

Project Proposal

*The Impact of Incorporating AI Application on
Traditional Project Management Styles in Construction
Projects in Riyadh, Saudi Arabia*

أثر توظيف تطبيقات الذكاء الاصطناعي على الأساليب التقليدية لإدارة
المشاريع في المشاريع الإنشائية بالرياض

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Abstract

The construction industry in Saudi Arabia has continued to experience major changes and shifts, evolving from traditional project management and now embracing new technology. The changes have necessitated the need to adopt new technologies to catch up with the ever-changing management dynamics and practices in project management. Project management in Riyadh follows the traditional approaches in the construction industry that have various limitations such as time wastage and lack of lean approaches hence affecting the success of any project. Despite the availability of new technology and approaches in project management, traditional approaches are still in use in Riyadh. AI is the future and will eventually be incorporated into project management approaches yet the impact it has is unknown. Therefore, it is important to analyze the impact of AI in project management and how it will impact construction styles in Riyadh.

الخلاصة

استمرت صناعة البناء والتشييد في المملكة العربية السعودية في مواجهة تغييرات وتحولات كبيرة، حيث تطورت من إدارة المشاريع التقليدية وتتبنى الآن التكنولوجيا الجديدة. لقد استلزمت التغييرات الحاجة إلى اعتماد تقنيات جديدة لمواكبة ديناميكيات وممارسات الإدارة المتغيرة باستمرار في إدارة المشاريع. تتبع إدارة المشاريع في الرياض الأساليب التقليدية في صناعة البناء والتشييد والتي لها قيود مختلفة مثل إهدار الوقت وعدم وجود أساليب بسيطة وبالتالي تؤثر على نجاح أي مشروع. على الرغم من توفر التقنيات والأساليب الجديدة في إدارة المشاريع، إلا أن الأساليب التقليدية لا تزال مستخدمة في الرياض. الذكاء الاصطناعي هو المستقبل وسيتم دمجها في نهاية المطاف في مناهج إدارة المشاريع ولكن تأثيره غير معروف. لذلك، من المهم تحليل تأثير الذكاء الاصطناعي في إدارة المشاريع وكيف سيؤثر على أنماط البناء في الرياض.

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1. Introduction

1.1 Background

The construction industry in Saudi Arabia has continued to experience major changes and shifts, evolving from traditional project management and now embracing new technology. The changes have necessitated the need to adopt new technologies to catch up with the ever-changing management dynamics and practices in project management. For instance, there are new software adopted in the construction industry that are key catalysts in the changes witnessed in project management. These programs have ensured innovativeness while addressing the challenges faced in construction and in project management as a whole. The accuracy and precision cannot be overlooked as well, thanks to new technology. The transformation from the old project management practices to the current methods is attributed to the continuous growth of construction in the Kingdom. In Riyadh, Saudi Arabia new technologies continue to impact project management and construction in a significant manner. Project managers are shifting significantly from traditional methods and adopting new technologies to address major challenges facing the industry today.

The traditional project management practices in Riyadh follow the waterfall methodology or the step-by-step approach where the project is broken down into steps and plans that must be completed with a timeline. The processes involved in the different stages are necessary to ensure that the project manager can assess and manage risks before the completion of every stage. Following such a process makes it challenging to adopt changes when mistakes occur during the project cycle, leading to the failures of most of the projects implemented in Riyadh (Alsuliman, 2019). As such, there is a need to explore additional approaches that ensure agility and precision in project management practices. Artificial Intelligence plays a major role in promoting an agile

and lean approach to project management. Therefore, it is important to understand the impact of incorporating AI on traditional project management styles in construction projects in Riyadh.

According to research on the application of AI in project management, its application will greatly transform construction and project management as a whole. Research indicates that only 35% of construction projects go to completion due to a lack of the required technology to propel project management practices (Abioye et al., 2021). With the application of advanced technology such as machine learning and AI in project management, researchers expect a major shift in success rate. This is based on improved project selection, facilities testing, prioritization, reporting speed, and progress monitoring. In general, the application of virtual assistants will reduce most of their oversight roles while ensuring they focus more on stakeholder management and coaching. Most of the manual tasks and administration can be reduced through the application of AI. In light of this, it is important to assess the impact of this new technology in Riyadh project management, assessing the changes expected to occur and, the advantages and disadvantages of adopting AI in project management.

Understanding the impact of AI on traditional project management styles in construction projects in Riyadh is important to the general society and the project management stakeholders as a whole. Currently, the public sector experiences delays in project completion. The traditional approaches to project management are always blamed for stalled projects that never succeed. Alsuliman (2019) notes that general approaches are always used in project management and despite the conferences and seminars held to discuss new approaches, no success is recorded. Therefore, the findings from this systematic review research will help improve the current situation and ensure projects in Riyadh succeed.

1.2 Research Problem

Project management in Riyadh follows the traditional approaches in the construction industry that have various limitations such as time wastage and lack of lean approaches hence affecting the success of any project. Despite the availability of new technology and approaches in project management, traditional approaches are still in use in Riyadh. AI is the future and will eventually be incorporated into project management approaches yet the impact it has is unknown. A significant problem in project management that uses traditional approaches is the limitation in the success rate of the projects due to limitations of the available technologies, which also occurs in Riyadh's approach to construction and project management. The available technologies have limitations in the assessment of success rates based on deliverables especially due to the changing dynamics in the field of project management. Therefore, there is a need to assess the impact of new technologies, particularly on the application of AI, and how it will improve traditional approaches to project management in Riyadh, Saudi Arabia. The findings will help advise whether the adoption of AI is a necessity in project management to promote agile and lean operations that lead to the success of a project.

1.3 Project Aim

AI has a significant impact on project management and therefore, the proposed project intends to investigate the impact of AI in traditional project management styles in construction projects in Riyadh.

1.4 Research hypothesis

Incorporating AI in traditional project management styles in construction projects in Riyadh will improve the success of project completions.

2. Literature Review

2.1 Traditional Methodologies in Project Management

Nieto-Rodriguez (2023) noted that the approach to project management can be equated to the approach used in different fields but follows a specific approach to achieve set goals and objectives. The traditional methods applied in project management and construction style follow a life cycle, typically referred to as the waterfall approach Nieto-Rodriguez (2023). This means that the project must be subdivided into various stages with distinct deliverables and tasks. In the waterfall approach, the managers ensure that each step is followed subsequently and decisions made in each stage may affect the success of the next one. The traditional approach emphasizes more on the project processes that must be followed effectively to ensure the success is achieved. The outcomes of the projects are also dependent on the risk analysis and prediction of the desired outcomes Nieto-Rodriguez (2023). Based on these factors, the project has to be completed in stages to ensure risks and errors are eliminated at every stage. The mistakes made at every stage may affect the success of the project, preventing timely completion or leading to the stalemate of the entire project.

Nieto-Rodriguez (2023) further noted that, as a strict method used in project management, particularly in the construction industry, the phases are completed in sequences that involve planning the project and setting out the requirements. The procedures to be followed should be documented while communication is done with everyone in the project to ensure success is achieved. The documentation has to be done on every section of the project. Therefore, the success of the traditional approaches to these types of projects is based on documentation Nieto-Rodriguez (2023). This allows continuity of the project should any of the members leave during the cycle. It is also considered an easy way of managing the project due to

simplified tracking methods. However, it is worth noting that the traditional method applied in project management has extreme challenges when the requirements are not stated clearly. Because the output for every step acts as the input for the subsequent stage, a mistake in the previous stage may affect the success of the project altogether. The traditional approach to project management also experiences challenges based on its lack of adaptability to change leading to more cost. This calls for the need to explore more ways of improving project management approaches such as the application of AI in traditional construction styles.

The impact of the traditional approaches is always quantified based on quality, time, and cost. With the right approach to project management, time, costs, and resources used are saved. Yet most of the project fails to succeed as they follow the traditional approaches that have restrictions hindering the success of the projects. Research indicates that most of the projects following the traditional approach are prone to failure as they have limited flexibility. The traditional approach to construction and project management is characterized as rigid and follows a structured method. The approach does not create room for changes when challenges occur which leads to failures in the project success. Also, the lack of involvement of the customers in the initial stages is blamed for the failures encountered as they are only involved in the final stages.

2.2 Overview of AI and application in project management

According to Rasch (2019), artificial Intelligence simulates human intelligence but in the form of machines or computers. Various industries are adopting these new technologies that have changed the dynamics of how things are done today. The technology was developed through ingesting training data, which was then analyzed for pattern and correlation and the outcomes of the patterns used in the prediction of the future outcome of events. Since the introduction of AI,

it has significantly changed how people live, play, or work. AI has also contributed a lot to the automation of various activities performed by humans in different fields including quality control of projects, fraud detection, and customer service among others. AI performs most of the tasks better compared to human labor, eliminating repetitiveness, and errors (Rasch, 2019). Tasks are also completed quickly without complaining of fatigue hence its application in different fields today. Generally, it has contributed to efficiency in various fields and continues to find its way into other complex fields such as project management.

Given the benefits of AI in other fields, its application in project management would also contribute to positive results. According to AA, the application of AI and other technology in the construction industry styles and project management will increase the success rate significantly. Research by Rasch (2019) noted that by 2030, most of the projects will be run through AI with the application of big data, natural language processing and machine learning technologies. Its application is likely to disrupt most of the processes in project management. One of the aspects that are likely to experience the benefits of AI is prioritization and selection of the projects that are likely to bring more value to the organization. With the application of AI, correct data can be analyzed through machine learning technologies that make accurate predictions. Thus it will help prioritize projects that are beneficial to the organization and only select those with high success rates. One of the advantages of applying machine learning technology and AI in project management is that bias will be eliminated in the decision-making process promoting the success of the selected project.

Nieto-Rodriguez (2023) noted that, AI will optimize office operations in project management to ensure timely monitoring of the projects undertaken. Also, AI will help identify potential problems likely to arise and address them automatically, saving time and resources.

Office operations in project management will be improved especially in reporting where reports will be prepared and distributed effectively for timely feedback (Nieto-Rodriguez, 2023). The AI brings with it a virtual assistant for support of risk assessment and checking on the status of the project. With AI applications, project managers will generally automate most of the tasks for effective results. Although some managers fear their administrative roles will be replaced by AI, the new era of AI-enabled project management systems will ensure that managers have new roles (Mohite et al., 2024). For instance, they will be required to cultivate soft skills or leadership skills that promote strategic thinking for the benefit of the organization. Although there are fears of disruption in the industry by AI, it is worth noting that it will contribute to the overall success of the projects, ensuring they are completed on time.

2.3 Examining the application of AI in the construction industries, benefits and challenges

According to Savio and Ali, (2023), AI is being utilized at a global scale to enhance the completion of construction projects globally. This is due to its potential to improve the monitoring of activities, optimize the allocation of resources, enhance strategies in risk management, and promote lean operations (Savio & Ali, 2023). The application on a global scale is attributed to its ability for process optimization, increased productivity, promoting informed decisions, efficiency, and improved safety. However, it is also important to note that the technology may also experience challenges. For instance, internet connectivity and power supply for the computers remain a major concern as most of the construction sites are remote. The construction activities may also lead to disruption of the internet and power affecting the application of AI tools in the construction industry. The other issue is based on the high initial cost. Abioye et al. (2021) Investing in AI solutions such as acquiring robotics will be a challenge affecting most small firms and subcontractors. There is also an issue of the shortage of AI

engineers required to spearhead developments in the construction industry. Available engineers have limited knowledge and skills in construction projects and may not provide the needed technology that serves the interests of project managers.

3.0 Methodology and Research Methods

The structure of this research will be based on qualitative research with two types of data sources being collected and examined. The data sources that will be examined will include primary and secondary data sources. The primary data sources will incorporate direct gathering of data from research study respondents through interviews. The secondary data will be collected from previously published research studies.

3.1 Interviews

Interviews are commonly used methods for data collection in qualitative research studies. These methods are vital in gaining in-depth and nuanced insights regarding the participants' perspectives and experiences. This research will utilize semi-structured interview approach that involves conducting a comprehensive survey interview with prospective participants to gather insightful information regarding their opinions on the impact of incorporating AI application on traditional project management styles in construction projects within their respective construction companies within Riyadh, Saudi Arabia. This approach will provide an opportunity to delve deeper into the perspectives and opinions of the respondents to help understand the impact of incorporating AI into the traditional project management styles within the construction industry.

3.2 Secondary Data

Secondary data will be collected prior to the survey to help understand the perspectives of the previous researchers on the impact of incorporating AI application on traditional project management styles in construction projects. The utilization of the secondary data will help in enhancing the conclusiveness of our underlying research question. The research will focus on the analysis of qualitative data obtained from researchers with real-world experience to understand the impact of AI in Riyadh industries. Analysis of previous research will also highlight the various methods used in the implementation of AI technology in traditional project management and construction styles. A thorough investigation of the literature will be used to identify the most applicable articles for review. The information will be obtained from major databases such as Google Scholar and only peer-reviewed articles will be utilized in the study. Search terms such as AI, application of AI in the construction industry, and the impact of AI in the construction industry will be used to ensure only extant articles are identified. Case studies and industrial reports will also be used to gather the needed data for this project.

3.3 Research Limitations

Given that this is a mixed study approach, the limitations are based on available resources, context, and temporal considerations. One of the limitations is access to quality resources for review. Some of the literature may require a subscription for access, affecting the comprehensiveness of the study. Bias publication is another challenge likely to affect the outcomes of the results, geographical and temporal scope may limit the outcomes of the results due to the generalization of the construction industry.

The context of the study is limited to the construction industry since it primarily focuses on the implementation of AI application on traditional project management styles in construction

projects. In this case, the scope or the context of the study is limited to the construction projects and limits the study to providing a general understanding of the impact of AI applications in traditional project management styles in construction projects. However, the findings may be applicable to a wide range of project management contexts. The temporal consideration is also another limitation of this study because the study only considers the present and future impact of AI application on traditional project management styles. In this case, the project will not incorporate the historical aspects when it comes to the evolution of AI technology in project management within different industries.

3.3 General Perception and Research Structure

The research is a qualitative research study focusing on the impact of incorporating AI applications on traditional project management styles in construction projects in Riyadh Saudi Arabia. The research will follow a mixed method involving systematic review and survey interview and data will be analyzed for themes, similarities, benefits, and limitations of AI in the construction industry. The results obtained will be used to conclude the impact of incorporating AI applications on traditional project management in Riyadh.

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