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Role of Communication, Scope and Stakeholders on the Success of Public Sector Projects

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ABSTRACT

Public sector construction projects have been crucial in facilitating substantial progress for the government of Balochistan, Pakistan. Nonetheless, obstacles are hampering the success of these projects, such as inadequate coordination, an ambiguously defined project scope, and complex stakeholder engagement. The challenges can be ascribed to the dynamic evolution of project management practices in Pakistan. The purpose of this study was to address this gap by examining the interplay between these factors and project effectiveness in the public-sector construction domain, using responses from 200 practitioners and analysis with Partial Least Squares Structural Equation Modelling (PLS-SEM). As such, it was established that effective communication and articulation of a project scope are key to achieving desirable levels of project success; nonetheless, stakeholder management was not predicted to have a significant impact. This highlights the need for better communication and clearer scope definition to improve project performance and, in turn, mitigate challenges such as time and cost overruns and project failure, which are common in the region. By focusing on these areas, policymakers and project managers can improve project delivery, thereby positively impacting Balochistan's development.



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Introduction

In recent times, projects are considered successful only when they achieve the intended outcomes within the defined time, budget and quality constraints, keeping in view the sustainable use of resources during the life of the project, along with the satisfaction of the client/end-user (Mrzygłocka-Chojnacka et al., 2021). Moreover, when a project is closed under the aforementioned circumstances, not only does the project team celebrate, but it is also a means to environmental and financial prosperity of several other parties involved. The national economy's growth largely depends on the effectiveness of project execution, particularly construction projects. Similarly, the welfare of the general public is directly impacted by a multitude of construction projects, such as those involving buildings, roads, bridges, and irrigation systems (Watermeyer and Phillips, 2020). Furthermore, it is being asserted that a 1.0% rise in government investment in infrastructure expansion projects will provide a directly proportional 1% increase in the gross domestic product (GDP) of the country (Oyewobi et al., 2016, Muneer et al., 2022).

However, in developed and developing nations alike, the problem of construction project failures has been noted (reference). Managers and organizations experience difficulty in meeting deadlines, managing cost overruns, and handling quality issues. A few recent studies suggest that the situation is dire due to the complex and dynamic nature and uncertainties of construction projects (Tran and Nguyen, 2024, Cleden, 2017). Similarly, inadequate benefits of these public sector projects have led activists to rise and blame the governments for poor project planning, and weak monitoring and control measures as major reasons for wasting public money.

In Pakistan, however, most construction projects face delays and are rarely completed on time. Recent research indicates that in Pakistan, there are several factors that hamper the success of public sector projects, among which inadequate planning and unrealistic project feasibilities, poor target management and control structures and a shortage of competent human resources are predominant reasons (Ahmed & Azmi bin Mohamad, 2014; Irfan et al., 2021).

Additionally, public sector projects in Balochistan, one of the provinces of Pakistan, face interruptions, budget overspending, project abandonment, poor construction quality, and poor returns on investment. The problems in the largest province of Pakistan are as a result of ineffective project selection and feasibility study, lack of technical designs and specifications, inadequate project modality and their management, lack of skills and manpower, weak management and control systems, and low funding (Budhani and Mallah, 2007, Irfan et al., 2021).

According to Baluchistan's Provincial Public Sector Development Program (PSDP) for 2017–2018, several projects have been running since 1997. Inadequate planning and human resources have been blamed for cost overruns that have reached 1500%. Notwithstanding rapid advances in project management, project success rates have persistently declined. Consequently, those of public sector organizations have now initiated pursuing new strategies to upgrade their success rates. This ongoing dilemma necessitates understanding and solutions by both scholars and practitioners. Within construction projects, there are determinants that outline the success. Critical factors include project scope, stakeholder management, and communication. The scope of a project is the predefined range and results of the project; it provides a clear structure that guides subsequent steps (Wang et al., 2023). It is important to clearly define the limits of a project's scope to

manage scope creep and ensure that all project objectives are realised without unnecessary deviations from the scope (Ajmal et al., 2022). Stakeholder management is a critical concern for the success of most projects since it means: knowing, understanding, and addressing the needs and interests of all the project concerned parties. Effective management of project stakeholders helps create a conducive environment and ensures that all stakeholders are aligned with the project's goals and objectives (Englund & Graham, 2019).

Effective communication, alongside scope and stakeholder management, is one of the critical aspects that impact the success of construction projects. It is through communication that project management is carried out, that is, the exchange of information among members of the project team and other relevant stakeholders (Nyanga, 2021, Butt et al., 2016). Poor communication may lead to misunderstandings, errors, and delays, whilst clear channels of communication with clarity and consistency lead to better cooperation, issue resolution, and decision-making. It follows that understanding how the issues of project scope, stakeholder management, and communication overlap is critical in meeting the objectives for the success of construction projects (Ika and Pinto, 2022). The purpose of this study is to investigate the individual and combined contributions of these three factors to the overall effectiveness of construction projects, providing information that can help project managers enhance their strategies for the better realization of projects.

This study seeks to examine client attitudes regarding project scope, communication, and project stakeholders, as well as their influence on project success. The subsequent sections of the study comprehensively elucidate the literature, methodologies, and results. Balochistan, the largest province of

Pakistan, is facing challenges in public-sector projects, including delays, budget overruns, abandonment, poor quality, and inadequate benefits.

This research aims to evaluate the correlation among project scope, project communication, and project stakeholder management and their relationship to the success of public-sector construction projects in Baluchistan. The research work seeks to evaluate three fundamental concepts (project scope, project communication, and project stakeholders) and examine their relationship with the success of building projects in Balochistan specifically. This research demonstrates a connection among the three principal constructs utilizing both a regression model and a structural equation model. This study enhances existing research on construction project success by highlighting techniques that mitigate adverse outcomes, such as resource mismanagement, time delays, and budget overruns. This study will present valuable insights to policymakers and governments to enhance understanding of project success and implement strategies to improve the project success rate.

Literature Review

Project Success

Effective construction project management is a challenging task that enables us to meet a set of project objectives within the given limitations of time, cost, and quality. Looking back, project success was determined concerning time, cost and quality; the concept of “iron triangle” or “triple constraint” was used (Atkinson, 1999). Non-completion of the project within the timeframe, budget overruns, and the predetermined quality model are important performance benchmarks. From the standpoint of time and cost, the project stakeholders focused on time and cost constraints, but recently developed perspectives have highlighted the more

important, but other critical success factors, such as stakeholder satisfaction, environmental protection and safety concerns (Toriola-Coker et al., 2023).

Stakeholder satisfaction has emerged as a game-changing success factor for construction projects (Wu et al., 2021). This means the projection for delivering the needs and the expectations of several stakeholders, e.g., the client, contractor, supplier, communities, etc. Effective stakeholder management ensures the project aligns with stakeholders' aspirations and secures their support throughout the project life cycle. The success of a project is not only rooted in compliance with technical requirements but also in meeting and even exceeding stakeholders' expectations and requirements (Munthali, 2022). Satisfied stakeholders will be more likely to promote future projects, and this will also help consolidate success and reputation in the foreseeable future.

In addition, in the construction sector, project performance is also perceived to include outcomes and impacts that accrue over a long period. This concerns the project's contribution to economic, environmental and social progress. Efficient projects should be those whose returns exceed the value of the project's operations alone and positively affect society and the environment. This broader view of project success is useful since it means that construction projects could have profound effects; hence, the projects need an evaluation of their potential to deliver more benefits over time (Ika and Pinto, 2022). Given these parameters of understanding, it is evident that project managers would not only ensure the timely completion of project objectives but also consider the project's long-term positive effects on society and the environment.

Table 1: *Key Elements for Evaluating Project Success*

Variable	Aspects Covered	Criteria/Parameters	References
Project Success	Shared Aspects	Time, Budget, and Performance Standards	(Davis, 2014, Lamprou and Vagiona, 2022)
	Less Common Aspects	Organizational Advantages, Impact on Projects, Potential for Future Growth, Satisfaction of Key Stakeholders	(Heravi and Ilbeigi, 2012, Ciric Lalic et al., 2022)
Variable	Aspects Covered	Criteria/Parameters	References
Project Success	Shared Aspects	Time, Budget, and Performance Standards	(Davis, 2014, Lamprou and Vagiona, 2022)
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Variable	Aspects Covered	Criteria/Parameters	References

Project Scope and Project Success

The project scope in construction projects and construction project management is the complete set of the project's deliverables or characteristics. It defines what is to be included or excluded in the project by specifying the scope of work, the major deliverables, and the outcomes expected for the project to be considered complete. This includes defining the project's aims, objectives, activities, resources, time, and boundaries, thus creating a baseline within which all parties to the project work. Failure to define scope accurately leads to an inability to plan, execute and monitor and control project activities (PMI, 2021). Scope management ensures that all relevant parties share a common understanding of the features of the intended project. The significance of this is that it may prevent the uncontrolled changes or uncontrolled growth of a project scope, referred to as scope creep (Ajmal et al., 2022).

In construction management, the relationship between the two key concepts, project scope and project success, is complex and quite often varies. The causal link between a clearly established project frame and project success is traditionally accepted; however, many studies show that this correlation is not uncommon. Scope creep is one of the important reasons for this disparity (Ajmal et al., 2022, Agyekum-Mensah and Knight, 2017). Lost in all stages of the management process, it is defined as the gradual expansion of the scope of the project until it becomes broadly out of control; this leads to inevitable slippage in the schedule of the project, over-expenditure of the budget and inefficiency of the project (Turner and Cochrane, 1993). Even though processes of scope change may be controlled, factors such as stakeholder demands or market and technological changes may force managers to include additional requirements, thereby negatively impacting success factors.

Furthermore, project success is a multifaceted concept that encompasses numerous elements beyond compliance, i.e., stakeholder satisfaction, quality of outputs, adherence to timelines and budgets, and long-term viability. Project scope establishes a foundation for delineating objectives and deliverables; nonetheless, success necessitates the equilibrium of conflicting needs and priorities while providing value to stakeholders (Adeyemi and Amhana, 2024). Consequently, project managers must evaluate not just the initial scope but also the wider project context and stakeholder expectations when determining project success. By embracing a comprehensive perspective on project success and integrating adaptability in scope management, project managers can more adeptly manoeuvre through the intricacies of construction projects and improve overall project results.

H1: *Project scope management positively impacts construction project success.*

Project Stakeholder and Project Success

Individuals or groups with a significant interest in the project outcomes, who may be affected by the project or help elaborate on its ideas and results, are referred to as stakeholders in a construction project. These include internal stakeholders of the project, such as the project manager, team members, and other company officials, and external stakeholders, such as clients, contractors, subcontractors, suppliers, regulatory authorities, and the public. Each and every stakeholder has different interests, expectations and concerns, which, if not managed properly, can affect the cohesiveness of the project and its overall success (Jepsen & Eskerod, 2013; PMI, 2021). A systematic approach to identifying, analyzing, and engaging with project stakeholders throughout the project's life is called for in managing project stakeholders. As a precondition, a stakeholder analysis is

conducted to establish the level of interest, power, and relevance of each stakeholder to the project (Turner & Müller, 2004; Ali & Haapasalo, 2023).

Furthermore, project success depends on factors beyond the level of involvement of the relevant stakeholders, such as project management methods, the effectiveness of communication, and external environmental conditions. Although stakeholder involvement is fundamental to ensuring that projects align with an organization's strategic aims and that stakeholders' concerns are adequately addressed, their participation is not the sole determinant of achieving project objectives. It has been demonstrated that the effectiveness of stakeholder participation in a project management approach which combines other essential management success factors as part of the success strategy is optimal in achieving project goals (Malik et al., 2023). As a result, although stakeholder participation is important, project managers need to look at the big picture and take a holistic approach to succeed.

Further research has revealed an inconsistent relationship between project stakeholders and project success in construction management. The involvement of stakeholders is important in determining project outcomes; however, in practice, studies have shown that the impact of stakeholder participation on achieving project objectives can vary widely. A study by Urbinati et al. (2021) explained that stakeholder engagement can increase project outcomes in some situations, but it cannot be expected to be the cause of better outcomes all the time. The stakeholders' ability to influence a project, their competing demands, and differences in their aspirations could mess up stakeholder management implementation and inevitably negatively impact project success factors, such as time and cost management.

Moreover, the complexity of relationships among stakeholders and the dynamic nature of construction projects add further fluctuation to the relationship between stakeholders and the project's success. Construction projects typically involve a large number of various interest groups with differing levels of power and concerns, including owners, contractors, subcontractors, regulators, and neighborhoods. Appropriate management of these differential stakeholders requires a well-thought-out strategy to meet their specific needs, problems and aspirations (Rawlins, 2006; Benn et al., 2016). Low stakeholder involvement is likely to create resistance, disputes, and slippage, thereby endangering the project's success.

H2: *There is a positive association among project stakeholder management and construction project success in Balochistan*

Project Communication and Project Success

Effective project communication is crucial for construction project management because it involves the flow of information, messages, and updates among stakeholders throughout the project. As all project participants must have the required information, know their duties, and coordinate appropriately to achieve project goals (PMI, 2021), it is vital that communication is well maintained on such projects. Construction communication includes meetings, project emails, phone calls, reports and communications through project management software. However, the actual methods, such as presentations or meetings, may depend on the nature of the information being communicated, the 'audience', and the level of urgency. So-called routine project meetings encourage face-to-face interaction, which helps to foster cooperation among the project's participants and allows them to monitor the performance, challenges, and decision-making in real time.

Similar to emails, project management applications, such as the email system, also keep people who are in different places up to date and in the same loop (Turner and Müller, 2004, Carrasco, 2024).

In the recent past, the focus on the link between project communication and project success in construction management has increased quite a bit as studies have pointed out how important communication is, as well as its difficulties in practice. However, some scholars maintained that project success might not be systematically tied to communication. Although such communication is essential, its effectiveness in achieving project success might be influenced by surrounding factors. In addition, advances in technology and changes in working habits have added more dimensions to project communication, which might alter its relationship to project success. Nowadays, communication through mobile devices and virtual work sites enables information to be shared and work to be conducted “remotely” in real time. However, the research literature catalogues negative aspects of digital communication, including information excess, message aversion and

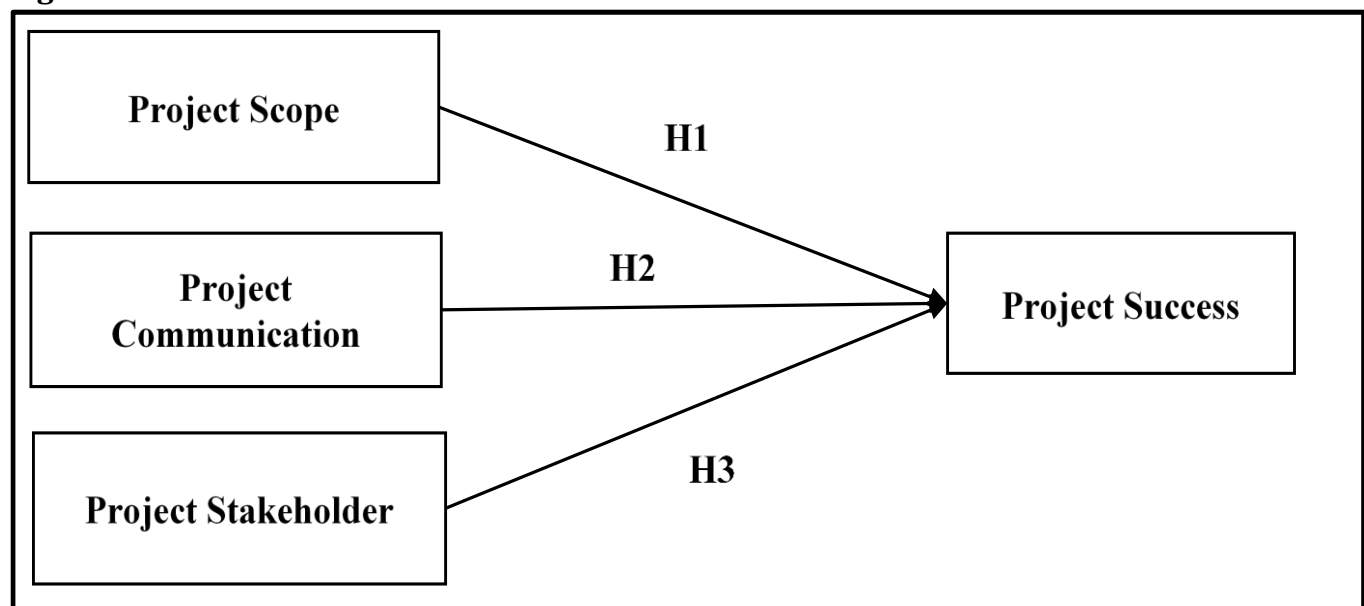
loss of interpersonal contact (Santos et al., 2020). Such problems impede effective communication and eventually affect project success measures such as time and stakeholder satisfaction.

Besides communication, project success is influenced by other factors including the methods employed to manage the project, how actively stakeholders partake in the project and the external environment within which the project is implemented. To be effective in cross-cultural cooperation, conflict resolution, or the exchange of materials, one cannot rely solely on effective communication, although it is an important element. Studies show that there is a greater need to integrate the communication components with other key project success elements to help increase project performance (Safapour et al., 2019). Therefore, proper communication is important, but project managers need to manage the project as a whole and adopt a more integrated approach to success.

H3: *There is positive association among project communication and construction project success in Balochistan.*

Conceptual Framework

Figure 1: *Research Framework*



Research Methodology

The aim of the study is to predict the antecedents of project success in public sector organizations. It is evident from the scarce literature that the relationship among the scope of a project, project communication, project stakeholders, and project success remains poorly understood, particularly in the context of public sector organisations in Pakistan. Therefore, this study is considered as explanatory because it aims to explore this link. Thus, to achieve the set of objectives stated earlier, a quantitative approach is employed. This approach will allow us to understand the relationships with sufficient empirical evidence.

Questionnaire Development

A questionnaire is a tool in research that is used for collecting primary data from a certain population with a predetermined set of questions. These questions, which are also referred to as items in the social science research. Moreover, these items are used to elicit respondents' opinions on certain constructs the investigation at hand seeks to explore. In this study the authors wish to explore quantitatively the determinants of success of construction projects undertaken by public sector organisations in Balochistan. These determinants include project scope, project stakeholders, and project communication. The questionnaire employed in the current study comprises five sections.

In the first section of the Questionnaire, respondents were asked to provide their demographic information, including their education, project-related experience, and the position and department in which they were currently working. The purpose of including items related to the demographic profile in the questionnaire is to confirm that the data has been collected from the relevant sample. In the following section, the participants of the research were asked questions related to project scope. This section is included in the measurement

instrument to obtain the response of the target population about the boundaries and limitations of the project. The eleven questions were adapted from Ahmad, Rehman and Ilyas (2019). In the third section, the measures for project stakeholders were included in the questionnaire. The project stakeholder measures were adapted from de Oliveira & Rabechini Jr. (2019) because this scale comprehensively covers all critical dimensions of stakeholders in a project. In the fourth section of the questionnaire, communication on projects was measured using different items. The communication scale for projects was adapted from Wu, Liu, Zhao, & Zuo (2017). In the last section of the measurement instrument, items that measure project success were included. These questions were adapted from a scale developed by Joslin & Müller (2015). This scale was adapted because it has been widely used by researchers to measure project success. Also, items relevant to the study's context were included in the questionnaire. The Questionnaire of the study is attached as Appendix A.

Additionally, a five-point Likert scale with 1 indicating "strongly disagree" and 5 indicating "strongly agree" was used in the present study to elicit the opinion of the respondents. The Likert scale is one of the most common techniques used in social science to collect respondents' opinions, as prior literature indicates that its results are reliable and valid. However, after the questionnaire was developed, it was shared with five field experts and five University professors for content validity. A few minor changes were suggested by the experts and incorporated into the questionnaire before it was distributed.

Population and Sampling

Population is defined by (Zikmund et al., 2012) as any large group of units that share a similar set of attributes. The population,

according to (Sekaran & Bougie, 2016), is the entire group of people, things, or events that the researcher wants to investigate. Malhotra (2004) goes on to define the target population as the primary entities from which the researcher extracts the needed data and draws conclusions.

In view of all the above interpretations, the intended sample for this study is mid-level managers (Sub-divisional officers and Executive Engineers) from predominant public works departments in Balochistan, such as the Communication, Works, Physical Planning and Housing Department Balochistan, the Irrigation Department Balochistan, the Public Health Engineering Department, the Balochistan Development Authority, the Local Government Department Balochistan, the Quetta Development Authority, and the Planning and Development Department Balochistan. Such departments were chosen because they account for 62% of the Balochistan Public Sector Project's budget.

A sampling frame is required in order to select an appropriate sample size for determining the study topic. The sampling frame for this research is mid-level managers from the various departments of Balochistan. Based on the data that was collected from officials operating in the predominant public works departments, the total number of mid-level managers (Executive Engineers and Sub divisional officers) in the Construction & Works (C&W) Department is 429, in the irrigation department is 156, in the Public Health Engineering (PHE) department is 153, in the BDA department is 80, in the Quetta Development Authority (QDA) is 15, in Planning & Development Department (P&D) is 32 and in Local Government is 72. As a result, our study's sampling frame is 916.

The sample size is defined by Zikmund et al., (2012) as a portion or subset of a large population. The sample size in this study is the number of mid-level managers picked

from the sampling frame to participate in the research questionnaire. Numerous scholars use power analysis in their studies to select an adequate study sample. Cohen & Bailey (1997) emphasized that while selecting a relevant sample for research, it is critical to employ the power of statistical analysis.

The sample size was estimated using the G-Power of statistical tests of power analysis in this investigation. We computed the current study sample size by using GPOWER V3 software, a prior power analysis test. With three primary exogenous factors, the medium size impact will be 0.15 with a significance level of 0.05 and a chance of rejecting the null hypothesis of 0.95. The total sample size for this study has been determined to be 89.

Hair et al., (2012) suggests that when there are five or fewer latent constructs and each latent construct has more than three manifest variables in the proposed theoretical framework, the minimum sample size required for the Structural Equation Modelling (SEM) technique is 100. Based on the criteria, a sample size of 100 people is deemed appropriate for this study.

Data Collection

According to Dawn Iacobucci & Gilbert A. Churchill (2002), data gathering methods include telephone surveys, personal interviews, faxes, e-mail surveys, postal surveys, and web surveys. According to Sekaran & Bougie (2016), three general methodologies should be considered when doing survey research: interviews, questionnaires, and observation. Because the current research takes a quantitative approach, a questionnaire survey was chosen, as it allows managers to respond using a predetermined scale.

Data was gathered from different departments working on projects in Balochistan, Pakistan, from Early September 2021 to Mid-November 2021. Of the 236 submitted questionnaires, 36 were omitted from the analysis due to reasons such as

encircling multiple choices on the questionnaire, suspicious response patterns and incomplete information, yielding 200 valid surveys for the study. The study sought to investigate and analyse the relationships among the variables to illustrate correlation and regression with the dependent variable. Purposive sampling was selected to specifically focus on public sector construction projects in metropolitan areas of Balochistan, in accordance with the study's objectives.

Data Analysis Method

The major objective of the study was to determine how the scope of the project, project stakeholders, and project communication affect the success of public sector projects; therefore, structural equation modelling (SEM) was employed to evaluate these relationships. SEM is one of the contemporary techniques that allows researchers to understand the relationships between multiple predictors and criterion variables. There are two major stages of analysis in SEM: i) factor analysis and ii) multiple regression analysis. Moreover, SEM has been classified into two further groups of analysis: i) variance-based SEM (VB SEM), also known as Partial Least Squares structural equation modelling (PLS SEM), and ii) Covariance-Based SEM (CB SEM).

PLS SEM is applied in both explanatory and predictive research. The current study has adopted the Partial Least Squares – Structural Equation Modelling (PLS-SEM) technique to analyse and predict the determinants of successful construction projects in public-sector organisations. PLS SEM is one of the contemporary techniques in the domain of multivariate analysis. PLS-SEM is considered more robust than conventional methods and can address certain biases. One of the major advantages of this method is that in PLS SEM the relationships between latent variables can be analyzed conveniently with reduced standard

error. Also, it is a non-parametric method that allows the researcher to compute the data without having to meet the strict condition of data normality. Similarly, it is observed from the recent literature that PLS SEM is employed sparingly in the recent research due to the fact that it produces a robust distribution from the data set through the bootstrapping technique, which consequently assists in answering the research questions and hypothesis of a study.

In PLS-SEM, data is usually analyzed in two stages. The first stage of analysis is known as Measurement Model Analysis, and the second as Structural Model Analysis. In the first stage of the analysis, the outer layer, also known as the manifestations of constructs, is examined for reliability and validity using measures such as Cronbach's Alpha and Composite Reliability. Later on, in the second stage of the analysis, the collinearity among the constructs, path coefficients, the coefficient of determination and effect size are evaluated. The second stage of the analysis allows the researcher to determine a conclusion about the findings of the study and answer the proposed hypothesis.

Results

Demographics

Table 1 presents data summarising individuals' credentials, project experience, roles, and departmental affiliations. Seventy per cent of individuals hold bachelor's degrees, followed by twenty-six per cent with master's degrees, three per cent with Diplomas, and one per cent with PhDs. Regarding project-related experience, 46% possess 1 to 5 years, 31% have 6 to 10 years, 19% hold 11 to 15 years, and merely 2% exceed 20 years of expertise. The workforce consists mostly of Sub Divisional Officers at 77%, followed by Executive Engineers at 14%, with Superintending Engineers and Chief Engineers each at 1%. Personnel are allocated among different departments, with

the Irrigation Department comprising 18%, Local Government 16%, and Communication and Works 14%. Other departments, including Public Health Engineering, BDA, and QDA, constitute 12%, 10%, and 5%, respectively, while 13% are employed in

various other categories. The data indicates a workforce primarily possessing bachelor's degrees, relatively inexperienced, and predominantly situated in middle-management roles.

Table 2: Respondents' Demographics

Characteristics		Frequency	Percent
Qualification	Diploma	6	3
	Bachelors	140	70
	Masters	52	26
	PhD	2	1
Project Related Experience	1 to 5 years	92	46
	6 to 10 years	62	31
	11 to 15 years	38	19
	16 to 20 years	4	2
	More than 20 years	4	2
Position	Sub Divisional Officer	154	77
	Executive Engineer	28	14
	Superintending Engineer	2	1
	Chief Engineer	2	1
	Others	14	7
Department	Communication and Works	28	14
	Public Health Engineering	24	12
	Irrigation	36	18
	Local Government	32	16
	QDA	20	10
	BDA	24	12
	P & D	10	5
	Others	26	13

Structural Equation Modelling

The structural model and measurement had less of an interactional effect when using Anderson and Gerbing (1988) two-step method for structural equation modelling with Smart PLS. Based on the initiation of evaluation of the measurement model, the validity of the observed items and the accompanying constructs is assessed. A

composite structural model was then developed to observe the relation between exogenous and endogenous variables. In order to improve Average Variance Extracted (AVE) and, in turn, the validity of both convergent and discriminant models, Hair Jr et al. (2017) recommended eliminating indicators with low factor loadings. Consequently, the framework was amended,

resulting in the exclusion of indicators PS2, PS4, PSC08, and PSC011 from the final measurement model.

Table 1: *Reliability and Convergent validity of the selected constructs*

Construct	Items	Loadings	rho_a	CR	AVE
Project Communication	PCOM1	0.782	0.847	0.887	0.570
	PCOM2	0.845			
	PCOM3	0.754			
	PCOM4	0.572			
	PCOM5	0.778			
	PCOM6	0.772			
Project Scope	PSC01	0.662	0.849	0.886	0.527
	PSC02	0.821			
	PSC03	0.837			
	PSC04	0.607			
	PSC05	0.694			
	PSC06	0.677			
	PSC07	0.688			
	PSC09	0.681			
	PSC010	0.701			
Project Stakeholder	PSTK1	0.777	0.894	0.913	0.541
	PSTK2	0.805			
	PSTK3	0.687			
	PSTK4	0.723			
	PSTK5	0.724			
	PSTK6	0.803			
	PSTK7	0.719			
	PSTK8	0.782			
	PSTK9	0.569			
Project Success	PS1	0.747	0.844	0.882	0.517
	PS3	0.622			
	PS5	0.660			
	PS6	0.793			
	PS7	0.743			
	PS8	0.763			

PS9

0.693

Measurement Model Assessment

The underlying construct is evaluated by examining item integrity in the measurement model analysis. The proposed study framework includes three underlying constructs: planning, project managers' competency, and project success. However, these underlying constructs are fundamentally unobservable, necessitating the use of questions or items to assess them. The elements in question are identified as noticeable factors because they can be directly observed; however, they appear as proxies for the latent constructs in analysis.

Reliability

The manifest factor's reliability was initially measured to assess inter-item consistency. Additionally, Cronbach's Alpha is commonly used to assess the reliability of a questionnaire. Cronbach's Alpha assumes that all indicators exhibit the same reliability, implying that each indicator's loading on a variable is uniform. The threshold for this measure is set at 0.6 or above (Hair Jr et al., 2014). Table 3 presents the instrument outcomes for Cronbach's Alpha. Table 3 shows that the Cronbach's Alpha values are above 0.6 for all constructs, in accordance with the recommendations of (Thorndike, 1995). As a result, it was determined that the elements of the measurement device demonstrate reliability.

Moreover, composite reliability (CR) is advocated as a substitute measure for internal consistency that would be used to assess the dependability of particular statistics (Hair Jr et al., 2014). Additionally, it was noted that attention should be directed to the reliability of each indicator. The CR level was set at 0.7 or higher. The composite dependability of each construct is illustrated in Table 3. The composite dependability values for project communication (0.887), project scope (0.849), project stakeholders (0.894), and project success (0.844) indicate

a high level of consistency across these variables. The composite reliability scores for these dimensions exceed the threshold, demonstrating strong internal consistency. Consequently, one can confidently state that the instrument's reliability is beyond doubt.

Convergent Validity

The convergent validity can be defined as the extent to which one indicator meaningfully corresponds with another assessing the identical construct. Various indicators are utilised to evaluate a similar construct when these data demonstrate an introspective correlation with it. It is essential for these indicators to demonstrate a notable level of convergence or variance in relation to one another (Hair Jr et al., 2017). Additionally, Hair et al. (2012) supports the use of factor loadings of constructs and the average variance extracted (AVE) as essential metrics for assessing convergent validity. A study indicated that the construct would show a minimum of fifty percent variation in its indicators when the AVE value reaches 0.5 or above (Hair Jr et al., 2014). Table 3 shows that all conceptions have AVE values exceeding 0.5, indicating convergent validity.

The convergent validity is being achieved by utilizing indicator loadings. The standard loading value between 0.4 and 0.7 is recommended, with a preference for values exceeding 0.708 (Hair Jr et al., 2017). The reasoning behind these values being so is that squaring the factor loading values within this range results in a score of 0.5 or higher, which indicates an item's communality. Table 3 presents the minimum factor loadings along with the Average Variance Extracted (AVE) to assess convergent validity.

Measuring Discriminant Validity

Discriminant validity was examined to verify that the individual variables are clearly distinct from one another. It is theoretically and conceptually evident that these

constructs differ; yet academics have proposed that one should also ascertain their statistical distinctiveness. To examine discriminant validity, one uses the criteria established by Fornell and Larcker (1981). In PLS-SEM, discriminant validity is evaluated by assessing the square root of the mean variance retrieved for the elements with the correlation estimates of those elements. The discriminant validity is being confirmed whenever the Average Variance Extracted

(AVE) score exceeds the correlation coefficient ($AVE > r$).

Table 4 illustrates the discriminant validity scores according to the Fornell and Larcker criterion. The square roots of the AVE values for every individual variable exceed the correlation estimations of the elements. This demonstrates adequate discriminant validity for each of the model's variables and that the constructs are statistically separate from one another.

Table 4: *Discriminant Validity Analysis via Fornell-Larcker Method*

Constructs	Project Communication	Project Scope	Project Stakeholders	Project Success
Project Communication	<u>0.755</u>			
Project Scope	0.614	<u>0.726</u>		
Project Stakeholders	0.723	0.680	<u>0.735</u>	
Project Success	0.538	0.686	0.465	<u>0.719</u>

The Heterotrait-Monotrait criterion was suggested by Henseler et al. (2015) as the third method for assessing discriminant validity. Henseler et al. (2015) assert that if HTMT is below 0.9, the two constructs are

significantly distinct. Table 5 displays the HTMT values for the constructs of this model. The HTMT scores in this study are below the 0.9 threshold, indicating the establishment of discriminant validity.

Table 5: *Discriminant Validity Analysis via HTMT Method*

Constructs	Project Communication	Project Scope	Project Stakeholders
Project Communication			
Project Scope	0.717		
Project Stakeholders	0.841	0.756	
Project Success	0.619	0.796	0.488

Structural Model Assessment

It is advised to look at (i) the path coefficients, (ii) the collinearity between the components, (iii) the coefficient of determination (R^2), (iv) the effect size (F^2), and (v) the predictive relevance (Q^2) in order to assess the structural model (Hair Jr et al., 2014).

Before testing the hypothesis, it is crucial to determine whether the variance inflation

factor (VIF) can clearly distinguish among the latent variables: project communication, project scope, project stakeholders, and project success. While some research suggests that VIF readings should ideally be below 3.3 (Diamantopoulos and Siguaw, 2006), Sarstedt et al. (2014) support a threshold of 5. Table 6 displays the Variance Inflation Factor (VIF) values for collinearity (Hair Jr et al., 2017).

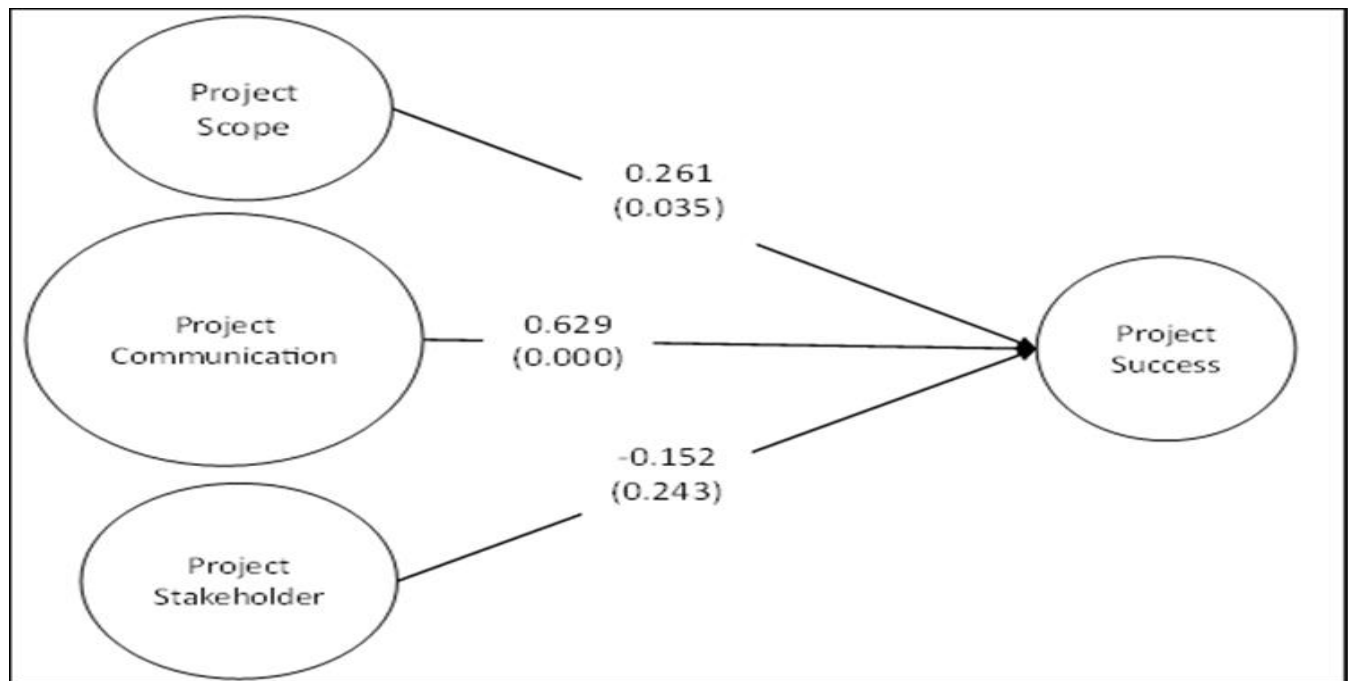
Table 6: Collinearity Statistic (VIF) and Effect Size

Constructs	Effect Size (f^2)	VIF
Project Communication	0.062	2.223
Project Scope	0.402	1.978
Project Stakeholders	0.018	2.579

As the VIF values are less than 3.3 and 5 therefore, there is no issue among the constructs regarding collinearity.

A structural model was built to test the assumptions, presuming that each of the constructs utilized is reliable and valid. A 5,000 resample bootstrapping approach was used in accordance with Hair Jr et al. (2014) to test the hypotheses and create the model. The outcomes are shown in Figure 2, Table 7. The findings provided support for H1, H2 and

H3 is not supported by demonstrating strong evidence for the connection between project communication (PCOM), project scope (PSCO) and project success (PS) ($\beta = 0.261$, $t = 2.114$, $p = 0.035$), ($\beta = 0.629$, $t = 5.018$, $p = 0.000$), respectively. The findings of the study reveal the significant but inverse effect of project stakeholders (PSTK) on project success (PS) ($\beta = -0.152$, $t = 1.169$, $p = 0.243$), as shown by Table 7 and Figure 2.

Figure 2: Path diagram of the Structural Model**Table 2: Structural Model Summary**

Hypothesis	Direct Effect (β)	Standard Deviation	T-Statistics	P-Values	Results
Project Communication_ Project Success	0.261	0.124	2.114	0.035	Significant
Project Scope_ Project Success	0.629	0.125	5.018	0.000	Significant
Project Stakeholders_ Project Success	-0.152	0.130	1.169	0.243	Insignificant

Coefficient of Determination (R^2)

With $R^2 = 0.502$ and R^2 corrected = 0.486, the project success construct has a moderately high coefficient of determination. Table 8 shows that the variables of project communication (PCOM), project scope (PSCO), and project stakeholder (PSTK) explain half of the variation in project success (PS). According to Sarstedt et al. (2022), the cut-off value for endogenous constructs that are classified as large, moderate, and weak is based on R^2 threshold values of 0.75, 0.50, and 0.25." Although it does not indicate predictive accuracy beyond the sample, the R^2 score quantifies the explanatory power of the sample data.

Effect Size (f^2) and Predictive Relevance (Q^2)

Cohen's f^2 is used to assess the influence of variables within the model, indicating the

change in R^2 resulting from the removal of an exogenous construct. Cohen's f^2 values of 0.062, 0.402, and 0.018 signify low, large, and modest impact sizes, respectively, and serve as indicators of the effect (Hair Jr et al., 2017). Table 6 indicates that the total output f^2 ranges from 0.018 to 0.402. We do predictive relevance analysis utilising Stone-Geisser's Q^2 . The Q^2 value indicates the predictive significance of the independent variable for the dependent variable (Sarstedt et al., 2022). The second technique for assessing in-sample prediction, as proposed by Hair et al. (2019), indicates that Q^2 signifies the model's predictive validity in Smart-PLS. Table 8 indicates that the Q^2 result of 0.246 for project success (PS) suggests that the exogenous construct may effectively predict the endogenous construct, demonstrating significant relevance to the insight.

Table 3: Coefficient of Determination, Effect Size and Predictive Relevance

	R^2	R^2 Adjusted	Q^2
Project Success	0.502	0.486	0.246

Discussion

The study findings show that there are close relationships between some of the critical areas of project management, namely project communication, project scope, and project stakeholders and the performance of public sector construction projects in Balochistan, Pakistan. These findings assert more value to the elements that determine success, looking at how these variables relate within the public sector building projects.

The data gathered on one of the findings of the research in conjunction of other research showed that there is a substantial correlation between project communication and project success ($\beta = 0.261$, $p = 0.035$). This also emphasizes the need for effective communication, specifically in the public sector building projects. Good communication emphasizes that all stakeholders are updated, ensures

collaboration and decisive actions, and potential conflicts are dealt with putting strategies in place that could avert conflict during project execution. Such findings validate earlier works which stress the essence of communication in project management success, particularly in complex environments (Turner and Müller, 2004). In Balochistan, public sector projects involve several bodies, agencies, contractors and communities. So, the development of effective communication channels helps to avoid misunderstandings which can otherwise lead to time and cost overrun or disputes among the parties. Rapid and proactive sharing of project information ensures that the objectives of projects are understood, promoting focus and reducing exposure to the risk. For example, in public sector building projects, the need for timely project updates ensures that any issues or concerns are raised and addressed, making

timely completion of tasks and adherence to budgetary constraints possible (Santos et al., 2020).

The analysis indicated that there is a strong positive relationship between the project scope and project success ($\beta = 0.629$, $p = 0.000$). In this context, it is important to note that in any undertaking such as a public construction program, greater care should be exercised in the formulation of the project scope. Scope management includes the setting of specific goals, which include objectives and a statement of work's deliverables, and resource, time, and cost estimates. Clearly defined scope helps to mitigate the common issues of scope creep: changing, adding, or extending demands in the work without commensurate time and budget extensions resulting in failures and delays of projects (Turner and Cochrane, 1993). In Balochistan effective scope management is necessary to avoid unnecessary expenses and time delays because in most cases, public projects are underfunded and understaffed. The definition of the scope of work from the very beginning serves to align all the participants of the project with its intended outcome, thereby ensuring that the expectations are not only managed but also delivered upon which will improve overall project success (PMI, 2021).

For this study, the impact of project related parties on the success of the project was shown to be negative and weak ($\beta = -0.152$, $p = 0.243$), which implies that this aspect of Balochistan public sector projects is more complex. This study claims those who emphasize the importance of stakeholders for speeding up project processes such as government agencies, contractors and local communities, are likely to experience inefficiencies and delays due to conflicting interest among the three (Malik et al., 2023). In the case of Balochistan, it has been noted that some public sector projects suffer from bureaucratic hurdles and political

intervention which might further escalate the challenge of managing the stakeholders' expectations. It is to be noted that issues of different priority can rationalize long processes in decision making active resistance and project stagnation. Thus, while stakeholders are important for the integration of the project with the wider aims of society and organizations, it is equally crucial to find good ways to balance opposing stakeholder's interests in relation to public sector projects in Balochistan. Addressing these problems may enhance the prospects of stakeholder integration and contribute towards greater success of the project (Urbinati et al., 2021).

The methodology under consideration was evaluated through various public sector construction projects in Balochistan, Pakistan. This research presented significant empirical data that supports the hypotheses, and validating the positive impact of effective project communication and clearly defines project scope on the successfulness of public sector projects. The findings provide empirical support for the theoretical claims made by earlier scholars, who argued that effective communication and accurate scope management are crucial for attaining project success.

Future Directions and Limitations

The results of this study are limited in their generalizability because the sample was limited to public sector organizations in Balochistan. Subsequent investigations might apply the same methodologies to a larger and more geographically diverse cohort. Moreover, although the current study looks at how project scope, stakeholder management, and communication affect public sector project success, future studies may look at related topics in private sector projects to assess how consistent the findings are.

This analysis evaluates project success based on the framework set forth by the Project

Management Institute (PMI). Further research endeavors could investigate alternative frameworks, such as the International Project Management Association (IPMA) and other global standards like ISO 21501, in order to provide a more all-encompassing perspective on project success. Examining these various approaches could help increase understanding of the best project management practices in various contexts.

Conclusions

This research provides an in-depth analysis of the factors that affect the success of public sector construction projects in Balochistan, Pakistan. The outcomes of the empirical investigation pointed out that both project scope and project communication have significant positive contributions to project performance, but the management of stakeholders is more complicated and indirect than was perceived at the beginning.

At first, project scope and communication were believed to be of positive significance to the successful completion of projects. The findings suggest that effective communication ensures the alignment of all stakeholders, the reduction of risks and that the objectives of the project are achieved on time and within budget. Given the complexity of public sector projects in Balochistan, effective communication plays a role in clarifying conflicts, avoiding delays and budget overruns, which all in turn improves the project outcome.

Moreover, the study also pointed out that project scope is an important variable affecting project success, scoring the highest positive correlation. A well-defined project scope ensures that all the stakeholder parties understand what the output will be, when it will be delivered, and what resources are necessary for its finalization, thus helping to manage stakeholder expectations and avoid

scope changes. This is important especially in the case of public sector projects in Balochistan because there are limited resources coupled with the bureaucratic bottlenecks. A good scope management structure greatly enhances the chances of delivering projects on time and within budget.

Still, the association between stakeholder management and the effectiveness of the project produced rather surprising outcomes, indicating an inconsequential and negative correlation. This reveals that in the case of public projects in Balochistan, stakeholder interest management is quite complex in nature and perhaps due to a complex web of interest among several stakeholders which include the government agencies, contractors and local communities. When there are competing objectives, it is likely that there will be delays, wastage and distortion of the main aim of the project. Hence, although stakeholder management is an important element for the success of any project, the findings of the research point out that there are even more sophisticated strategies which are required to optimally manage these people in the public sector context.

It is further argued that good management of project communication and project scope are critical for success in the public sector projects in Balochistan; however, the issue of stakeholder includes factors that mean that more advanced strategies will be needed. These findings make very important contributions for the project managers and the policy makers, and these provide practical suggestions as to what can be done to improve the chances of success of projects. Such research can be extended in future by looking at the edge of the private sector and other aspects of project management to get a better understanding of project success under different scenarios.

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