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Role of Project Planning and Project Manager Competencies on Public Sector Project Success

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Abstract: Even though the world has progressed exponentially, the core reasons for the failure of many public sector projects remain the same, i.e., the poor planning and competency of a project manager. Therefore, it becomes essential even in the contemporary world to assess and evaluate a model that determines the effect of planning and the project manager's competency on the success of public sector projects. Moreover, the present study aims to assess the role of project planning and the project manager's competency in project success in the context of project management methodology defined by the Project Management Institute. In the current survey-based study, a sample of 260 project engineers, from the public sector organizations operating in Balochistan, that were engaged in projects was taken in order to understand the relationship between the constructs. Quantitative data were collected to address the proposed hypotheses using the partial least squares structural equation modeling technique. It was inferred from the findings that planning and competency have a significant positive impact on the success of public sector projects. Among the two, it was determined that planning for public sector projects has a greater role in the success of projects. Therefore, it is concluded based on the results of the study that in future, due consideration should be given to planning and the abilities of a project manager.

Keywords: project planning; project manager competency; project success; public sector projects; structural equation modeling

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1. Introduction

A project is considered successful when the expected outcomes are of the predetermined standards, sustainable, achieved within the stipulated time and come under the umbrella of the preliminary budget. Moreover, success is a multidimensional concept that ensures project efficiency, organizational and business success, customer satisfaction, and preparing for the future [1]. Success in projects enhances the social, economic, and environmental wellbeing of various stakeholders involved [2,3]. Furthermore, the development of the national economy is directly affected by the success of public sector construction projects. Many construction projects directly affect the public's quality of life, such as roads, bridges, buildings, and irrigation facilities [4]. Additionally, it is believed that every 1% of

government investment in infrastructure developmental projects will cause an increase in the gross domestic product (GDP) equivalent to 1% [5].

However, it has been observed that construction projects have been failing both in developed and developing countries [6]. Additionally, the complex nature, dynamics, and uncertainties of the construction projects create difficulties for project managers and organizations in completing their projects as per the schedule, within the approved cost and specifications [7]. The issue of delayed, over-budgeted, poor quality and insufficiently beneficial projects is becoming epidemic worldwide [8] due to improper planning [9–12], poor mechanisms of monitoring and control [8,13] and a lack of human resource competencies [13–15].

Jorgensen and Isaksson [16] identified many projects in different countries that were over-budgeted and delayed due to lack of proper planning, such as Boston's Big Dig Project (275% cost overrun), and Denver's International Airport project (200% over budget). Likewise, Bangkok's Skytrain USD 2 billion project could not achieve its goals and the project company ended up with financial crises due to the miscalculation of passenger forecasting in the planning stage [17]. In the same context, it was reported by Ayodele and Alabi [18] in their study that Nigeria is considered as the world's junk-yard of problematic and abandoned projects, due to inadequate planning, faulty design, incompetent project staff, poor monitoring and control mechanisms, inadequate funds, and delayed payments. Likewise, it was observed in a study that the average schedule overrun in the construction industry of India is 55% due to improper planning, scope creep, and lack of commitment and competency [19].

Similarly, it is rare in Pakistan that construction projects are completed without delays [7]. In the past few years, studies have indicated that Pakistan is facing serious issues and challenges in the completion of public sector projects due to the inadequate feasibility and planning of the projects, weak monitoring and control mechanisms, and a lack of human resource competency [20,21]. Moreover, public sector projects in Balochistan, which is the largest province of Pakistan, are suffering from delays, cost overruns, abandonment, lack of quality, and benefits shortfalls issues. The reasons for these problems in the largest province of Pakistan are due to poor project selection and feasibility, lack of technical designs and specifications, lack of project planning and control, lack of competent human resource and technology, weak project supervision, and insufficient funds availability [22]. Provincial Public Sector Development Program (PSDP) for the year 2017–2018 in Balochistan clearly shows that some projects have been on-going since 1997, and cost overrun is up to 1500% due to incompetent human resources and poor planning. It can be noted from the discussion that even though the growth in the profession of project management is rapid, success rates in projects have been constantly falling. As a result, public sector organizations have started to look for new techniques to improve their success rates. Moreover, this chronic issue needs to be understood and addressed by the academia and practitioners.

Therefore, this study is carried out with the aim of finding out the perceptions of clients regarding project planning and human resource competency, and their impact on project success. In the following sections, the literature, methodology, and findings of the study are discussed comprehensively.

2. Literature Review

2.1. Project Success

Projects are timebound activities that are carried out by organizations to achieve strategic objectives within the limited resources [23]. Although every project manager wishes to end projects successfully, unfortunately, many projects are either delayed or abandoned. Moreover, the successful completion of a project is a myth. At times, project managers consider a project to be closed when they achieve the major objectives of the project [24], whereas in other instances, if the project does not exceed the time, cost, and quality constraints, it is deemed to be successful [11]. However, a few academicians believe that a project is only successful if it fulfils the requirements of the key stakeholders [25]. In terms of public sector projects, if the results of the projects are beneficial for the general

public, only then is the project regarded as successful [26]. However, it is still unclear which of these opinions about project success is true.

Factors that affect project success have been thoroughly reviewed and empirically tested from time to time. The most popular ones are given by Muller and Turner [27] and Pinto and Slevin [28]. Similarly, in a recent study it has been postulated that sustainable practices in projects also have an impact on the success of public sector projects [7]. Moreover, project success is considered as a multidimensional construct by Joslin and Muller [29], and they concluded that it consists of both the common and uncommon elements of project management success. Table 1 provides a comprehensive view of the dimensions of project success that have been under discussion in the literature. It can be observed from the synthesis of the literature that the concept of project success has evolved from merely an efficiency measure to a holistic concept, which includes five major dimensions lying under common and uncommon elements.

Table 1. Short-term and long-term dimensions of project success.

Construct	Coverage	Dimensions	Sources
Project Success	Common Elements	Time, Cost and Quality	[11,30–33]
	Uncommon Elements	Organizational Benefits	[2,34,35]
		Project Impact	[28,32,36,37]
		Future Potential	[2,32,38]
		Stakeholder Satisfaction	[32,39–42]

Additionally, project success has been in the limelight of research for several years for many reasons [37]. Successful projects are believed to improve the overall reputation of the organization [26]. Similarly, project success contributes to adding value and generating economic provisions for the parent organization. Organizations that finish their projects within the limited resources are believed to gain competitive advantages. Furthermore, public sector project success raises the confidence of the general public and establishes a bond of trust between the people and their government [43].

Thus, it may be inferred here that project success has evolved, and different measurement models have been developed that are applicable to different settings of projects, and yet, authors believe further investigation must be conducted to determine the factors that lead to this construct [27,32,44]. This study in turn is a continuation of the ongoing research in the discipline of project management, and will provide insights related to project success.

2.2. Project Planning

Planning is generally understood as the determination of actions, tasks, and all the other resources that are necessary to achieve the objectives. Tucker has defined planning as the method of monitoring, directing, communicating, and cooperating between the stakeholders [12], whereas project planning is the formulation of goals and objectives that explain the work that has to be done, the timeline for the project, and the necessary resources that are required to accomplish the objectives of the project [45]. Furthermore, projects are a result of strategic objectives that are set by the top management, while project planning is the determination of the procedure, policies, and programs to achieve those objectives. In another instance, project planning is defined as the establishment of a predetermined course of action for the forecasted environment [46]. According to the Project Management Institute, the planning process is the defining and refining of project objectives and the selection of the best alternatives to achieve these objectives [47].

Similarly, at the European level, project cycle management (PCM) is commonly used to assign and monitor financial funds. Additionally, PCM can be used in organizations that need a well-balanced mechanism to plan and manage projects. An essential element of PCM is the logical framework approach (LFA). Following the guidelines of LFA, it is possible for

project managers to distinguish the principal elements of a project, as follows: from one side, resources and activities; and from the other side, products, outcomes and goals [48].

Moreover, the purpose of project planning is to develop a guideline for the project with sufficient detail to inform the project team about the necessary work packages that have to be executed and when the work has to be done, as well as keeping track of the overall progress of the project and maintaining the record of the project for future use. Another reason for project planning is to ensure that the stakeholders involved understand all the activities and aspects of the project with sufficient details, along with the time, quality, and cost constraints [49]. Furthermore, the purpose of project planning is to determine that the plan is realistic and that planning involves processes that will convert the "should be done work packages" into tasks that can be completed [50]. The planning process in a project proceeds from the conceptualization phase of a project and continues until the project is closed.

However, it is debated in the literature that in the planning phase of every project, the important considerations are technical skills, project management knowledge, and organizational approach [51]. In the planning stage, initial designs are formulated, the risks of the project are analyzed, the execution approach is defined and critical decisions are made [52]. Moreover, during the planning phase, these fives mandatory areas for a project are explored: (i) clarifying outputs, (ii) determining stakeholders, (iii) defining the scope of the project, (iv) determining the schedule, cost, and quality criteria of the project, and (v) identifying the communication channels and risks associated with the project [49]. A similar pattern for project planning was proposed by the Project Management Institute (www.pmi.org). The differences between traditional planning and project planning are given below in Figures 1 and 2. It can be observed from Figures 1 and 2 that project planning requires the extensive detailing of the processes that are involved in projects.

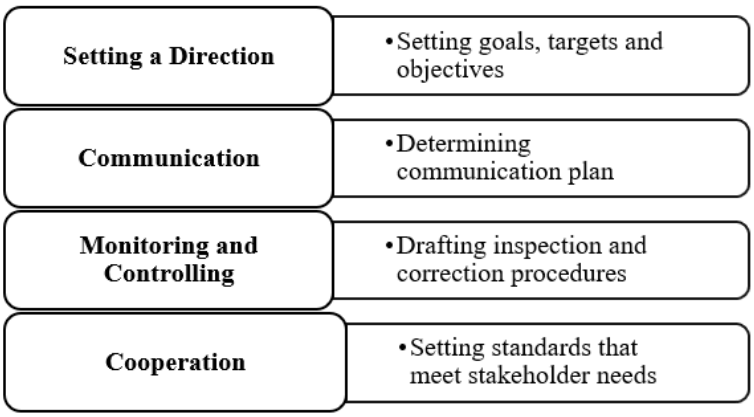


Figure 1. Traditional planning.

Similarly, Kerzner identified nine different modules of the planning phase: the goals of the project, time for project completion, future forecast, program, budget, organization, procedures, and standards [46]. Alternatively, the Project Management Institute mentioned the scope of the project, time for completion, budget, specifications, project team, mode of communication, risks involved in the project, and methods of procurement as the basic components of planning [47].

A recent study [53] determined the six components of the planning phase that greatly affect the project's success as schedule development, defining activities of the projects in detail, team management, mode of communication, project plan development by the planning team and organizational planning of the project. Furthermore, in another study, it was stated that in the planning phase, the scope of the project should be well-defined [52]. Scope definition is the process of preparing projects for execution. As such, it can be observed from the above discussion that for a project to be successful, comprehensive planning is necessary.

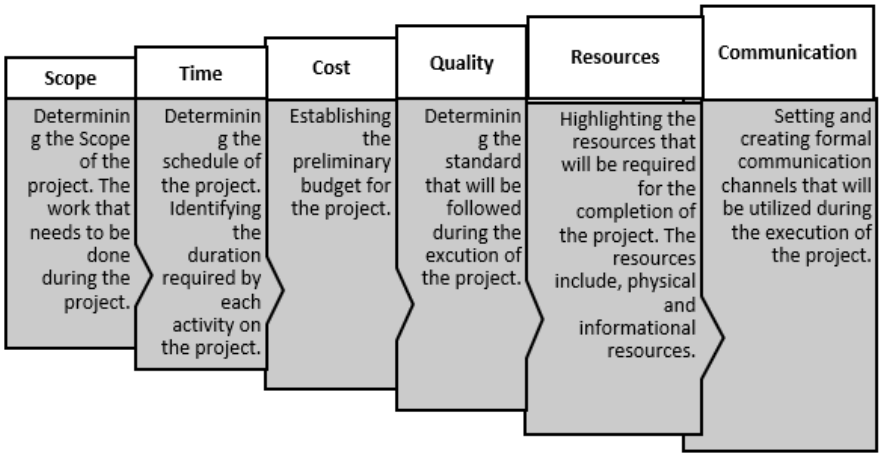


Figure 2. Project management planning.

Besides this, it can be clearly noted from the available literature on project planning that the emphasis of the academicians has been primarily on the private sector, neglecting the role of planning in the public sector. Therefore, it is crucial to understand the role of planning as an antecedent to success in public sector projects.

2.3. Planning for Project Success

After a thorough examination of the literature, the evidence for planning as an antecedent to project success seems to be prevalent. Moreover, it can also be observed from the available literature that planning is not only one of the key factors for managing projects, but it is vital for the successful delivery of the project. Additionally, it is firmly believed by the majority of the researchers that extensive and thorough preliminary planning results in the successful management of projects [54,55]. Furthermore, a good project plan does not guarantee project success, yet poor project planning would surely cause projects to fail [56]. Similarly, the planning and scheduling of projects plays a vital role in the implementation of successful infrastructure projects [57]. Likewise, it is suggested that project managers need to make proper inceptive planning to achieve project goals [58].

Recently, Dvir described the advantages that are associated with planning for a project [55]. He believes that by maintaining consistency between various stages of planning, it is easier to manage and control the project, diminish the project risks and vulnerabilities, and also improve the proficiency of the project manager. Likewise, Ref. [59] posits that effective planning not only enables the project managers to make efficient use of their infrastructure, i.e., land and buildings, but also generates economic benefits for the stakeholders.

Similarly, in Oman, recently a study was conducted for assessing the views of project managers regarding planning and scheduling practices in construction projects [60]. The findings of their study imply that project managers should implement knowledge-based planning and scheduling concepts for project success. Additionally, Ref. [61] interviewed thirty-two experts from ten international megaprojects, and concluded that addressing coordination challenges in the international megaprojects needs special attention in the planning process and control system. Furthermore, in a study, data of from more than 100 projects were collected, and it was concluded that for the success of any project, detailed initial planning is critical [62]. From the above discussion, it is evident that planning has an important role to play in the successful delivery of projects. Therefore, based on the arguments presented above, the following is suggested:

Hypothesis 1. *There is a positive relationship between planning and public project success.*

2.4. Project Managers Competencies

Generally, the term "competency" refers to the abilities, knowledge, and skills of an individual [63]. Moreover, the concept is also understood as a person's technical and motivational drive to be successful at work [64]. Experience, efficiency, efficacy, and effectiveness are all considered as limbs of competency at any workplace. However, from an employer's perspective, competency is a potential trait that an individual must display in order to achieve organizational strategic objectives [64].

In this currently progressive and more demanding working environment, an employee must always strive to enhance his or her competencies [65]. Employee competencies are mostly associated with the business goals and strategies of the organizations. Additionally, the competencies of employees or team members are enhanced because of the development of existing human resources in organizations or projects [66]. Simply stated, human resource competency development is a process of improving employee expertise by providing training, upgrading skill base sets, and inculcating technological skills [67].

The project manager's competency is the measurement of their ability to making quick decisions, and their having knowledge regarding the responsibilities and roles of the project team involved [68]. Competency involves enacting activities to increase others' abilities to perform the design work of the project, and increase the aptitude, experience, and skills of the team [69]. The workforce should not only be technical experts and highly skilled, but should adapt to change, learn quickly, communicate effectively, and develop interpersonal relationships [70,71].

In terms of projects, a project manager needs to have a certain set of competencies that will allow them to plan and execute projects effectively. Moreover, it is suggested that not only the project manager, but also the whole project team, must have a certain level of competency in order to complete the project [72]. Furthermore, it is argued in the literature that competency and personality traits potentially produce significant results in projects [73]. Additionally, they posit that the true determinant of the success of any project is the competencies, and not the project manager. Therefore, competencies should be prioritized when hiring individuals for projects. In Table 2, some of the most relevant competencies required from a project manager are displayed in chronological order.

Table 2. List of project manager competencies in chronological order.

Author and Year	Competencies
[74]	Ambition and drive (includes motivation, achievement, energy, tenacity, achievement, and initiative) The desire to lead, not to seek power (leadership motivation) Integrity and honesty Self-confidence (emotional stability) Intelligence Knowledge of the business
[75]	Self-confidence Result-oriented Ability to solve problems Energetic and initiative Ability to negotiate Perspective Communication

Table 2. *Cont.*

Author and Year	Competencies
[76]	Team-building Ability to make decisions Leadership Communication Integrity and honesty Stakeholder oriented Self-efficacy
[68]	Technical knowledge Trouble-shooting ability Communication skills Committed Conflict resolution Team player

However, the competencies of project managers in public sector projects seem to have received little or no attention from academia in the prior research, whereas the number of public sector projects is growing significantly around the world, and thus requires attention. Additionally, it is becoming essential to investigate further if the competencies required of a project manager in other sectors are similar to the ones in public sector projects. Therefore, it has become vital to understand the relationship between the two factors in the public sector.

2.5. Project Managers Competencies as a Driver to Project Success

While a number of variables are critical to achieving success in projects, the role of certain key factors such as the project manager's abilities and competency cannot be ignored. Depending on the nature and size of the project, the competencies required from the project manager may differ. Competencies are important for achieving organizational objectives as well as project targets. In a correlational study, a strong association between the project manager's competencies and project success was determined [27]. In contrast, recent studies related to information technology have determined that choosing merely advanced project management methodologies does not ensure the attainment of project objectives' success in projects, as this profoundly depends on the capabilities of a project manager [15,77–79]. Moreover, the link between the two constructs has been thoroughly examined and verified by several studies [80–83].

Previously, Pinto and Slevin [28] pointed out that when choosing a project manager, an organization must consider administrative competencies along with technical proficiency [28]. Furthermore, they determined that an individual with such managerial and technical competencies can only enhance the chance of the successful completion of projects. Moreover, it is suggested that apart from the methodologies adopted on projects, cross-disciplinary competencies are essential for project managers, in order to end the projects in line with customer expectations [84]. However, it is argued that the success of projects is reliant on many key factors, such as the project manager's competencies [68]. Additionally, they stressed that the development of such competencies through certifications and training can increase the probability of completing the project successfully.

In another study, it was determined that along with technical competencies, soft skills, i.e., the human element of the project, should also receive adequate attention [85], and it is suggested that it is the combination of these competencies that will result in beneficial results in projects. In another instance, it is believed that the human factor, such as project manager competencies (critical thinking, communication, leadership, flexibility, documentation, and conflict resolution), will ensure success in projects [86]. Consequently, based on the arguments presented earlier, it is determined that project performance can be enhanced by the competencies of the project manager, and thus we can hypothesize the following:

Hypothesis 2. *There is a positive relationship between project manager competencies and public project success*

Based on the evidence from the literature, a model that reflects the association between project planning, competencies, and project success has been developed. The relationship between project planning, project manager's competencies, and project success is illustrated schematically in Figure 3. It can be observed from the figure that both planning and competencies can behave as antecedents to project success.

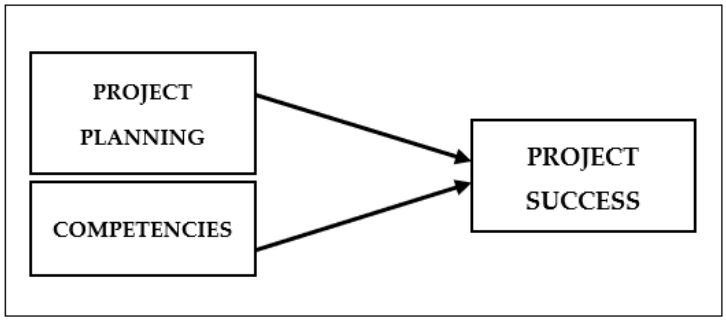


Figure 3. Proposed research model.

3. Methodology

The purpose of this study is to determine and classify the antecedents of public sector project success. As stated earlier, the link between project planning, project manager's competencies, and project success are yet to be completely understood. As such, the present study is considered explanatory because it seeks to understand the association between planning, competency, and project success. Thus, to achieve the proposed objectives, the quantitative approach will be employed. This approach will allow us to comprehend the relationship in a meaningful manner.

3.1. Questionnaire Development

Generally, a questionnaire is believed to be a set of pre-formulated questions in which the participants of research are asked to inscribe their perceptions or opinions about an issue under investigation [87]. The type of questions to be used depends on the nature of the study that is carried out. To examine and evaluate the relationship between project planning, project manager's competencies, and project success, a questionnaire consisting of four sections was developed. However, the scope of the study is restricted to the guidelines that were proposed by the Project Management Institute in its guidebook on Project Management Body of Knowledge [47].

Section 1 of the questionnaire recorded the demographic profile of the respondents. Additionally, in this section, the knowledge and the experience of the respondent were also elicited. This was to clarify if the respondent possessed sufficient knowledge about the variables under discussion. In Section 2 of the questionnaire, the respondents were asked their opinion relating to planning for projects. The items of this section were mainly adapted with minor modifications from Refs. [44,56,88]. Moreover, Section 3 of the questionnaire consisted of questions that measured the project manager's competencies. The items for this section were mainly adapted from Ref. [89]. The last part of the questionnaire, i.e., Section 4, comprised questions related to the success of projects. The items for this section were mainly adapted from Refs. [29,32]. The questionnaire of the present study is attached in Appendix A.

However, for the present study, the research constructs will be operationalized using pre-defined scales commonly used in the field of social science. Furthermore, to evaluate the responses of the participants, the Likert scale is used as the primary method. The advantage of using this scale is that it will produce results that have better validity and reliability [90]. A five (5)-point Likert scale anchored from one (1), "Strongly disagree",

to five (5), "Strongly agree", was adopted for the measurement of constructs stated in Sections 2–4. Sekaran and Bougie (2010) claim that larger distributions of the score used in a scale offer sturdier discriminating power.

3.2. Sample and Data Collection

Zikmund defines the population as any comprehensive group of units that share the same set of characteristics [91]. Moreover, population is defined as the group of people, things, or events that the researcher desires to examine [87]. Concerning the definitions stated, the target population for this research is mid-level managers (executive engineers) from the four major Public Works Departments of Balochistan, i.e., Communication and Works, Physical Planning and Housing Department Balochistan, Irrigation Department Balochistan, Public Health Engineering Department, and Balochistan Development Authority. These departments were selected because they contribute a major share of the Balochistan public sector's projects.

The sampling frame is defined as the physical representation of all the prerequisites in the population from which the sample was extracted [87]. This is also generally known as the working population. Since the primary objective of this research is to investigate mid-level managers' perceptions of significant success factors that could lead to the success of public sector projects, the unit of analysis for this research is the mid-level managers working on different public sector projects.

Moreover, the sample size is understood as some part or subset of the huge population [87]. A non-probabilistic sampling method was employed in this study due to the need for ease of access for the participants. In this study, the G-Power was used to determine the sample size [92]. By running an a priori power analysis test, with a medium-size effect of 0.15 and a significance level of 0.05, and with two main exogenous variables (planning of the projects and human resource competency), the total sample size required for this study was determined as 119.

In conjunction with this, there are numerous methods for data collection that include a telephone survey, personal interview, fax, e-mail survey, mail survey, and web survey [93]. However, it is recommended that while conducting survey research, interviews, questionnaires, and observations are three general methods that should be considered [87]. Since in the present study a quantitative approach has been used, a questionnaire survey was considered to be most appropriate because it allows the managers to respond to the items within a proposed range of scales. In the current study, the mail survey method was followed to distribute the questionnaires to the target population. Additionally, it was advocated that a 30% response rate is satisfactory for the mail survey method [94]. Data were collected in three months, i.e., from December 2018 until the end of February 2019. A total of 500 mail questionnaires was sent to the respondents and 260 valid responses were collected.

In total, 72.7% of the respondents reported that they have more than five years of work experience in their department, and 27.3% of the respondents had more than 15 years of field experience. Overall, respondents had an appropriate level of engineering qualification, as 94.6% of respondents had a Bachelor's degree, 2.7% had a Masters, and 2.7% possessed a Bachelor's in Engineering Technology (BTECH) Degree. Almost 67% of the participants in the study were Sub-Divisional Officers, who are involved in the planning and implementation of the public sector projects, whereas around 33% of the respondents were from the executive level, who are mainly responsible for the planning of the public sector projects. Data were collected from four different public departments who are primarily involved in public sector projects. A major chunk of the participants were from the Communication and Works Department, i.e., 48.5%, whereas 21.5% of the respondents were from the Irrigation Department, 20% of the participants were from the Public Health Engineering Department, and 10% of the respondents were from the Balochistan Development Authority. The experience, qualifications, and designations of the respondents indicate that they have a familiarity with project planning and the competencies required for a project.

3.3. Data Analysis Using Structural Equation Modelling

Since the objective of the study was to determine the impact of planning and project managers' competency on the success of public sector projects, structural equation modeling (SEM) was employed to analyze the data. SEM is a technique that is used to evaluate and describe the relationship among multiple variables [95]. SEM comprises of two multivariate analysis techniques, i.e., factor analysis and multi-regression analysis. SEM is further classified into covariance-based structural equation modeling (CB-SEM) and variance-based SEM (VB-SEM). The purpose of CB-SEM is to confirm a previously proposed relationship, whereas the objective of VB-SEM, more commonly known as partial least squares structural equation modeling (PLS-SEM), is to predict the antecedents to certain outcomes in any given case.

In the present study, PLS-SEM was used to analyze the data since the objective was to determine the antecedents of project success. PLS-SEM is the second generation of multivariate data analysis [96,97]. It is the result of the efforts of statisticians to overcome the weaknesses of the conventional methods. In PLS-SEM, the proposed framework is evaluated using two basic models, i.e., (i) the measurement model and (ii) the structural model. An additional advantage of using this method is that it is capable of evaluating latent variables. It is a non-parametric technique, which does not bind the researcher to assuming the condition of data normality. Moreover, PLS-SEM produces a robust distribution from the data set via the bootstrapping technique, which was eventually optimized to answer the proposed research questions and hypotheses. PLS-SEM is also preferred because it reduces the error terms while estimating the path relationships.

Moreover, in the first stage of the analysis using PLS-SEM, the outer layer, i.e., the manifest variables, are evaluated for reliability and validity. This is also known as measurement model analysis. After having confirmed the integrity of the measures, in the second stage, the path coefficients are examined, as are the t-statistic and confidence interval (p-value), to address the proposed hypotheses using the bootstrapping method. This stage is also known as structural model analysis.

4. Results

4.1. Measurement Model Analysis

In measurement model analysis, the integrity of the items is evaluated, which is used to measure the latent construct. Overall, there are three latent constructs, i.e., planning, project managers' competency and project success, in the proposed research framework. However, these latent constructs are directly unobservable, and thus questions or items to measure the constructs have been used. These items are also known as manifest variables because they are directly observable, but serve as a proxy for the latent constructs that are under investigation.

4.1.1. Reliability

Initially, the inter-item consistency of the manifest variables was evaluated by determining reliability. Moreover, to assess the reliability of a questionnaire, generally Cronbach Alpha (α) is used. Cronbach Alpha assumes that all the indicators are equally reliable, such that the indicator loadings on a variable are the same. The threshold for this measure is 0.6 and beyond [98]. The results of the Cronbach Alpha for the instrument are given below in Table 3. It was concluded from Table 3 that the Cronbach's Alpha values for all the constructs are above 0.6, as proposed by [99]. Therefore, it was determined that the items in the measurement instrument are reliable.

Table 3. Reliability and convergent validity.

Description		Reliability		Convergent Validity	
Construct Name	**No. of Items**	**Cronbach Alpha (α)**	**Composite Reliability**	**AVE**	**Minimum Factor Loading**
Project Planning	9	0.876	0.901	0.506	0.598
Competency	8	0.857	0.889	0.500	0.672
Project Success	7	0.845	0.884	0.525	0.591

In addition, composite reliability (CR) is suggested as an alternative measure of internal consistency, which can be used to measure the reliability of individual indicators [98]. Furthermore, the same researchers suggested that priority should be given to the reliability of individual indicators. The threshold for CR was 0.7 and beyond. Table 3 indicates the composite reliability of individual constructs. The composite reliability values of project planning (0.901), competency (0.889) and project success (0.845) show that these dimensions have a very high level of consistency. The composite reliability scores for these dimensions are even greater than the threshold values, which suggests a high level of internal consistency. Thus, it can be claimed here that there is no issue regarding the reliability of the instrument.

4.1.2. Assessment of Convergent Validity

Convergent validity is the degree to which an indicator correlates significantly with an alternative indicator of the same construct. Several indicators are utilized for the measurement of the same construct when the indicators have a reflective relationship with a construct. These indicators must share a high percentage of convergence or variance amongst each other [100]. Additionally, Ref. [101] recommends as a common measurement to be used for the assessment of convergent validity the factor loadings of the constructs and the average variance explained (AVE). One study proposed that the construct will exhibit half or even more than half variation in their indicators when the value of AVE is 0.5 or greater [98]. As indicated in Table 3, all the constructs have AVE values higher than 0.5, indicating their convergent validity.

Similarly, indicator loadings have also been used to determine convergent validity. For that, it is recommended that the standard loading value should be between 0.4 and 0.7, or greater, and ideally 0.708 or greater [100]. The reason for these particular values is that by squaring the factor loading values in this range, one will get the score of 0.5 or greater, which will show an item's communality. The minimum factor loadings and AVE for assessing convergent validity can be observed in Table 3.

4.1.3. Assessment of Discriminant Validity

Discriminant validity analysis is performed to confirm that the individual variables are distinctly different from each other. It is obvious that, theoretically and conceptually, these constructs are different from each other, but it has been suggested by researchers that one should determine if they are statistically distinct as well [98]. Discriminant validity assessment is carried out by using Fornell and Larcker criteria [102]. In PLS-SEM, assessment of the discriminant validity has been achieved by comparing the square root of the average variance extracted for the items with the correlation estimate of the same items. Discriminant validity is established when the AVE score is more than the value of 'r' ($\sqrt{\text{AVE}} > \text{r}$).

Table 4 represents the discriminant validity scores using the Fornell and Larcker criteria. The square roots of the AVE values of each variable are greater than the correlation estimates of the items. This shows that all the variables in the model indicate sufficient discriminant validity, and the constructs are statistically distinct from each other.

Table 4. Fornell and Larcker criteria of discriminant validity.

Constructs			
Project Planning	**0.712**		
Competency	0.637	**0.707**	
Project Success	0.710	0.643	**0.725**

Note: The elements in bold and underlined in the diagonal represent the square root of AVE, and the off-diagonal elements show bivariate correlations between the constructs.

The key objective of the measurement model analysis is to assess the relationship between constructs and their respective items. Keeping in view the results presented, it has been confirmed that the instrument is reliable and valid.

4.2. Structural Model Analysis

To assess the structural model, it is advised to analyze the (i) collinearity among the constructs, (ii) path coefficients, (iii) coefficient of determination (R^2), iv) the effect size (F^2) and (v) the predictive relevance (Q^2) [98].

Before testing the hypothesis, it is necessary to find out whether the latent variables, i.e., project planning, project manager's competency and project success, are distinctly different from each other by using the variance inflation factor (VIF). Diamantopoulos and Siguaw suggested that the VIF values should ideally be less than 3.3 [103], whereas some studies recommend a threshold of 5 [104]. In Table 5, the values of the VIF for collinearity are presented [100].

Table 5. Collinearity statistic (VIF) for structural model.

Constructs	Project Success
Project Planning	1.682
Competency	1.682

It can be observed from Table 5 that the variance inflation factor (VIF) values are less than the critical values of "3" and "5". These values in Table 5 show that there is no issue of collinearity among the exogenous and endogenous constructs.

Next, in the structural model analysis, the path coefficients and their significance can be observed to resolve the proposed hypotheses. By employing a bootstrapping technique with a subsample of 3000, it was determined that (Hypothesis 1) the project planning ($\beta = 0.506$; $p < 0.000$) and (Hypothesis 2) project manager's competency ($\beta = 0.321$; $p < 0.000$) have a significant impact on project success. Figure 4 below exhibits the structural model, along with the path coefficients and their significance values. Furthermore, a summary of the path coefficients along with their respective hypotheses is presented in Table 6.

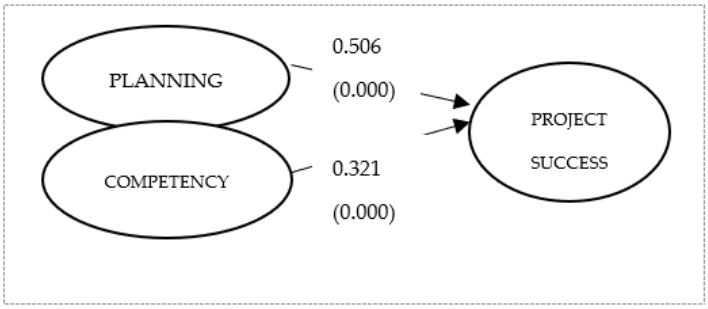


Figure 4. Structural model.

Table 6. Summary of the structural model.

No.	Hypotheses	Direct Effect (β)	Standard Deviation	T Statistic	*p*-Value
1	Project Planning → Project Success	0.506	0.063	8.047	0.000
2	Competency → Project Success	0.321	0.072	4.448	0.000

Likewise, the coefficient of determination (R^2) is 0.566, which means that 56.6% of the variance in project success is explained by both project planning and project manager competencies. R^2 value closer to 1 indicate higher levels of predictive accuracy [98]. Moreover, it is suggested that R^2 value between 0.5–0.75 is considered moderate and acceptable in the field of social sciences [105]. However, in the next step, the individual effect size (f^2) of the exogenous constructs is determined. Standards for evaluating the effect size (f^2) are that values of 0.35, 0.15 and 0.02, correspondingly, represent large, medium and small effects. Values below 0.02 indicate a negligible effect. In the present study, project planning has a large effect ($f^2 = 0.351$) and project manager's competency exhibits a medium effect ($f^2 = 0.142$). This indicates that project planning explains the maximum variance in project success.

Likewise, it has been suggested that Stone-Geisser's (Q^2) [106,107] should also be examined by a researcher to understand the predictive relevance or out-of-sample predictive power of the exogenous constructs over the endogenous construct. These values are obtained through a blindfolding procedure for a specific omission distance in Smart PLS version 3.2. Q^2 values greater than "0" for a reflectively modelled dependent variable indicate the path models predictive relevance. In the current study, the value obtained for $Q^2 = 0.260$, which indicates that the data has predictive relevance for the dependent variable.

5. Discussion

The creativity of a project team can be suppressed by exhaustive planning, but it is critical to acknowledge the role of project planning to a certain required level. Moreover, globally prominent project management standards, such as Projects in Controlled Environments (PRINCE), PMI Body of Knowledge, and International Project Management Association (IPMA), stress deliberately the need to invest in project management processes so as to improve project planning. The reason behind the following argument is that planning reduces uncertainty and increases the probability of success.

Accordingly, one of the major objectives of this study was to assess and evaluate the relationship between project planning and project success in the public sector organizations of Balochistan. Moreover, for Research Question 1 (RQ1), in this study, sufficient evidence has been established indicating that planning positively affects the success of public sector projects. The results of the present study are in line with the findings of previous research, whereby planning was believed to be correlated with project success [32,36,42,45,88]. However, the findings of these studies were primarily about the private sector, ignoring the public sector projects.

Similarly, it was postulated in this study that the abilities and skills of a project manager affect the success of public sector projects. For Research Question 2 (RQ2), which was to examine the relationship between project manager competencies and project success, this paper confirms the positive impact of project managers' competencies on project success. This assumption was based on the argument that if project managers have valid knowledge and experience, this will assist them in the achievement of project objectives. Moreover, these findings are in coherence with the findings of previous studies [85,89], which were about generic projects.

Nevertheless, the aggregate effect of planning and competency on project success appears to be moderate. This can be due to the fact that planning and project managers' competency are overlooked in public sector organizations.

Additionally, the proposed model was evaluated through a wide range of public works departments in Balochistan, Pakistan. In this present study, sufficient empirical evidence has been generated in support of the formulated hypotheses (H1 and H2), confirming the influence of project planning and project managers' competency in public sector project success. Similarly, the results of the study provide scientific evidence for the theoretical reasoning presented by other researchers [68,89,108]. They posit that effective planning and the abilities of a project manager have a direct and strong influence on the performance of a project.

6. Limitations and Future Direction

In the present study, a well-balanced sample was taken only from the public sector organizations of Balochistan, and therefore the inferences cannot be generalized. However, in future studies, the method can be reiterated, with a much larger sample from a different geographical perspective. Since the present study is aimed at understanding the impact of planning and the competencies of a project manager on the success of public sector projects, future research can address similar issues in the private sector to discover if the findings are consistent.

Moreover, the current study addresses the issue of project success with respect to the methodology and procedures defined by the Project Management Institute. Conversely, future studies can focus on other methodologies, such as those of Projects in Controlled Environments (PRINCE) and International Project Management Association (IPMA), and other International standards such as ISO 21501.

7. Conclusions

The planning and competency of individuals working in organizations can enhance the overall efficiency and effectiveness. Similarly, in the present, study based on the results and findings, it is suggested that the public works departments of Balochistan can improve the success rates of their projects by directing their attention to the initial planning of the projects, and by focusing on project managers' competencies. Furthermore, it is recommended that the public works departments should not prepare the preliminary feasibility of the projects in haste. Instead, due consideration should be given to the planning of the projects by incorporating the major elements of planning, i.e., scope, time, cost, quality, risk, communication, procurements and stakeholders. Moreover, it is postulated from the findings of the study that proper initial planning facilitates the implementation of the project, and aids in monitoring and controlling.

Likewise, it is proposed from the outcomes of the study that if public sector organizations wish to increase the likelihood of project success, they should focus on the knowledge, experience, technological skills, project management awareness, and interpersonal skills of the project manager. These competencies do not only help in achieving the project's objectives, but they also ensure the sustainable use of resources in public sector organizations.

Therefore, public sector organizations in Balochistan should divert their attention towards improving their existing planning practices. Additionally, they should conduct preliminary screening tests for the appointment of project managers to determine the required competencies. This will not only allow the smooth execution of the projects, but will also assist in the efficient use of limited resources. Thus, the overall effort will be beneficial and sustainable for the general public of the province and the country.

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Appendix A

Table A1. Questionnaire.

Section I Demographic Profile				
1. Qualification				
Diploma	Bachelors	Masters	PhD	
2. Project Related Experience				
1 to 5 years	6 to 10 years	11 to 15 years	16 to 20 years	20 years plus
3. Position				
Superintending Engineer	Executive Engineer	Sub Divisional Officer		
4. Department				
Communication and Works	Irrigation Department	Public Health Engineering Department	Balochistan Development Authority	

Section II Project Planning	
Ident.	Item
	Public Sector Organizations in Balochistan
PPLG1	define end-user (Stakeholder) requirements properly
PPLG3	have operational requirements properly documented
PPLG4	have operational specifications well-defined
PPLG5	have acceptance criteria well-defined
PPLG6	have life cycle cost well-defined
PPLG7	have procurement and contract management plan well documented
PPLG8	have clearly drafted risk and resource plans in order
PPLG9	define quality assurance procedures
PPLG9	have clear decision-making management mechanisms

Section III Project Manager Competencies	
Ident.	Item
	Project Managers in Public Sector Organizations of Balochistan
PMC1	have knowledge regarding the project and project management
PMC2	have experience of prior projects
PMC3	know the application of tools and techniques in performing project activities
PMC4	have interpersonal skills and the ability to resolve conflicts
PMC5	have received training on projects
PMC6	are aware of project management methodologies
PMC7	have leadership abilities
PMC8	have team building and decision-making skills

Table A1. *Cont.*

Section IV Project Success	
Ident.	Item
PMS1	In Public Sector Organizations of Balochistan projects are finished within time, cost and quality constraints
PMS2	projects have minimum number of agreed scope changes
PMS3	project managers show compliance to defined procedures
PMS4	projects are executed which have an impact on public that are visible
PMS5	projects focus on satisfaction of the general public
PMS6	projects meet objectives that were set in the beginning
PMS7	projects comply with safety and environmental regulations

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