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Factors Affecting Turnaround Maintenance Project Success in Yemeni Oil and Gas Industries with a Moderating Role of Leader Personality Traits

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Abstract

This study aimed to investigate the critical factors influencing the success of Turnaround Maintenance (TAM) projects in the Yemeni Oil and Gas industry. Despite existing research on turnaround maintenance (TAM) projects in the oil and gas industry, there is a significant knowledge gap in identifying critical success factors and addressing management-related factors, particularly in the context of the Yemeni oil and gas sector. This calls for further exploration of TAM success determinants, focusing on management practices, stakeholder perspectives, and context-specific challenges to improve the reliability and efficiency of TAM projects in the industry. The study collected data from 386 participants through a structured questionnaire and analyzed the data using the Partial Least Square method to test ten hypotheses. In this study, a stratified sampling procedure was employed, selecting individuals involved in TAM-related activities across various departments to obtain a representative sample and gain insights into the current practices and future trends in their organizations. The findings revealed that organizational factors did not have a significant effect on TAM project success, while human resource-related factors, project management factors, project factors, and leader personality traits were identified as critical factors for successful TAM projects. The study also found that leader personality traits had a significant moderating effect on the relationship between critical success factors and TAM project success. The study's findings have several practical implications, such as improving the selection and training of TAM project leaders and emphasizing the importance of human resource management and project management practices. Additionally, the study provides academic implications, particularly for researchers interested in investigating the critical fac-

tors for TAM project success in other contexts. The study's limitations and recommendations for future research were also discussed. Overall, this study contributes to the understanding of critical success factors for TAM projects in the Yemeni Oil and Gas industry.

Keywords

Turnaround Maintenance, Project Success, Project Management, Economic Resilience, and Leader Personality Traits

1. Introduction

This paper begins by explaining the notion of Turnaround Maintenance (TAM) projects in the oil and gas sector. It then delves into aspects like turnaround management, evaluates the results of TAM projects, and provides insights unique to projects in Yemen. With the help of relevant underlying theories and insights from earlier research, the literature review provides a comprehensive examination of the variables that were selected for this study. The research design is a detailed plan that specifies how the study will be carried out. It offers a methodical and coherent framework for gathering, analyzing, and interpreting data. The discussion portion then provides additional contextual depth by interpreting and analyzing the findings. Key findings are summarized, ramifications are emphasized, and frequently, new study options are suggested while accepting limitations in the conclusion section.

Turnaround maintenance projects are dynamic but crucial events initiated to avoid unforeseen breakdowns, maximize production throughput, improve plant productivity (Elwerfalli, 2019), and ensure that the plant is secure to work (Al-Turki, Duffuaa, & Bendaya, 2019). Although these programs are critical in process plants, project failures are common (Beny & Romy, 2020; Elwerfalli, 2019). Project managers are continually forced to complete effective turnaround tasks while working under tight budgets, tight schedules, and a flexible scale while maintaining the highest levels of protection and efficiency. According to Al-Turki and Duffuaa (2019), there has long been a notion that thorough use of planning and scheduling methods leads to improved project management and, as a result, a successful project conclusion. According to Al-Turki and Duffuaa (2019), project success may be enhanced if all participants know success and are aware of the elements that contribute to it. As a result, this research aims to investigate the factors that have a major effect on the performance of shutdown initiatives. In addition, the research will use structural equation modelling to examine the relationship between project results and variables that influence project success. The findings of this study offer an overview of the indicators that may be used to evaluate the success of shutdown projects and the variables that project managers can consider when looking to improve the outcome of their turnaround

maintenance. This chapter introduces the problem that the study is attempting to solve. The chapter provides an outline of the research and its intent after this introduction. Furthermore, the research issues and the rationale for how this research would advance the present state of the art. Before listing the main words commonly employed in this research report, a short description of the analytical methodology used to answer the research questions is discussed. The chapter ends with a research outline and a list of main points.

A key component of an organization's maintenance policy is turnaround maintenance. These programs are necessary for the preventive upkeep of continuously functioning equipment that cannot be halted for repairs during plant operations (Beny & Romy, 2020). During turnaround, the processing facility is stopped down so that the machinery may be properly inspected and cleaned before repairs can be made (Audrain, 2021). Standard turnaround maintenance, according to Al-Turki and Duffuaa (2019), requires a large budget, thousands of actions, the organization of a multidisciplinary team, a propensity for discovery work, and a significant risk of safety issues. The development of these programs is crucial to everyone involved as a consequence (Audrain, 2021). The stability and reputation of the facility might be at jeopardy if the project proceeds poorly; this could have an economic impact owing to lost output and other environmental and safety consequences (Duffuaa, Al-Turki, & Daya, 2019). Several project failures have been documented, despite the significance of turnaround maintenance programs for several industrial facilities (Elwerfalli, 2019). Approximately 25% of turnaround programs completely fail, and 80% of these initiatives fail to reach their production targets, according to studies (Beny & Romy, 2020). About 40% of turnaround programs fall short of average output objectives by at least 30%, according to other researchers' findings (Al-Turki & Duffuaa, 2019). Audrain (2021) made a similar point, stating that delays and cost overruns occurred in approximately 70% of the projects.

The difficulties in Yemen are comparable in complexity. According to research carried out in the area, every Turnaround maintenance operation has delays and cost overruns (Al-Turki et al., 2019). The likelihood of Turnaround maintenance initiatives being completed late or over budget is high, according to Al-Turki et al. (2019) findings. Recent blackouts in Yemen have been caused by insufficient maintenance and a shortage of energy supply from power producing plants. The usefulness of Turnaround maintenance project analysis is therefore justified. Turnaround maintenance project outcomes must be assessed, and creative approaches to boosting their performance must be looked at. Although programs are viewed as strategic tools for achieving organizational goals, fostering economic growth, and increasing competitiveness, poor productivity is common in projects (Duffuaa & Al-Shayea, 2020). Companies must place a lot more emphasis on maintaining assets, expanding manufacturing capacity, and maximizing benefits if they want to maintain their long-term sustainability in this era of globalization (Beny & Romy, 2020). This implies that dependability is

critical to the overall sustainability and effectiveness of a Turnaround maintenance project (Duffuaa et al., 2019). Initiatives must, however, be successfully completed for the company's productivity to rise (El Werfalli, 2019).

Project success is a hotly debated issue across several academic disciplines. It is generally understood that the word "project success" has several diverse meanings and has no one definitive definition (Hajko & Badánik, 2020). Rantala, Kortelainen, & Ahonen (2021) assert that the significance and intent of the initiative are to blame for the various interpretations of its performance. The significance of this phrase has increased as a result, and many academics are now interested in the subject (Khasanah, 2022). However, the phrase must be well-established to improve the effectiveness of shutdown programs. Turnaround maintenance should be covered by an organization's maintenance policy. These programs are necessary for the preventative maintenance of continuously operating equipment that cannot be stopped for repairs during plant operations (Khasanah et al., 2019). The processing facility is shut down during turnaround so that the equipment can be thoroughly inspected and cleaned until repairs can be made (Rantala et al., 2021).

According to Ratendra and Virender (2021), standard turnaround maintenance involves hundreds of steps, the formation of a multidisciplinary team, is prone to discovery work, carries a significant risk of safety incidents, and necessitates a sizable expense. Therefore, everyone concerned needs these programs to be developed (Tervo, 2021). If the project fails, the plant's stability and reputation may be in peril; this could have an economic impact due to lost output and worries about the environment and safety (Alfares, 2022). There have been a number of documented project failures despite the importance of turnaround maintenance programs for various industrial facilities (AlHamouri, Caldas, Hwang, Krishnankutty, & de Oliveira, 2021). Studies show that 80 percent of these projects fall short of their intended productivity goals and that over 25 percent of turnaround programs entirely fail (Al-Turki, Duffuaa, & Bendaya, 2019). Around 40% of turnaround initiatives, according to Elwerfalli (2020) and Elwerfalli, Khurshid and Munive-Hernandez (2019), fall short of normal output objectives by at least 30%. Approximately 70% of turnaround initiatives, according to Nikmatul, Yudoko and Firman (2023) had delays and cost overruns. Yemen is a developing nation with comparable problems. Every turnaround repair operation, according to local studies, includes delays and cost overruns (Khasanah, 2022). The conclusion reached by Hlophe and Visser (2018) is that there is a good chance that turnaround maintenance initiatives will be finished late or over budget. Due to inadequate maintenance and a lack of electricity from power plants, Yemen has recently experienced blackouts. Because of this, it's important to evaluate how effective Turnaround maintenance projects are. Turnaround maintenance project outcomes must be evaluated, and innovative ways to enhance them must be considered. Programs are viewed as strategic tools for achieving organizational goals, spurring economic growth, and increasing competitiveness (Masubelele &

Mnkandla, 2021), however turnaround initiatives frequently produce subpar results. In this age of globalization, businesses must place a high priority on benefit maximization, asset maintenance, and the expansion of their manufacturing capabilities if they want to maintain their long-term sustainability (Rantala et al., 2021). This implies that the reliability of a Turnaround maintenance project determines an organization's whole existence and effectiveness (Alfares, 2022). To boost the business' productivity, though, project completion must be successful (Al-Turki et al., 2019).

A contentious topic of discussion in many academic domains is project success. It is well acknowledged that the term "project success" lacks a universal definition and that various scholars may have varied interpretations of what it means (Elwerfalli et al., 2019). According to Elwerfalli, Khan and Munive-Hernandez (2019) the various evaluations of the project's effectiveness are due to the project's purpose and meaning. Due to the rising prominence of this phrase, numerous scholars are now interested in the topic (Deepak Chandra, Preeti, Seema, & Kamal, 2023). It is necessary to spread awareness about shutdown initiatives in order to increase their efficacy. In the oil and gas sector of Yemen, Turnaround Maintenance (TAM) plays a crucial role in maintaining operational efficiency and preventing costly and environmentally detrimental interruptions. Oil and gas companies in Yemen commonly adopt the "Condition-Based Maintenance" (CBM) approach to monitor machinery until failure, addressing issues such as fatigue, welding joint fractures, and misalignments (Elwerfalli, 2019). Additionally, geographic conditions in Yemen pose a risk of erosion in pipelines and vessels, particularly in humid or sandblasted areas, necessitating novel techniques for assessing internal corrosion (Beny & Romy, 2020). TAM is essential in gas plants, where the interconnected nature of components like boilers, pipelines, and generators means that a single failure can halt production. Standby items for critical equipment can enhance plant reliability, but their implementation is challenging due to size and cost considerations. The TAM process includes risk-based failure (RBF) and risk-based inspection (RBI) assessments. Preventative and proactive maintenance strategies are often employed in Yemen's oil and gas sectors to manage equipment deterioration and prevent accidents. These strategies include monitoring variable temperatures, pressures, and vibrations to prevent leaks and bearing misalignments. However, comprehensive inspection and maintenance are only possible during a full plant shutdown, highlighting the importance of TAM. TAM aims to improve plant flexibility, reduce downtime, extend equipment life, and enhance safety, thereby helping companies in planning and anticipating maintenance workload more accurately (Deepak Chandra et al., 2023). The oil and gas industry in Yemen faces significant challenges in managing Turnaround Maintenance (TAM) projects, crucial for ensuring operational efficiency and mitigating production losses. Recent studies have highlighted the complexities in TAM scheduling and execution, with substantial impacts on production and costs (Elwerfalli, 2020; Elwerfalli, 2019; Duf-

fuaa et al., 2019; Ekpe, 2023). There is a recognized knowledge gap in addressing TAM scheduling issues and understanding the factors influencing TAM project success. While some research has focused on improving TAM intervals and duration, critical aspects like equipment prioritization and human and organizational factors have been less explored (Elwerfalli & Al-Maqespi, 2021; Al-Khu-laqi et al., 2023; Al-Turki et al., 2019; Beny & Romy, 2020; Cruz & Haugan, 2019). This study aims to bridge this gap by investigating the critical factors influencing TAM project success in Yemen's oil and gas industry, examining the relationships between organizational, human, and project management factors and TAM project success, as well as the role of leadership traits in moderating these relationships. The research emphasizes the need for a comprehensive framework to manage TAM projects effectively, addressing both objective and subjective success indicators (Deepak Chandra et al., 2023; Deng, Santos, & Verhagen, 2021; Duffuaa et al., 2019). This study is significant as it contributes to the limited literature on TAM in the oil and gas sector, particularly focusing on the Yemeni context, and aims to offer practical solutions for minimizing cost overruns and delays in TAM projects, thereby enhancing overall project efficiency.

2. Literature Review

2.1. TAM Project Success

A method called turnaround management (TAM) tries to bring a failing company's sustainability and profitability back. A TAM project's success is dependent on a number of important success elements, including solid financial management, competent leadership, and effective stakeholder communication. According to empirical data, a TAM project's success is highly impacted by five crucial success elements. For instance, a research by Masubelele & Mnkandla (2021) discovered that strong leadership is an essential component of TAM project success. According to the report, great leaders are able to inspire and encourage workers, communicate effectively with stakeholders, and put effective company turnaround plans into action. The survey also found that companies with strong CEOs were more likely to succeed in their TAM project goals.

Another essential component for TAM project success is sound finance management. Effective financial management is crucial in TAM initiatives, according to a research by Kortelainen et al. (2021), since it guarantees that the firm has the financial means to undertake the changes required to turn around the business. According to the survey, companies with solid financial management were more likely to succeed in their TAM project goals. The research also discovered that creating and executing a financial strategy, keeping tabs on financial performance, and modifying the plan as needed are all essential components of efficient financial management.

In TAM initiatives, effective stakeholder communication is also a crucial suc-

cess component. In order to guarantee that all stakeholders are aware of the changes being made and are in favor of the TAM project, efficient communication with stakeholders is crucial, according to a research by Rantala et al. (2021). According to the survey, firms were more likely to meet their TAM project goals if they had excellent communication with stakeholders. The research also discovered that in order to effectively communicate, it is necessary to identify the stakeholders, create a communication strategy, carry it out, and evaluate its success.

Controlling a turnaround is challenging (Baliouskas, Llopis, Gasco, & Gonzalez, 2023). To prevent sales losses while the refinery is not in operation, the many separate activities and their related services must be coordinated such that the average length of plant downtime is as little as feasible (Elwerfalli et al., 2019). As a result, most plants are prepared to invest a significant sum of money to get up and running more quickly (Fabic, Pavletic, Valic, & Markovic, 2019).

However, all refineries have difficulties in organizing, managing, and finishing turnarounds and shutdowns because to the substantial quantity of labor required during a turnaround (Kortelainen et al., 2021). Al-Turki et al. (2019) estimate that a big turnaround will take up to 150,000 person actions. More than half of all shutdown programs are delayed by more than 20% and more than 80% go over budget by more than 10% due to this level of complexity. The field of employment often grows by up to 50% without prior notice (Baliouskas et al., 2023).

Through a number of case study scenarios, this project would examine turnaround challenges in the oil and gas processing industry (Kortelainen, Rantala, Valkokari, & Ahonen, 2021; Masubelele & Mnkandla, 2021; Ranar Taraditya Wahyudhi, 2021). Each case study focuses on a particular problem that a site could have in addition to the typical difficulties with planning, organizing, coordinating, and scope management. While recognizing potential hazards requires experience and insight, every issue has a solution. These examples show the ways in which these locations were finally able to accomplish a full recovery.

Any review must comprehend and evaluate the critical factors that determine whether a project is successful or unsuccessful. A project's success or failure depends on a number of variables that are difficult to quantify with objectivity (Nikmatul, Yudoko, & Firman, 2023). These variables can only be accurately expressed if the performance metrics have been well established. Inadequate project outcome measurement may contribute to inefficient project management (Masubelele & Mnkandla, 2021). Nikmatul et al. (2023) said, "We must know when to correct, when to correct, and how much to correct if we wish to anticipate and affect the path of our programs."

Although corporations have taken attempts to ensure the success of TAM initiatives, there have been a number of failures (Gunawan, 2021). While businesses' willingness to implement performance measures like as methodologies,

tools, knowledge, and skills may be one problem, they often fail to assess TAM success using the right criteria (Akhimienmhonan, 2019). If the measurement parameters are the reason for the recorded errors, using them would lead to the same failures as before (Ranar Taraditya Wahyudhi, 2021).

Project success is a subject that is often discussed but hardly assessed. According to Bogopa & Marnewick (2022) and Hussain, Khan, Khan, & Khan (2022), project success will mean diverse things to various people, which leads to the differences in whether a project is outstanding or not. According to Hussain et al. (2022), there are several definitions of project success. They are established based on the fundamental aspects of the project shape, size, complexity, project participants, and owners' experience. TAM project success measurement criteria are required to help determine the elements influencing TAM project performance as well as to appropriately analyze the TAM project result.

The success of a project has often been evaluated using internal metrics including satisfying technical and operational objectives, the timeframe, and the budget. According to Khattak, Um-e-Rubbab, Shaikh, & Afridi (2022), project success criteria are a collection of standards or benchmarks that may be used to achieve desired results in a certain amount of time. Four essential elements of project execution were highlighted by Ktaish & Hajdu (2022). They contend that a project is successful if it meets all of the following requirements: it is authorized and used by the client for whom it was created; it is delivered on time; it is completed on schedule; and it achieves all of the original goals (client satisfaction criterion). Recent research has shown that project success entails much more than simply successful project execution. According to Moradi & Kähkönen (2022), many additional metrics might be employed to evaluate project success. These metrics show how well the project has done outside or how it has affected the start-up and its clients.

In conclusion, A TAM project's success is dependent on a number of important success elements, including solid financial management, competent leadership, and effective stakeholder communication. According to empirical data, a TAM project's success is highly impacted by five crucial success elements. Employee motivation and inspiration, stakeholder communication, and the implementation of efficient company turnaround methods are all skills that good leaders possess. Effective communication with stakeholders ensures that all parties are aware of the changes being made and are supportive of the TAM project. Strong financial management ensures that the business has the financial resources to execute the required changes. Prioritizing these crucial success criteria will increase an organization's chances of achieving the TAM project's goals and returning the firm to profitability and sustainability (**Table 1**).

2.2. Underpinning Theories of This Study

In the context of the Yemeni oil and gas industry, the integration of strategic management theory, trait theory, and production theory offers a comprehensive

Table 1. Summary of TAM Project success criteria based on literature.

Sources	Identified TAM Project Success Factors	
Garousi et al. (2019)	Budget	Functionality
	Scope	User satisfaction
	Schedule	Team satisfaction
	Reliability	Top management satisfaction
	Esay to use	Overall quality of software delivered
	Flexibility	
Shakya, P. & Shakya, S. (2020)	On-time Delivery	Improved managerial effectiveness
	Improved Quality Product	Ability to react to change
	Customer Satisfaction	Reduced project risk
Pacagnella Jr. et al. (2019)	Efficiency	Impact on the team
	Impact on consumers	Preparation for the future
Pirotti et al. (2020)	Short-term goal	Meeting: Time, Budget, Requirement goals
	Medium-term goal	Meeting: Performancem target, Technical specifications, Functional requirement
	Long-term goal	Commercial success, Market share, Revenue and profits
	Very long-term goal	Developing: Opportunities, Technology, Techniques, Products and markets for the future
	Business and direct success	Project efficiency
	Future preparation	Impact on customer
Unegbu et al. (2020)	Completed on time	Meeting design requirement
	Completed within budget	Overall stakeholders satisfaction
	Meeting quality requirement	
Altarawneh & Samadi (2019)	Completion of project on schedule	The projects satisfy the team members needs
	Completion of project on agreed budget	Completion of the project safely
	Completion of project in accordance to agreed quality specifications	Absence of conflict among the project parties
	The project satisfies the client needs	Achieving the goals of project
Pham at el. (2019)	Meeting the general project objectives	Meeting clients' requirements
	Completion status within a pre-determined budget, quality and time	Clients' appreciation

framework for addressing the industry's challenges and enhancing its operational effectiveness. Strategic management theory, as discussed by Ferreira, Mueller, and Papa (2020), highlights the critical distinction between strategic and opera-

tional management, emphasizing the need for clear direction setting and efficient operation within these strategic bounds. This approach is especially pertinent in Yemen's oil and gas sector, which navigates complex challenges like political instability. On the other hand, trait theory, as elaborated by Jayawickreme, Zachry, and Fleeson (2019), underscores the importance of leadership traits in uniting people towards a common goal, with a renewed focus on behavioral traits that promote leadership development and success. This aspect is crucial in the industry, particularly in the context of managing Turnaround Maintenance (TAM) projects, where leadership plays a pivotal role. Furthermore, production theory, employed in studies like those by Dormandy, Mufti, Higgins, Bailey, and Dixon (2019), focuses on the operational aspects of how businesses produce goods and services, highlighting key success factors like technology readiness and user involvement in TAM projects. Empirical studies, including those achieved by Kassem, Khoiry, and Hamzah (2021), reinforce the significance of these theories in navigating the industry's complex environment. They emphasize the importance of strategic management in maintaining competitiveness amidst external challenges, and the role of production theory in ensuring the success of technological and managerial initiatives. The relevance of trait theory is further supported by research like Wael et al. (2018), which links emotional intelligence, a key leadership trait, to effective leadership and success in the industry. Collectively, these theories offer a multifaceted understanding of the dynamics in Yemen's oil and gas sector, providing valuable insights for driving growth and addressing the industry's unique challenges.

2.2.1. Strategic Management Theory

In the Yemeni oil and gas industry, strategic management theory, as advocated by Ferreira et al. (2020), plays a pivotal role in addressing the complexities of project management, particularly in Turnaround Maintenance (TAM) projects. This theory emphasizes the importance of distinguishing between strategic and operational management, advocating for a comprehensive approach to planning and scheduling, as delineated by Iheukwumere-Esotu and Yunusa-Kaltungo (2022), focusing on work breakdown structures, critical path identification, and various project management facets such as resource, scope, budget, procurement, risk, communication, and safety management. Yunusa-Kaltungo and Labib (2021), Duffuaa et al. (2019), and Raza and Hameed (2022) further emphasize the critical components of project management, underscoring the significance of scope, time, cost, quality, and safety in ensuring high-quality project outcomes. Strategic management theory is particularly vital in TAM projects in Yemen's oil and gas sector, where it is used to identify and manage various factors influencing project effectiveness, including organizational characteristics, human resource factors, project management aspects, project features, economic resilience, and leader personality traits (Elwerfalli, 2019; Kassem et al., 2021; Hakimi et al., 2019; Mitrofani, Emiris, & Koulouriotis, 2020; Kamenga, Pellegrini,

Rodriguez, & Merabet, 2021; Cruz & Haugan, 2019; Ma, Sun, Chung, & Chan, 2022; Meissner, Rahn, & Wicke, 2021; Ertem, As'ad, Awad, & Al-Bar, 2022). This theory assists in aligning resources and capabilities with organizational goals and objectives, thereby enhancing project success. The importance of leadership traits in moderating the relationship between critical success factors and project success is also highlighted, with strategic management theory acknowledging the pivotal role of leadership in steering successful strategies and realizing organizational objectives. Overall, strategic management theory offers a valuable framework for effectively navigating the complexities and evolving landscape of Yemen's oil and gas industry, ensuring the success of technology adoption projects and overall organizational resilience.

2.2.2. Trait Theories

Trait theory provides a valuable perspective in understanding how inherent personality traits of leaders can significantly impact the success of Turnaround Maintenance (TAM) projects in the Yemeni oil and gas industry. This theory, as explored by Wari, Zhu and Lim (2023) and Elwerfalli et al. (2019), posits that certain inherent traits such as conscientiousness, extraversion, and emotional intelligence can enhance a leader's effectiveness in project management. The correlation between leadership traits and project success has been empirically supported by research from Khasanah, Jamasri and Yuniarto (2019) and Khasanah et al. (2021), indicating that emotional intelligence and conscientiousness in project leaders are linked to higher project success rates. Similarly, research by Iheukwumere-Esotu and Yunusa-Kaltungo (2022) and Shou et al. (2020) highlights the effectiveness of risk-taking and transformational leadership traits in managing complex projects successfully. Trait theory has evolved from the early 20th-century belief that leaders could be identified by specific traits (Al-Marri, Nechi, Ben-Ayed, & Charfeddine, 2020), despite the later realization that no universal traits define all leaders. Nevertheless, certain traits, including technical skills, affability, social skills, emotional control, intelligence, and charisma, are frequently associated with effective leadership. The current study leverages trait theory to examine how leadership personality traits moderate the relationship between critical success factors and TAM project success. The findings suggest that these personality traits, particularly emotional intelligence and creativity, are instrumental in enhancing project success, as evidenced by studies like Duffuaa et al. (2019), Duffuaa and Al-Shayea (2020), and Beny and Romy (2020). These studies validate the hypothesis that leadership traits such as emotional intelligence, creativity, conscientiousness, and extraversion can positively influence project outcomes and mitigate the impact of project complexities and uncertainties.

2.2.3. Production Theory

Production theory in economics, as elucidated by Mitrofani et al. (2020), Moradi and Shadrokh (2019), and Ahmed (2020), offers a critical framework for under-

standing how businesses determine the production of goods and services by effectively combining various inputs like labor, raw materials, and capital. This theory encapsulates fundamental economic principles, particularly the interplay between input and output dynamics and their impact on commodity prices and production quantities. It also addresses variable inputs, essential for short-term supply flexibility. The applicability of production theory extends to micro-level resilience, especially in how firms optimize resource utilization and investment in recovery post-disasters, as discussed by Dormandy et al. (2019) and A. Elwerfalli (2019). This framework is particularly relevant in understanding the resilience and success factors in Turnaround Maintenance (TAM) projects in the Yemeni oil and gas industry, as highlighted by Al-Marri et al. (2020) and Duffuaa & Al-Shayea (2020). Empirical studies like those by Ghadaffi (2020) and Kortelainen et al. (2021) further validate the use of production theory in analyzing the relationship between project management practices and TAM project success. These studies demonstrate the significant impact of project management techniques, user acceptability, training, and support on the success of TAM projects. In this context, production theory serves as a theoretical lens to comprehend how critical success factors, acting as inputs, influence the output, which is the project's success. The theory helps in dissecting the intricacies of labor, capital, technology, organizational characteristics, human resources, and leadership traits, all contributing to the effective execution of TAM projects.

2.3. Hypothesis Development

A turnaround maintenance project is divided into multiple phases and each phase consists of a number of activities starting from the initiation phase and ending with project closure. The success of a TAM project, however, depends on a number of other essential success factors. One of the primary success factors is project management, which involves planning, scheduling, and risk management. Hatcher et al. (2020) examined the relationship between project management methods and the project's success in a TAM project at an Egyptian university. The study revealed that project management methods have a significant influence on a TAM project's success. The study found that the factors most important to a TAM project's success were planning, timing, and risk management. The study revealed that adopting production theory as a theoretical framework may help explain the relationship between project management methods and project success.

2.3.1. Organizational Factors and TAM Project Success

Several researchers have identified crucial elements that influence project success (Gunduz & Almuajebh, 2020; Mathar, Assaf, Hassanain, Abdallah, & Sayed, 2020; Meyer & Torres, 2019; Miller, 2021, 2022; Moczydłowska, Sadkowska, & Economics, 2021; Mohammed, Vallon, & Walters Jr., 2021; Pinto & Pinto, 2021; Sarvari, Chan, Alaeos, Olawumi, & Aldaud, 2021; Singh & Sharma, 2020). The

elements that affect project success, however, are the subject of debate among scholars (Bogopa & Marnewick, 2022). Numerous project management studies have emphasized how crucial operational variables are to the success of projects (Vrchota, Řehoř, Maříková, & Pech, 2020), communication (Akbiyikli, Dikmen, Eaton, & Akbiyikli, 2019), change management (Krakri, 2020), organizational culture (Ika & Pinto, 2023), organizational culture (Mohammed, 2022), organizational culture (Durmic, 2020).

Despite the importance of these organizational aspects in TAM project management, especially the contribution played by soft organizational factors in project performance, few studies have examined how these components interact and how success is assessed. To our knowledge, there is no conceptual model that integrates the analysis of project performance with these organizational features. Only one of the factors examined in this study has often been the focus of prior research. Lamprou and Vagiona (2022), for instance, evaluated the effect of communication-conflict interaction on project success. In contrast to Masubelele and Mnkandla (2021), who examined the relationship between project success and stakeholders, He, Wang, Chan, Li and Chen (2019) examined the relationship between an entrepreneurial mindset and project success.

In view of these gaps and the dearth of in-depth research on the subject, this article seeks to analyze the influence of organizational factors on project performance in oil and gas corporations operating in emerging countries (Yemen). Industry-specific organizational factors that affect project success may be found in (Zaman, Wang, Rasool, uz Zaman, & Raza, 2022). Because there are greater opportunities for management innovation in the petroleum business, it was chosen. A constant factor behind managerial creativity has been the petroleum industry (Muhammad, Alasan, & Afridi, 2022). Montenegro, Dobrota, Todorovic, Slavinski and Obradovic (2021) also agreed with this. Thus, this study hypothesises that:

H1: Organisational factors have a significant effect on Turnaround Maintenance project success.

2.3.2. Human Factors and TAM Project Success

Even though several success elements affect project success, all studies agree on the significance of human factors (Khoury, 2019). Altarawneh & Samadi (2019) emphasized that it's important to remember that individuals execute the projects when it comes to project management. "Human aspects" refers to the characteristics of the study subjects. Human elements include their ability, competence, dedication, past experience, motivation, decision, training, and position of power (Łabędzki, 2021). Excellent project participant coordination, the availability of competent resources, the project manager's competency, and the dedication of all project participants are all human-related success factors, according to Rani, Singh, Taneja, Prasad and Dhiman (2021). The project manager and project team actively assist the effective implementation of turnaround measures. In order to

achieve a project's goals, project managers apply their expertise, knowledge, processes, and techniques (El Khatib, Almteiri, & Al Qasemi, 2021). This research will concentrate on how the project manager's abilities, qualifications, dedication, leadership style, and experience impact the project's success. The project team's aptitude, zeal, cohesion, competence, and dedication were seen to be variables influencing the success of TAM initiatives. Therefore, the following hypothesis has been formulated:

H2: Human related factors have a significant effect on Turnaround Maintenance project success.

2.3.3. Project Management Factors and TAM Project Success

Turnaround Management (TAM) project success is greatly influenced by project management parameters. TAM initiatives often try to increase an organization's systems and processes' effectiveness and productivity. The success of TAM initiatives depends on a number of project management variables. These include, among other things, stakeholder management, resource allocation, risk management, and project planning (Bergmann & Karwowski, 2019; Kusuma & Khoiroh, 2023). The process of project planning is creating a thorough plan that specifies the project's goals, deadlines, and resource needs. Resource allocation entails distributing funds, employees, and other resources to the project. Risk management entails identifying and reducing dangers that might compromise the project's success. Making sure that everyone is aware of the project's status and development entails communication. Stakeholder management entails interacting with them to guarantee their support and participation in the project. The success of TAM initiatives seems to be highly impacted by project management characteristics, according to empirical data. For instance, Cleary and Lamanna (2022) and Elbaz and Spang (2020) illustrate the link between project management elements and the accomplishment of a TAM project inside an Indian banking business. The research discovered that the success of the project was highly affected by project planning, resource allocation, and risk management. The research also discovered that successful stakeholder management and communication were essential to the project's success.

According to Struckell, Ojha, Patel and Dhir (2022), the factors used to evaluate this collection of components include the project's complexity, nature, size, and value. Based on the success variables discovered in this study, the project characteristics of TAM projects were determined to be the financial magnitude of the project, the shutdown project interval, and the lead-time used to design the project. When characterizing turnaround efforts, Khasanah et al. (2021) suggested that the number of personnel involved in the project, as well as the project's total cost and planning time, be taken into account. The characteristics of a project are decided by the cost of the turnaround, the duration, the lead-time, the percentage of contractors engaged in the project, and the shutdown organization, according to Nikmatul et al. (2023). Therefore, TAM project success is

significantly influenced by aspects related to project management. The success of TAM initiatives may also be impacted by the usage of project management approaches like Agile and Waterfall. According to empirical data, the success of TAM initiatives is substantially influenced by project planning, resource allocation, risk management, communication, and stakeholder management. To guarantee the success of their TAM initiatives, organizations should emphasize the efficient use of certain project management aspects.

H3: Project Management factors have a significant effect on Turnaround Maintenance project success.

2.3.4. Project Factors and TAM Project Success

A stochastic estimation of TAM duration and interval resulted in production losses and a considerable rise in TAM expenses for a number of oil and gas companies. Due to the stochastic and permanent estimation of TAM scheduling (decreasing duration and increasing interval of TAM) based on the recommended periods of the Original Equipment Manufacturers, neither the residual life of the critical equipment nor real planning associated with operating conditions and maintenance strategy of the gas plant were adopted (OEMs). The gas plant's TAM schedule may be completed soon in accordance with the suggested timetable from the OEMs (Abylova & Salykova, 2019). However, this OEM technique cannot be regarded as the most ideal TAM scheduling in the medium and long terms since operational conditions differ significantly from one firm to another. Consequently, depending on operating conditions and the remaining useful life of important equipment, plant facilities must be shut down for a few years (Albtoush, Doh, Rahman, & Al-Momani, 2022).

In order to improve decision-making and fill a gap in the literature, prior research has indicated a need to identify knowledge gaps in order to handle TAM scheduling issues in the TAM sector of gas plants (Mathar et al., 2020; Pham, Nguyen, Tu, Pham, & Le, 2019; Yohannes & Mauritsius, 2022). Numerous earlier studies concentrated on enhancing TAM intervals based on individual pieces of equipment during planned and unforeseen downtime times without taking important equipment components into consideration. Many studies have examined ways to lengthen TAMs from a commercial and management perspective, including expanding human resources, creating contracts, strengthening culture, building TAM crew skill sets, and managing conflict during TAM operations. Therefore, the following hypothesis is formulated:

H4: Project factors have a significant effect on Turnaround Maintenance project success.

2.3.5. Economic Resilience and TAM Project Success

In order to successfully complete a project, economic resilience has been identified as a key component. The term "economic resilience" describes an economy's capacity to resist and recover from shocks, such as economic downturns or natural catastrophes, without suffering a large drop-in economic activity. Eco-

nomic resilience has a positive correlation with project performance, according to research, since it creates a stable economic climate that fosters project success (Ika & Pinto, 2023). For instance, (Mohammed, 2022) indicated that areas with greater levels of economic resilience had much better rates of project success because they offered a more stable environment for projects to operate in.

According to research, the TAM is correlated with project success in a favourable way because it offers a framework for comprehending and resolving user concerns and problems with the technology being used (Abylova & Salykova, 2019). For instance, Bogopa and Marnewick (2022) found that the TAM was a strong predictor of project success in a Jordanian e-government project since it assisted in identifying and addressing user problems linked to the adoption of new technology. The link between economic resilience and TAM seems to be complimentary, which means that they cooperate to improve project performance, to sum up the findings. For instance, Vrchota et al. (2020) discovered that the combination of TAM and economic resilience greatly boosted the chance of project success in the context of new product development initiatives. According to the authors, whereas TAM offers a framework for resolving user problems and difficulties connected to the technology being adopted, which ultimately leads to project success, economic resilience offers a stable economic climate for projects to function in. While more challenging, "complex system" techniques have recently acquired more momentum than "equilibrium" methods because they better capture real-world economic processes (Akbiyikli et al., 2019). This research employs the complex systems perspective on resilience. According to Albtoush et al. (2022), the economic resilience of the oil and gas sector is the ability of this sector to withstand or recover from various (market, competitive, environmental, etc.) shocks, if necessary, by undergoing adaptive changes to its economic structures as well as social and insular structures. So, it can be hypothesised that.

H5: Economic Resilience has a significant effect on Turnaround Maintenance project success.

2.3.6. Moderation Role a Leader's Personality Traits

Individuals have basic qualities called personality traits (Jayawickreme et al., 2019). According to Jayawickreme et al. (2019), personality characteristics largely impact an individual's values, behavior, motivation, and perception. A few of the personality trait assessments that have been created include the Myers-Briggs Type Indicator (MBTI) (Masubelele & Mnkandla, 2021), Multidimensional Personality Questionnaire (Masubelele & Mnkandla, 2021), and the five-factor model of personality (Al-Hodiany & Misztal, 2022), also referred to as the "Big Five". The Big Five personality qualities include extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience. The Big Five is utilized in this study because it is stable (Allam & Akre, 2021) and has cross-cultural generalizability (Cooney, 2020). It has regularly shown favorable results in a variety of populations (Gumay, Purwandari, Raharjo, Wahyudi, & Purwaning-

sih, 2020). Since it is a widely used measuring scale, the 44-question Big Five personality test created by Hans and Mnkandla (2019) is employed in this study: agreeableness (Joyner, 2020); extraversion (Krakri, 2020); neuroticism (Ktaish & Hajdu, 2022); and openness to experience (de Souza & Costa, 2021; Ktaish & Hajdu, 2022). Using personality tests, the success requirements for PMs in the banking (Gumay et al., 2020) and construction (Ika & Pinto, 2023) industries have been identified. But rather than the Big Five, the MBTI is the foundation of these investigations. Key factors for efficient project management were compiled by Khattak et al. (2022) from a variety of industries. A project manager's attitude and demeanor are unique to them and are influenced by their personality traits. According to (Khattak et al., 2022; Kulkarni & Purandare, 2023), a project leader's personality affects others' behavior, values, and work output (Allam & Akre, 2021). Each personality type influences both human and project management components, and certain personality traits are connected to specific behavioral patterns (Bergmann & Karwowski, 2019). Personality qualities affect the results of projects as well (Cooney, 2020). Therefore, the following hypotheses have been developed:

H6: Leader Personality traits significantly moderate the relationship between the organisational factors and Turnaround Maintenance project success.

H7: Leader Personality traits have a significant moderating effect on the relationship between the related factors and Turnaround Maintenance project success.

H8: Leader Personality traits have a significant moderating effect on the relationship between the management factors and Turnaround Maintenance project success.

H9: Leader Personality traits significantly moderate the relationship between the Project factors and Turnaround Maintenance project success.

H10: Leader Personality traits significantly moderate the relationship between Economic Resilience and Turnaround Maintenance project success.

3. Research Design

In this quantitative study, the research design is pivotal for elucidating the impact of independent variables on a dependent variable, considering the moderating effects. As Creswell (2020) notes, selecting an appropriate research design is essential for effective data collection, measurement, and analysis. This study employs a quantitative approach, ideal for testing empirical hypotheses and generalizing findings across populations. The chosen prediction study design aligns with the objectives, especially in evaluating the role of meaningful work as a mediator and moderator. Utilizing a correlation research approach, as recommended by Watson (2020), the study examines the influence of variables on the dependent variable without manipulating them, thus observing their impact in a natural setting. This approach is instrumental in quantifying the relationships' magnitude and direction. A cross-sectional study design is adopted,

following Williams (2019) and Creswell (2020), to capture a snapshot of attitudes, behaviors, and perceptions at a single time point, making it suitable for diverse groups within organizational contexts related to TAM success. The sampling strategy, integral to the research design, involves stratified sampling to ensure representative cross-sectional data from various organizational positions. The basis of sampling involves dividing the population into distinct subgroups or strata based on specific characteristics and then drawing a random sample from each stratum. This approach ensures that each subgroup is adequately represented in the sample. The researcher selected individuals from a list of all personnel in the population of interest who were exclusively engaged in TAM-related activities across various departments (Maintenance, Production, HSE, Procurement and Contracts, Logistic, Technical, and HR). These individuals are well-placed to provide insights into the current practices and anticipated future trends of their organizations.

Factors influencing sample size, such as homogeneity, statistical power, and analytical methods (Gill, 2020; Mweshi & Sakyi, 2020), are carefully considered. Consistent with Saunders et al. (2019) and Asenahabi (2019), a sample size exceeding 200 is selected for greater accuracy. The sample size calculation, based on a 95% confidence level and a 5% margin of error following The Research Advisors (2010) and using the ROASOFT method, determines a minimum sample size of 385, deemed sufficient for the study's scope and ensuring a balance between accuracy and feasibility in data collection and analysis (**Table 2**).

3.1. Instruments

In this research, the measurement and operationalization of constructs were achieved using established instruments, adapted from reputable scholarly works to align with the specific context of the study, as guided by Manimala (2022). The instruments, characterized by their current relevance, positive reviews, widespread

Table 2. Stratified sampling of the respondents.

Position	ARC	YLNG	OMV	PETRO MASILA	SEPOC	Sub-Total
Top Management	1	1	1	1	1	5
TAM Project Manager	1	1	1	1	1	5
Senior Team Members	8	2	2	3	5	20
Intermediate Team Members	15	3	3	5	8	34
Junior Team Members	135	19	17	47	87	305
Consultant	4	1	4	2	5	16
Total	164	27	28	59	81	385

testing for reliability and validity, and the inclusion of accepted scales, as noted by Tomaszewski, Zarestky, & Gonzalez (2020), comprised closed structured questions with fixed response choices, enhancing response rate and data uniformity as recommended by Watson (2020). Utilizing a five-point Likert scale for all instruments, the structured, closed-ended questionnaire was designed to be concise and straightforward, ensuring ease of completion within 10 to 20 minutes, in line with Manimala (2022) and Huntington-Klein (2021). This questionnaire format not only facilitated efficient data collection but also maintained respondent anonymity, encouraging more accurate responses. The questionnaire was divided into three sections, addressing demographics, familiarity with research topics, understanding of Turnaround Maintenance Project Success Criteria, and perceptions of TAM Project Success Factors, including organizational, human-related, project management, project-related, and economic resilience factors, along with leader personality traits. These sections were inspired and adapted from the works of Masubelele (2019), Pashapour et al. (2019), and Obiajunwa (2010), with minor modifications for contextual relevance, and their reliability was confirmed through prior successful research applications. The use of the 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), allowed for detailed expression of respondent agreement levels, enhancing the study's robustness and validity, and mitigating common method bias as suggested by Cardano (2020) and Mweshi & Sakyi (2020).

3.2. Data Analysis

Table 3 shows the demographic profile of the 385 respondents in the study is as follows: The vast majority, 376 (97.7%), are male, and 9 (2.3%) are female. Age-wise, 130 respondents (33.9%) are aged 46 years and above, 114 (29.5%) fall between 41 - 45 years, 73 (18.9%) are between 36 - 40 years, 49 (12.7%) are between 31 - 35 years, and 19 (4.9%) are below 30 years. In terms of education, 217 respondents (56.5%) hold a Bachelor's Degree, 120 (31.1%) have a Master's Degree, 34 (8.8%) possess a Diploma, 8 (2.1%) are classified under "Other", and 6 (1.6%) have a PhD. Regarding functional roles, 126 (32.9%) are part of the Intermediate TAM Project Team (including Engineers, Foremen, Supervisors), 105 (27.2%) are in the Senior TAM Project Team (including Head, Superintendent, Senior Engineers), 41 (10.6%) are Top Management (including managers from other departments), another 41 (10.6%) are TAM Project Managers, 37 (9.6%) fall under "Other", 22 (5.7%) are part of the TAM Project Team (including Technicians, Helpers), and 13 (3.4%) are Consultants (including Original Equipment Manufacturer or Expats). The respondents work in various industry types: 178 (46.4%) in Gas Plant (LPG, LNG), 81 (21%) in Refineries, 66 (17.1%) in Exploration & Production, 37 (9.6%) in Petrochemicals, and 23 (6%) in other sectors. As for TAM involvement, 206 respondents (53.4%) have been involved for 11 years and more, 92 (23.8%) for 7 - 10 years, 45 (11.7%) for 3 - 6 years, 33 (8.5%) are not involved, and 10 (2.6%) have less than 3 years of involvement.

Table 3. Demographic profile (n = 385).

Variable	Category	N	%
Gender	Male	376	97.7
	Female	9	2.3
Age	46 years and above	130	33.9
	Between 41 - 45 years	114	29.5
	Between 36 - 40 years	73	18.9
	Between 31 - 35 years	49	12.7
	Below 30 years	19	4.9
Level of Education	Bachelor's Degree	217	56.5
	Master's Degree	120	31.1
	Diploma	34	8.8
	Other…	8	2.1
	PhD's Degree	6	1.6
Functional Role	Intermediate TAM Project Team "Includes: Engineers, Foramens, Supervisors"	126	32.9
	Senior TAM Project Team "Includes: Head, Superintendent, Senior Engineers"	105	27.2
	Top Management "Includes: all mangers from other departments"	41	10.6
	TAM Project Manager	41	10.6
	Other…	37	9.6
	TAM Project Team "Includes: Technicians, Helpers"	22	5.7
	f. Consultant "Includes: Original Equipment Manufacturer or Expat"	13	3.4
Industry Type	Gas Plant (LPG, LNG)	178	46.4
	Refinery	81	21
	Exploration & Production	66	17.1
	Petrochemicals	37	9.6
	Other…	23	6
TAM Involvement	11 years and more	206	53.4
	7 - 10 years	92	23.8
	3 - 6 years	45	11.7
	Not involved	33	8.5
	Less than 3 years	10	2.6

3.3. Descriptive Statistics

Descriptive statistics assist in providing a precise description of a set of items by transforming the raw data into usable information (Bougie & Sekaran, 2019). In

this study, descriptive statistics were examined using measures of central tendency and measures of dispersion. Metrics of central tendency and dispersion were useful for gaining an understanding of the core characteristics of the data (Bougie & Sekaran, 2019). Measures of central tendency may be calculated using mean, median, and mode (Bougie & Sekaran, 2019). The mean score of the questions was utilized in this study to examine the central tendency of the data that had been collected since it is the most common method for doing so (see Table 4).

Result of the descriptive statistics showed that response for majority of the items were clustered around the neutral region except for the response items of Leader's Personality Traits (mean = 3.811). Moreover, the mean score range of 3.811 to 4.308. In terms of standard deviation score, Economic Resilience had comparatively higher value than the other constructs. This showed that when comparing with other constructs, answer of the respondents deviated more from the mean score in terms of susceptibility to interpersonal influence.

3.4. Measurement Model Assessment

In this study, the reliability of measurement instruments was evaluated using Cronbach's Alpha, a widely recognized method for assessing scale reliability, as detailed by Hair Jr. et al. (2021), Bougie & Sekaran (2019), and Hair & Alamer (2022). Consistency and stability are key aspects of reliability, ensuring that measurements accurately reflect the investigation's main findings and remain stable over time. The acceptable range for Cronbach's Alpha values varies, with a common cutoff of 0.70, although it can be lowered to 0.60 in exploratory research, as suggested by Hair Jr. et al. (2021). Shiau, Sarstedt, & Hair (2019) and Sinaga, Panjaitan, & Suhairiani (2022) indicate that values between 0.70 and 0.95 denote suitable reliability, with varying degrees of reliability categorized below and above this range. The present study's instruments showed high reliability, exceeding the 0.70 threshold, indicating a sufficient level of internal consistency among the items used to measure each variable. Despite some items (TAMS1,

Table 4. Mean and Standard Deviation of the variables.

Name	Mean	Standard deviation
TAM Project Success Criteria	4.308	0.786
Organisational Factors	4.212	0.828
Human-related Factors	4.295	0.789
Project Management Factors	4.259	0.785
Project-related Factor	4.225	0.794
Economic Resilience	4.145	0.899
Leader's Personality Traits	3.811	1.042

Source: The data is collected and calculated by the researcher.

TAMS5, TAMS7, LRT7, LRT8, LRT17, LRT18, HRF1, HRF2, HRF3, HRF7, HRF8, HRF11, OF5, OF8, PMF6, PMF7, PMF8, and PMF11) being removed due to lower item loading, the overall constructs demonstrated a sufficient level of reliability, confirming the appropriateness of the item selection for the study, based on the guidelines of Sarstedt et al. (2022) and further validated by a pilot study.

In the study, construct validity of the measurement model was established following guidelines by Hair Jr. et al. (2021), ensuring that the instrument accurately measures the intended underlying constructs. Construct validity, crucial in Exploratory Factor Analysis (EFA), was examined through convergent validity and discriminant validity, reinforcing the data's capability to represent population characteristics. Convergent validity, indicating a high proportion of shared variance among items of a specific construct, was assessed using factor loadings, composite reliability (CR), and average variance extracted (AVE). The AVE values in this study met the established threshold of 0.50, albeit marginally, effectively demonstrating convergent validity. Additionally, CR was used to ascertain if the measurement model reliably measures the latent constructs. Adhering to Hair Jr. et al. (2021)'s recommendation, a minimum CR value of 0.70 is considered the rule of thumb, with values of 0.60 or higher deemed sufficient for establishing reliability. In this study, CR values ranged from 0.882 to 0.964, meeting the recommended criteria and further validating the constructs. These findings, detailed in **Table 5**, confirm that all constructs achieved the necessary thresholds for construct validity, ensuring the reliability and appropriateness of the measurement model used (**Figure 1**).

3.5. Discriminant Validity

In this study, the discriminant validity of the measurement model was evaluated to ensure the uniqueness and distinction of the constructs. Following guidelines by Hair Jr. et al. (2023) and Hair Jr. et al. (2021), discriminant validity was assessed by comparing the square root of the Average Variance Extracted (AVE) for each construct with the correlation coefficients of that construct with others. The Fornell-Larcker criterion was applied, as shown in **Table 6**, where the square roots of the AVEs (bolded values) were higher than their respective correlation coefficients with other constructs. This indicates strong discriminant validity, confirming that the constructs are closely related to their indicators and distinct from each other. Additionally, the correlation between exogenous components was found to be less than 0.85, meeting the required standards for discriminant validity. However, acknowledging recent criticisms of the Fornell-Larcker criterion, the study also employed the Heterotrait-Monotrait Ratio (HTMT) as a more robust measure of discriminant validity. According to Sarstedt, Ringle, & Hair (2021), an HTMT value exceeding 0.85 or 0.90 indicates compromised discriminant validity. The HTMT results, detailed in **Table 6**, further validated the discriminant validity of the model, as all HTMT values were within acceptable

Table 5. Summary measurement model analysis.

Variable	Items	Loading	CA	rho_A	CR	AVE
TAM Project Success	TAMS2	0.804	0.838	0.842	0.882	0.555
	TAMS3	0.739				
	TAMS4	0.758				
	TAMS5	0.807				
Personality Traits	LRT1	0.847	0.959	0.960	0.964	0.673
	LRT2	0.823				
	LRT3	0.797				
	LRT4	0.861				
	LRT5	0.825				
	LRT7	0.753				
	LRT9	0.834				
	LRT10	0.803				
	LRT11	0.837				
	LRT12	0.843				
	LRT14	0.749				
	LRT15	0.832				
	LRT16	0.850				
Human Resource Factor	HRF4	0.839	0.906	0.930	0.926	0.591
	HRF5	0.771				
	HRF6	0.860				
	HRF9	0.873				
	HRF10	0.832				
	HRF12	0.855				
	HRF13	0.809				
Organizational factor	OF1	0.766	0.854	0.850	0.889	0.538
	OF2	0.775				
	OF3	0.799				
	OF4	0.747				
	OF6	0.721				
	OF7	0.771				
Project Factors	PRF1	0.901	0.873	0.874	0.914	0.728
	PRF2	0.733				
	PRF3	0.869				
	PRF4	0.897				

Continued

Project Management Factor	PMF1	0.803	0.928	0.930	0.939	0.584
	PMF2	0.732				
	PMF3	0.782				
	PMF4	0.788				
	PMF5	0.766				
	PMF9	0.738				
	PMF10	0.771				
	PMF12	0.840				
	PMF13	0.721				
	PMF14	0.735				
	PMF15	0.719				
Economic Resilience	ERRF1	0.770	0.873	0.877	0.908	0.664
	ERRF2	0.797				
	ERRF3	0.813				
	ERRF4	0.821				
	ERRF5	0.868				

Note: item no TAMS1, TAMS5, TAMS7, LRT7, LRT8, LRT17 LRT18, HRF1, HRF2, HRF3, HRF7, HRF8, HRF11, OF5, OF8, PMF6, PMF7, PMF8, and PMF11 were removed due to lower item loading. TAM Project Success (TAMS); Personality Traits (LRT); Human Resource Factor (HRF), Organizational Factor (OF), Project Factors (PRF); Project Management Factor (PMF); Economic Resilience (ERRF).

limits. This comprehensive approach to assessing discriminant validity ensured that each construct in the model was adequately distinct and representative of its intended domain. The square root of AVE for each construct is greater than its correlation coefficient with other constructs, as shown in **Table 6** and **Table 7** below.

3.6. Structural Model

In this study, after validating the measurement model for goodness-of-fit and construct validity, the constructs were integrated into a structural model for further analysis, following Hair Jr. et al. (2021). The structural model highlighted the relationships between constructs, guided by the underlying literature. To address multicollinearity, correlation analysis was conducted, revealing that none of the correlation coefficients between the independent variables exceeded the threshold of 5.0, indicating the absence of multicollinearity issues (Hair Jr. et al., 2021). The squared multiple correlations (R^2) value of 0.580 suggested that the predicting variables could explain 58% of the variance in TAM Project Success, demonstrating significant explanatory power of the model. This level of R^2, while substantial, aligns with various benchmarks by Cohen (1988), Lin et al. (2020),

Table 6. Fornell-Larcker criterion.

	ERRF	HRF	OF	LRT	PRF	PMF	TAMS
ERRF	0.815						
HRF	0.151	0.802					
OF	0.378	−0.045	0.733				
LRT	0.403	0.114	0.366	0.820			
PRF	0.468	0.104	0.447	0.832	0.853		
PMF	0.540	0.185	0.529	0.492	0.564	0.764	
TAMS	0.474	0.181	0.488	0.513	0.552	0.618	0.745

Note: TAM Project Success (TAMS); Personality Traits (LRT); Human Resource Factor (HRF), Organizational Factor (OF), Project Factors (PRF); Project Management Factor (PMF); Economic Resilience (ERRF).

Table 7. Heterotrait-Monotrait Ratio (HTMT).

	ERRF	HRF	OF	LRT	PRF	PMF	TAMS
ERRF							
HRF	0.161						
OF	0.419	0.146					
LRT	0.437	0.119	0.389				
PRF	0.531	0.114	0.501	0.907			
PMF	0.593	0.197	0.564	0.516	0.617		
TAMS	0.551	0.203	0.559	0.568	0.640	0.697	

Note: TAM Project Success (TAMS); Personality Traits (LRT); Human Resource Factor (HRF), Organizational Factor (OF), Project Factors (PRF); Project Management Factor (PMF); Economic Resilience (ERRF).

and Sarstedt et al. (2022) for considering the explanatory power adequate. Additionally, effect sizes (f^2) were assessed, with all independent variables showing a small impact on TAM Project Success, as per Cohen (1988)'s categorization. The predictive relevance of the model was evaluated using the blindfolding technique, resulting in a Q^2 value of 0.559 for TAM Project Success, indicating medium predictive significance. This aligns with Hair Jr. et al. (2021)'s recommended values for Q^2, confirming that the proposed model has a suitable level of predictive significance for the endogenous construct. Overall, the structural model effectively demonstrates the relationships between constructs and their impact on TAM Project Success, supported by the appropriate use of statistical techniques for multicollinearity analysis, R^2, f^2, and predictive relevance evaluation (**Tables 8-11**).

3.7. Hypothesis Testing

All of the current study's hypotheses were tested using the structural model

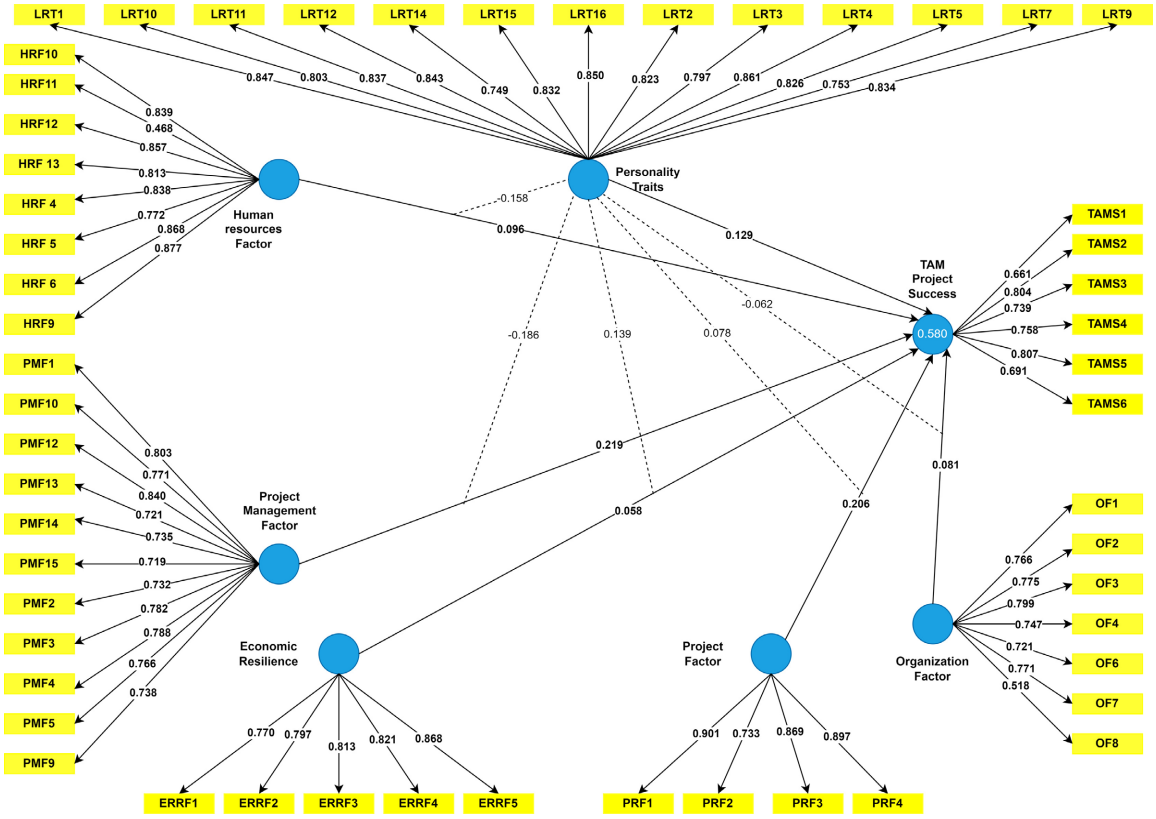

Figure 1. Measurement model.

(Figure 2) after the structural model's goodness of fit was evaluated. Based on the output of the standardized and regression path coefficient, decisions were taken about the hypotheses. Four of the study's six hypotheses were judged to be valid after the analysis. The first and fourth hypotheses were rejected. The p-value of each relationship route was used to inform the choice. The results of the analysis are shown in Table 12.

In the context of the Yemeni Oil and Gas Industry, the analysis of the relationship between various factors and Turnaround Maintenance project success led to mixed results. Organizational factors were found to have no significant effect on Turnaround Maintenance project success (β = 0.083, t = 1.816, p = 0.069), thus refuting Hypothesis 1. Conversely, Hypothesis 2, which posited a significant impact of human resource-related factors on project success, was supported (β = 0.101, t = 2.507, p = 0.012). Similarly, Hypothesis 3 was confirmed, with Project Management factors showing a significant effect (β = 0.220, t = 4.386, p = 0.000). Hypothesis 4, concerning the influence of project factors, was also supported, as these factors significantly affected project success (β = 0.217, t = 2.788, p = 0.005). However, Economic Resilience, the focus of Hypothesis 5, did not significantly impact Turnaround Maintenance project success (β = 0.057, t = 1.142, p = 0.254), leading to the rejection of this hypothesis. Finally, Hypothesis 6 was confirmed, indicating that Leader Personality traits have a significant relationship with project success (β = 0.124, t = 2.320, p = 0.020),

Table 8. Correlation between exogenous constructs (Inner VIF).

Independent Variables	TAM Project Success
Economic Resilience	1.683
Human Resource Factor	1.136
Organizational Factor	1.645
Personality Traits	3.430
Project Factors	4.228
Project Management Factor	2.280

Table 9. The squared multiple correlations (R^2).

Variable	Estimate (R^2)	R-square adjusted	Cohen (1988)	Chin (1998)	Hair Jr. et al. (2021)
TAM Project Success	0.580	0.569	Substantial	Fair	Fair

Table 10. Effect size (f^2).

Variables	TAM Project Success	Effect Size
Economic Resilience	0.005	Small
Human Resource Factor	0.020	Small
Organizational Factor	0.009	Small
Personality Traits	0.012	Small
Project Factors	0.024	Small
Project Management Factor	0.050	Small

Table 11. Predictive relevance (Blindfolding) Q^2.

TAM Project Success	Q^2 predict	RMSE	MAE
	0.559	0.683	0.497

suggesting the potential of these traits as a moderating factor in project outcomes. This comprehensive analysis highlights the varying degrees of influence that different factors exert on project success within this specific industry context.

The phrase "moderation" describes a situation in which the relationship between two constructs is not linear but rather depends on the values of a third variable, also referred to as the moderator variable. A link between two model constructs is altered by the moderator variable (or construct), changing its direction or even its strength (Sarstedt & Cheah, 2019). When estimating moderating effects in partial least squares structural equation modelling (PLS-SEM), researchers have a variety of techniques to illustrate the influence of a moderator on a

Table 12. Hypothesis testing based on regression coefficient.

Hypo	Relation	Std. Beta	Std. Error	t-value	P Values	Decision
H1	Organizational Factor -> TAM Project Success	0.083	0.044	1.816	0.069	Not Supported
H2	Human Resource Factor -> TAM Project Success	0.101	0.038	2.507	0.012	Supported
H3	Project Management Factor -> TAM Project Success	0.220	0.050	4.386	0.000	Supported
H4	Project Factors -> TAM Project Success	0.217	0.074	2.788	0.005	Supported
H5	Economic Resilience -> TAM Project Success	0.057	0.051	1.142	0.254	Not Supported
H6	Personality Traits -> TAM Project Success	0.124	0.056	2.320	0.020	Supported

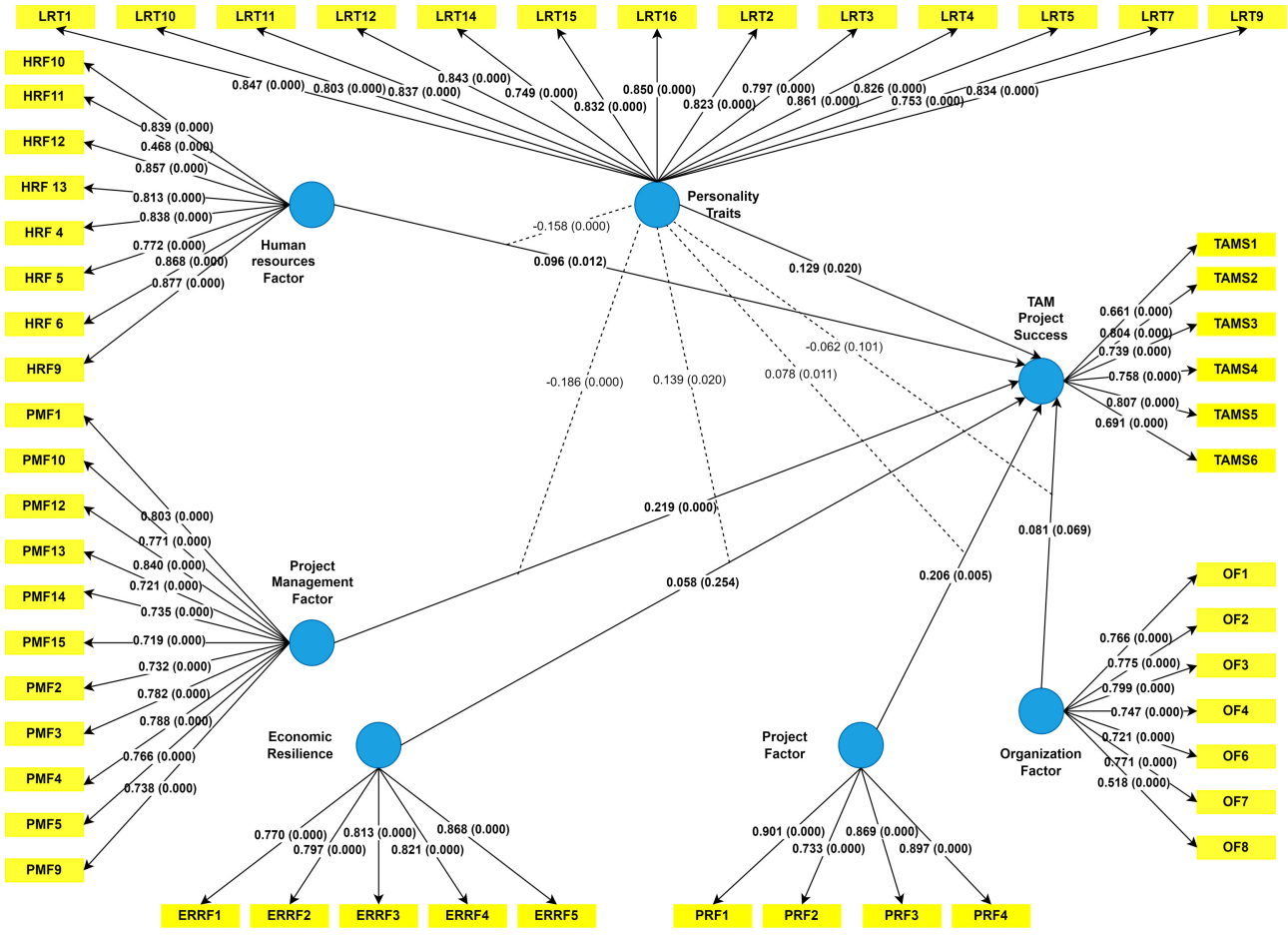

Figure 2. Structural model of this study.

relationship between two constructs (see Table 13). In this research, Leader's personality traits have a major moderating effect in the relationships between Yemen's project management factor, economic resilience factor, human resource factor, human resource factor and project factor.

In the study of the Yemeni Oil and Gas Industry, various hypotheses tested the moderating effect of Leader Personality traits on the relationship between different factors and Turnaround Maintenance project success. Hypothesis 7 (H7), positing a significant moderating effect of Leader Personality traits on the relationship between organizational factors and project success, was rejected ($\beta = -0.056$, $t = 1.643$, $p = 0.101$), indicating no significant moderating effect. Conversely, Hypothesis 8 (H8) was confirmed, showing that Leader Personality traits significantly moderated the relationship between project management factors and project success ($\beta = -0.174$, $t = 3.400$, $p = 0.000$). Similarly, Hypothesis 9 (H9) was supported, revealing a significant moderating effect of Leader Personality traits on the relationship between economic resilience and project success ($\beta = 0.141$, $z = 2.332$, $p = 0.02$). Hypothesis 10 (H10) also found support, indicating that Leader Personality traits significantly moderated the relationship between human resource factors and project success ($\beta = -0.160$, $t = 4.120$, $p = 0.00$). Lastly, Hypothesis 11 (H11) was confirmed, demonstrating a significant moderating effect of Leader Personality traits on the relationship between project factors and project success ($\beta = 0.080$, $t = 2.535$, $p = 0.01$). These results highlight the nuanced role of Leader Personality traits in moderating the impact of various factors on Turnaround Maintenance project success in this industry context (Table 14).

4. Discussion

The results of this research point to a tight relationship between good TAM project outcomes and solid project management, human resource management, and

Table 13. Moderating effects.

Hypo	Relation	Std. Beta	Std. Error	t-value	P Values	Decision
H7	Personality Traits × Organizational factor -> TAM Project Success	−0.056	0.038	1.643	0.101	Not Supported
H8	Personality Traits × Project Management Factor -> TAM Project Success	−0.174	0.053	3.499	0.000	Supported
H9	Personality Traits × Economic Resilience -> TAM Project Success	0.141	0.060	2.332	0.020	Supported
H10	Personality Traits × Human Resource Factor -> TAM Project Success	−0.160	0.038	4.120	0.000	Supported
H11	Personality Traits × Project Factors -> TAM Project Success	0.080	0.031	2.535	0.011	Supported

Table 14. Summary of the hypothesis testing.

Hypo	Relation	Decision	Findings
H1	Organisational factors have a significant effect on Turnaround Maintenance project success.	Not Supported	T value = 1.816; P value = 0.069;
H2	Human resource related factors have a significant effect on Turnaround Maintenance project success.	Supported	T value = 2.507; P value = 0.012;
H3	Project Management factors have a significant effect on Turnaround Maintenance project success.	Supported	T value = 4.386; P value = 0.000;
H4	Project factors have a significant effect on Turnaround Maintenance project success.	Supported	T value = 1.816; P value = 0.069;
H5	Economic Resilience has a significant effect on Turnaround Maintenance project success.	Not Supported	T value = 1.142; P value = 0.254
H6	Leader Personality traits have significant relationship with Turnaround Maintenance project success.	Supported	T value = 2.788; P value = 0.005;
H7	Leader Personality traits have a significant moderating effect on the relationship between the organizational factors and Turnaround Maintenance project success.	Not Supported	T value = 1.643; P value = 0.101;
H8	Leader Personality traits have a significant moderating effect on the relationship between the project management factors and Turnaround Maintenance project success.	Supported	T value = 3.499; P value = 0.000;
H9	Leader Personality traits have a significant moderating effect on the relationship between economic Resilience and Turnaround Maintenance project success.	Supported	T value = 2.332; P value = 0.020;
H10	Leader Personality traits have a significant moderating effect on the relationship between the Human Resource factors and Turnaround Maintenance project success.	Supported	T value = 4.120; P value = 0.000;
H11	Leader Personality traits have a significant moderating effect on the relationship between the project factors and Turnaround Maintenance project success.	Supported	T value = 2.535; P value = 0.011

Source: The data is collected and calculated by the researcher.

leadership practices in the Yemeni oil and gas sector. The results of this study are in line with other research on the elements that influence project success, highlighting the significance of taking both technical and people-related issues into account in project management. However, it is crucial to thoroughly evaluate these results in the context of prior work and external variables.

The non-significant association between organizational characteristics and TAM project performance is one thing to keep in mind. This contrasts with several earlier research that claimed that organizational characteristics, such as organizational culture and structure, had a significant impact on project success (Abylova & Salykova, 2019; Bilir, 2022). The discrepancy may be attributed to the particular context of the Yemeni oil and gas industry, which may prioritize different organizational factor aspects or be influenced by particular challenges,

such as political unrest or economic hardships, that could mitigate the impact of organizational factors on project success.

Furthermore, even while economic resilience had no discernible impact on the performance of TAM projects, this conclusion is not necessarily at odds with other studies. It can draw attention to the distinctive features of Yemen's oil and gas sector, which has seen difficulties and interruptions owing to the continuing war. It is important to do further study to understand the precise function of economic resilience in this situation since these external influences may obscure the effect of economic resilience on project performance.

Additionally, the leader personality qualities factor's somewhat lower mean score shows that it may not be as well-emphasized or understood as other aspects. This result is in contrast to studies that have shown the value of strong leadership in a project's success (Al-Hodiany & Misztal, 2022). It's possible that other elements, such effective project management techniques and human resource management, are seen as having a greater influence on TAM project success in the Yemeni oil and gas business.

This study's second research goal is to examine the connection between organizational characteristics and TAM project performance. The investigation refuted the results that organizational variables significantly influence the effectiveness of Turnaround Maintenance projects in the Yemeni oil and gas sector. The p-value for this association was 0.069, which is higher than the usual cutoff of 0.05, while the standard beta coefficient was 0.083, which is rather low. This shows that in the Yemeni oil and gas sector, organizational variables may not be crucial in determining the effectiveness of Turnaround Maintenance operations. The results of the research suggest that other elements, including those relating to human resources, project management, project, and leader personality qualities, may be more crucial for assuring effective project outcomes. The results of this research imply that, in the Yemeni oil and gas sector, organizational issues may not be crucial in predicting the effectiveness of Turnaround Maintenance initiatives. This result is in line with other research that found that other variables, including those relating to human resources, project management, project variables, and leader personality characteristics, were more crucial for assuring effective project results. For instance, project management, human resource management, and leadership were found to be crucial elements in assuring project success in research by Aziz et al. (2023) on the variables determining the success of building projects in the United Arab Emirates. Similar to this, Bilir (2022) found project management, human resource management, and project factors as crucial success factors while examining the variables influencing the success of engineering, procurement, and construction (EPC) projects in Iran.

However, several research have shown that organizational elements are crucial for project success. For instance, organizational culture and organizational structure were important elements in assuring project success, according to a research by Yohannes & Mauritsius (2022) on the factors impacting the success of build-

ing projects in China. These studies' and this study's conclusions may vary as a result of using different sectors, situations, and research approaches. There are a number of reasons for the variance in the results about the importance of organizational elements in predicting TAM project success. It is crucial to properly evaluate these results in the context of prior research and external variables.

The distinct environment and difficulties that organizations in this area encounter may be one reason for the lack of a statistically significant correlation between organizational characteristics and TAM project performance in the Yemeni oil and gas sector. Political unpredictability, economic hardship, and raging conflict may cause companies to reorient their attention to issues that have a more immediate and direct impact on project performance, such as those relating to human resources, project management, projects, and leader characteristics. Due to this, organizational characteristics may have less of an impact than they otherwise would, which would explain the observed non-significant association.

The variance in results may also be caused by variations in the study's industry, setting, and research methodology. For instance, the TAM projects in the Yemeni Oil and Gas sector can have different success determinants than the construction projects researched by Zhu, van Jaarsveld, & Dekker (2022) in China and the projects explored by Aziz et al. (2023) in the United Arab Emirates. These inconsistencies could be explained by variations in legislative frameworks, industry-specific obstacles, and cultural elements. The procedures used in this research, including sampling tactics, data gathering methods, and statistical analyses, might possibly be a factor in the observed variations in results.

It is also important to note that this study's p-value of 0.069 is quite near to the usual cut-off point of 0.05, which may indicate that the association between organizational characteristics and TAM project performance may still have practical significance. The lack of significance may be attributable to a lack of statistical power, which may be caused by a small sample size or other constraints in the study design. However, the results of this research imply that in order to increase their chances of success, firms in the Yemeni Oil and Gas sector should concentrate on aspects linked to human resources, project management, project factors, and leader personality characteristics.

The research third objective aimed to investigate the relationship between human factors and TAM project success. The analysis's findings showed that the hypothesis was correct since the success of the Turnaround Maintenance project was significantly influenced by aspects linked to human resources. The p-value for this link was 0.012, which is lower than the usual cut-off of 0.05, and the standard beta coefficient for this relationship was 0.101, which is rather high. The effectiveness of Turnaround Maintenance programs in the Yemeni oil and gas sector is therefore suggested to be significantly influenced by aspects relating to human resources. The conclusion that human resource-related elements sig-

nificantly influence the performance of Turnaround Maintenance projects in the Yemeni oil and gas sector is consistent with prior research that have highlighted the significance of human factors in project success. For instance, Durmic (2020)'s research discovered that team building, staffing, and other human resource management techniques were essential for a project's success. Similar to this, a research on project success factors by Allam & Akre (2021) highlighted human resource-related elements such team makeup and leadership as crucial success factors.

Similar to this, Bilir & Yafez (2021) investigated the link between project performance and human resource management techniques in the healthcare industry. According to the research, human resource management techniques including hiring, training, and performance evaluation contributed to the success of projects. The research also found that strong leadership was essential for healthcare programs to succeed. This result supports the current study's conclusion that the success of Turnaround Maintenance projects is significantly correlated with the personality attributes of the leaders.

In addition, Al-Hodiany & Misztal (2022)'s research, which looked at the connection between human resource management practices and project performance in a variety of sectors, found that strategies including training, staffing, and team building were crucial to project success. The research also found that strong leadership and excellent communication were crucial for project success. These results support the current study's conclusions that the success of Turnaround Maintenance projects is significantly influenced by human resource-related issues, and that project success is significantly correlated with leader personality qualities.

In addition, Bilir (2022) investigated the link between project success and human resource management methods in the Chinese construction sector. According to the research, the effectiveness of a project was significantly impacted by human resource management methods including recruiting and selection, training and development, and performance management. A further finding of the research was the need of strong leadership in making building projects successful. The results of this study, which stress the importance of human resource-related aspects on Turnaround Maintenance project effectiveness in the Yemeni Oil and Gas business, are consistent with earlier research; nonetheless, it is important to critically assess the areas where the studies diverge and agree.

The broad acknowledgement of human factors as essential drivers of project performance across many sectors may be one reason for the consistency across the research. Effective human resource management techniques, including training, staffing, team building, and leadership, have been connected to project performance across the healthcare, construction, and several other industries, as noted in the research stated previously. The idea that human aspects are crucial contributors to project success, regardless of industry, is supported by this consistency.

Some scholars, however, contend that the importance of human elements may differ based on the sector, project type, and cultural setting. For instance, the healthcare business may stress interpersonal and communication abilities whereas the construction industry may put a stronger focus on technical skills and knowledge. Similar to other nations, Yemen's oil and gas business may place a different emphasis on human elements owing to cultural or contextual considerations, such as Yemen's continuing war and its economic difficulties.

Researchers may also vary on the precise human resource management techniques that are most important for project success. Studies may place a stronger emphasis on the value of recruiting and selection, while others may place more emphasis on performance management or training and development. This disparity suggests that further study is required to identify the best human resource management strategies for various sectors and environments. Furthermore, it is critical to recognize that there is a bidirectional link between human variables and project success. Some researchers may contend that a project's success may be influenced by human factors, such as employee motivation and satisfaction, or that there are additional contextual considerations, such as economic and political stability, that may moderate the association between human factors and project success.

The research objective four aimed to investigate the relationship between project management factors and TAM project success. The analysis's findings showed that the hypothesis was correct since successful Turnaround Maintenance projects were significantly influenced by project management parameters. The p-value for this link was 0.000, which is substantially lower than the usual cutoff point of 0.05. The standard beta coefficient for this relationship was 0.220, which is quite high. This shows that criteria related to project management are very important in deciding whether Turnaround Maintenance initiatives in the Yemeni oil and gas sector are successful.

The results of this study are consistent with other studies that stressed the significance of project management elements in project success. For instance, Ciric Lalic, Lalic, Delić, Gracanin, & Stefanovic (2022) research discovered that successful project management techniques, such as stakeholder management, risk management, and project planning, were essential. Similar findings were made by Cooney (2020), who discovered that project management techniques including planning, resource, and communication management were important indicators of project success. Additionally, Durmic (2020) discovered that crucial success elements in the Malaysian oil and gas business included project management techniques including planning, risk management, and communication. Similar to this, project management was recognized as a critical success element in the construction sector in a research on project success factors by El Touny, Ibrahim, & Mohamed (2021). Overall, the results point to the importance of project management elements, such as planning, risk management, communication, and project monitoring, in determining the performance of Turnaround

Maintenance projects in the Yemeni oil and gas sector. To guarantee that projects are finished on schedule, within budget, and to the acceptable quality standards, project managers should pay particular attention to these criteria. Organizations should also spend money on project managers' training and development to enhance their project management capabilities.

It is important to critically evaluate these results in light of any possible discrepancies or limitations, even if the current study's findings are consistent with earlier studies stressing the significance of project management aspects in project success. The conclusions may not be as clear-cut as some academics claim when it comes to the association between project management variables and TAM project success. For instance, despite using best practices in project management, many large-scale projects often have cost overruns and delays, according to a research by Fabic et al. (2019). This emphasizes the possible impact of other elements, such as complexity, unpredictable outcomes, or cognitive biases, which might undermine the efficacy of project management techniques.

Additionally, the typical beta value of 0.220, although being reasonably high, nevertheless suggests that variables other than project management may have a considerable impact on the success of TAM projects. Research by Ghadaffi (2020), for instance, emphasized the significance of softer characteristics, such as leadership, team culture, and stakeholder participation in predicting project success. Therefore, depending exclusively on project management elements may not ensure success, since other aspects may also be just as important in determining how the project turns out.

Furthermore, it is critical to consider the special context of the Yemeni oil and gas business, which can have different goals and problems than those of other industries or countries. For instance, according to research by Gunawan (2021), the construction sector in developing nations may encounter particular difficulties such resource shortages, poor infrastructure, and a lack of experienced workers, which may call for specialized project management techniques. As a result, the results may not be as generalizable as they might be, and further study may be required to examine the effect of project management elements in other sectors and circumstances.

The research objective five aimed to investigate the relationship between project factors and TAM project success. The analysis results indicated that the hypothesis was supported as project factors had a significant effect on Turnaround Maintenance project success. The p-value for this association was 0.005, which is lower than the usual cutoff of 0.05, while the standard beta coefficient was 0.217, which is quite high. The success of Turnaround Maintenance projects in the Yemeni oil and gas sector is therefore suggested to be significantly influenced by project variables such project scope, project complexity, and project length.

According to earlier research on project success factors, the conclusion that

project variables have a major impact on Turnaround Maintenance project success in the Yemeni oil and gas sector is accurate. In the construction business, for instance, Gunawan, Riantini, & Machfudianto (2023) highlighted project characteristics including project complexity, project scope, and project length as crucial success determinants. Similar to this, Gunduz & Almuajebh (2020) found project elements including project scope and project complexity as critical success determinants across a range of sectors.

In addition, Ahmed (2020) on the elements influencing the accomplishment of maintenance projects in the Saudi Arabian oil sector found that elements including project size, project complexity, and project length had a substantial impact on project accomplishment. Project-related characteristics including project scope, project complexity, and project planning were recognized as crucial elements for project success in Ktaish & Hajdu (2022) on the major success factors for engineering, procurement, and construction projects in the oil and gas sector. These results imply that project elements, especially Turnaround Maintenance initiatives, are crucial in influencing the success of projects in the oil and gas sector.

Although the results of this study are consistent with earlier research that suggests that project factors have a significant impact on Turnaround Maintenance project success, it is important to critically evaluate these results in light of potential discrepancies, limitations, and contextual factors that may affect their generalizability.

First and foremost, it's crucial to consider any possible discrepancies in the literature. For instance, some research suggests that organizational or human-related variables may be more important to project success than project-related aspects (Kumar, Pandey, & Singh, 2023). This mismatch may result from variations in study circumstances, such as industry type or geographic location, which might affect the relative value of several elements. The generalizability of these results has to be confirmed by more study in the Yemeni oil and gas sector as well as in other settings.

The possible limitations of the methodology and sample employed in this research are a further topic of debate. The results could not adequately reflect the underlying correlations between project parameters and TAM project performance if the sample size is too small or not representative of the whole Yemeni oil and gas sector. The external validity of the research would be improved with a larger and more representative sample. Multicollinearity among the independent variables may also have an impact on the unusually high standard beta coefficient for the association between project parameters and TAM project performance. The real impact of project parameters on the performance of TAM projects may be overstated if they are significantly associated with other factors, such as human-related factors or project management factors. Future studies should look into the possible multicollinearity problem and analyse the particular ways in which each component contributes to a project's success.

The study may not fully take into account for potential interactions between project factors and other variables, such as human-related factors or project management factors, even though it identifies project factors like project scope, project complexity, and project duration as critical success factors. For instance, the effectiveness of project management techniques may reduce the effect of project complexity on project success (Kozhakhmetova, Zhidebekkyzy, Turginbayeva, & Akhmetova, 2019).

The results of this research show that project managers and stakeholders in the Yemeni oil and gas sector should pay particular attention to project-related aspects while organizing and carrying out Turnaround Maintenance projects. To make sure that project goals are feasible within the given resources and time restrictions, they should thoroughly examine the project scope, complexity, and length. To increase the efficiency and effectiveness of the project, they need also create and apply the proper project management techniques. For instance, project managers may keep an eye on and regulate project activities and results using project management tools and procedures including scheduling, risk management, and quality control.

Investigating the link between economic resilience and TAM project performance was the sixth study goal. The analysis's findings showed that the premise was unsupported since Economic Resilience has no discernible impact on the effectiveness of Turnaround Maintenance projects. The p-value for this association was 0.254, which is higher than the usual cutoff of 0.05, while the standard beta coefficient was 0.057, which is quite low. This shows that the success of Turnaround Maintenance initiatives in the Yemeni oil and gas sector may not be heavily dependent on economic resilience. The study's conclusions are in line with more recent research, which has produced conflicting findings about the connection between economic resilience and project performance. For instance, whereas Nikmatul et al., 2023; Ktaish & Hajdu (2022) found no significant association between the two variables, Khoury (2019) discovered that Economic Resilience had a substantial beneficial influence on project success. To fully comprehend the impact of economic resilience in turnaround maintenance project performance, further study is required.

There haven't been much research looking at the connection between Yemeni oil and gas sector TAM project performance and economic resilience. However, Hawash, Mokhtar, Yusof, Mukred, & Gaid (2021) examined the performance of the Yemeni oil and gas sector in relation to macroeconomic variables. The results of the research revealed that political instability had no discernible effect on the performance of the sector, but economic growth, inflation, and currency rates did.

The impact of financial and non-financial elements on project performance in Pakistan's oil and gas sector was the subject of a different research by Hussain et al. (2022). According to the research, whereas non-financial elements like communication, cooperation, and leadership had a greater influence on project per-

formance than financial ones, such as budget management and resource allocation. Although the research by Mughal, Bahaudin, & Salleh (2019) concentrated on the Oil and Gas sector in Pakistan, their results are consistent with those of our study in terms of the significance of project management and human resource-related aspects in predicting the performance of Turnaround Maintenance projects. Both studies stress how important good leadership and communication are to achieving successful project results.

While the results of this study indicate that the success of TAM projects in the Yemeni oil and gas industry is not significantly impacted by economic resilience, it is important to consider the possible causes of the discrepancy between this study and others that have found conflicting results regarding the connection between economic resilience and project success. First, the varied outcomes can be related to the various research contexts. As was already indicated, political unrest in Yemen is posing serious problems for the country's oil and gas sector, which may have an impact on the link between project success and economic resiliency. The economic resilience of various businesses or nations may also vary which might explain why different research have produced varied results.

Second, methodological variations can potentially be a factor in the various outcomes. There may be inconsistencies in the results of studies due to the use of various controls, project success indicators, or economic resilience measurements. The studies by ul Haq, Ali, & Nawaz (2019) and Iqbal, Zaman, Siddiqui, & Imran (2019), for instance, may have operationalized economic resilience or project success differently or might have included other variables that might have moderated the association between economic resilience and project success.

Third, there may be additional variables that affect how much economic resilience affects a project's success. For instance, in particular sectors or situations where projects are more susceptible to economic volatility, economic resilience could be more important for project success. Alternately, the availability of efficient project management techniques, excellent human resource management, or the degree of economic growth in the nation might reduce the association between economic resilience and project success. Overall, there is widespread consensus that efficient project management and aspects linked to human resources are essential for project success in the oil and gas business, notwithstanding minor discrepancies in the results among researches.

The research objective seven aimed to examine the moderating role of TAM project leader's personal traits in the relationship between the critical success factors and TAM project success. The analysis's findings showed that, in contrast to organizational variables, leader personality characteristics significantly moderate the association between project management factors, economic resilience factors, human resource-related factors, and project factors.

According to H7, the research could not prove that the attributes of a leader significantly moderate the link between organizational variables and TAM project

performance. According to a study by Kozhakhmetova et al. (2019), there is no significant moderating effect of leadership styles on the relationship between project management techniques and project success in the construction industry. This finding supports the idea that leader personality traits do not significantly moderate the relationship between organizational factors and TAM project success in the Yemeni oil and gas industry. It is crucial to remember that there can be cultural and contextual distinctions between the oil and gas business in Yemen and the construction sector, which might explain why the study's conclusions varied. On the other hand, the analysis's findings supported the hypotheses H8 to H11, which found that a leader's personality traits significantly moderate the relationship between project management factors, economic resilience, human resource factors, project factors, and project factors, as well as the success of TAM projects in the Yemeni oil and gas sector. The importance of leader personality qualities in guaranteeing the success of Turnaround Maintenance programs in the Yemeni oil and gas sector is highlighted by these results.

These results are in line with more recent research that has stressed the significance of leadership personality qualities for project success. For instance, Kusuma & Khoiroh (2023) discovered that the success of projects in the construction business was significantly predicted by the emotional intelligence of the leader. In a similar vein, Kozhakhmetova et al. (2019)'s investigation on the influence of leadership personality characteristics on the performance of construction projects discovered that the conscientiousness and openness to experience of the leader were important predictors of project success. These results are consistent with earlier studies that highlighted the significance of leadership in project success (Kumar et al., 2023; Kumar, Singh, & Pandey, 2024).

The results of this study support current research that stresses the significance of leadership personality qualities in project success, however it is important to critically evaluate these findings in light of the different viewpoints and possible discrepancies among researchers. The non-significant moderating influence of leader personality qualities on the association between organizational parameters and TAM project performance might be one source of dispute. According to certain research, like Łabędzki (2021), leadership significantly affects the link between organizational characteristics and project performance. This gap may be explained by the special circumstances surrounding the Yemeni oil and gas sector, in which external elements like political unpredictability, economic hardship, or cultural quirks may have a greater impact than personality attributes of leaders. The particular personality qualities that were taken into account in this research, which could not have covered the complete spectrum of traits related to the association between organizational parameters and project performance, might also be to blame for the non-significant moderating impact.

The study's results also coincide with current studies emphasizing the importance of leadership personality qualities in project success. It is crucial to under-

stand that the relative significance of a leader's personality attributes may change based on the sector and nature of the project. For instance, when assessing project performance, greater emphasis may be placed on process-driven characteristics than on leader personality attributes in more technical or bureaucratic businesses. This may help to explain why some academics contend that the importance of a leader's personality attributes may be overstated given the potential importance of team dynamics, external market circumstances, or technical advancements in project success (Ktaish & Hajdu, 2022). Additionally, there may be disagreement on the study's conclusions regarding the moderating role of a leader's personality attributes in the link between economic resilience and TAM project performance. According to other academics, project leaders' personality attributes may not have much of an impact on this link since economic resilience is an external issue that is mostly beyond their control. On the other hand, supporters of this study's results would argue that leadership characteristics can have a significant impact on how businesses adjust to and deal with economic obstacles, ultimately affecting project success.

Implication

The results of this research have several theoretical and practical ramifications for project management inside and outside of the Yemeni oil and gas sector. First, the research discovered that characteristics relating to human resources were important predictors of Turnaround Maintenance project performance. This suggests that businesses should spend money on training and retaining a motivated, qualified personnel to complete projects successfully. Organizations may enhance their human resource management techniques by funding training and development initiatives, offering chances for professional advancement, and fostering productive teamwork. The findings of this study have significant implications for trait theories of leadership. The findings show that leader personality qualities modify the association between important success criteria and project success and have a substantial impact on Turnaround Maintenance project success. This result is consistent with leadership characteristic theories, which contend that certain personality qualities, such as extraversion, conscientiousness, and openness, are necessary for successful leadership. The study's conclusion that the effectiveness of Turnaround Maintenance projects is significantly influenced by the personality qualities of the leaders implies that businesses should prioritize hiring and training executives who have the correct personality attributes. Organizations should also provide leadership development and training programs to strengthen leaders' personality qualities and advance their leadership abilities. The findings of this research have significant theoretical ramifications for understanding the factors that contribute to the effectiveness of Turnaround Maintenance (TAM) projects in the Yemeni oil and gas industry. In order to forecast the success of TAM projects, the research places a strong emphasis on project management, project features, leader personality

qualities, and human resource-related factors. The parts that follow go into further depth about the theoretical ramifications of these discoveries. The research also shows that project management elements including planning, controlling, monitoring, and reporting are critical to the success of Turnaround Maintenance initiatives. To properly design and manage Turnaround Maintenance initiatives, businesses need make sure they have skilled project managers.

5. Conclusion

The purpose of this research was to look into the crucial elements that affect the success of Turnaround Maintenance (TAM) projects in the Yemeni oil and gas sector. The research gathered data from 385 people and used partial least squares (PLS) analysis to analyse the data. According to the study's results, the success of TAM projects in the Yemeni oil and gas sector is significantly influenced by aspects relating to human resources, project management, projects, and leader personality qualities. Economic resilience and organizational characteristics were shown to have no discernible influence on the success of TAM projects. The results of this study are in line with earlier research, which has emphasized the significance of elements relating to human resources, project management, and projects in general in influencing project success. For instance, Keegan et al. (2018)'s research discovered that team building, staffing, and other human resource management techniques were essential for project success. Similar to this, Leybourne and Bernardin (2020) recognized human resource-related elements, such as team makeup and leadership, as crucial success factors in their research on project success factors. The results of this study add to existing research by highlighting the significance of leadership personality factors in predicting the success of TAM projects.

The study's conclusions have several useful ramifications for Yemen's oil and gas sector. To guarantee the success of TAM project objectives, organizations in the Yemeni oil and gas sector should first concentrate on creating and executing efficient human resource management procedures. This can include offering suitable training and development opportunities, assuring suitable workforce numbers, and encouraging successful team-building exercises. Second, project managers need to understand the significance of good project management techniques, such as stakeholder management, risk management, and project planning, in assuring successful project results. Third, while designing TAM initiatives, organizations should consider the significance of project-related parameters such project scope, project complexity, and project length. Fourth, organizations need to understand how crucial leadership personality attributes are to the success of TAM projects. Project success may be strongly impacted by leaders with excellent leadership abilities, such as good communication, decision-making, and conflict resolution skills.

The results of the investigation have academic ramifications as well. By underlining the significance of leader personality qualities in influencing TAM project

success, the study's findings add to the body of knowledge already known on project success determinants. Future study should investigate how personality qualities of leaders affect project performance in various situations and sectors, according to this conclusion. Further evidence for the significance of project management, project-related, and human resource-related aspects in influencing project success is provided by the study's results.

Even though this study has several advantages, such as a large sample size and a quantitative research methodology, there are certain drawbacks that need to be noted. First, since the research was done in a particular context—the Yemeni oil and gas industry—the results may not be applicable in other situations. Second, the research used self-report metrics, which might be biased. Finally, while it may be a topic for future research, the study did not examine the links between the identified important success elements.

In a nutshell, this research has pinpointed the crucial elements that have an impact on TAM project success in the Yemeni oil and gas sector. The study's conclusions emphasize the significance of project management, project-related, human resources-related, and leader personality attributes in influencing project success. The study's conclusions have significant practical ramifications for businesses in Yemen's oil and gas sector and provide insightful information for future research on project success determinants.

5.1. Recommendation for Future Study

There are several suggestions for additional research that might further our knowledge of the elements that contribute to the success of Turnaround Maintenance projects in the Yemeni oil and gas sector. These recommendations are based on the results and discussions given in this study.

First, it is advised that future research concentrate on examining the underlying processes through which the noted parameters affect the performance of Turnaround Maintenance projects. For instance, research might look at the effects of certain project management elements like resource allocation, risk management, and project scheduling. Future research may provide project managers and other stakeholders participating in Turnaround Maintenance projects useful advice by developing a greater knowledge of the precise processes through which these variables affect project performance.

Second, by examining the connection between other elements that can affect the effectiveness of a Turnaround Maintenance project, future research might build on the results of the present study. Studies could, for instance, look at how project funding, scope, and communication affect the success of a project. Future research may give a more thorough knowledge of the elements that influence project performance by looking at a wider variety of factors that may affect Turnaround Maintenance project success.

Third, future research might examine the precise leadership behaviours that contribute to project success given the major importance of leadership in the

success of Turnaround Maintenance programs highlighted in this study. Studies may examine, for instance, how leadership traits like empowerment, communication, and vision setting affect project success. Future research may provide project managers and other project stakeholders with useful advice by identifying the precise leadership behaviours that contribute to project success.

Fourth, future research may look at how national culture and industry traits and other contextual variables affect the effectiveness of Turnaround Maintenance programs. Studies might, for instance, look at how cultural ideals like individualism or collectivism affect the success of projects in the Yemeni oil and gas sector. In a similar vein, research might look at how industry characteristics like the degree of competition or the regulatory landscape affect project performance. Future research may provide a more nuanced view of the components that contribute to project success by taking into account the influence of contextual factors on project performance.

Fifth, it is advised that future research examine the influence of various project management philosophies on the accomplishment of Turnaround Maintenance projects. Studies might, for instance, look at how Agile project management techniques affect projects' performance in Yemen's oil and gas sector. Studies may also look at how various project management tools and technology affect a project's success. Future research may provide useful advice for project managers and other stakeholders participating in Turnaround Maintenance projects by studying the effect of various project management methodologies on project success.

Sixth, future research may look at how external variables like the state of the economy and political unrest affect the performance of Turnaround Maintenance programs. Studies may, for instance, look at how changes in the price of crude affect the performance of projects in Yemen's oil and gas sector. Studies might also look at how governmental policy changes or political unpredictability affect project outcomes. Future research may provide project managers and other Turnaround Maintenance project stakeholders useful advice by studying the influence of external variables on project performance.

Seventh, longitudinal study approaches should be used in future studies to evaluate the variables that affect Turnaround Maintenance project performance over time. Future studies may look at how the influence of various variables on project performance evolves throughout the life of a project by using longitudinal study methodologies. Similar to this, longitudinal research approaches may aid in identifying the pivotal stages of a project when certain elements are more likely to have an influence on project success.

Finally, it is advised that future research take into account the involvement of stakeholders besides project managers in Turnaround Maintenance programs. Studies may, for instance, look at how staff attitudes and behaviours affect project performance. Similar studies may look at the influence of stakeholder participation and consumer satisfaction on project success. Future research may better

understand project performance by taking a wider variety of stakeholders into consideration.

5.2. Limitation

The research was specifically carried out within the context of the Yemeni Oil and Gas industry, and consequently, the applicability of the findings to other settings may be constrained. The investigation focused exclusively on major oil and gas operators in Yemen. The use of self-report measures introduces the potential for bias in the study's outcomes. Additionally, the research did not delve into the interconnectedness of the identified critical success factors, leaving room for exploration in future studies. Enhancing the precision of results through multivariate analysis techniques could be achieved by enlarging the sample size. Therefore, future research endeavors may benefit from considering a larger sample size to further refine the insights gained from the study.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix A: Questionnaire

Section A: Respondent Details

The purpose of this section is to gather the demographic information of this survey. Kindly select the answer that is most relevant to you.

Please tick only one appropriate answer.

1) Gender

a) Male

b) Female

2) Age

a) Below 30 years

b) Between 31 - 35 years

c) Between 36 - 40 years

d) Between 41 - 45 years

e) 46 years and above

3) What is the highest level of education you have completed?

a) Diploma

b) Bachelor's Degree

c) Master's Degree

d) PhD's Degree

e) Other……

4) What was your functional role in the TAM project?

a) Top Management

b) TAM Project Manager

c) Senior Team Members

d) Intermediate Team Members

e) Junior Team Members

f) Consultant

g) Other……

5) Which industry is your Company?

a) Exploration & Production

b) Refinery

c) Gas Plant (LPG, LNG)

d) Petrochemicals

e) Other……

6) How long have you been involved in TAM projects?

a) Less than 3 years

b) 3 - 6 years

c) 7 - 10 years

d) 11 years and more

e) Not involved

Section B: Tam Project Success Criteria

A list of performance measures or performance indicators that measure the out-

come of a turnaround maintenance project is provided.

Kindly indicate the extent to which you agree or disagree that the following variables of success are used by your company when evaluating the outcome of your turnaround maintenance project.

Please put Tick mark (✔) on the number according to the extent of your agreement and disagreement with the statement where Strongly Agree (SA) = 5, Agree (A) = 4, Neutral (N) = 3, Disagree (D) = 2, and Strongly Disagree (SD) = 1.

Items		Source
TAMS1	Completion of the TAM project within budget is one of the success criteria	Masubelele, 2019
TAMS2	Completion of the TAM project within scope is one of the success criteria	
TAMS3	Completion of the TAM project on time is one of the success criteria	
TAMS4	Completion of the TAM project according to quality requirements is one of the success criteria	
TAMS5	Completion of start-up and commissioning of the TAM without incidents is one of the success criteria	
TAMS6	Completion of TAM with no incidents in safety, health and the environment is one of the success criteria	
TAMS7	Completion TAM within the estimated amount of discovery work is one of the success criteria	

Section C: Tam Project Success Factor

This section provides a list of critical factors or attributes believed to impact the success of turnaround maintenance projects.

Organizational Factors:

Kindly indicate the extent to which you agree or & disagree that the following organizational factors have the most influence on the success of your turnaround maintenance project.

Items		Source
OF1	Top management support leads to project success	Masubelele, 2019
OF2	A realistic strategy leads to project success	
OF3	Organizational structure of the TAM project influences the success of the project	
OF4	Organizational culture influences the success of the project	

Continued

OF5	Empowering of the TAM manager with necessary authority leads to project success	
OF6	Supporting Management team on request for additional resources due to scope changes leads to project success	
OF7	Providing adequate funds, and other resources leads to project success	
OF8	Develop TAM management process procedure leads to project success	

Human Related Factors:

Kindly indicate the extent to which you agree or disagree that the following human-related factors have the most influence on the success of your turnaround maintenance project.

Items		Source
HRF1	Having a competent TAM manager leads to project success	Masubelele, 2019
HRF2	Having a TAM manager with formal qualification leads to project success	
HRF3	Having a TAM Manager with TAM experience leads to project success	
HRF4	Having a TAM Manager with leadership skills leads to project success	
HRF5	A competent TAM Team leads to project success	
HRF6	The TAM Team's commitment leads to project success	
HRF7	A motivated or incentivized team lead to project success	
HRF8	Clearly defined roles and responsibilities for all TAM team members lead to project success	
HRF9	The TAM team's alignment with organizational goals and strategy lead to project success	
HRF10	A well-integrated and cohesive TAM team leads to project success	
HRF11	Applying effective conflict resolution leads to project success	
HRF12	Providing adequate training and education to the TAM team leads to project success	
HRF13	The availability of specialized skills within the TAM team leads to project success	

Project Management Factors

Kindly indicate the extent to which you agree or disagree that the following turnaround maintenance project management related factors have the most influence on the success of your turnaround maintenance project.

Items		Source
PMF1	Setting clear and realistic TAM objectives leads to project success	
PMF2	Estimating realistic time and cost of TAM leads to project success	
PMF3	Efficient and detailed TAM planning leads to project success	
PMF4	Review of readiness prior the TAM execution leads to project success	
PMF5	Performing risk-based inspection leads to project success	
PMF6	Freezing of the TAM scope leads to project success	
PMF7	Strict scope control and management leads to project success	
PMF8	Recognising the amount of discovery work during TAM execution leads to project success	Masubelele, 2019
PMF9	Having clear communication channels for all TAM team members leads to project success	
PMF10	Performing safety awareness and safety training leads to project success	
PMF11	Integration of TAM projects with other projects leads to project success	
PMF12	Identification, assessment and addressing risks leads to project success	
PMF13	Effective site management leads to project success	
PMF14	Effective monitoring and feedback lead to project success	
PMF15	The TAM report and lessons learned will help in preparation for the next TAM project	

Project Related Factors

Kindly indicate the extent to which you agree or disagree that the following project related factors have the most influence on the success of your turna-

round maintenance project.

Items		Source
PRF1	The size and complexity of the TAM effects project success	Masubelele, 2019
PRF2	Having sufficient TAM duration leads to project success	
PRF3	The frequency of TAM held effects project success	
PRF4	Having sufficient lead time for TAM results in project success	

Economic Resilience Related Factors

Kindly indicate the extent to which you agree or disagree that the following Economic Resilience Related Factors have the most influence on the success of your turnaround maintenance project.

Items		Source
ERRF01	The organisation creates and evaluates static economic resilience plans to ensure the success of the TAM project.	Pashapour et al., (2019).
ERRF02	The organisation creates and tests dynamic economic resilience plans to ensure the success of the TAM project.	
ERRF03	In times of crisis, the organisation has contingency plans to ensure the success of the TAM project.	
ERRF04	Organizational processes and decisions are transparent, especially during times of crisis, to ensure the success of the TAM project	
ERRF05	In a crisis, the organisation expects several different paths of action to ensure the success of the TAM project.	

Leader's Personality Traits

Kindly indicate the extent to which you agree or disagree that the following Leader's Personality Traits related factors have the most influence on the success of your turnaround maintenance project.

Items		Source
LRT1	The TAM manager has a shared vision	Obiajunwa (2010).
LRT2	The TAM manager is a good communicator	
LRT3	The TAM manager is a man of Integrity	

Continued

LRT4	The TAM manager works in honesty
LRT5	The TAM manager is enthusiastic
LRT6	The TAM manager is empathic
LRT7	The TAM manager is competent to perform his job
LRT8	The TAM manager can delegate tasks and responsibilities
LRT9	The TAM manager remains cool under Pressure
LRT10	The TAM manager has good team-building abilities
LRT11	The TAM manager has problem-solving abilities
LRT12	The TAM manager is an open-minded person
LRT13	The TAM manager has tolerance to ambiguity
LRT14	The TAM manager is very supportive
LRT15	The TAM manager always has the patience to listen to others
LRT16	The TAM manager always has the determination to achieve the success of his projects
LRT17	The TAM manager is very much interested in the job
LRT18	The TAM manager is proactive

Thank you very much for your valuable time.