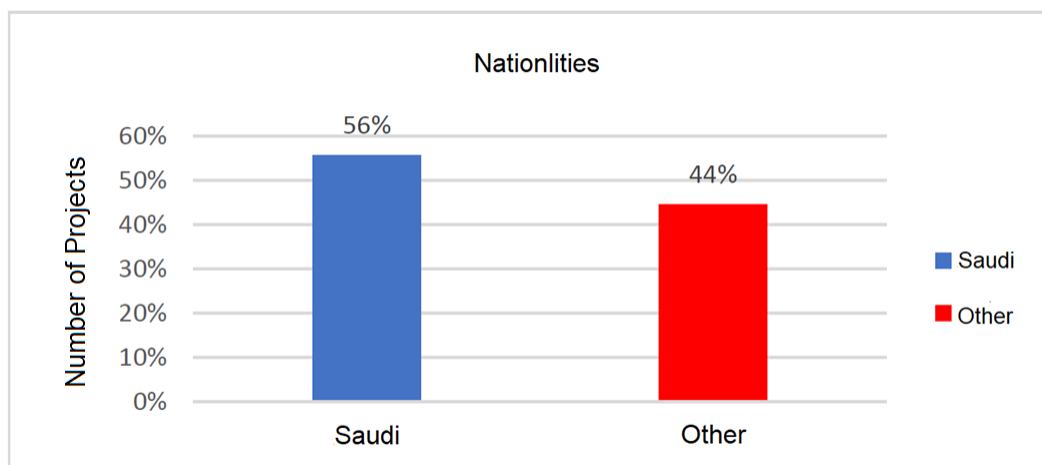


Figure (1) Nationalities

Gender	Number of Posts	Percentage %
Male	107	70%
Female	46	30%
Total	153	100%

Table (2) Gender

We can notice that from Table (2) above that 107 of the sample members are male, representing 69.9% of the total sample, while 46 of the participating individuals are female, representing 30.1% of the total sample.

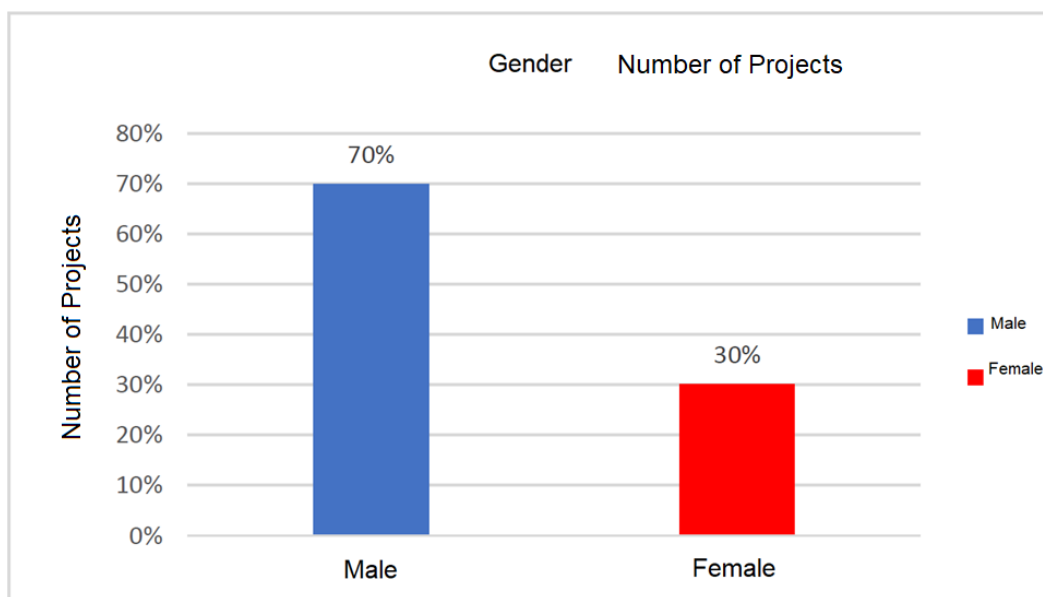


Figure (2) Gender

3-Age:

Age	Number of Posts	Percentage %
Less than 30 Years	25	16 %
From 30 to 40 Years	70	64 %
From 40 to 50 Years	52	32 %
From 50 Years and above	6	4 %
Total	153	100 %

Table (3) Age

We can notice that from Table (3) above that 25 individuals from the sample are less than 30 years old, representing 16% of the total sample, while 70 of the participating individuals are between the ages of 30 and 40, representing 46% of the total sample. Also, 52 are between Their ages are between Individuals between 40 and 50 years old, representing 34% of the total sample, leaving 6 individuals over the age of 50, representing 4%.

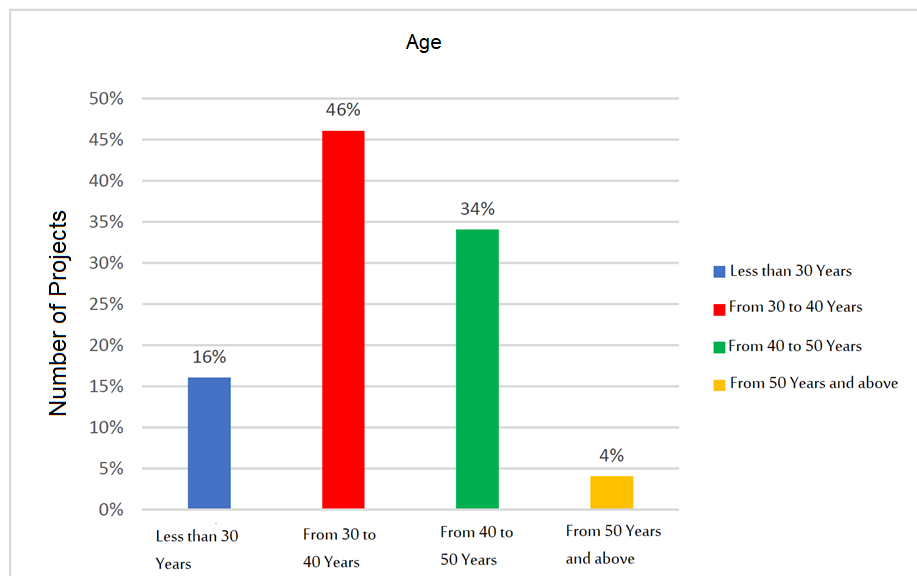


Figure (3) Age

Gender	Age	No of Posts	Percentages %
Male	Less than 30 Years	17	16 %
	From 30 to 40 Years	51	48 %
	From 40 to 50 Years	36	34 %
	From 50 Years and above	3	3 %
Female	Less than 30 Years	8	17 %
	From 30 to 40 Years	19	41 %
	From 40 to 50 Years	16	25 %
	From 50 Years and above	3	7 %

Table (4) Age & Gender

We notice that from Table (4) above that 17 of the male members of the sample are under 30 years of age, representing 16%, 1 of the male members of the sample is between the ages of 30 and 40 years, representing 48%, and 36 of the male members of the sample are between 40 and 50 years of age, representing 34% and 3 of the male members of the sample are over 50 years old, representing 3% of the total male members of the sample, while 8 of the female members of the sample are under 30 years of age, which represents 17% of the total female sample, and 19 of the female members of the sample are between 30 and 40 years old.

A percentage of 41%, and 16 of the female members of the sample are between 40 and 50 years old, and 35% of the female members of the sample are over 50 years old, a percentage of 7% of the total females in the sample.

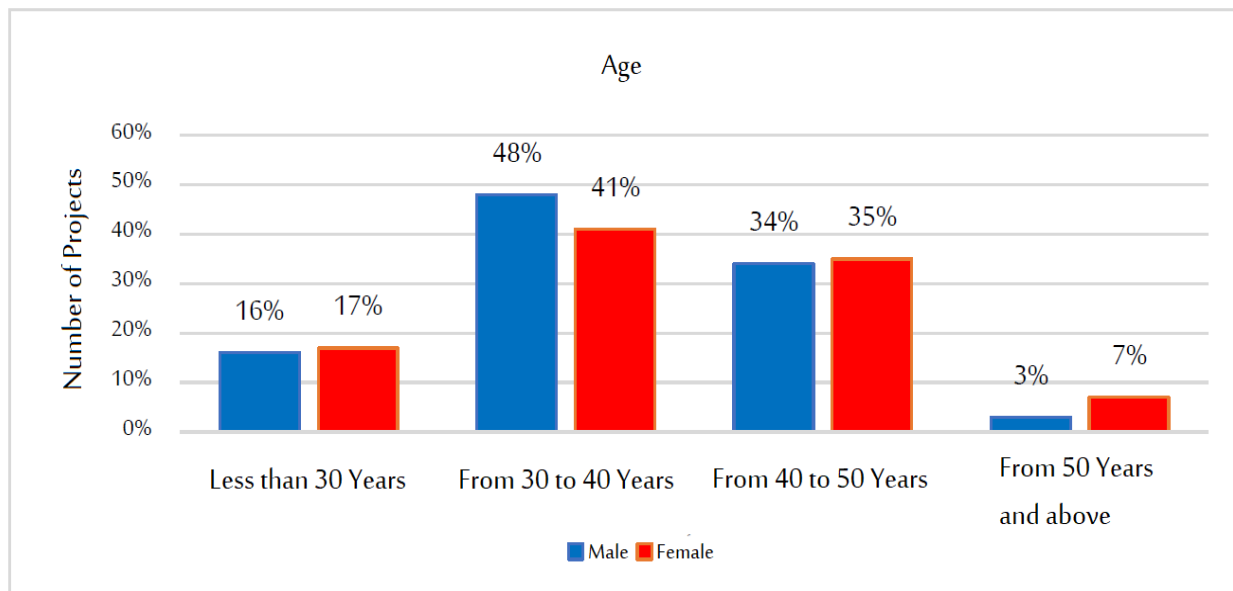


Figure (4) Age & Gender

Gender	Age	No of Posts	Percentages %
Project Manager	Less than 30 Years	9	16.1 %
	From 30 to 40 Years	25	44.6 %
	From 40 to 50 Years	28	32.1 %
	From 50 Years and above	4	7.1 %
Member of the project team	Less than 30 Years	16	16.5 %
	From 30 to 40 Years	45	46.6 %
	From 40 to 50 Years	34	35 %
	From 50 Years and above	2	2.1 %

Table (5) Specific and Age

We found that from Table (5) above that 9 of the sample members under the age of 30 participated in projects in the capacity of a project manager, representing 16.1%, and 25 of the sample members between the ages of 30 and 40 workers also participated in the capacity of a project manager, representing 44.6%. 18 of the sample members participated as a project manager, and their ages were between 40 and 50 years In general, a percentage of 32.1%, and 4 of the sample members participated as a project manager, and those over the

age of 50, representing 7.1% of the total participants as project managers in the sample, while 16 sample members under the age of 30 participated in projects as a member of the project team, representing a percentage of 16.5% of the total sample. Of the participants as a member of the project team, 45 of them were between the ages of 30 and 40 workers, at a rate of 46.4%, and 34 of the participants as a member of the project team were among the sample, aged between 40 and 50 years, at a rate of 35%, and 2 of them among the sample were over 50 years old, at a rate of 7. % of the total participants as a member of the project team.

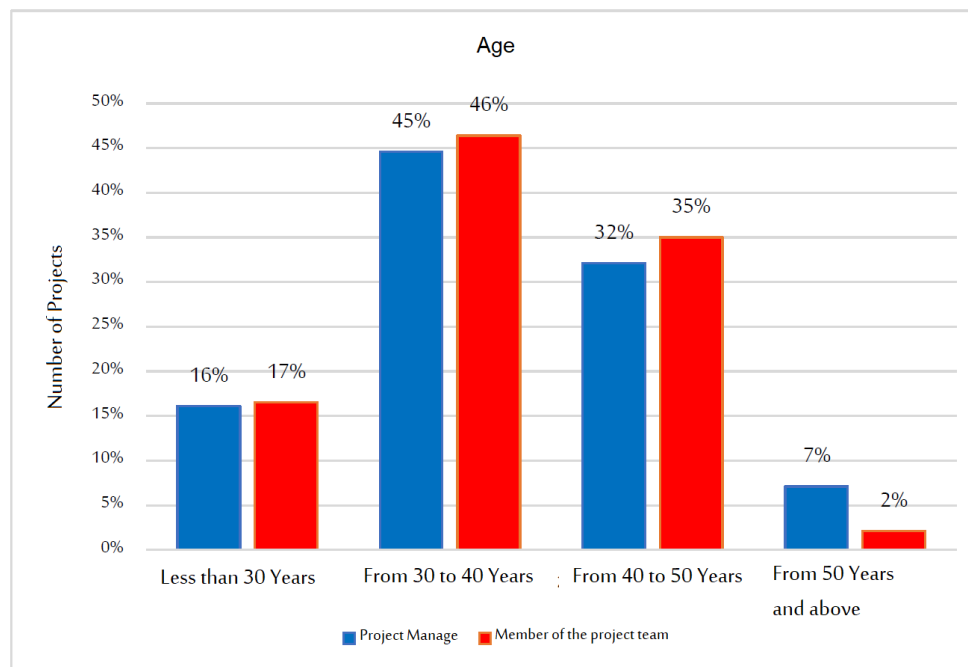


Figure (5) Specific and Age

4.Number of Experience Years:

Years of Experience	No. of Post	Percentage %
Less than 5 Years	30	20 %
From 5 to 10 Years	37	24 %
From 10 to 15 Years	53	35 %
More than 15 Years	33	22 %

Table (6) Years of Experience

We found that from Table (6) above that 30 individuals from the sample have less than 5 years of experience, representing 20% of the total sample, while 37 of the participating individuals have experience ranging between 5 to 10 years, representing 24% of the total sample, and 53 individuals Their experience ranges between 10 and 15 years, representing 35% of the total sample. The sample contains 33 individuals whose experience exceeds 15 years, representing 22%.

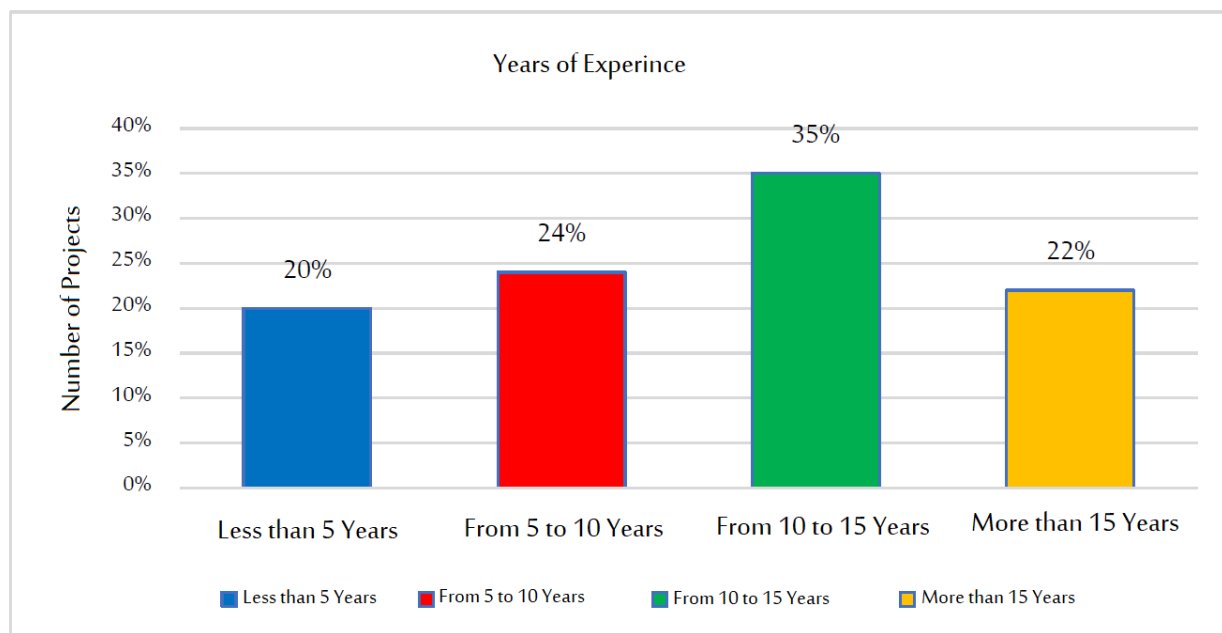


Figure (6) Years of Experience

Gender	Male				Female			
Years of Experience	Less than 5 Years	From 5 to 10 Years	From 10 to 15 Years	More than 15 Years	Less than 5 Years	From 5 to 10 Years	From 10 to 15 Years	More than 15 Years
No. of Posts	17	22	42	26	13	15	11	7
Percentage	15.9 %	20.6 %	39.3 %	24.3 %	28.3 %	32.6 %	23.9 %	15.2 %

Table (7) Gender & Years of Experience

We found that from Table (7) above that 17 of the male members of the sample had less than 5 years of experience, representing 15.9%, and 22 of the male members of the sample had experience between 5 to 10 years, representing 20.6%, and 42 of the male members of the sample had experience between 10 to 15 years. A percentage of 39.3% and 26 of the male members of the sample had more than 15 years of experience, and a percentage of 24.3% of the total males in the sample, while 13 of the female members of the sample had less than 5 years of experience, which represented a percentage of 28.3% of the total female sample, and of the female members of the sample their experience ranged between 5 to 10 years. At a rate of 32.6%, 11 of the female members of the sample had experience between 10 and 15 years, at a rate of 23.9%, and 7 of the female members of the sample had more than 15 years of experience, at a rate of 15.2% of the total females in the sample.

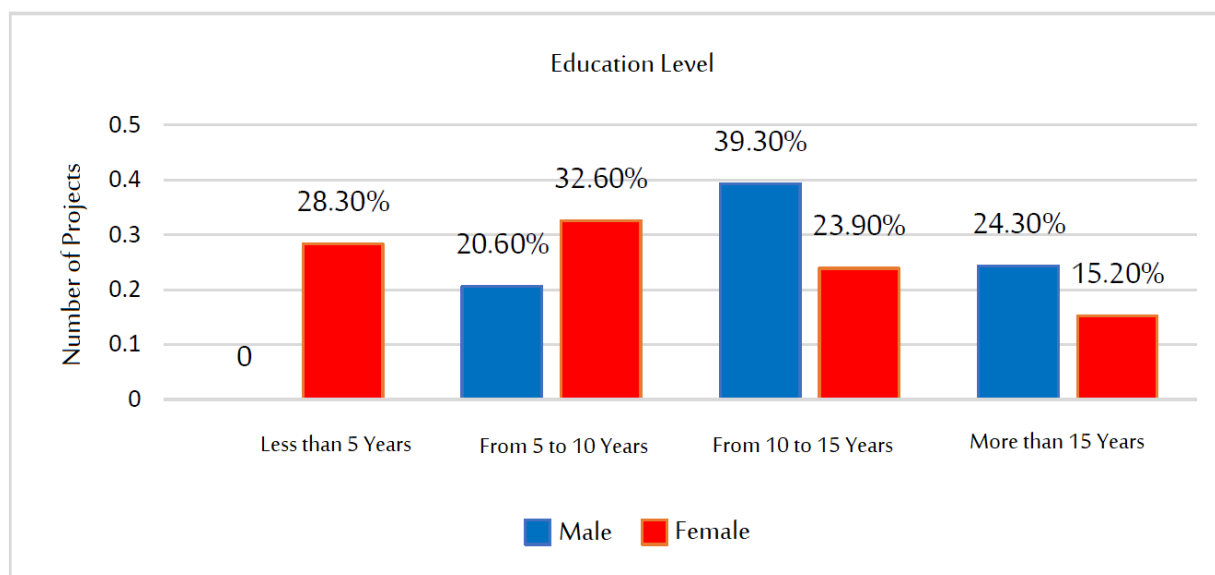


Figure (7) Gender & Years of Experience

Position	Years of Experience	No of Posts	Percentages %
Project Manager	Less than 30 Years	9	16.1 %
	From 30 to 40 Years	11	19.6 %
	From 40 to 50 Years	20	35.7 %
	From 50 Years and above	16	28.6 %
Member of the project team	Less than 30 Years	16	16.5 %
	From 30 to 40 Years	12	12.4 %
	From 40 to 50 Years	21	21.6 %
	From 50 Years and above	19	19.6 %

Table (8) Position and Years of Experience

We found that from Table (8) above that 9 of the participants in the capacity of project manager among the sample members are over 5 years, representing 16.1%, and 11 of the participants in the capacity of project manager among the sample members have experience between 5 to 10 years, representing 19.6%, and 20 of the participants in the capacity of project manager among the sample members have experience between 5 to 10 years, representing 19.6%. A project manager among the sample members has experience between 10 and 15 years, at a rate of 35.7%, and 16 of the participants in the capacity of a project manager among the sample members have more than 15 years of experience, at a rate of 28.6% of the total number of participants in the capacity of a project manager among the sample members, while 16 of the participants as a member of the project team are individuals. The sample had less than 5 years of experience, representing 16.5% of the total sample of participants as a member of the project team, and 12 of the participants as a member of the project team. Among the sample members, their experience was between 5 to 10 years, representing 12.4%, and 21 of the participants as a member of the project team included The sample members had experience between 10 and 15 years, at a rate of 21.6%, and 19 of the sample participants as a member of the project team had more than 15 years of experience, at a rate of 19.6% of the total participants as a member of the project team in the sample.

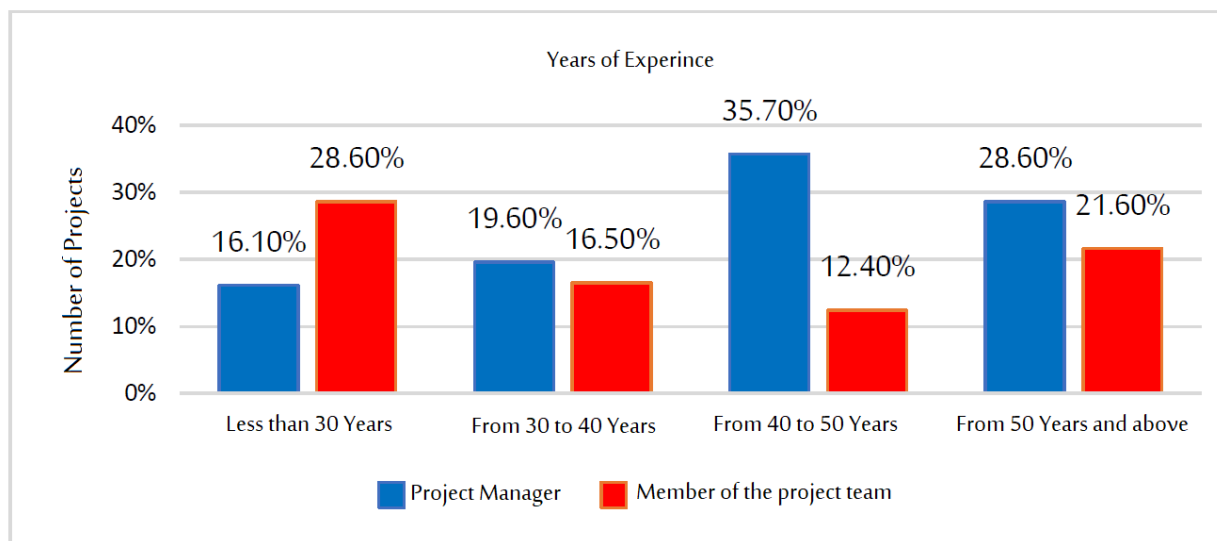


Figure (8) Position and Years of Experience

5.Education Level:

Education Level	No. of Posts	Percentage
Diploma	14	9 %
Bachelor	97	63 %
Master	34	22 %
PhD	8	5 %

Table (9) Level of Education

We found that from Table (9) above that 14 of the sample hold a diploma as an academic qualification, representing 9% of the total sample, while 97 of the participating individuals hold a bachelor's degree, representing 63% of the total sample, and 34 individuals hold a master's degree. Their percentage represents 22% of the total sample, and the sample contains 8 individuals who hold a doctorate degree, representing 5%.

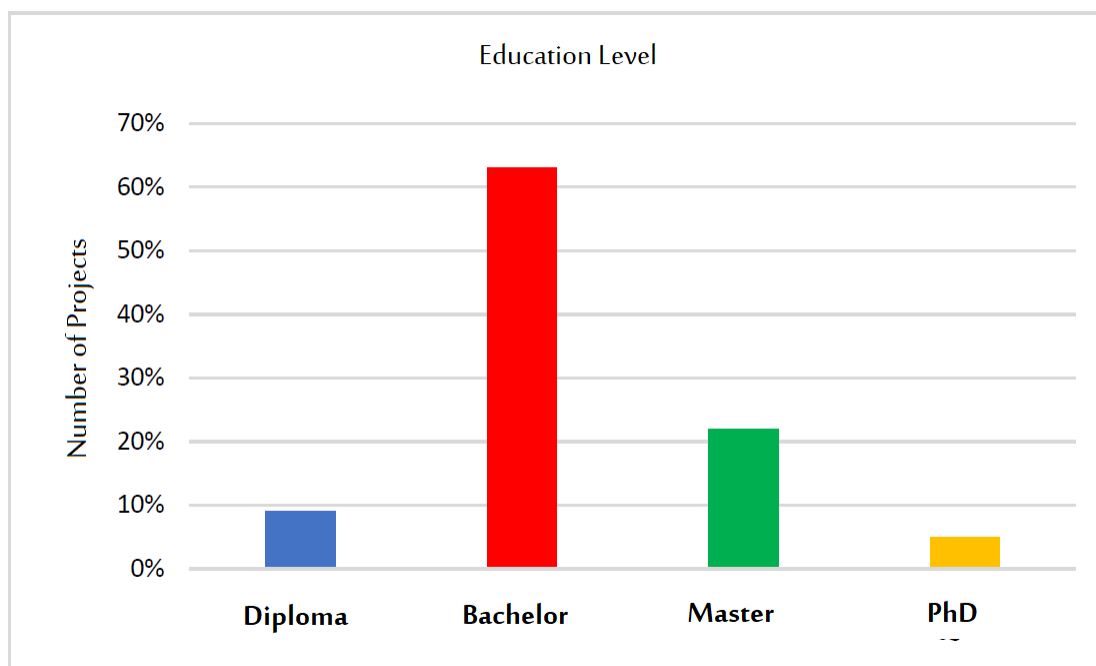


Figure (9) Level of Education

Gender	Male				Female			
Education Level	Diploma	Bachelor	Master	PhD	Diploma	Bachelor	Master	PhD
No. of Posts	4	69	33	1	10	28	1	7
Percentage	3.7 %	64.5 %	30.8 %	9 %	21.7 %	60.9 %	2.2 %	15.2 %

Table (10) Gender and Level of Education

We found that from Table (10) above that 4 of the male members of the sample are diploma holders, representing 3.7%, 69 of the male members of the sample are holders of bachelor's degrees, representing 64.5%, 33 of the male members of the sample are holders of master's degrees, representing 30.8%, and 1 person is from The male members of the sample hold doctorates, representing 0.9% of the total males in the

sample, while 10 female members of the sample hold diplomas, representing 21.7% of the total female sample, and 28 of the female members of the sample hold bachelor's degrees, representing 60.9%, and 1 of the female members of the sample holds master's degrees, representing 2.2. 7% of the female members of the sample hold doctorates, representing 15.2% of the total females in the sample.

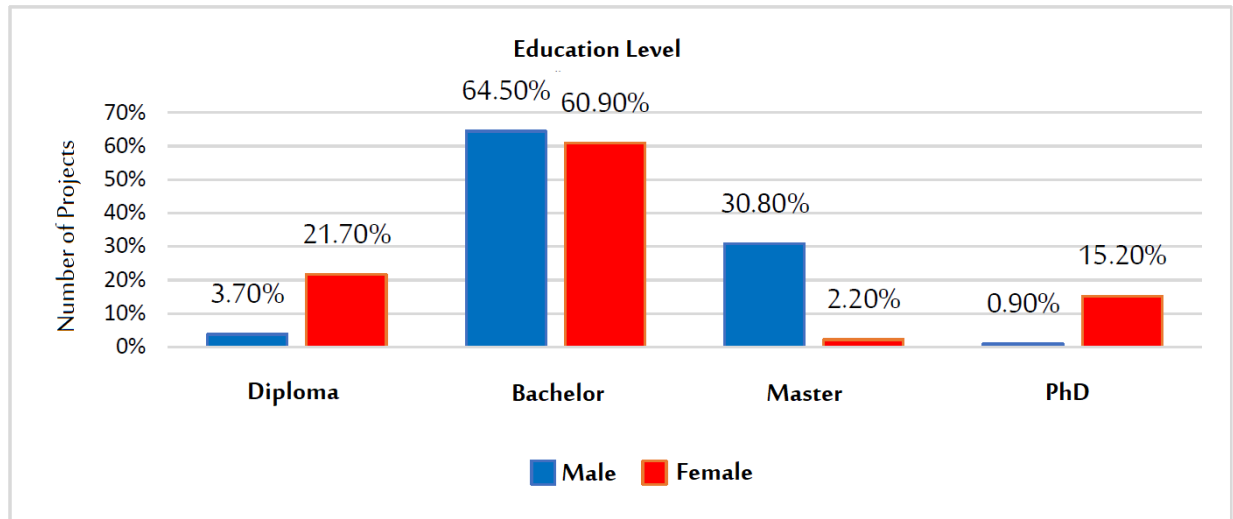


Figure (10) Gender and Level of Education

Position	Years of Experience	No of Posts	Percentages %
Project Manager	Diploma	3	5.4 %
	Bachelor	31	55.4 %
	Master	18	32.1 %
	PhD	4	7.1 %
Member of the project team	Diploma	3	3.1 %
	Bachelor	46	47.3 %
	Master	16	16.5 %
	PhD	3	3.1 %

Table (11) Position and Level of Education

It can be noted from Table (11) above that 3 of the project participants as a project manager from among the sample members are diploma holders, representing 5.4%, and 31 of the project participants as a project manager from among the sample members hold a bachelor's degree, representing 55.4% and 18 of the project participants. As a project manager among the sample members who hold a master's degree, at a rate of 32.1%, and 4 of the project participants as a project manager among the sample members who hold a doctorate, at a rate of 7.1% of the total participants in the project. As a project manager among the sample members in the sample, while 3 of the project participants are a member of the project team. Of the sample members, they hold a diploma, representing 3.1% of the total sample of participants in the project as a member of the project team, and of the participants in the project as a member of the project team, they hold a bachelor's degree, representing 47.4%, and 16 of the participants in the project as a member of the project team are members of the sample who hold Master's degrees, at a rate of 16.5%, and 3 of the project participants as a member of the project team. The sample members held doctorates, at a rate of 3.1% of the total project participants as a member of the project team in the sample.

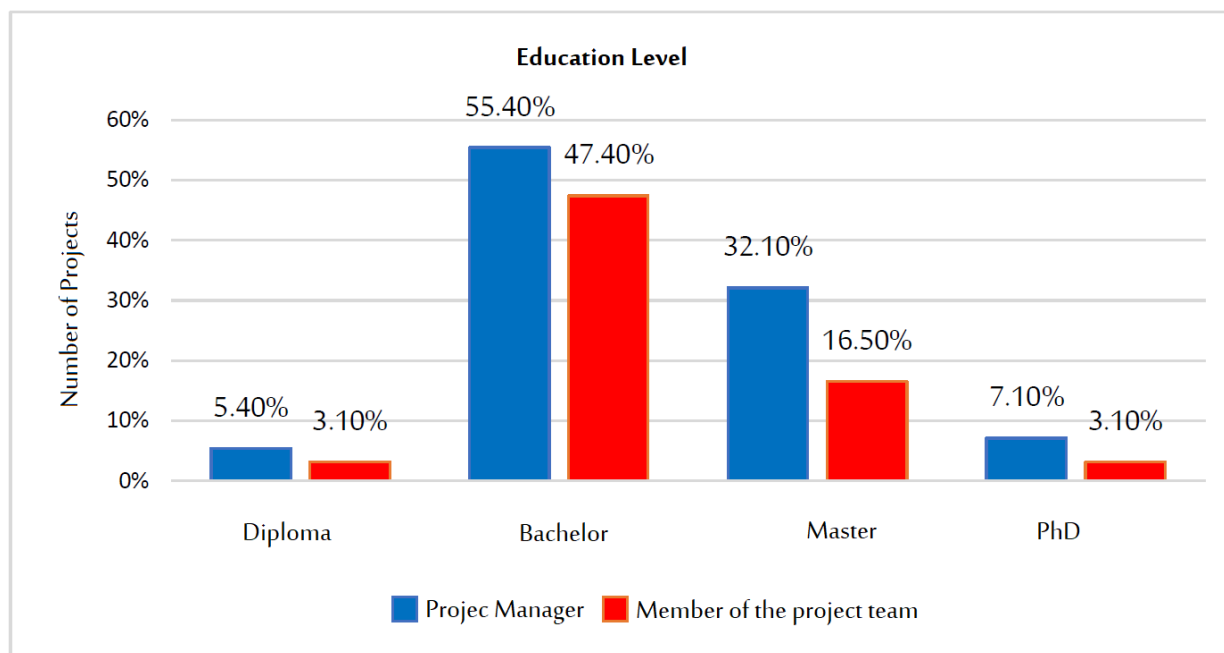


Figure (11) Position and Level of Education

6- Person Level on The Project:

Gender	Male		Female	
Position	PM	Member on PM Department	PM	Member on PM Department
No. of Posts	46	61	10	36
Percentage	43 %	57.1 %	21.7 %	78.3 %

Table (12) Position, Gender and No. of Projects Implemented

We found that from Table (15) above that 46 of the male members of the sample participated in the projects in the capacity of project manager, representing 43%, and 61 of the male members of the sample participated in the projects as a member of the project team, representing 57.1%, while 10 of the female members of the sample participated in projects in the capacity of project manager, represented by 21.7% of the total female sample, and 36 of the female members of the sample participated in projects as a member of the project team,

i.e. 78.3%. The table explains that males participated in projects in the capacity of project manager more than females.

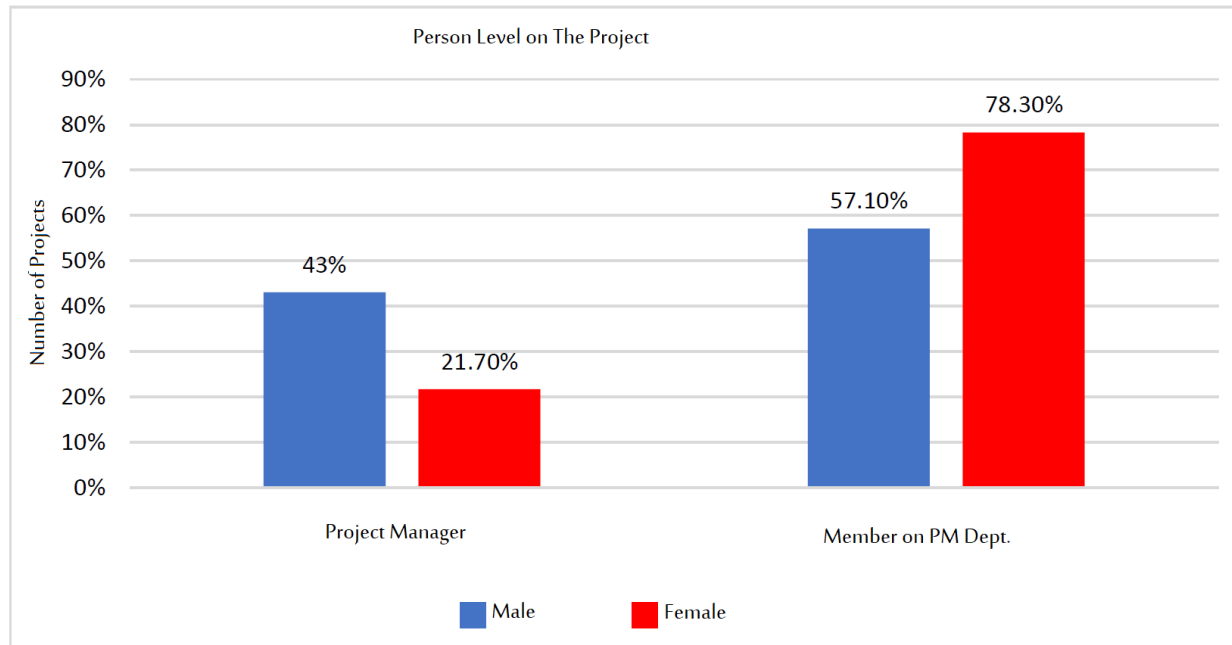


Figure (12) Position, Gender and Number of projects Implemented

Analysis of the second section of the questionnaire for research:

The questionnaire contains 7 questions that are answered with nominal variables, each of which has a weight assigned to it to enable researchers to perform the analyzes necessary for the study, as shown in the following table.

Variable	Size
Totally Agree	5
Agree	4
Objective	3
Not Agree	2
Strongly Disagree	1

Table (12) Variable and Size

Based on these weights, the hypothetical mean for the sample was calculated according to the following equation:

The hypothesized mean $j = \frac{\text{sum of the values of the weights}}{\text{Number of variables}}$

By applying the equation: $(5+4+3+2+1) / 5 = 15/5 = 3$

The hypothetical mean is used to measure the trend of the sample in each answer, as values higher than 3 can be combined to represent agreement, and values less than 3 can be combined to represent non-agreement. However, the analysis will be done more precisely for the comprehensiveness of the study, and the focus will be on the results based on the overall analysis based on Several elements, namely the arithmetic mean, variance, standard deviation, and sample trend, which can be known based on the value of the arithmetic mean as shown in the table.

the next:

Direction	
Totally Agree	5 to 4.2
Agree	4.2 to 3.4
Objective	3.4 to 2.6
Not Agree	2.6 to 1.8
Strongly Disagree	1.8 and below

Table (13) The Direction

7. Results of data collection and analysis of the sample:

The sample data will first be analyzed in general without specification, and then it will be studied from several angles selected from the first part of the questionnaire, sometimes from the point of view of the project managers and from the point of view of the project work team.

The following table shows the viewpoint of the entire sample on the questionnaire questions in general:

Sr.	Questionnaire	Totally Agree	Agree	Objective	Not Agree	Strongly Disagree	No. of Answer
1	Artificial intelligence significantly reduces the time required for project planning and scheduling.	97	45	7	3	1	153
2	AI techniques improve the accuracy of risk assessments in project management.	44	60	23	25	1	153
3	The integration of AI in project management has led to cost savings for projects at Al Jafurah gas field.	80	44	21	7	1	153
4	Project managers at Al Jafurah gas field are sufficiently trained to leverage AI technologies in their work.	5	34	35	60	19	153
5	AI-driven decision-making tools have increased the overall success rate of projects in Saudi Aramco.	37	77	25	11	3	153
6	The adoption of AI in project	98	51	1	2	2	153

	management has encountered resistance from the project management team.						
7	AI has the potential to automate critical project management tasks, thus freeing up more time for strategic decision-making.	12	35	42	49	15	153

Table (14) view of the entire sample

The following table shows the percentages of complete responses to the questionnaire in general:

Sr.	Questionnaire	Totally Agree	Agree	Objective	Not Agree	Strongly Disagree	No. of Answer
1	Artificial intelligence significantly reduces the time required for project planning and scheduling.	63.4%	29.41%	4.58%	1.96%	0.56	100%
2	AI techniques improve the accuracy of risk assessments in project management.	28.76%	39.22%	15.03%	16.34%	0.65%	100%
3	The integration of AI in project management has led to cost savings for projects at Al Jafurah gas field.	52.29%	28.76%	13.73%	4.58%	0.65%	100%
4	Project managers at Al Jafurah gas field are sufficiently trained to leverage AI technologies in their work.	12.42%	39.22%	22.88%	22.22%	3.27%	100%
5	AI-driven decision-making tools have increased the overall success rate of projects in Saudi Aramco.	24.18%	50.33%	16.43%	7.19%	1.96%	100%
6	The adoption of AI in project	64.05%	34.64%	0.65%	0.00%	0.65%	100%

	management has encountered resistance from the project management team.						
7	AI has the potential to automate critical project management tasks, thus freeing up more time for strategic decision-making.	65.36%	31.37%	1.96%	1.31%	0.00%	100%

Table (15) - Percentages of all answers

Accordingly, the result of data analysis was obtained from an arithmetic mean, standard deviation, and sample trend, which is shown in the following table:

Sr.	Questionnaire	The arithmetic average	variance	standard deviation	Sample Direction
1	Artificial intelligence significantly reduces the time required for project planning and scheduling.	4.53	0.54	0.74	Totally Agree
2	AI techniques improve the accuracy of risk assessments in project management.	3.79	1.11	1.06	Agree

3	The integration of AI in project management has led to cost savings for projects at Al Jafurah gas field.	4.27	0.83	0.91	Totally Agree
4	Project managers at Al Jafurah gas field are sufficiently trained to leverage AI technologies in their work.	3.35	1.12	1.06	Agree
5	AI-driven decision-making tools have increased the overall success rate of projects in Saudi Aramco.	3.88	0.86	0.93	Agree
6	The adoption of AI in project management has encountered resistance from the project management team.	4.59	0.37	0.61	Totally Agree
7	AI has the potential to automate critical project management tasks, thus freeing up more time for strategic decision-making.	4.61	0.33	0.57	Totally Agree

Table (16) Analyzing Data from Arithmetic Mean, Standard Deviation, and Sample Trend

The results of data collection for the sample based on the type of work in the project, the weight and percentage of which were explained in the first part, are as follows:

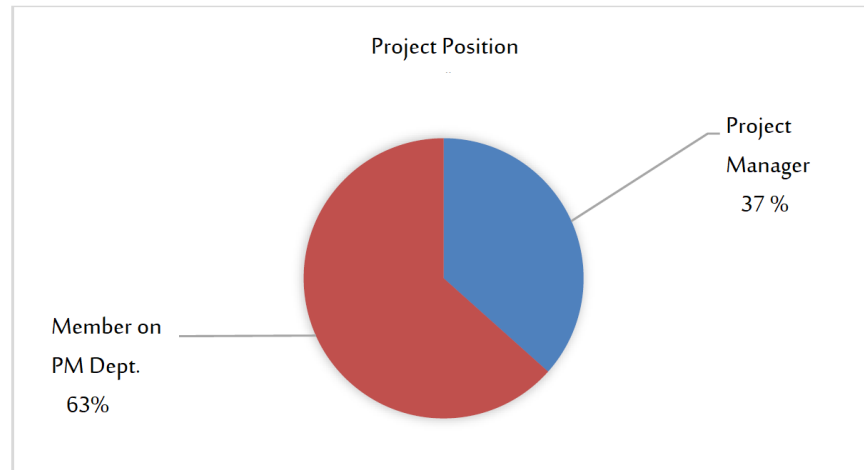


Figure (13) Percentage of Project Position

8. Reference List:

A. Books and Academic Journals:

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5. Journal of Artificial Intelligence Research (JAIR).
6. Project Management Journal, PMI.
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11. Davenport, T. H., & Ronanki, R. (2018). Artificial Intelligence for the Real World. Harvard Business Review Press.
12. Journal of Artificial Intelligence Research.
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15. IEEE Transactions on Engineering Management.
16. Artificial Intelligence.

B. Industry Reports:

1. Saudi Vision 2030 Progress Reports.
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3. Gartner. (2020). Market Trends in AI and their Impact on Project Management.
4. McKinsey Global Institute. (2017). Artificial Intelligence: The Next Digital Frontier?
5. Deloitte Insights. (2019). AI and Cognitive Technologies in Project Management.
6. Saudi Vision 2030 official progress reports and publications.
7. Saudi Aramco Annual Reports and AI Implementation Strategies.

C. Online Databases and Libraries:

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2. Scopus.
3. Google Scholar.
4. ProQuest Dissertations & Theses Global.
5. IEEE Xplore Digital Library.
6. SpringerLink.
7. Web of Science.
8. JSTOR.

D. Professional Bodies and Standards:

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2. Association for the Advancement of Artificial Intelligence (AAAI).
3. IEEE Computer Society.

4. Project Management Institute (PMI). (2017). A Guide to the Project Management Body of Knowledge (PMBOK Guide).
5. Association for the Advancement of Artificial Intelligence (AAAI) resources.

Note:

The above references are indicative and should be updated with the actual resources consulted during the research. Each reference should be cited according to the appropriate academic or professional style guide (e.g., APA, MLA, Chicago) as required by the research's publication standards.

8. Conclusion:

The research into the use of artificial intelligence techniques in project management at Saudi Aramco's Al Jafurah Gas Field has yielded insightful conclusions. It is evident from the study that AI has the potential to significantly enhance the efficiency, accuracy, and decision-making capabilities within project management. Through the integration of AI, projects can benefit from advanced analytics, improved risk assessment, and optimized resource allocation.

Project managers have shown a positive inclination towards adopting AI technologies, although the extent of this varies according to individual acceptance and the level of training received. The study also uncovered that while there is enthusiasm for AI, there are barriers to its full adoption, including cultural resistance and a need for more specialized training.

Furthermore, the research highlights that the strategic implementation of AI in project management aligns with the goals of Saudi Arabia's Vision 2030 by promoting innovation and sustainability. AI's capacity to automate and improve project tasks can contribute to the nation's economic diversification efforts and enhance its competitive stance in the global market.

In conclusion, the impact of AI techniques on project management at the Al Jafurah gas field is multifaceted and promising. However, to harness the full potential of AI, Saudi Aramco will need to address the challenges identified, particularly in terms of change management and skill development. With a focused approach to overcoming these challenges, Saudi Aramco can lead in setting a benchmark for AI application in project management within the oil and gas industry and beyond.