

Midocean University

College of Management

Master of Business Administration



**The role of project design management in raising the
efficiency of the implementation of engineering projects in
the oil and gas sector: an applied study in Saudi Arabia**

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:Academic Year

2025

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Introduction:

The role of project design management is one of the main pillars in the modern business world, as it represents a scientific and methodological framework aimed at planning, implementing, monitoring and successful termination of any institutional project, whether in the engineering, service, technology, or other sectors. The role of project design management is not just organizing a set of tasks or tracking schedules, but rather an integrated system that aims to transform ideas into tangible achievements, by directing human, financial and technical resources in a coordinated and planned manner to achieve specific goals within a certain time frame and budget. This management approach is based on a set of standards, tools and practices aimed at ensuring efficiency and effectiveness in performance, reducing risks, and achieving quality outputs.

The main function of the role of the project design department is to clearly define the strategic objectives of the project, and then divide them into structured implementation stages starting with the "start-up" phase, where the idea is analyzed and its feasibility, passing through the "planning" stage, in which a detailed structure is prepared that includes defining the scope of work, estimating costs, allocating resources, setting schedules, and assessing risks. This is followed by the "implementation" phase, where plans are translated into practice, including coordination between teams, ensuring efficient workflow, and dealing with emergency obstacles. The fourth phase is "monitoring and control", in which project performance is measured, deviations from the basic plan are analyzed, and necessary corrective actions are taken. Project management concludes with a "lockdown" phase, which includes a comprehensive assessment of work, delivery of results, and documentation of lessons learned.

The role of the Project Design Department is important in that it contributes to achieving optimal use of resources, reducing waste, raising the quality of implementation, and ensuring a balance between

time, cost and quality. It is also a vital tool in supporting decision-making, adapting to environmental variables, and competing in global markets that require high flexibility and rapid response. With rapid technical and economic developments, the role of project design management is increasingly relying on technology, such as specialized software to manage schedules, cost analysis, and communication between teams, making the process more efficient, transparent and accurate.

In addition, the role of project design management is closely linked to the organization's culture and leadership style, as it requires positive interaction between different teams, providing an environment that supports creativity and innovation, as well as the importance of motivation and effective communication to ensure commitment to goals. In this context, the importance of leadership and soft skills (soft skills) of the project manager is highlighted, such as the ability to solve problems, negotiate, work under pressure, and build positive relationships with stakeholders, because the project is not only managed with tools and techniques, but Also with strong human relationships.

In light of the above, the role of project design management is no longer a traditional administrative function, but has become a scientific discipline in its own right, taught in major universities, and enjoys international accreditation such as the PMP certificate from the Institute of Project Design Management Houses (PMI). Today, it is an indispensable tool for organizations aspiring to achieve operational efficiency, competitive leadership and sustainable growth.

Raising the efficiency of the implementation of engineering projects is one of the main pillars in urban planning policies and sustainable urban development, because of its direct impact on the quality of life of the population and enhancing social and economic stability within cities. The development of neighborhoods does not only mean the construction of new buildings or the improvement of infrastructure, but also includes a human, social, economic and cultural dimension. Data protection is the immediate environment in which individuals and families live, a space where their sense of belonging

and identity is shaped and influenced by the level of services, the environment, employment opportunities, and social interaction.

The concept of raising the efficiency of the implementation of engineering projects stems from the awareness of the gap between neighborhoods within cities, whether in terms of infrastructure, services, population density or quality of buildings, which sometimes leads to the emergence of neglected or random areas that lack the minimum urban components. Therefore, development strategies seek to rehabilitate these areas by improving roads, water, electricity and sewage networks, providing parks and public facilities, and establishing educational, health and cultural centers, which contribute to raising the standard of living and reducing urban and social marginalization.

Moreover, increasing the efficiency of engineering project implementation requires a participatory approach that includes all stakeholders, from government agencies and real estate developers, to the population itself, who must have a pivotal role in setting development priorities and providing feedback on their real needs. Many countries today adopt modern concepts in this area such as "community-oriented development", "smart neighborhood planning" and "progressive improvement", all of which aim to balance urban growth with the preservation of the local and cultural character of neighborhoods, without compromising the spirit of place or expelling indigenous people.

The economic aspect cannot be overlooked in raising the efficiency of the implementation of engineering projects, as these projects contribute to activating the real estate movement, creating direct and indirect job opportunities in the fields of construction, maintenance and services, and leading to an increase in the market value of real estate. Supporting affordable housing is one of the most prominent components of the development process, to ensure that these projects do not turn into elite areas that exclude low-income people, which causes an imbalance in the social balance and exacerbates class disparity within cities.

In light of the escalating environmental challenges, it has become necessary to raise the efficiency of the implementation of engineering projects taking into account the principles of environmental sustainability, through the use of environmentally friendly building materials, enhancing energy efficiency, and relying on urban designs that take into account natural ventilation and reduce carbon emissions, while increasing green spaces and reducing random horizontal expansion. Some global cities adopt the concepts of "zero carbon neighborhoods", "pedestrian-friendly cities" and "urban humanization" in the development of their neighborhoods, as advanced examples of the integration between the environment and urban development.

In general, raising the efficiency of the implementation of engineering projects represents a complex process that requires coordination between various sectors, long-term planning that takes into account current and expected needs, and depends on a comprehensive vision of the city as a living organism that evolves with time, where urbanization overlaps with man, the economy with the environment, and the past with the present and the future.

The role of the Project Design Department is a pivotal tool in the success of efforts to raise the efficiency of the implementation of engineering projects adjacent to the Riyadh Metro, especially in light of the ambitious vision of the Kingdom of Saudi Arabia towards achieving sustainable and balanced urban development. With the rapid urbanization and growing population density in the capital, the importance of developing these neighborhoods has emerged as a vital area that contributes to improving the quality of life, raising the efficiency of land use, and supporting public transportation, especially the Riyadh metro project, which is one of the largest infrastructure projects in the region.

The role of the Project Design Department in this context is to develop an integrated plan to qualify the protection of data surrounding metro stations, so that development processes are directed in a thoughtful and effective manner that ensures compatibility with the infrastructure of the project, and

achieves integration between transportation, residential and service areas. This includes developing urban plans, improving road networks and pedestrian walkways, and providing a safe and stimulating urban environment for the use of public transport, reducing dependence on private vehicles and contributing to reducing congestion and pollution.

Within the role of the Project Design Department, the process of developing neighborhoods adjacent to the Riyadh Metro requires professional methodologies that include precise stages that begin with determining the scope of the project, analyzing population needs, assessing the current situation in terms of infrastructure, urban density, and level of services, and then moving to the planning stage, which includes preparing schedules, allocating resources, and drawing a roadmap for implementation. All this must be done in coordination with the concerned authorities such as the Riyadh Development Authority, the City Municipality, and the Riyadh Train Company, to ensure institutional integration.

The management of these projects also requires high flexibility in dealing with project variables, due to the multiplicity of stakeholders, the different priorities of the population, and the different nature of the neighborhoods surrounding each metro station. For example, some areas may be densely populated and need comprehensive rehabilitation, while others require simple interventions such as improving sidewalks or aesthetically urbanizing. Risk management, feasibility analysis, and cost estimation tools are important to ensure that goals are achieved without exceeding budgets or timelines.

On the other hand, the role of the Project Design Department in this field seeks to create an integrated urban model known as "mixed use development", where residential, commercial, recreational, educational and service functions are integrated into a single environment, enhancing urban life and encouraging residents to use the metro as the main means of transportation. This type of development not only increases the value of the property in the areas adjacent to the stations, but also enhances the economic attractiveness of these neighborhoods, turning them into vibrant urban activity centers.

The role of the Project Design Department also relies on modern technologies in tracking and implementation, such as geographic information systems (GIS), agile project management methodologies, and urban modeling techniques, which facilitates timely decision-making and ensures accurate performance tracking. Community engagement is also an integral part of the project management phase, as it contributes to enhancing community satisfaction and providing an environment responsive to the aspirations and actual needs of the residents.

The development of neighborhoods adjacent to the Riyadh Metro is not only an urban project, but a development project at its core, in which issues of urban planning, public policies, real estate investment, and urban behavior overlap. Hence, the management of this type of project represents a strategic challenge that requires careful coordination between all these factors, while emphasizing the importance of an integrated vision that combines the environmental, social, economic and urban dimension, to achieve the ultimate goal of building a smart, balanced, and sustainable city, worthy of the Kingdom's Vision 2030.

Based on this, the problem of the study is to analyze the impact of the role of project design management in its combined dimensions, represented in (project planning - project risk management - project cost management - project resource management) in raising the efficiency of the implementation of engineering projects by applying to the oil and gas sector in Saudi Arabia.

Search problem

In recent years, the Kingdom of Saudi Arabia has been witnessing major strategic transformations within the framework of its ambitious Vision 2030,

as it seeks to diversify the national economy and enhance operational efficiency in vital sectors, especially the energy sector. This sector is one of the most complex and sensitive, due to its size and direct impact on the national economy, and its increasing reliance on technology and smart systems. With this transformation, automation and digital solutions have become an urgent necessity to ensure the sustainability of operations, achieve efficiency and transparency, and reduce human error and waste of resources.

However, the implementation of automation projects in the energy sector still faces significant challenges related to system integration, resistance to institutional change, poor coordination between stakeholders, and the absence of a unified digital vision in some projects. In this context, project design management stands out as a critical factor that can contribute to overcoming these challenges. Project design management goes beyond traditional concepts of project management to adopt digital technologies such as smart planning tools, predictive analytics, artificial intelligence, and data cloud technologies, which enhances the accuracy of implementation, supports data-driven decisions, and increases the efficiency of communication and integration between different teams.

The research problem addressed by this research stems from a noticeable gap between the possibilities offered by project design management and the practical reality of applying automation solutions in energy projects. Despite the availability of technological infrastructure and the availability of technical competencies to some extent, a large proportion of automation projects face difficulties in implementing on the ground, whether in terms of adhering to timelines, in terms of integration between different systems, or even in measuring the return on digital investment. These

challenges point to the need to examine the relationship between project design management practices and the successful implementation of automation solutions in the sector.

Accordingly, the research seeks to answer the main question: What role does Project Design Department play in facilitating and improving the implementation of automation solutions in the oil and gas sector in Saudi Arabia?, and how effective are digital tools and methodologies in addressing traditional challenges facing the application of automation? The research also explores the readiness of the energy sector to adopt these methodologies, and the institutional ability to adapt to the requirements of digital transformation in project management.

This research problem is of great applied importance, given that the success of automation projects in energy does not depend only on the availability of technology, but also requires effective digital management that enables the transformation of digital vision into practical reality, which contributes to improving performance, reducing costs, raising the level of safety and efficient operation, which the study seeks to analyze through an applied field perspective.

Importance of the study:

The importance of this study depends on its theoretical and practical contributions to the following:

Theoretical significance:

- ✓ Enriching the scientific literature in the field of the role of urban project design management by studying the relationship between the

mechanisms of the role of project design management and the effectiveness of raising the efficiency of the implementation of engineering projects adjacent to the Riyadh Metro, especially in light of the major urban transformations in the capital.

- ✓ Provide a modern theoretical framework that links the components of urban development projects (such as transport integration, use intensity, infrastructure improvement, and quality of urban life) with the outputs of the project design management role such as adhering to schedules, reducing deviations, and improving the quality of implementation.
- ✓ Bridging a knowledge gap in Arab urban and administrative studies, which did not adequately address the relationship between major transport projects (such as the metro) and their impact on raising the efficiency of the implementation of engineering projects from an administrative and planning perspective.
- ✓ Contribute to the development of quantitative and qualitative assessment tools to be used in the future to measure the success of the strategies of the role of project design management in guiding integrated urban development and achieving the goals of sustainable urban transformation in the capital.

Applied importance:

- ✓ Supporting decision-makers in the authorities concerned with urban development and urban planning with accurate indicators on the impact of the role of the Project Design Department on raising the efficiency of the implementation of engineering projects adjacent to the Riyadh Metro, which contributes to the design of more integrated and sustainable policies.

- ✓ Improving the quality of implementation of development projects by providing practical recommendations based on field results that support institutional coordination, reduce financial and time waste, and contribute to efficient resource management.
- ✓ Raising the efficiency of planning and engineering teams by highlighting the importance of integrated management strategies, which take into account the transportation infrastructure, the requirements of the population, and the integration of urban functions within the neighborhood.
- ✓ Achieving economic and social returns by enhancing the investment of areas adjacent to the metro, improving the built environment, and increasing the demand for public transport, in order to achieve the goals of urban transformation and Saudi Vision 2030.

Objectives of the study:

The study aims to analyze the impact of the role of project design management in its combined dimensions, represented in (project planning - project risk management - project cost management - project resource management) in raising the efficiency of the implementation of engineering projects by applying to the oil and gas sector in Saudi Arabia, and a set of sub-objectives branched from it:

- ✓ Analyze the impact of project planning in raising the efficiency of the implementation of engineering projects by application to the oil and gas sector in Saudi Arabia.

- ✓ Analyze the impact of project risk management in raising the efficiency of the implementation of engineering projects by applying to the oil and gas sector in Saudi Arabia.
- ✓ Analysis of the impact of project cost management in raising the efficiency of the implementation of engineering projects by application to the oil and gas sector in Saudi Arabia.
- ✓ Analyze the impact of project resource management in raising the efficiency of the implementation of engineering projects by application to the oil and gas sector in Saudi Arabia.

Study Questions

The first main question: What is the impact of the role of the Project Design Department in its combined dimensions, represented in (project planning – project risk management – project cost management – project resource management) in raising the efficiency of the implementation of engineering projects by applying to the oil and gas sector in Saudi Arabia, and several sub-questions branch out of it as follows:

- To what extent does project planning contribute to raising the efficiency of the implementation of engineering projects applied to the oil and gas sector in Saudi Arabia?

- What is the impact of project risk management in raising the efficiency of the implementation of engineering projects applied to the oil and gas sector in Saudi Arabia?
- How does project cost management affect the efficiency of the implementation of engineering projects applied to the oil and gas sector in Saudi Arabia?
- To what extent does project resource management contribute to raising the efficiency of the implementation of engineering projects applied to the oil and gas sector in Saudi Arabia?

Study assignments:

To achieve the objectives of the study and answer its questions, the researcher can rely on the theoretical framework related to the study, and based on the results of previous studies, the following hypotheses have been formulated:

The first main hypothesis : There is no statistically significant impact of the role of the Project Design Department in its combined dimensions, represented in (project planning - project risk management - project cost management - project resource management) in raising the efficiency of the implementation of engineering projects by application to the oil and gas sector in Saudi Arabia.

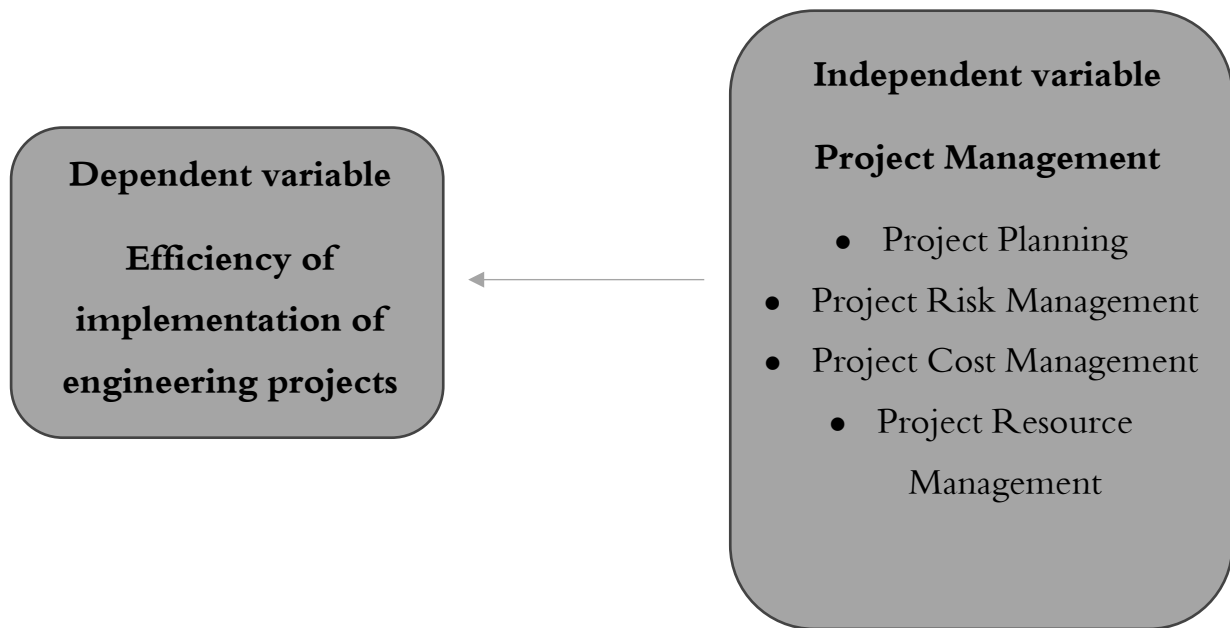
From this hypothesis emerge the following four sub-hypotheses:

- There is no statistically significant impact of project planning in raising the efficiency of the implementation of engineering projects applied to the oil and gas sector in Saudi Arabia.
- There is no statistically significant impact of project risk management in raising the efficiency of the implementation of engineering projects applied to the oil and gas sector in Saudi Arabia.
- There is no statistically significant impact of project cost management in raising the efficiency of the implementation of engineering projects by application to the oil and gas sector in Saudi Arabia.
- There is no statistically significant impact of project resource management in raising the efficiency of the implementation of engineering projects applied to the oil and gas sector in Saudi Arabia.

Study Form:

Independent variable: **The** role of project design management in its combined dimensions represented in (project planning – project risk management – project cost management – project resource management).

Dependent variable: Efficiency of implementation of engineering projects.



Source: Researcher work

Previous studies:

Studies on Project Design Management

A study (Baquer, 2020), entitled The Impact of Risk Management on the Role of Engineering Project Design Department: The Mediating Role of

Organizational Culture in the Public Authority for Roads and Land Transport in the State of Kuwait

The current study aimed to identify the impact of risk management in its dimensions: technical risk management, logistical risk management, financial risk management, human resources risk management, social and political risk management and environmental risk management on the role of engineering project design management in its dimensions: cost, quality, time and field, through the mediating role of organizational culture in the Public Authority for Roads and Land Transport in the State of Kuwait. To achieve the objectives of the study, the descriptive analytical approach was relied on, through the design of a questionnaire and its distribution to individuals. The study sample: engineers and technicians working in the Public Authority for Roads and Land Transport in the State of Kuwait through the use of simple random sample technology. The number of questionnaires distributed electronically reached (220) questionnaires, while the number of questionnaires recovered and valid for analysis reached (160) questionnaires, representing 72.72% of the total questionnaires distributed. In order to analyze the study data, descriptive statistics represented by frequencies, percentages and arithmetic averages were used, simple and multiple linear regression analysis was used, in addition to the use of PLS–SEM program to analyze and test hypotheses. The current

study reached a number of results, the most important of which are: the existence of a statistically significant impact of risk management in its combined dimensions on the role of the Engineering Projects Design Department in its combined dimensions in the Public Authority for Roads and Land Transport in the State of Kuwait, and the existence of a statistically significant impact of risk management in its combined dimensions in the organizational culture. And the existence of a statistically significant impact of the organizational culture in the role of the Engineering Projects Design Department in its combined dimensions in the Public Authority for Roads and Land Transport in the State of Kuwait. It was also found that there is a statistically significant partial impact of risk management in terms of its combined dimensions on the role of engineering project design management in terms of its combined dimensions through the organizational culture as an intermediate variable in the Public Authority for Roads and Land Transport in the State of Kuwait. In light of the results of the current study, the researcher recommends a number of recommendations, the most important of which are: Establishing electronic systems to monitor and evaluate the equipment and tools used in the project and linking them with the Quality Control Department to ensure permanent compliance with the specifications and standards followed. Reduce supply chain risks by identifying, assessing, mitigating and

monitoring unforeseen events and circumstances and preparing for their negative impact on any part of the supply chain during project performance by developing risk tracking software and linking them with software for project design management role such as Primavera Linking KIMS The user in the Public Authority for Roads and Land Transport in the Audit Bureau and Financial Management to avoid any inaccurate operations and to increase the level of internal and external control. Building a database that includes most of the risks facing engineering projects at all stages of the project's life, and the most important requirements for implementing engineering project risk management in the Public Authority for Roads and Land Transport in the State of Kuwait, and how to address and avoid risks.

A study (Al-Shehri, 2024), entitled The Role of Agile Management in Supporting Knowledge Management Project Management Projects in Government Agencies in the Kingdom of Saudi Arabia: A Proposed Model

The study aimed to identify the role of agile management in supporting knowledge management projects in government agencies in the Kingdom of Saudi Arabia, and also aimed to identify the role of agile management in supporting knowledge management projects through the processes of

(knowledge transfer and distribution – knowledge acquisition – knowledge application) in Saudi government agencies, as well as to identify the level of current practices of agile management through dimensions (continuous improvement, vision management, respect for individuals) and its role in supporting knowledge management projects and identifying employees' perception about the obstacles and difficulties that Faced applications of agile management in support of knowledge management projects, the study followed the descriptive survey approach, and the questionnaire was used to obtain analysis data, while the current study sample consisted of all heads of departments and senior departments working in government agencies in the Al-Baha region, numbering (42) individuals, and the questionnaire was used to collect data related to the axes of the study, and the results of the study showed the existence of a role for agile management in supporting knowledge management projects represented in the dimension of the application of knowledge followed by after the acquisition of knowledge followed by After the transfer and distribution of knowledge, the results of the study also showed the approval of the study members to a very high degree at the level of current practices of agile management through the dimensions of continuous improvement, management by vision, and respect for individuals, and that the most prominent results of the level of current practices of agile management

were represented in the dimension of management by vision, followed by after continuous improvement, followed by after respect for individuals, in addition, the results showed that there were no differences between years of experience in supporting knowledge management projects in government agencies due to variables: (Academic qualification, years of experience, employer), and the existence of a statistically significant correlation between the support of knowledge management projects through its dimensions (knowledge acquisition, knowledge transfer and distribution, and application of knowledge) and the level of current practices of agile management through its dimensions (for continuous improvement, management by vision, respect for individuals at a significant level of 0.01, the results showed a strong and statistically significant correlation between supporting knowledge management projects and modern management methods and methods, and the study recommended the need to ensure the participation of the government apparatus and the individuals working in it. Planning and implementation processes to enhance their creativity, working to take advantage of the mistakes that occur from employees and considering them opportunities for learning and continuous improvement, holding workshops to address the weak support of senior management for agile management applications, encouraging the government apparatus to adopt innovative ideas submitted by its employees because of

their positive role in supporting knowledge projects, supporting the government apparatus's adoption of a clear policy to regulate the agile work environment in support of knowledge projects, and seeking solutions to the economic pressures facing workers Finally, the study presented a proposed model for the role of agile management in supporting knowledge management projects in government agencies in the Kingdom of Saudi Arabia.

A study (Abdul Nabi, 2021), entitled The Relationship of Innovation and Creativity in the Success of the Role of the Project Design Department: An Application to the Emiratisation Agency at the Ministry of Human Resources and Social Development

The study aimed to identify the role of innovation and creativity in the success of the role of the Project Design Department, where the problem of the study is the main question: What is the relationship between innovation and creativity with the success of the role of the Project Design Department in application of the Emiratisation Agency in the labor sector at the Ministry of Human Resources and Social Development? The study population consists of the employees of the Tawteen Agency at the Ministry of Human Resources and Social Development, and their number is (128), and the questionnaire was distributed to them, and (128) questionnaires were retrieved with a response

rate of (100%), and the study relied on the descriptive analytical approach, and it became clear from the results of the study that innovation and administrative creativity has to do with developing the framework of concepts of the innovative ability of the Tawteen Agency in providing new products, and its relationship to market performance by attracting human resources with qualifications and experience, and the Tawteen Agency innovates and creativity in projects, and accepts Change and renewal in business performance, and that the adoption of new ideas in the processes of project planning, implementation and control, organizational structure, organization and distribution, is done through continuous development and innovation of products, and that there is a relationship between creativity and innovation and between improving human resource management, and project quality management. Most projects with an innovative format were unique, which increased the chances of success. The study recommended continuous encouragement of development, innovation and the spirit of cooperation in small and medium enterprises, and more attention to workers in accomplishing tasks in creative and innovative ways, and the ability to think creatively, through creative methods of management.

A study (Lead, 2023), entitled Contributions of Network Analysis to the Effectiveness of the Role of Project Design Management: A Study of the Reality of the Public Works Sector in Tamangst State

The study aimed to highlight the reality of the contributions of network analysis to the effectiveness of the role of the Project Design Department in the state of Tamangst, in terms of the completion of construction projects on time, at the lowest cost and with the required quality, and to achieve this goal, the questionnaire was distributed on paper to 40 contractors whose main activity is public works and was processed using SPSS v23 program. The study reached several results, the most important of which is the existence of an impact of the use of network analysis on the effectiveness of the role of the construction projects design department, although most of the study sample members They do not plan, schedule and monitor their construction projects using network analysis and modern programs, which is reflected in reducing the cost of projects, the time it takes to complete them and profitability In light of the results of the study, a set of recommendations were proposed, including training workers to use and effectively control modern programs for the role of project design management.

A study (Al-Abdallat, 2021), entitled The Impact of Good Governance on the Role of Project Design Management: The Modified Role of Crisis Management Planning in the Greater Amman Municipality

This study aimed to identify the impact of good governance in its dimensions (rule of law, transparency, accountability, participation, integrity, fairness, effectiveness, efficiency and sustainability) on the role of project design management in its dimensions (quality management, schedule management, scope management, cost management, risk management and resource management) through crisis management planning as a modified variable in the Greater Amman Municipality. To achieve the objective of the study, the study adopted the quantitative approach. The study population consisted of workers in the projects of the Greater Amman Municipality: managers, project managers and employees, which numbered (300) employees, and the comprehensive survey was used, and (258) questionnaires were retrieved. The study reached a set of results, the most important of which is the existence of an average level of importance for good governance and the role of project design and planning management management in the Greater Amman Municipality, and the existence of a statistically significant impact of good governance in the role of project design management, as well as the existence of a role for crisis management planning in improving the impact of good

governance in the role of project design management in the Greater Amman Municipality. It also found that the dimensions of sustainability and effectiveness have the greatest impact on the role of project design management and its dimensions, and the sustainability dimension has the greatest impact on the existence of crisis management planning. The transparency dimension has had the opposite effect on the role of project design management as well as in the presence of crisis management planning. The study recommended a set of recommendations, the most important of which are: the need for the Greater Amman Municipality to continue to apply and evaluate good governance, with continuous awareness of its employees about the dimensions of good governance, and work to spread the culture of governance in the Municipality, while continuing to develop strategies that ensure the provision of services to all target groups in accordance with social justice and without discrimination, and giving everyone equal opportunities, and the need to develop performance indicators to measure the dimensions of the role of the project design department in the projects implemented in the Municipality, as well as appointing specialized teams for crisis management and others for risk management. And the work of a special guide in the governance of rational projects is applied in governmental and private

organizations with the need for a body responsible for following up the application and conducting a similar scientific study in the private sector.

Infrastructure Studies

A study (Alnsour, 2023), entitled A Sustainable Urban Design Model for Residential Neighborhoods: Palestinian Context

This study aimed to develop an integrated model for sustainable urban design of residential neighborhoods in Palestine, based on the analysis of international sustainability assessment tools such as NSA. The researchers used GIS and Urbano tools along with interviews and observation, to identify , local measurement indicators that take into account the climatic and social specificity of the Palestinian context. The results showed that the integration of the natural environment, energy and water infrastructure, and community activities leads to enhancing the efficiency of neighborhoods and reducing environmental impact. The study recommends the adoption of an institutional sustainability index for local neighborhoods that takes into account the .environment, economy, and social scope as balanced pillars

Karaman (2022) study titled Residential Satisfaction and Quality of Urban Life: Examining Diverse Housing Environments in Kayseri, Turkey

In a comprehensive study of residents of Kayseri district in Turkey, the researchers examined the relationship between the type of residential environment (high density versus low) and quality of life. Data from 600 households were collected using a questionnaire, then analyzed across multiple regression and ANOVA. The results proved that the satisfaction of residents is more severe in low-storey neighborhoods compared to high, as the presence of nearby urban services and social relations between neighbors enhances the sense of belonging, and therefore quality of life. The study concluded that the psychological, social and structural dimensions should be taken into account when designing neighborhoods, and called for improving the level of urban services in high-density neighborhoods.

A study (Mouratidis, 2022), entitled What Makes Cities Livable? Determinants of Neighborhood Satisfaction and Happiness in Thessaloniki and Oslo

The researchers led a comparative study in two European cities, based on structural factor analysis on survey and geographical data from the city's population. The results highlighted that proximity to the urban center, safety and belonging to the place are common factors that raise the degree of satisfaction. Happiness is also associated with calmness, social cohesion and

low density. The team found differences between the two cities: the parks did not contribute much to the satisfaction of the residents of Thessaloniki, but they did in Oslo. They recommended including both residents' motor and emotional satisfaction in urban planning, to raise the quality of life and the .positive impact of sustainable planning

A study (Hassan, 2023), titled Neighborhood Connectivity and Social Sustainability: A Case Study of Qasimabad, Hyderabad

,The researchers reviewed the case of the Qasimabad district of Hyderabad highlighting the importance of the road network and public spaces in promoting the social sustainability of neighborhoods. They found that rapid population growth without a planning structure causes urban randomness that negatively affects social cohesion and quality of life. Through a literature analysis and a field questionnaire, the researchers identified nine ,characteristics of a sustainable neighborhood, including spatial proximity .inclusivity, service access, community communication, and local governance They stressed that enhancing structural and social communication within the neighborhood reduces isolation and increases the satisfaction and continuity .of residents in the neighborhood

Study (Lee, 2021), entitled Relationship between Physical Environment Satisfaction, Neighborhood Satisfaction, and Quality of Life in Gyeonggi, Korea. Land, 10(7), 663–675.

The study aimed to analyze the relationship between residents' satisfaction with the physical environment of the neighborhood (such as streets, services, green spaces) and their overall satisfaction with the neighborhood and quality of life. Data from a national survey conducted in Gyeonggi Province, Korea, involving 20,000 participants was used in a multi-stage stratified design. The results of the Working Regression Analysis and ANOVA showed that residents' satisfaction with the physical environment of their service – such as the availability of amenities and the safety of the area – is positively and consistently correlated with overall quality of life. A moderate effect analysis also showed that the level of satisfaction About the neighborhood enhances the positive impact of environmental satisfaction in enhancing the quality of life, which expresses the role of the relationship between the individual and his environment. The results suggest that neighborhood planning should focus on improving the quality of infrastructure and services and taking into account safety and comfort requirements to achieve a tangible improvement in residents' satisfaction and quality of life.

Research Gap:

A review of previous studies on the role of project design management, functional integration and raising the efficiency of engineering project implementation shows that there is a richness in research efforts that addressed each of them separately, but at the same time reveals a clear research gap regarding the interconnectedness of these axes in rapidly growing national urban contexts, such as in the Riyadh metro project and adjacent residential areas.

Most of the previous studies intersect in their interest in analyzing the elements of administrative and field performance in the role of project design management (as in the studies of Abdul Nabi, 2021; Abdallat, 2021; and Taqda, 2023), focusing on traditional variables such as innovation, governance, and network analysis. Despite the scientific importance of these studies, they mostly focused on administrative or construction sectors without direct link to the development of residential neighborhoods adjacent to large urban transport projects such as the metro. Most of these studies relied on typical management models without looking deeply into the urban environment as a changing and multidimensional field.

On the other hand, data protection studies (such as Karaman, 2022; Mouratidis, 2022; Hassan, 2023) have focused on elements of housing satisfaction, social sustainability, and urban quality, but have not integrated the tools of the role of project design management as a governing mechanism in neighborhood development processes, nor have they considered how these tools can be used within the contexts of transformational development resulting from major national projects such as the metro. Also, these studies have mostly focused on cities outside the Arab world, limiting the possibility of

generalizing their findings to Gulf urban environments with cultural and demographic specificity, such as Riyadh.

The current study, which examines the **role of project design management in raising the efficiency of engineering project implementation**, offers a unique treatment in terms of combining the tools of the role of traditional project design management with urban development goals within a national transformation framework. It differs from previous studies in its orientation towards **integrating the planning and administrative dimension with the urban transformation dimension in a modern and complex context**. The study is also distinguished by its targeting of a specific geographical location of strategic importance at the national level, which is the vicinity of the Riyadh metro project, which is one of the largest urban transport projects in the Middle East. This overlapping and accelerating context of transformation has not been addressed in depth in previous Arab or foreign studies.

Accordingly, the research gap is highlighted in the fact that the current study focuses on activating the role of project design management as a strategic tool to guide raising the efficiency of the implementation of engineering projects affected by national projects, and evaluating the effectiveness of this activation at the administrative and urban levels, which was not addressed by previous studies that were limited to either administrative or residential contexts in a fragmented manner.

Theoretical premises of the study:

The current study, titled "The Role of Project Design Management in Raising the Efficiency of Engineering Projects Implementation: An Applied Study on the

Oil and Gas Sector in Saudi Arabia", relies on a number of theoretical premises that constitute the intellectual and cognitive framework on which it is based in analyzing the studied phenomenon and understanding its dimensions.

At the forefront of these premises comes the comprehensive concept of the role of project design management, as an organizational and strategic tool used to plan, implement and monitor projects, by applying knowledge, skills, tools and techniques to project activities to achieve its objectives effectively. This concept has evolved to include new areas such as urban transformation, where it is no longer limited to technical and construction aspects, but includes social, economic and environmental dimensions that affect urban communities and the ways of life of residents.

The study is also based on urban planning literature that places raising the efficiency of the implementation of engineering projects at the heart of urban transformation processes, especially in light of the growth of national projects such as mass transit projects. Neighborhoods adjacent to metro stations are seen as strategic urban environments, affected by functional and structural changes as a result of convergence with major transport hubs, which calls for an integrated management approach to develop them according to quality, sustainability and urban suitability standards.

The study theoretically frames the concept of urban transformation as a dynamic process that includes the restructuring of urban spaces, by directing investment, improving infrastructure, and raising the quality of life, while preserving the cultural and social specificity of the population. In this context, the role of the Project Design Department intersects with the urban transformation in creating effective management tools that contribute to

improving the urban performance of neighborhoods, which this study seeks to monitor and analyze in the reality of the city of Riyadh.

On the other hand, the study proceeds from the premise that major transport projects, such as the Riyadh Metro project, are not only transportation infrastructures, but are catalysts for large-scale urban transformation, which directly and indirectly affect the planning and raising the efficiency of the implementation of neighboring engineering projects. Therefore, the management of urban development projects in these neighborhoods requires advanced models of governance, stakeholder engagement, and coordination between executive authorities and local communities, all of which establish the important role played by the role of the Project Design Department in controlling this transformation.

Based on the above, the current study bases its theoretical framework on integrating the concepts of the role of urban project design management and urban transformation, taking into account the unique Saudi context, and the challenges posed by the National Vision 2030, including the trend towards improving the quality of life and activating economic and social mobility in major cities such as Riyadh.

Methodology and Research Methods:

The descriptive approach and the analytical approach were followed as an appropriate method of description, which corresponds to the theoretical chapters, either in the applied analytical chapter and the deductive method in order to analyze and evaluate the data obtained in the questionnaire of the

institution under study as appropriate for determining the facts and understanding the components of the subject, while subjecting it to careful study and analysis of its dimensions, which we will address in the applied chapter in the case study.

The choice of the appropriate approach to the nature of the research depends on the nature of the problem and the goal of its study, and in order to take note of the various aspects of the study, the descriptive analytical approach will be relied on, the descriptive method is suitable for the description that matches the theoretical chapters, but in the applied analytical chapter and the deductive approach in order to analyze and evaluate the data obtained in the questionnaire under study, as this approach contributes to answering research questions through data collection and then analysis and discussion. This approach is used in most previous studies.

Sources of data collection

- **Secondary sources:** These include data and information in books and references, theses, working papers, journals, periodicals, scientific conferences and workshops, in addition to published and unpublished reports that dealt with the topic in various relevant institutions.

- **Primary sources:** The study relied on the questionnaire as the main tool in collecting data from its sources, which was specially designed for this purpose on Google Forms and sending its link to the research community.

Study Tools:

The research tool is defined as "the means by which the data collection process is carried out in order to answer his questions, and researchers will rely in collecting data on the questionnaire, which is defined as "a specific form of paragraphs and questions aimed at collecting data from research individuals"

It consisted of two main sections:

- **The first section:** It is the part related to the demographic variables of the members of the study sample, represented by: gender, age, educational qualification, and job level.
- **Section II: The** second section included paragraphs and dimensions that measure the variables of the independent and dependent study.

Statistical methods used

The following statistical methods were used to achieve the objectives of the study:

- Cronbach alpha coefficient to measure the stability of the study tool and Pearson's correlation coefficient to measure the validity of the study tool and the relationship between variables
- Frequencies, percentages, arithmetic mean and standard deviation related to the study variables and to all responses to the questionnaire paragraphs.
- Simple linear regression coefficient to measure the effect of each dimension of the independent variable on the dependent variable

Study Tool

The questionnaire in the current study is designed to suit the variables of the research by reviewing previous studies related to the subject of the study.

The questionnaire consists of two main sections:

The first section: deals with the demographic variables of the study sample of workers in the construction projects sector, and includes job title, age, educational level, and number of years of experience.

The second section: contains the paragraphs that measure the independent and dependent variables in the study.

First: The independent variable – the role of project design management, measured through 20 paragraphs divided into three main dimensions:

1. Project Planning
2. Project Risk Management
3. Project Cost Management
4. Project Resource Management

Second: The dependent variable – raising the efficiency of the implementation of engineering projects, measured through (10) distributed paragraphs.

Limitations of the study:

- **Objective limits:** The study is limited to analyzing the impact of the role of project design management in its combined dimensions, represented in (project planning – project risk management – project cost management – project resource management) in raising the efficiency of the implementation of engineering projects by applying to the oil and gas sector in Saudi Arabia.

- **Spatial boundaries:** The study is conducted on the oil and gas sector in Saudi Arabia.
- **Time limits:** The study was prepared in 2025.
- **Human limits:** The human limits of this study are limited to those working in the oil and gas sector in Saudi Arabia.

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قطاع النفط والغاز: دراسة تطبيقية في السعودية

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2025