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Sustainable Development Through Effective Project Management: The Petromasila in Yemen

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ABSTRACT

This study examines the process by which the components of project management influence the sustainable development effectiveness of PetroMasila personnel in Yemen. The quantitative technique was utilized in the current investigation. The online survey was utilized to gather information from 342 workers working in departments involved in project-related activities. The Structural Equation Model (SEM) was used in Smart-PLS Software to analyze the data. This study revealed that project management and its following aspects, including planning management and cost management had a substantial and favorable impact on the oil industry's capacity for sustainable growth. The study model explained 32% of the variance in sustainable development effectiveness. In addition, this paper outlines limitations and further research.

Keywords: cost management, PetroMasila, planning management, project management, risk management, sustainable development, time management, Yemen.

INTRODUCTION

Yemen faces significant challenges in achieving sustainable development due to its low economic status, high poverty levels, and limited access to essential services like clean water, healthcare, and education [1]. The ongoing civil war further exacerbates these issues, impacting the country's economic and social development [2]. Yemen's oil and gas sector, a key economic driver, has been hindered by insufficient infrastructure investment and technology modernization. Additionally, project management issues have led to delays, cost overruns, and reduced success rates [2-4].

Sustainable development, defined as meeting current needs without compromising future generations' ability to meet their needs, focuses on integrating economic, social, and environmental [5]. This concept is crucial in addressing the world's complex challenges and has gained prominence in academic and managerial circles [6]. The oil and gas industry, in particular, requires sustainable development strategies to mitigate potential negative impacts on local communities and the environment [7].

Project management, the skill and science of managing various resources to achieve specific objectives, is essential for executing projects effectively and efficiently [8, 9]. Research has shown a positive correlation between project management and factors like project performance, cost management, and risk management [10, 11]. Factors such as sustainability integration, stakeholder engagement, and communication levels during project management processes can impact the success of sustainable development efforts [12-15].

In Yemen's oil and gas industry, effective project management can contribute to sustainable development by ensuring efficient project completion while minimizing environmental and community impacts [7]. Investment in sustainable technologies and infrastructure also plays a crucial role in achieving sustainable development goals [16].

This research paper investigates the effect of project management on sustainable development within PetroMasila, a leading Yemeni oil and gas company. By exploring the relationship between project management practices and sustainable development outcomes at PetroMasila, this study aims to offer insights into how effective project management can support achieving sustainable development goals in the oil and gas sector.

The findings of this research may benefit PetroMasila and the broader oil and gas industry in their efforts to balance economic growth with social and environmental responsibilities. Additionally, the study's results may have implications for other industries and organizations striving to promote sustainable development through effective project management practices.

LITERATURE REVIEW

Sustainable Development

The definition of sustainable development satisfies the demands of the present without compromising the ability of future generations to meet their own needs. Sustainability is a collaborative effort to ensure that future generations will enjoy a high degree of economic stability, democracy, and public participation in community government, while preserving the ecological system and the sanctity of life [17].

The three aspects of sustainability are identified as "Triple Bottom Line," or alternatively "Triple P: people, planet, and profit". However, these three pillars are not stable; they are in continual motion owing to social, political, economic, and environmental factors [6]. Drejeris and Oželienė [18] Insinuate that the idea of sustainability includes a technological dimension in addition to the four traditional aspects. Clearly, the technology factor is required to convey sustainability in terms of innovation implementation. Sustainability incorporates ecological, social, economic, and technological components [16].

Enterprises must assess their sustainable development performance in terms of economic, social, environmental, and technological aspects. The sustainable technological aspect is a socio-historical phenomenon that comprises a system of technical devices designed to meet the needs of individuals and society [19]. The sustainable environment aspect means meeting current needs without jeopardizing the right and ability of future generations to meet theirs and is one that is connected with the ecological concept of interdependence. Social sustainability is defined as a concept encompassing variety, equality, quality of life, maturity, democracy, and governance, and interconnected/social cohesions [17]. Bartelmus [20] suggests that a sustainable economy is one that can maintain its economic performance and growth and is based on sustainable processes, energy, and raw materials.

There is a growing body of literature on sustainable development, with research covering a wide range of topics and perspectives. Some studies have focused on the conceptual foundations of sustainable development, exploring its definitions, dimensions, and implications. Many authors have argued that renewable energy sources are a viable alternative to fossil fuels and can significantly reduce greenhouse gas emissions; solar energy can be used for cooking, water heating, drying, and electricity generation and biodiesel and ethanol production and its applications for transportation are also viable options [21]. There have emphasized the importance of equity, justice, and participation in sustainable development. In addition, innovations in science and technology can alter the kind and efficiency of energy and materials utilised to promote economic growth while safeguarding and restoring natural systems [22].

Sustainable development refers to serving the present's requirements without sacrificing future generations' ability to do so. In this sense, sustainable development's social, environmental, and economic components strongly depend on technology [19]. Enterprises' routine value chain actions create both positive and negative social and societal outcomes. There are linkages between companies and the societies in which they operate. Businesses rely on healthy societies for a trained workforce. Even though the private sector, rather than the government, is frequently responsible for providing jobs and infrastructure (not to mention goods and services), and only a healthy society can generate the kind of productive workers that every company wants to hire [23].

Sustainability has simultaneously evolved as a crucial idea in the growth and administration of countries. Sustainability must be included in all planning and development phases, including project management implementation. The projects play a major role in community development and have contributed greatly to economic growth and sustainable development. Therefore, sustainability might be regarded to be a prerequisite in the context of modern undertakings [24].

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There are numerous challenges to the successful implementation of sustainable development. These barriers should be viewed as obstacles and entrepreneurial opportunities and addressed accordingly. The current development model is unsustainable and places unsustainable pressures on the natural environment. Human well-being is inseparably linked to economic growth, and economic growth inevitably has environmental implications [25]. Ahmad, Soskolne [26] claim that sustainable development faces various obstacles, including the application of current and future hard- and soft-law instruments, the depletion of natural resources, and an insufficient global framework for addressing environmental and social obligations. Despite the numerous obstacles to attaining sustainable development, governments, civil societies, and academics must engage in the creation and implementation of environmentally and ecologically responsible development strategies.

The Concept of Project Management

According to Jain [10], project management is the act of planning and managing a company's resources to accomplish a certain objective or duty. The method of project management helps firms to manage their projects. The advancement of information technology supports the development of project management strategies and procedures. Too and Weaver [27] suggested that project management is the act of matching the project deliverables with the company's objectives in order to provide value for the organization. Project management involves managing resources such as employees, finance, technologies, and intellectual property. The core components of project management include project objectives, quality control, and the iron triangle of project management. Project management is a discipline that involves the planning, organizing, and controlling of resources in order to successfully deliver a project [10, 11].

The Project Management Body of Knowledge (PMBOK) is a collection of methods and knowledge areas that are generally recognized as best practices in the project management profession. The PMBOK Guide is an internationally recognized standard that outlines the foundations of project management as they pertain to a wide variety of projects [11]. The Project Management Body of Knowledge (PMBOK) describes its own project management methods and includes nine essential knowledge areas that are universal to all projects, irrespective of the project management technique applied. The domains addressed are project integration management, scope management, cost management, quality management, time management, human resource management, risk management, and procurement management [28].

The advantages and techniques of project management assist firms in achieving more effective projects [29, 30]. It has become increasingly important for organizations across all sectors to effectively manage their projects in order to achieve their strategic objectives and deliver value to stakeholders [31]. Andrejić, Đorović [9] determined that projects would get more complicated in the future and that a project management approach would be necessary to handle such projects. Surveys and studies have shown that project management tools can improve business performance.

Project management leads to less disruption and better coordination within an organization. Applying a benefits management process to pre-identified critical success factors promoted

better project management practices and effectively impacted project success [29]. Vacar [8] found that project management is an effective tool for implementing change in organizations and can help organizations to take advantage of opportunities and protect themselves from threats. Various business applications that may be successfully handled as projects employ project management. New project management methods have been created to meet contemporary projects' features.

Project management is essential in construction to ensure that projects are finished on schedule, within budget, and to the appropriate quality standards. By precisely planning and managing the production process, project management may increase productivity and decrease waste in manufacturing [32]. Project management is essential for properly developing and deploying new software and systems in the IT industry. Project Management Information Systems (PMIS) are essential project management tools in many industries; however, they are sometimes prohibitively costly for small and medium-sized businesses (SMEs) [33]. By coordinating the efforts of several healthcare experts and ensuring that resources are utilized, project management may improve patient care and results in the healthcare industry [34]. In the education sector, project management may be used to plan and coordinate initiatives such as producing new curricula, deploying new technology, and constructing new buildings [35].

Impact of Project Management on Sustainable Development

There is also significant research on the relationship between project management and sustainable development. Many studies have found that project management can be key to promoting sustainable development outcomes. Sustainable project management is necessary to fully realize the objective of constructing an environmentally friendly building. Project management can help organizations to align their projects with sustainable development goals and to measure and report on their performance in a transparent and accountable manner. [12, 14].

Sustainable Project Management is an important global project management trend. One of the primary objectives of project management is to optimize the utilization of resources, such as financial, human, and material assets; this is crucial for the project's success and the organization's long-term viability. By reducing waste and inefficiency, companies may lower their environmental impact and promote sustainable growth through efficient resource management [36].

Moreover, project management may assist firms in aligning their initiatives with their broader sustainability objectives. For instance, a corporation may have a goal to reduce its carbon emissions and utilize project management techniques to plan and execute initiatives that will help it reach this objective, such as deploying energy-efficient technology or producing new, low-carbon goods [37]. The future of project-based organizations lies in the combination of these two disciplines. Projects are influenced by the environment in which they are carried out, but they also contribute to their modification. Sustainability is a project's ability to deliver outcomes that may be particularly favorable at the moment but have severe consequences for many stakeholders in the future. Each project utilizes energy and generates social, economic, and environmental (SEE) repercussions, which determine the project's overall sustainability [38].

However, there is also evidence that project management can sometimes conflict with sustainable development goals, particularly when it is used to prioritize economic goals over social and environmental ones [11]. Some authors have argued that the traditional focus of project management on efficiency, cost, and time can sometimes be at odds with the broader and more holistic goals of sustainable development [39]. Others have pointed to the need for a more nuanced and contextualized understanding of the relationship between project management and sustainable development, taking into account the specific characteristics and challenges of different sectors, regions, and cultures [40]. Subsequently, the following hypothesis is proposed:

H1: *Project Management is related positively to sustainable development efficacy among employees of PetroMasila in Yemen.*

The Component of Project Management

Project planning management, project cost management, project time management, and project risk management are the four origins of project management [11].

Project Planning Management:

According to Munoz-Raskin, Moody [41], Planning is the first essential function of any organization since it provides direction for all tasks. A planning process is a way of thinking through all facets of an issue or a problem before taking action. In general, planning contains procedures (initiating, planning, executing, controlling, and closing) and attributes (scope, time, resources, cost, quality, risk, and others).

In addition, it provides the ingredients for action. As part of the planning process, organizations assess their resources, environments, and objectives. Management planning includes forecasts, objectives, policies, and programs based on that assessment [42]. Planning is also a strategic mechanism that helps determine priorities for an organization's future direction. The key aim of planning is to define the existing tools and use them optimally. Planning involves establishing the organization's objectives, determining the actions necessary to attain these objectives, and utilizing these activities to evaluate the organization's performance [41].

Strategic planning is a compilation of stated objectives and developed financial predictions and budgets for the long term. In comparison, operational planning is the short-term planning of finances, marketing, inventories, and sales. Strategic planning is superior to operational planning and is connected with higher performance in small businesses [43].

Numerous empirical studies of project management success criteria have identified planning as one of the essential project success factors. Recent research indicates that firms employing management practises such as planning, risk management, and cultural fit have a strong organisational culture that positively affects project management plans [44].

Sustainable growth requires strategic planning. Timofeeva [45] discovered that strategic planning is necessary for sustainable agricultural development. In this study, the researcher will examine the link between project planning management, one of the project management dimensions, and sustainable development. Subsequently, the following hypothesis is proposed:

H1.1: *Project planning Management is related positively to sustainable development among employeesof PetroMasila in Yemen.*

Project Time Management:

The definition of time management is the intelligent use of time to accomplish and perfect a specific activity within a time constraint. However, no one definition of time incorporates every aspect of the concept. Becker [46] split time into quantitative and qualitative categories.

Kristan [47] argued that time management is about taking command thoughtfully, intentionally, and deliberately - not avoiding challenges but embracing them. In addition, several authors emphasize that time management is not an aim in and of itself. It serves as a means to an end. When coupled with goal-setting and success, it offers a means of eliciting extremely high achievement from individuals and others with whom they interact.

Effective time management is intimately related to knowing the distinction between efficiency and effectiveness. The habit of identifying strategic tasks in an acceptable way and the selection of relevant tools and strategies for their execution may be regarded as the most fundamental prerequisites for good time management. On the other hand, time management training may improve time management skills, but this does not necessarily lead to better performance and sustainable behavior [48]

Moreover, several studies indicate that time management may assist firms in achieving their sustainable development objectives. Kim, Bansal [49] discovered that a present-time viewpoint might assist companies in achieving sustainable growth, while Jackson [50] discovered that realistic time management and organization strategies could increase productivity and quality of life. According to Gehani [51], time-based management is an important resource for technology management. The commercial success of creative operations depends on the timing of relevant efforts. Van Berkel [52] discovered that the goals for sustainable technology might be attained by creating more sustainable technologies by utilizing time management strategies. Subsequently, the following hypothesis is proposed:

H1.2: *Project Time Management is related positively to sustainable development efficacy among employeesof PetroMasila in Yemen.*

Project Cost Management:

The cost has been defined as the extent to which general circumstances facilitate the completion within the stated budget. Cost is the sum of all expenses incurred from the beginning of a project's development up until its conclusion. Cooper and Slagmulder [53] defined project cost management as the steps required to ensure the project is completed within the budgeted amount and as the enhancement of an organization's cost-effectiveness through the knowledge and management of the actual cost drivers throughout the life cycle of a project. The most successful cost management strategies for building projects were cash-flow forecasting, tender budgeting/estimating, and elemental cost planning. [54].

Nandjebo, Akande [55] found that cost studies of earlier projects and financial management implementations are crucial components of project cost management that might significantly improve the time and quality performance of public sector projects. In addition, he observed

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that employing particular project cost management techniques may improve project cost performance. Yismalet and Patel [56] presented the limits, difficulties, and flaws of each project cost management function in relation to contractor practises, which must be changed to accomplish set project objectives and contractor profitability. Large construction projects are most significantly impacted by material price variations, cash flow and financial challenges faced by contractors, a lack of communication between parties, a shortage of site employees, and faulty planning and scheduling by contractors.

Project cost management is the process of looking for ways to reduce costs and improve customer satisfaction. The ideal situation is where there are obvious cost reduction outcomes, process improvements, and customer satisfaction benefits. Although cost management is mostly concerned with expenses, it also strives to enhance other performance areas, such as quality and delivery. Cost management identifies, gathers, measures, classifies, and reports information managers may use for costing, planning, control, and decision-making and improve sustainable development [57].

According to several academics, cost management is essential for sustainable growth. Yun [58], Duman, Icerli [59], and Wanass and Shahaza [60] all discovered that cost-cutting methods contribute to sustainable development. This can be accomplished by enhancing independent innovation in the industry of construction cost evaluation [58], reducing harmful environmental effects during the transformation of raw material to the final product [59], or by applying the target cost technique to calculate the costs of the product, as this is one of the modern management accounting techniques that can help achieve sustainable development [60]. In the current research, the authors seek to investigate the association between Project Cost Management and sustainable development. Thus, the following hypothesis was developed:

H1.3: *Project Cost Management is related positively to sustainable development efficacy among employees of PetroMasila in Yemen*.

Project Risk Management:

Risk management is an activity within project management that is growing in relevance due to the globalization and intensifying rivalry of organizations [61, 62]. Risk is defined as the potential for anything negative to occur. The risk management process comprises a set of phases, including creating the context, identifying, analyzing, assessing, treating, monitoring, and communicating risks, which allow for the ongoing improvement of decision-making. Project risk management is a strategy for detecting, evaluating, and prioritising risks, followed by resource planning to restrict, monitor, and control the probability and impact of undesirable events [11, 62]

Abdulsamad, Ali [63] argued that risk-taking and innovativeness have a significant and positive impact on organizational performance. According to Saleem and Abideen [61], the proper management of project risks promotes the successful completion of the project, increases customer satisfaction, and boosts the organization's financial performance. To effectively manage a project by assuring on-time completion and maximizing profit, it is essential to identify, assess, and mitigate the associated risks. Results indicate that risk management has an effect on individual performance indicators as a result of the inverse link between risk management and return on assets and other factors [64]. Abdulhadi, Ariffin [65] argued that

risk management has a positive impact on the four main components of project management in construction, which are project scope, project timelines, project benefits, and project quality. According to Gheorghe [66] , risk management is an effective tool for sustainable development. Bakhtiari [67] concludes that risk management is a potent tool for sustainable development and that the management of significant systematic risks and natural hazards is vital for sustainable development. According to Ayse and Triant [68], sustainability risk management necessitates the comprehensive and systematic integration of ecological, socioeconomic, and corporate risk variables. The author provided a conceptual model for corporate sustainability that manages and integrates business aims to produce economic and financial value as well as environmental and social responsibility consciousness. Krysiak [69] defined sustainability as the requirement to reduce the risk of injuring future persons and offers a framework in which risk management methods, such as mean-variance analysis, may be used to examine planning decisions and to compute a risk-minimizing policy mix. In the present research, the authors seek to investigate the association between project risk management and sustainable development. On the contrary, Gheorghe [66] argued that short-term risk management practices are not sufficient alone for success sustainable development; it necessary to apply long-term risk management practices as well. Thus, the following hypothesis was developed:

H1.4: *Project Risk Management is favorably connected to sustainable development efficacy among PetroMasila personnel in Yemen.*

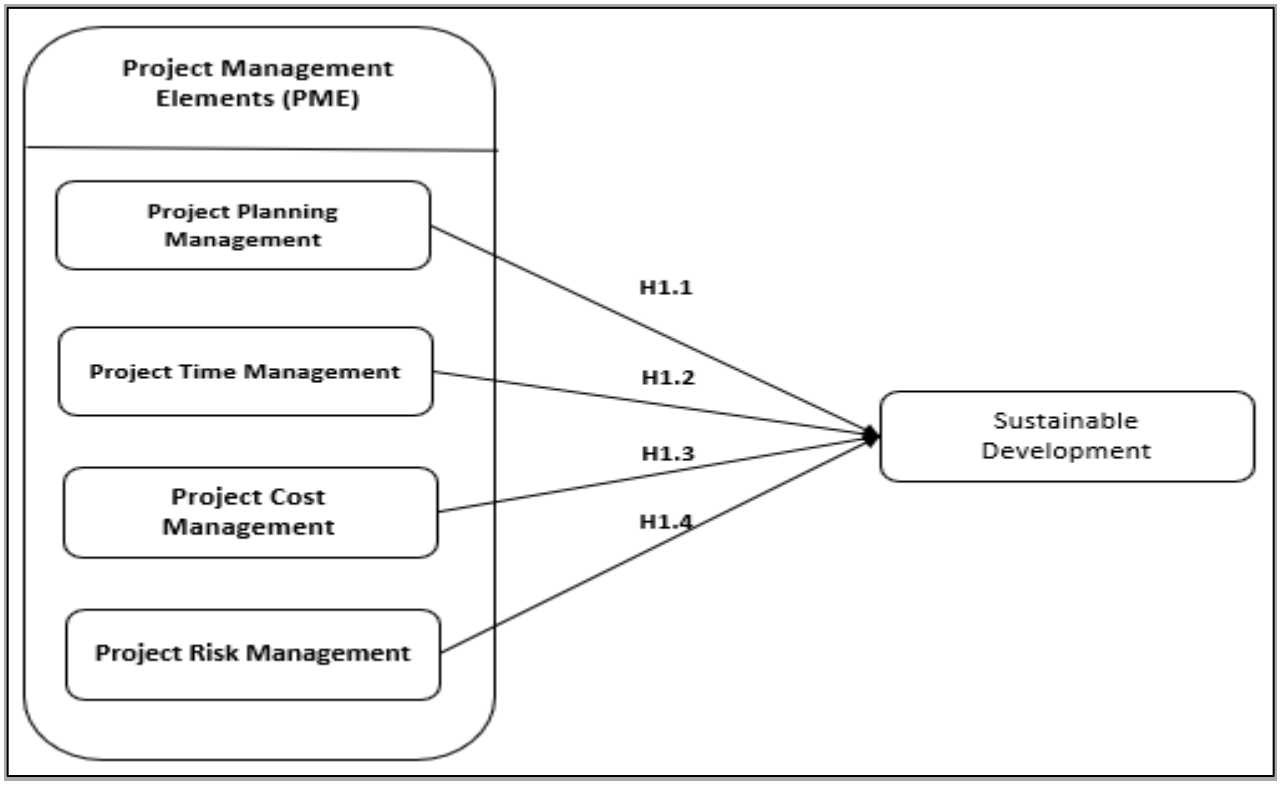

Figure 1:Research framework

METHODOLOGY

This study analyses the direct relationship between the four fundamental components of project management and sustainable growth at Yemen's PetroMasila. The quantitative method was

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employed, and the "Questionnaire" survey instrument was used to collect data from Masila Petroleum Exploration and Production Company departments staff involved in project management activities (PetroMasila). Personnel of the following departments was interviewed through the questionnaire: Projects, engineering, construction, production, operation, commissioning, well services, drillings, HS&E engineering, IT & communication, HR, subcontractors, supervisors, and others. The questionnaire for this study is divided into two sections: demographic information about respondents and measurements of study variables. The first section of the questionnaire, "the demographic," consisted of seven questions (items), while the second section featured nineteen questions (items) about independent factors (the components of project management) and twenty questions (items) about dependent variables (sustainable development). For all variables' items, a 5-point Likert scale was utilized.

According to the annual report of PetroMasila for 2021, 900 workers were working on activities related to projects. According to the table by [70], the sample size for this study consisted of 269 employees. The researchers used probability sampling with a random sample approach to select the sample size. Cronbach's alpha values for all variables were greater than 0.70 [71]. According to the pilot research, 30 employees indicated the questionnaire's validity and reliability. In order to avoid the issue of a low response rate, the number of questionnaires issued to respondents during the data collection phase was raised by 50 percent to 404 [71]. The researchers got 360 surveys; however, only 342 could be utilized. The Smart PLS-SEM instrument was utilized to analyze theacquired data and evaluate the study's hypothesis.

DATA ANALYSIS AND RESULTS

Descriptive Analysis

As shown in table 1, the skewness and kurtosis statistics define the distribution of the collected data, and it is proven that the data follow the normal distribution because their values are between +1 and -1 [72]. Sustainable development has gotten the lowest score, 3.6925, indicating that the respondents somewhat agree with the measurement. On the other hand, the project time management means score was the highest at 3.9322, which means that the respondents nearly agreed with the measurement. Subsequently, the variability accepted as the standard deviation ranged between 0.61876 and 0.81119. Therefore, the respondents have similar opinions about the studied variables, reflecting considerable acceptable variability within the data set.

Table 1: Descriptive Statistics for Study Variables (Mean and S.D)

Variable	Minimum	Maximum	Mean	S.D	Skewness	Kurtosis
Project Management	**1.85**	**4.70**	**3.8618**	**.61876**	**-1.223**	**1.386**
Project Planning Management	1.40	5.00	3.7836	.81119	-0.747	-0.159
Project Time Management	1.60	5.00	3.9322	.72578	-1.150	1.334
Project Cost Management	1.40	5.00	3.8690	.76747	-0.898	0.181
Project Risk Management	1.50	5.00	3.8662	.71035	-0.960	1.168
Sustainable Development	**1.3**	**4.7**	**3.6925**	**0.75393**	**-0.944**	**0.417**

Ascertaining Internal Consistency and Reliability

The reflective constructs' constructing validity, convergent validity, and discriminant validity are evaluated as part of the assessment of the measuring model. In this study, the reliability

(Cronbach's alpha) values for project management varied from 0.789 to 0.883, and the compositereliability (CR) values for the same variables ranged from 0.863 to 0.915, as shown in Table 2 & Figure 2. Therefore, all reliability and composite reliability values exceeded the acceptable threshold of 0.70 [71, 73]. Concerning the convergent validity of this, in the investigation, all item loadings were larger than 0.70, and the value of average variance extracted (AVE) was greater than 0.50; as suggested [71]; hence, convergent validity was confirmed. The measurement model was assessed by examining the outer loading of each construct item [71]. According to Hair, Sarstedt [71], as the rule of thumb, items were retained when they had to load more than 0.60. In the current study, out of 40 items, one item (RA3=0.639) was deleted because it has low loading.

Table 2: Items loading, Cronbach's alpha, Composite Reliability (CR), and AVE

Main-Variable	Sub- Dimension	Code	Loading	Cronbach's alpha	CR	AVE
	Project Management Planning	PM		0.844	0.888	0.615
		PM1	0.816			
		PM2	0.794			
		PM3	0.820			
		PM4	0.729			
		PM5	0.757			
	Project Management Time	TM		0.836	0.883	0.603
		TM1	0.801			
		TM2	0.824			
Project		TM3	0.752			
		TM4	0.767			
		TM5	0.733			
Management	Project Management Cost	BM		0.822	0.875	0.583
		BM1	0.774			
		BM2	0.775			
		BM3	0.737			
		BM4	0.784			
		BM5	0.746			
	Project Management Risk	RA		0.789	0.863	0.611
		RA1	0.794			
		RA2	0.818			
		RA4	0.763			
		RA5	0.752			
	Technological Aspect	TA		0.846	0.890	0.619
		TA1	0.791			
		TA2	0.756			
		TA3	0.794			
		TA4	0.789			
		TA5	0.803			

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	Economical Aspect	CA		0.861	0.900	0.643
		CA1	0.811			
Sustainable Development		CA2	0.784			
		CA3	0.797			
		CA4	0.813			
		CA5	0.804			
	Environmental Aspect	EA		0.866	0.903	0.651
		EA1	0.824			
		EA2	0.813			
		EA3	0.807			
		EA4	0.804			
		EA5	0.787			
	Social Aspect	SA		0.883	0.915	0.682
		SA1	0.824			
		SA2	0.828			
		SA3	0.807			
		SA4	0.838			
		SA5	0.831			

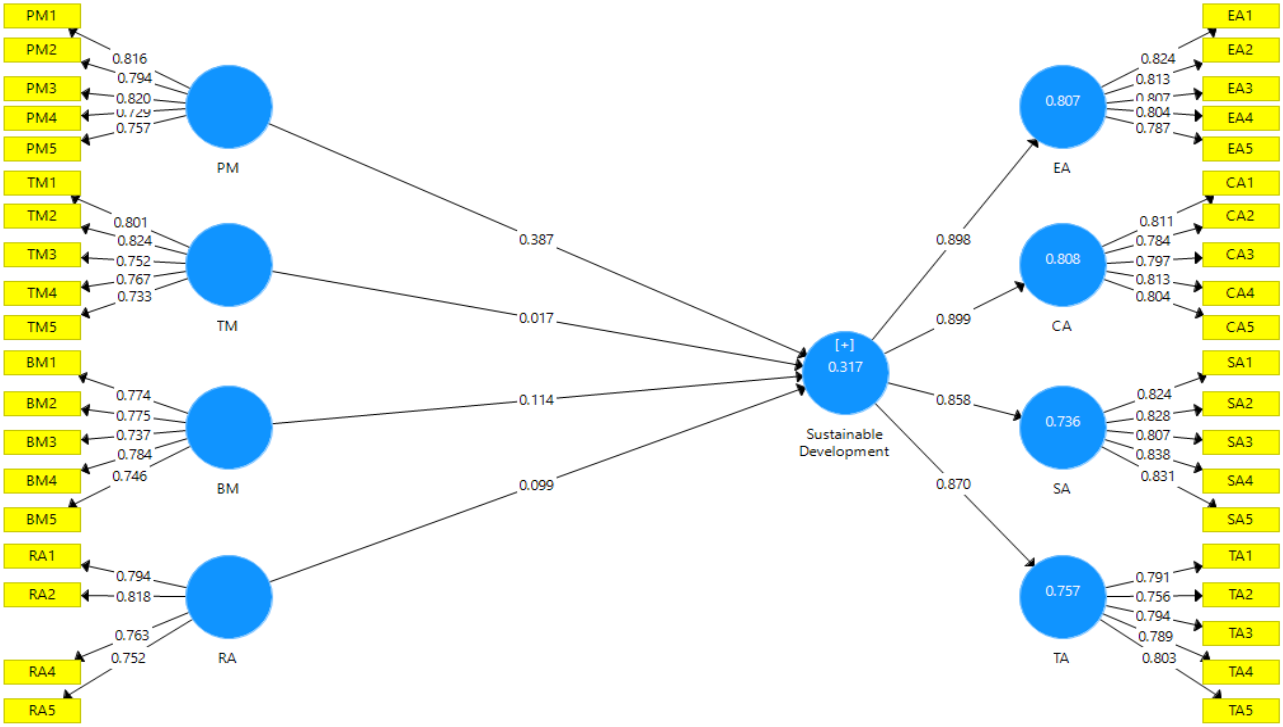

Figure 2: Results of a measurement model (R^2)

Discriminant validity "is the extent to which a construct is actually distinct from other constructs and decides if the measurement is unrelated and how many indicators indicate just one construct" [71]. In this investigation, the discriminant validity of the measurement model was evaluated using the Fornell-Larcker criteria, which requires the square root of the AVEs to

be greater than the correlation across exogenous components [73, 74]. Table 3 shows that the square root of the average variances extracted was all bigger than the correlation between latent components, indicating appropriate discriminant validity. As shown in the table below, the findings of the correlation matrix demonstrate the discriminant validity.

Table 3: Discriminant Validity (Fornell and Larcker,1981) and AVE for Latent Variables

Variable	AVE	BM	CA	EA	PM	RA	SA	TA	TM
BM	**0.583**	**0.764**							
CA	**0.643**	0.454	**0.802**						
EA	**0.651**	0.383	0.723	**0.802**					
PM	**0.615**	0.764	0.522	0.723	**0.784**				
RA	**0.611**	0.582	0.36	0.522	0.641	**0.782**			
SA	**0.682**	0.346	0.668	0.36	0.403	0.358	**0.826**		
TA	**0.619**	0.511	0.776	0.668	0.55	0.352	0.608	**0.787**	
TM	**0.603**	0.704	0.401	0.776	0.692	0.702	0.301	0.437	**0.776**

Note: AVE: Average Variance Extracted, BM: Project Cost Management, CA: Economical Aspect, EA: Environmental Aspect, PM: Project Planning Management, RA: Project Risk Management, SA: Social Aspect, TA: Technological Aspect, TM: Project Time Management.

Assessment of the Structural Model

After the measurement and structural models were confirmed to be reliable and valid, thenext step in PLS-SEM path modelling was to test the hypothesized relationships and assessthe (R^2) values.

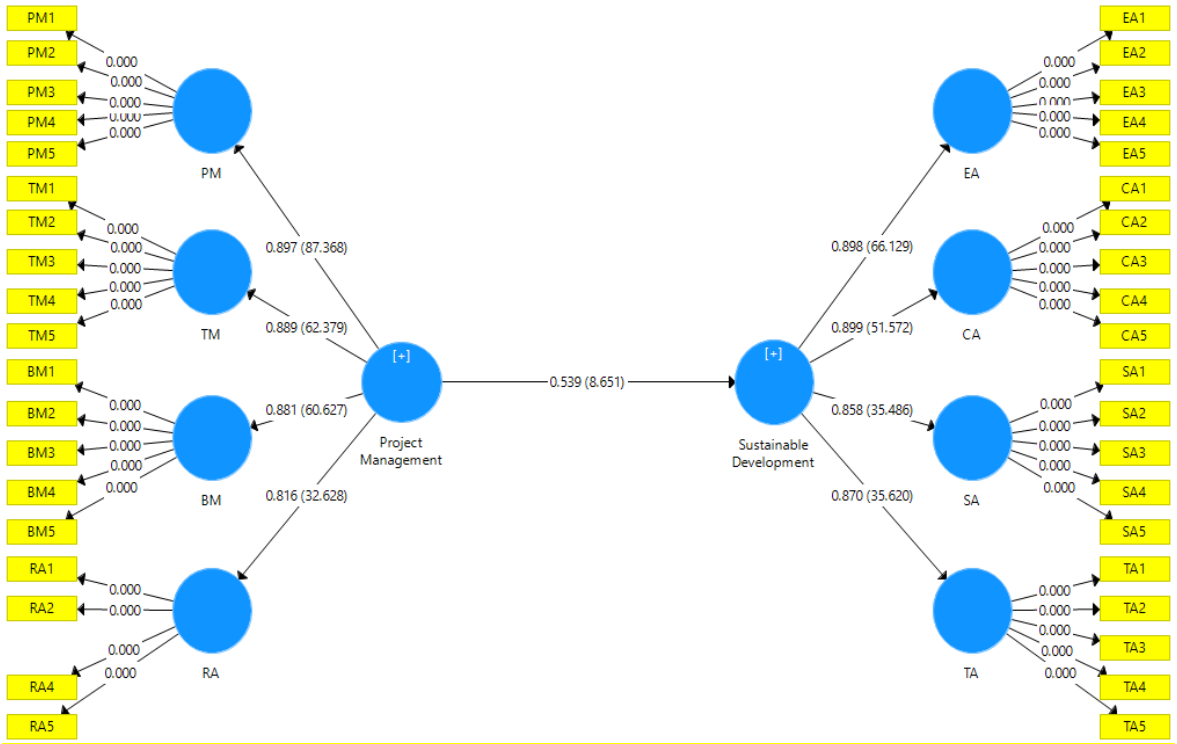

Figure 3: Results of main variable path coefficients (β,t)

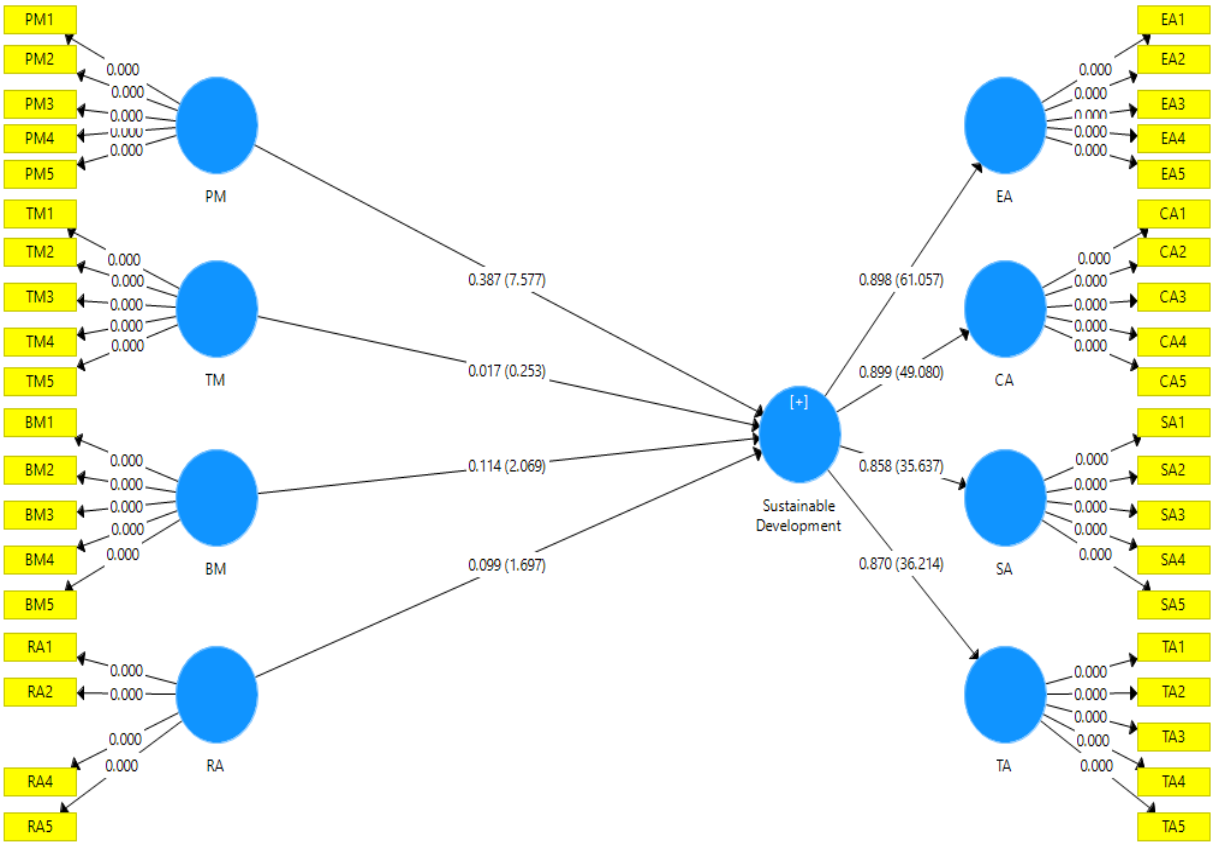

Figure 4: Results of sub-variables path coefficients (β,t)

Direct Hypotheses Results

The five main direct hypotheses connected to the purpose of this study were empirically evaluated. As demonstrated in Figures 3&4 and Table 4, Smart-PLS was used to model structural equations as follows:

H1: *Project Management is related positively to sustainable development efficacy among employeesof PetroMasila in Yemen.*

Table 4 and Figure 4 show that project management's effect on sustainable development was statistically significant and positive (t = 8.651; P <0.01). The hypothesis (H1) was therefore supported. The path coefficient was 0.539, showing a positive relationship.

H1.1: *Project Planning Management is related positively to sustainable development efficacy among employeesof PetroMasila in Yemen.*

Table 4 and Figure 4 indicated that Project planning management had a statistically significant positive effect on sustainable development (t = 7.577; P <0.05). The H1.1 theory was therefore supported. Additionally, the path coefficient was 0.387, which indicates a positive relationship.

H1.2: *Project Time Management is related positively to sustainable development efficacy among employees of PetroMasila in Yemen*.

The results indicated that according to Table 4, project time management does not influence sustainable development (t = 0.253; P > 0.05). The hypothesis (H1.2) was thus not supported. Moreover, the path coefficient was 0.017, showing that there was no relationship.

H1.3: *Project Cost Management is related positively to sustainable development efficacy among employeesof PetroMasila in Yemen.*

The study's findings present that the T and p-value of project cost management in predicting sustainable development were (2.069) and (0.001), respectively. It indicates that the probability of obtaining a T value greater than 2.069 in absolute value is less than 0.05 (P < 0.05). Consequently, H1.3 was supported. In addition, the path coefficient was 0.114, showing a positive relationship.

H1.4: *Project Risk Management is related positively to sustainable development efficacy among employees of PetroMasila in Yemen.*

Table 4 and Figure 4 indicated that Sustainable development was no influenced by project risk management (t=1.697; P >0.05). The hypothesis (H1.4) was thus not supported. Moreover, the path coefficient was 0.099, showing no relationship.

Table 4: Summary of Structural Model for Main Hypotheses Results

H	Exog.	Endo.	Original Sample (β)	Standard Deviation (STDEV)	t-value(C.R)	p-value	Result
H1	**PME**	**SD**	**0.539**	**0.064**	**8.651**	****0.000**	**Supported**
H1.1	PM	SD	0.387	0.050	7.813	**0.000	**Supported**
H1.2	TM	SD	0.017	0.063	0.265	0.791	**Not Supported**
H1.3	BM	SD	0.114	0.056	2.043	*0.042	**Supported**
H1.4	RA	SD	0.099	0.062	1.591	0.112	**Not Supported**

**Significant at p<0.01, *Significant at Bootstrapping p<0.05
Note: PME: Project Management, PM: Project Planning Management, TM: Project Time Management, BM: Project Cost Management, RA: Project Risk Management

Coefficient of Determination: R^2 Value

The R^2 value indicates the amount of variance of dependent variables, which is explained by the independent variables [71, 74]. As Chin [75] suggested, the R^2 values can be deemed weak, moderate, and strong if the output of R^2 in SPL-SEM is 0.19, 0.33, and 0.67, respectively. The result of R^2 for organizational Performance (endogenous latent variable) is shown in Table4.

Table 5: Coefficient of determination result R^2

Exogenous Constructs	Endogenous Construct	R^2	Chin (1998)
The dimensions of Project Management	Sustainable Development	0.317	moderate

According to the squared multiple correlations (R^2) values for the dependent variables, the model fit the data very well in this investigation: Sustainable Development (SD) (R^2=0.317) [71] According to Table 5, Thus, the four latent variables (Project Planning Management, Project Time Management, Project Cost Management, and Project Risk Management) accounted for an impressive 32% of the variation in sustainable development among PetroMasila employees in Yemen.

Assessment of Predictive Relevance (Q2)

On the other side, the outcome of the blindfolding test points out that the Q2 value is bigger than zero (Q^2=**0.158**), in agreement with the suggestion of Hair, Sarstedt [71] regarding the value of Q2 that has to be higher than zero; thus the research model had predictive pertinence.

DISCUSSION, CONCLUSION, AND FUTURE STUDY

The primary purpose of this study is to clarify the relationship between project management and sustainable development at PetroMasila in Yemen. The results of the current investigation suggested that all main direct hypotheses for project management and its related four sub-hypotheses were supported, except the hypothesis of project time and risk management was not supported. All variables included in the analysis accounted for 32% of the change in sustainable development, whereas 70% of the change in SD is attributed to variables not included in this investigation.

The association between project management and sustainable development was the strongest and most significant at PetroMasila (β= 0.539; t =8.651; P =0.00). This conclusion is consistent with Mathur, Price [76], Silvius and Schipper [77] assertion that the level of stakeholder engagement and communication during the project management process may impact the success of sustainable development efforts, and such as Benard and Iminza [13], Ivanov, Vlasova [14], and Toledo, Farias Filho [15], suggested that effective project management can contribute to the achievement of sustainable development goals. The results of this study suggest that PetroMasila can improve its sustainable development performance by implementing effective project management practices, such as those outlined in the PMBOK Guide [11].

The association between project planning management and sustainable development at PetroMasila was strongly associated with good and significant outcomes (β=0.387; t = 7.577; P =0.000). This conclusion was consistent with prior research, such as Timofeeva [45] discovered that strategic planning is necessary for sustainable agricultural development, and Ioppolo, Cucurachi [78] discovered that a strategic plan could assist in determining a local model of sustainable competitiveness

The relationship between project cost management and sustainable development was strongly associated with good and significant outcomes and was supported by the data (β=0.114; t = 2.069; P =0.042). This conclusion was consistent with prior research, such as Yun [58], Duman, Icerli [59], and Wanass and Shahaza [60], whom all discovered that cost-cutting methods contribute to sustainable development, and as Wanass and Shahaza [60] who asserted that reducing harmful environmental effects by applying the target cost technique to calculate the costs of the product, as this is one of the modern management accounting techniques that can

help achieve sustainable development. The results of this study suggest that PetroMasila can enhance its sustainable development performance by effectively applying project cost management techniques such as cost estimation, budgeting, and cost control.

On the other hand, the third hypothesis, which posited that project time management would have a relationship with sustainable development at PetroMasila, was not supported by the data (β=0.017; t = 0.253; P =0.791). This finding is somewhat surprising, as previous research has often found a positive relationship between project duration and sustainable development [49, 50, 52]. At the same time, these findings were consistent with a few prior research, such as Hoff Macan (1994) suggested that engaging in some time management behaviors may have beneficial effects on tensions and job satisfaction but not on job performance; thus, it will not affect sustainability accordingly. Lawrence and Michael [79] found that time management has an inverse relationship with an organization's self-management, environment, and productivity. The authors suggest that this could be because sustainable behaviors require long-term commitments and often involve challenging social norms to change through short-term interventions such as time management. Further research is needed to better understand the factors that may be influencing the relationship between project time management and sustainable development at PetroMasila.

In addition, the data also did not support the fifth hypothesis, which proposed that project risk management would have a relationship with sustainable development at PetroMasila (β=-0.099; t =1.697; P =0.112). This finding was surprisingly opposite consistent with previous research that has often found a positive relationship between risk management and sustainable development [67, 68]. At the same time, these findings were consistent with Gheorghe [66], who argued that short-term risk management practices are insufficient for successful sustainable development; it is necessary to apply long-term risk management practices as well. In addition, Dyer, Nguyen [80] argued that conventional risk management methods ignore and underestimate climate change risks and impacts. Further research is needed to determine the reasons for this discrepancy and to explore the potential factors affecting the relationship between project risk management and sustainable development at PetroMasila.

Future research might address the limitations of this study. First, this survey was confined to Yemeni PetroMasila Company employees. Consequently, the conclusions of this study do not reflect the behaviour of other sectors in Yemen, such as the public, commercial, and industrial sectors. Second, the characteristics of the personnel in the firms analyzed may not betypical; hence, the generalizability of the conclusions is doubtful. More research incorporating data from several organizations and industries is necessary to confirm or reject the conclusions. The data in this study relied on the cross-sectional technique, which implies the datawere collected at a single time point; thus, longitudinal data help examine the actual causation.

In conclusion, the results of this study provide valuable insights into the relationship between project management and sustainable development in the context of PetroMasila, a leading oil and gas company in Yemen. The findings suggest that project planning management, project cost management, and project risk management can positively affect sustainable development at PetroMasila, while project time management appears to have no significant relationship with sustainable development. These results have important implications for PetroMasila and other oil and gas companies operating in Yemen. By implementing effective project management

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practices, such as those outlined in the PMBOK Guide, PetroMasila can improve its sustainable development performance and contribute to the overall sustainable development of Yemen. However, further research is needed to understand better the factors that may be influencing the relationship between project management and sustainable development at PetroMasila and to identify potential strategies for addressing any challenges that may arise.

Overall, this study highlights the importance of project management for promoting sustainable development in the oil and gas industry, particularly in the context of developing countries like Yemen. By carefully considering the challenges and opportunities presented by project management, PetroMasila and other companies can play a significant role in promoting sustainable development and improving Yemen's people's lives.

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