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Assessment of Managerial Competencies in the Bhutanese Construction Projects: A Cross-Sectional Survey Approach

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Abstract

This research investigated the competencies of managers and their connection to the success of construction projects in Bhutan. A cross-sectional survey research design was employed to meet the study's objectives. Data were collected from 353 respondents, including project managers, project engineers, and general managers, using a questionnaire based on a five-point Likert scale. The analysis focused on three variables: intrinsic success factors (managerial competencies), extrinsic success factors, and construction project success. Key managerial competencies identified as most influential include conscientiousness, flexibility, and technical competence. Findings demonstrated a significant relationship between construction project success and the competencies of project managers ($r=0.834$, $p<0.01$), as well as with extrinsic success factors ($r=0.862$, $p<0.01$). Regression analysis indicated that 76.6% of the variation in the success of the project could be explained by the combined influence of managerial competencies and extrinsic factors. Of this, extrinsic success factors contributed the most (56.8%) compared to managerial competencies (33.3%). Nonetheless, the strong positive correlation between project manager competencies and project success highlights the critical role of managerial skills in ensuring the success of construction projects in Bhutan.

Keywords— project manager, managerial competencies, critical success factors, construction project success, Bhutan

1 Introduction

The construction industry is a global sector projected to achieve an annual output of $15 trillion by 2030, with an estimated yield of $11 trillion in 2020 [1]. In Bhutan, the construction sector contributed approximately 11.48% to the GDP in 2019 [2], playing a pivotal role in the economy by

addressing basic housing needs and providing vital infrastructure for socioeconomic development [1]. Recognized for its significant potential to drive wealth creation, employment, and sustainable growth within the Gross National Happiness (GNH) framework, the construction industry was prioritized in the revised Economic Development Policy, 2016 [3]. The success of this industry is closely linked to effective construction project management, which is rooted in the broader discipline of project management [4]. Construction project management involves planning, coordinating, and controlling projects from initiation to completion, ensuring client satisfaction by meeting objectives related to utility, functionality, quality, time, and cost [5]. Budgets for construction projects often reach millions, making project outcomes critical to the profitability and success of construction companies. However, these projects are inherently risky, involving the allocation of scarce and costly resources across complex task frameworks [4], [6]. Consequently, ensuring project success is a top priority for companies. Despite this emphasis, many projects fail for various reasons [7], prompting project management literature to focus on strategies to improve success rates [8]. In this context, project success is traditionally defined using performance metrics like cost and schedule compliance [9], but modern definitions include stakeholder satisfaction [10]. This study adopts a broad definition of project success, encompassing critical success factors such as time, cost, and quality (extrinsic factors) and managerial competencies like effective communication, negotiation, and motivation (intrinsic factors). The factors listed in this study were identified through a combined approach of prior empirical research and expert validation workshops, ensuring relevance to Bhutan's construction context. However, it is acknowledged that additional competencies may exist beyond those captured, and further studies could be explored for any missing elements. The literature suggests that identifying individuals with the right competencies for project management roles is a key strategy for enhancing project success [11]. Failures to meet cost and time objectives often stem from human factors such as low morale, poor motivation, and weak productivity, highlighting the importance of managerial competencies and leadership [7]. Studies, including those by Khan [12], Baldoni [13], Dulewicz & Higgs [14], Maxwell [15], Geoghegan & Dulewicz [16], and Lopez [17], have consistently shown that managerial competencies have a positive influence on project outcomes. The leadership style and management skills of project managers are crucial for achieving project objectives and overall success [18]. While technical skills are essential, soft skills such as social competencies are increasingly prioritized in project management [6], [19], [20], [21], [22]. Furthermore, the complexity management literature, particularly the theory and practice outlined by Maylor & Turner [23] in "Understand, reduce, respond: project complexity management theory and practice" offers valuable insights into how intrinsic factors can be managed effectively under complex conditions. Despite the recognized importance of managerial competencies, limited research has specifically identified the critical competencies needed to manage construction projects successfully. Although general project management competencies have been studied in various contexts, such as IT, manufacturing, and business, little research focuses on the specific requirements for construction projects in Bhutan. This study aims to bridge this gap by identifying the key competencies of construction project managers and assessing their relationship with project success in Bhutan. Using a cross-sectional survey, it investigated the practical implications for practitioners, including project managers, general managers, and HR personnel, to refine selection criteria, shortlisting processes, and success metrics for construction projects. Additionally, the study conducted a comparative analysis of critical success factors—extrinsic factors (e.g., budget and schedule) and intrinsic factors (managerial competencies)—to determine their relative importance for project success. This approach provides a comprehensive understanding of the factors influencing construction project outcomes.

2 Conceptual Framework

To address the objectives of this study, a conceptual framework was developed and is illustrated in Figure 1. The study focused on three key variables: independent variables, including intrinsic

success factors (ISFs) represented by managerial competencies (MCs) and extrinsic success factors (ESFs), and a dependent variable representing project success (PS), which is measured through cost, quality, and time.

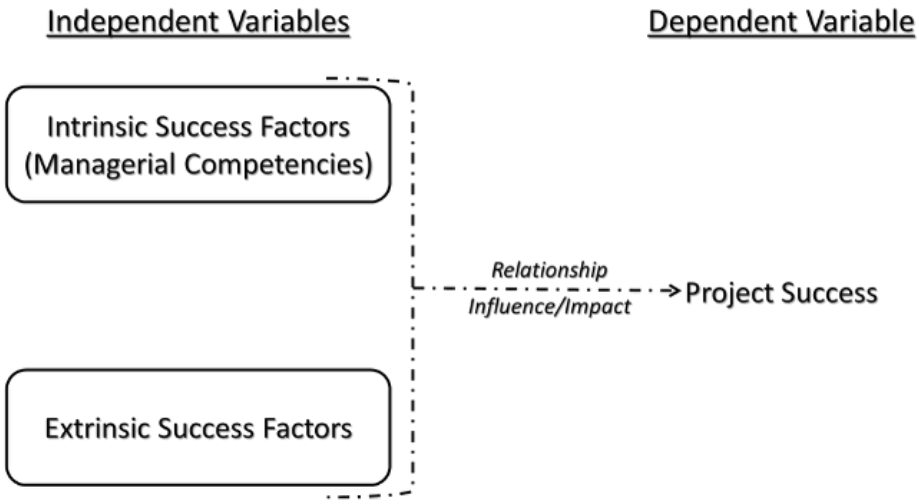

Figure 1: Conceptual Framework of the Study

The first objective was achieved by identifying and listing the managerial competencies alongside the extrinsic success factors. The second objective was fulfilled by analysing the relationship between managerial competencies and the success of the project. Similarly, the third objective was accomplished by evaluating the combined impact of managerial competencies and extrinsic success factors on project success. Finally, the fourth objective was met by comparing the influence of managerial competencies on project success with that of extrinsic success factors.

3 Methodology

The subsections within this section detail the development and implementation of the research methodology to achieve the study's aims and objectives. To provide a concise overview of the methodology used, a research methodology framework was created and is presented in Figure 2, offering a visual summary of the research approach.

3.1 Research Design

This study utilized a cross-sectional survey design, a research approach in which data is collected from a diverse group of individuals at a single point in time [24].

3.2 Study Sites, Sample, and Sampling Technique

The study was conducted in six locations: Chukha, Paro, Sarpang, Samdrup Jongkhar, Thimphu, and Wangdue. The target population included Project Managers, General Managers, Project Engineers, and Chief Executive Officers. According to data from the Construction Development Board (CDB) of Bhutan, there were approximately 779 registered construction companies in Bhutan in 2021, distributed across these study sites. From these companies, 1,618 individuals were eligible to participate in the questionnaire survey. The sample size was determined to be 353, calculated using the Taro Yamane Formula. Simple random sampling was employed to select participants, ensuring that all subsets of the population (sampling frame) had an equal chance of being included [25].

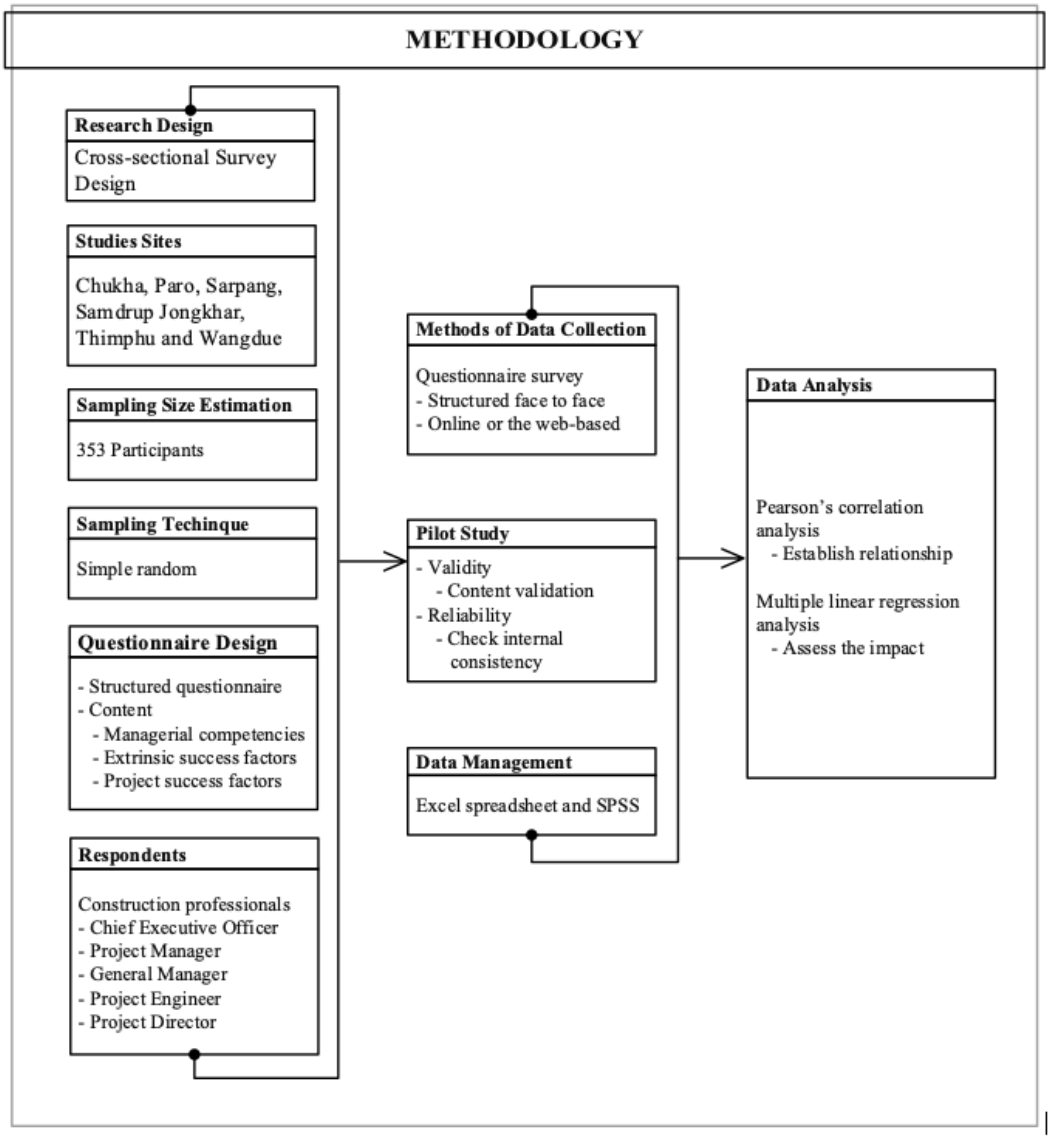

Figure 2: Research Methodology

3.3 Method of Data Collection

A structured questionnaire was used as the primary instrument for this study. The questionnaire items were adapted from existing, validated frameworks in the literature and supplemented with additional questions tailored to the Bhutanese construction context. It was designed based on an extensive literature review and refined through consultations with supervisors. Before administering the survey, respondents received a brief oral explanation of each section's purpose and item interpretation. no formal training session was conducted, but participants were invited to ask clarifying questions and share their perspectives. The questionnaire evaluated 15 variables each for Managerial Competencies (MCs) and Extrinsic Success Factors (ESFs), and three variables (time, cost, and quality) related to Project Success (PS). Managerial competencies were operationalized as specific, observable behaviors and skills, such as effective communication, project planning, risk management, and team coordination, each measured on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree), indicating respondents' degree of agreement with statements describing their demonstration of these competencies. These variables are detailed in Table 1.

Table 1: Critical Success Factors for Questionnaire Development

Extrinsic Success Factors	Ref.	Intrinsic Success Factors (Managerial Competencies)	Ref.
Advanced technologies	[27]	Conflict Management	[28], [29]
Competent project team members	[21], [22]	Conscientiousness	[30]
Cooperative organizational culture	[21]	Effective communication	[20], [31]
Customer satisfaction	[22], [32]	Empathy	[31]
Defining realistic and clear goals and objectives	[33], [34]	Flexibility	[35], [36]
Defining the schedule and schedule monitoring	[33], [37]	Honesty	[31]
Documentation	[38]	Ingenuity	[39]
Education and training	[40]	Interpersonal relationship	[31], [36]
Meeting the budget	[22], [37]	Motivation	[29], [36]
Meeting the deadline of the project	[37]	Negotiation skills	[31], [36]
Project planning	[22], [37]	Resiliency	[31]
Project team qualifications	[41]	Self-confidence	[31]
Risk management	[33], [42]	Supportive	[39]
Selecting the right project	[22]	Technical competence	[30], [43]
Team coordination	[21]	Trust building	[39]

Table 2: Cronbach's Alpha Coefficient

Variables	Number of Items	Cronbach's Alpha
Managerial Competencies	15	0.825
Extrinsic Success Factor	15	0.897
Project Success	12	0.762
All Measurement Items	42	0.871

3.4 Data Management and Analysis

The data collected were organized and processed by means of Excel and SPSS (Statistical Package for Social Sciences, v27) software. Initially, the data were entered into an Excel spreadsheet and then imported into SPSS. Before proceeding with analysis, the dataset was carefully cleaned, sorted, and checked for duplicate entries or missing values. Data analysis was subsequently performed using SPSS. This study utilized the Pearson's correlation analysis and multiple linear regression analysis. Pearson's correlation analysis was applied to examine the relationships between managerial competencies, extrinsic success factors, and project success. Multiple linear regression analysis was conducted to evaluate the combined impact of managerial competencies and extrinsic success factors on project success, as well as to compare the individual effects of these variables. A significance level of 0.05 was consistently applied throughout the analyses.

4 Data Analysis and Results

This section focuses on analyzing and interpreting the data obtained from the survey questionnaire.

4.1 Demographic Characteristics of the Respondents

Table 3 below presents the descriptive analysis of the survey respondents based on their job position, gender, age, educational background, work experience, and the maximum project size they managed. Among the respondents, 44.5% (n=142) were Project Engineers, while only 6% (n=19) held the position of Chief Executive Officer. Approximately 69% (n=219) of the participants were male, and a majority (58%, n=90) were aged between 20 and 40 years.

Table 3: Demographic Characteristics of the Respondents

Demographic Variables	Frequency	Percent
Position		
Chief Executive Officer	19	6.00
Project Manager	118	37.00
General Manager	40	12.50
Project Engineer	142	44.50
Gender		
Male	219	68.70
Female	100	31.30
Age (in years)		
20 to 30	185	58.00
Above 40	134	42.00
Experience (in years)		
Less than 15	187	58.70
More than 15	132	41.30
Education Level		
Bachelor's degree	248	77.70
Master's degree	71	22.30
Monthly Income (Nu.)		
Less than 50,000	205	64.30
Above 50,000	114	35.70
Project Size Worked On		
Small (Up to Nu. 1M)	20	6.30
Intermediate (Up to Nu. 5M)	136	42.60
Large (Up to Nu. 10M)	105	32.90
Very Large (Above 10M)	58	18.20

Furthermore, over half (58.6%, n=187) of the respondents had less than 15 years of project experience, and nearly three-quarters (77.7%, n=248) held at least a bachelor's degree, with the remaining 22.3% (n=71) possessing a Master's degree. Additionally, around 64.3% of respondents reported a monthly income of Nu. 50,000 or less. Nearly half (48.9%, n=156) indicated they had managed projects valued at Nu. 5 million or less.

4.2 Important Managerial Competencies and Extrinsic Success Factors for Project Success

The Relative Importance Index (RII) method was employed to rank the variables based on the responses collected for each variable in the study, as indicated in the figures below. This method was used to identify the factors most critical to the success of construction projects.

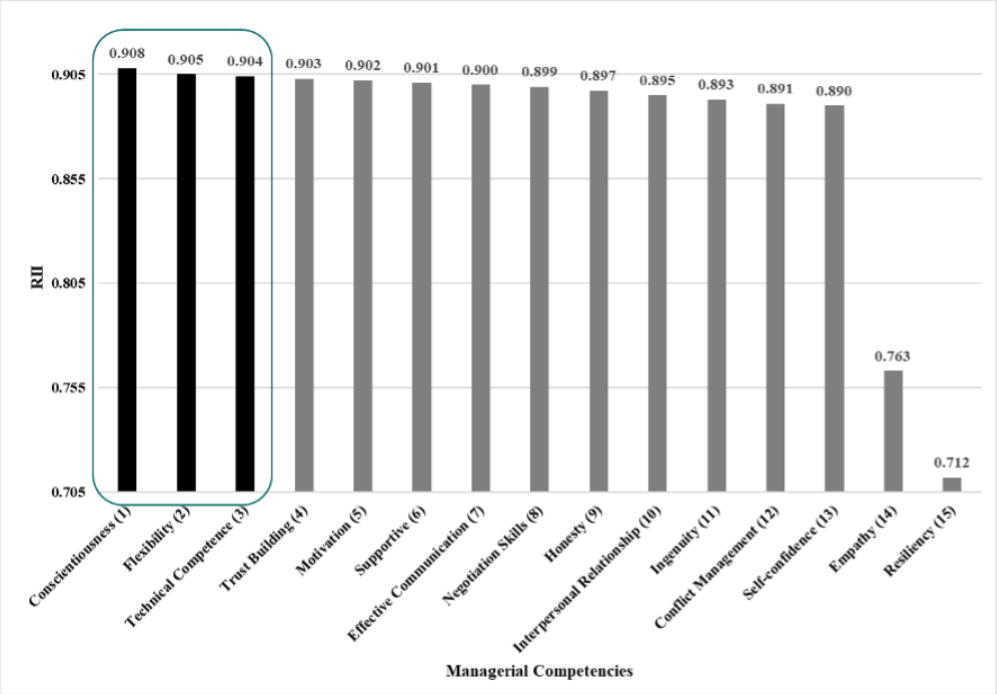

Figure 3: Ranking of Managerial Competencies

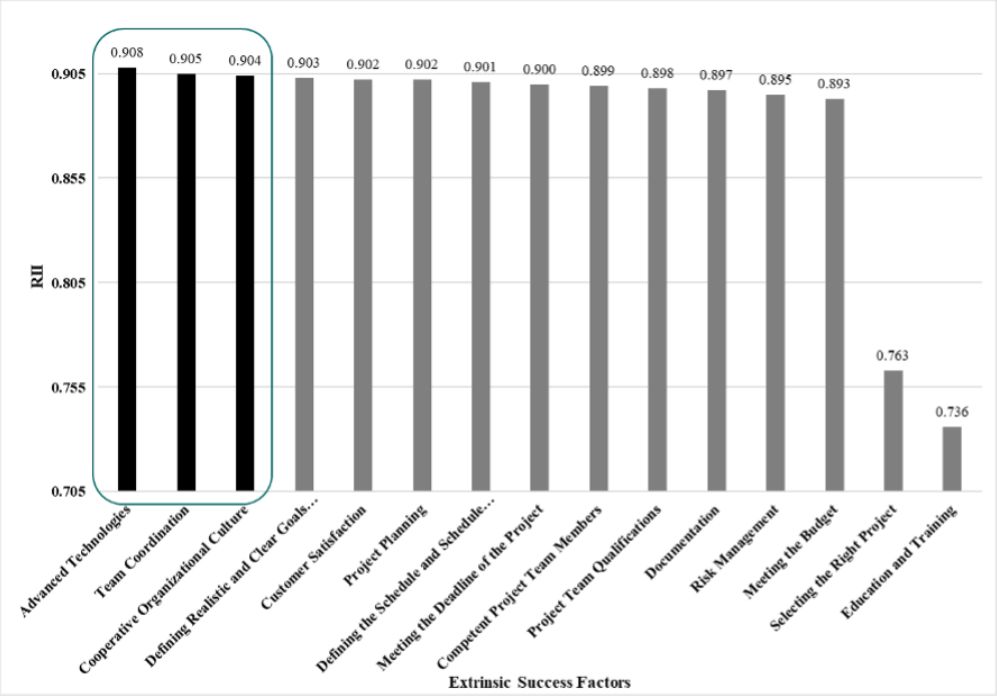

Figure 4: Ranking of Extrinsic Success Factors

For managerial competencies, variables such as conscientiousness, flexibility, and technical competence were rated highly on the RII scale and ranked among the top. Similarly, for extrinsic success factors, elements like advanced technology, team coordination, and a cooperative organizational culture received high RII scores. Figures 3 and 4 visually depict the rankings of the managerial competencies and extrinsic success factors, respectively.

4.3 Statistical Data Analysis

4.3.1 Relationship between Managerial Competencies, Extrinsic Success Factors, and Project Success

The Pearson's correlation analysis was utilized to evaluate the relationship between managerial competencies, extrinsic success factors, and project success. This method assesses the connection between two or more variables, providing insights into both the strength and direction of their association [44]. Prior to running the correlations, missing data (constituting less than 5% of all cases) were handled via mean imputation for each variable, and all variables were inspected for normality (skewness and kurtosis within ±1.0) to satisfy Pearson's assumptions.

Table 4: Pearson's Correlation Analysis

Pearson's Correlation Analysis		Extrinsic Success Factors	Managerial Competencies	Project Success
Extrinsic Success Factors	Correlation Coefficient	–		
	Sig. (2-tailed)	–		
Managerial Competencies	Correlation Coefficient	0.882**	–	
	Sig. (2-tailed)	0.000	–	
Project Success	Correlation Coefficient	0.862**	0.834**	–
	Sig. (2-tailed)	0.000	0.000	–

Note: **Correlation is significant at the 0.01 level (2-tailed).**

Table 4 presents the results of Pearson's correlation analysis, which was conducted to determine the relationship between the competencies of the construction project manager, extrinsic success factors, and the success of the project. The Pearson correlation coefficient (r) for the association between the competencies of the construction project manager, extrinsic success factors, and the success of the project was 0.834, indicating a very strong positive correlation, which was statistically significant (p-value < 0.01). Similarly, a strong and significant correlation ($r = 0.862$) was observed between extrinsic success factors and project success (p-value < 0.01). While Pearson's correlation analysis revealed the strength and direction of the relationships between the independent variables (managerial competencies and extrinsic success factors) and the dependent variable (project success), it did not provide conclusive evidence regarding the extent of influence of these independent variables. To address this limitation, multiple linear regression analysis was performed to assess the degree to which managerial competencies and extrinsic success factors impact project success.

4.3.2 Influence of Managerial Competencies and Extrinsic Success Factors on Project Success

Regression analysis measures how one or more variables influence another. To ascertain the statistically substantial impact of independent variables on a dependent variable, multiple regression analysis was employed [44]. Before interpreting the regression, linearity via scatterplots was verified, homoscedasticity with residual-versus-fitted plots was tested, and the absence of multicollinearity (variance inflation factors all < 2.0) was confirmed. This study applied regression analysis to evaluate the extent to which managerial competencies (intrinsic success factors) and extrinsic success factors influence project success. It also aimed to identify the factors that most significantly contribute to the success of construction projects in Bhutan. The adjusted R-squared value was analyzed to determine how much of the changes in the dependent variable (success of the project) could be described by the independent variables (managerial competencies and extrinsic success factors) and to assess the statistical significance of the relationships.

Table 5: Regression Analysis Results

Model[a]	**R**	**F**	**Sig.**[b]	**t**	β	**Sig.**[c]
Extrinsic Success Factors	0.766	520.398	0.000	5.791	0.568	0.000
Managerial Competencies				9.877	0.333	0.000

Note:
a. Dependent Variable: Project Success
b. F significance
c. t significance
d. R is adjusted R Square
e. β is the standardized coefficient beta

As shown in Table 5, the adjusted R-squared value, 0.766 specifies that 76.6% of the variance in the success of the project can be attributed to the independent variables. This means that 76.6% of the success in construction projects was accounted for by managerial competencies and extrinsic success factors, while the remaining 23.4% was influenced by other factors not included in the model. In essence, managerial competencies and extrinsic success factors play a substantial role in the success of construction projects. The F-test further confirms the model's statistical significance at the 95% confidence level (p-value < 0.05), indicating that the variation explained by the independent variables is not due to chance. The standardized beta coefficients highlight the relative influence of managerial competencies and extrinsic success factors on project success. These coefficients reveal that extrinsic success factors have a greater impact, with a standardized beta value of $\beta = 0.568$ (p-value < 0.05), compared to managerial competencies, which have a beta value of $\beta = 0.333$ (p-value < 0.05). This suggests that extrinsic success factors contribute more significantly to the success of construction projects in Bhutan. Additionally, the t-test significance figures, all below 0.05, indicate that both success factors are substantial (significant) and positive predictors of project success.

5 Discussion

The data analyzed and the results obtained are discussed and interpreted in the preceding sections.

5.1 Important Managerial Competencies and Extrinsic Success Factors for Project Success

The competencies of "Conscientiousness", "Flexibility", and "Technical Competence" ranked highest in relative importance index scores, signifying their strong positive impact on the success of construction projects in Bhutan. Similarly, among the extrinsic success factors, "Advanced Technologies", "Cooperative Organizational Culture", and "Team Coordination" received high scores, highlighting their significant influence on project outcomes. Therefore, it is essential for managers to recognize and prioritize these key competencies and factors to effectively manage construction projects and enhance their likelihood of success in Bhutan.

5.2 Relationship Between Project Manager's Competencies and the Success of Construction Projects

Using Pearson's Correlation Analysis, the results demonstrated a very strong positive relationship between the competencies of construction project managers and the success of construction projects ($r=0.834$, p-value<0.05). This highlights that managerial competencies significantly influence project success. The positive correlation suggests that enhancing the skills of project managers can directly contribute to higher success rates in construction projects. These findings align with prior research conducted by Zhang Fan [19], Cserháti Szabó [45], Wiangnak Lekcharoen [46], Cech Chadt [18], Fedida Missonier [47], Besteiro [37], Al Kazaz Shibani [48], Joslin Müller [49], Al-khawaldah [50] and Nigatu [51]. Although their studies focused on different types of projects and varied locations, the consistent conclusion was that managerial competencies play a significant role in project success. This underscores the universal importance of a manager's skills in determining project outcomes, regardless of the project's context.

5.3 Influence of Competencies of Project Managers and Extrinsic Success Factors on Project Success

The results of the multiple regression analysis revealed that approximately 76.6% of the success rate in construction projects could be attributed to managerial competencies and extrinsic success factors. This indicates that both managerial competencies and extrinsic factors play a significant role in determining the success of construction projects. When evaluating individual critical success factors, extrinsic factors were found to have a greater impact on overall project success compared to intrinsic factors, such as managerial competencies. This could be due to the frequent use of extrinsic factors, including advanced technologies, customer satisfaction, and project planning, by construction professionals in managerial roles in Bhutan to enhance project outcomes. While extrinsic success factors showed a stronger standardized beta ($\beta = 0.568$) than managerial competencies ($\beta = 0.333$), this may reflect industry norms in Bhutan, where resource availability (e.g., advanced technology, team coordination) exerts immediate influence on project outcomes. It could also indicate that organizational culture and external support mechanisms play a more decisive role than individual managerial skills in this context. The above findings were in agreement with the research done by Ihuah [21], Kendrick [42], Nugroho [33], Al-Hajj [52], Alem [53], Masár [54], and Khan [55]. The only notable difference was the varying degrees of influence observed, which were attributed to differences in project types and contexts, such as IT, manufacturing, management, and business projects. Given the rich dataset on 15 intrinsic and 15 extrinsic factors, future studies could examine interactions among these variables, identifying which combinations most powerfully predict success and which factors may be redundant.

6 Conclusion

The competencies of project managers play a vital role in ensuring the success of projects within organizations. As project managers are essential assets responsible for overseeing all aspects of a project's execution, understanding and recognizing their competencies is a critical factor for success. Consequently, this study aimed to identify the competencies of project managers, examine their relationship with the success of construction projects, and address a gap in the literature. While considerable research has explored managerial competencies, project management, and project success in general contexts, studies specifically focusing on the impact of construction managers and their competencies on construction projects remain scarce or limited in Bhutan. Based on the key findings, a strong positive correlation was identified between the competencies of construction project managers and project success, indicating that these competencies are closely linked to successful project outcomes. Among the competencies examined, "Conscientiousness," "Flexibility," and "Technical Competence" emerged as critical for the success of the Bhutanese construction projects. Enhancing these competencies is likely to improve organizational success rates, which are directly tied to productivity and were identified in this study as significant positive predictors. Furthermore, the analysis revealed that both managerial competencies and extrinsic success factors influence the success of construction projects. However, extrinsic factors were found to have the greatest impact on the project outcomes.

7 Recommendation

This study established a strong and significant relationship between managerial competencies and the success of construction projects. Based on these findings, the following recommendations are proposed:

- Strengthen and develop the competencies of managers working in administrative and management roles.
- Engage construction managers in training and professional development programs aimed at enhancing their competencies and technical skills, such as PRINCE2 and PMP certifications. Training should also focus on areas like communication, problem-solving, and creative thinking.
- Use standardized criteria to evaluate skills and attitudes when recruiting managers or engineers for construction projects.
- Regularly evaluate managers' competency levels using recognized and standardized competency assessment tools.

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