

Factors Influencing The Quality of Construction Projects in Public Universities

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Article Information:

Received: December 23, 2022, Accepted: January 03, 2023, Published: February 01, 2023

Abstract

The study aims to determine factors affecting project quality in public universities in eastern Ethiopia. The researchers used primary data in a quantitative research approach to accomplish the objectives. The dependent variable, project quality, is regressed on five Explanatory variables: Leadership, Policy & Strategy, People, Partnership & Resources, and Process. Each of these characteristics was gathered from the consultant, client, and contractor. In order to determine the validity of the model. All multiple regression assumption tests were found to be valid. According to regression analysis, it was found that Leadership, Policy & Strategy, People, Partnership & Resources, and Process all have a substantial impact on project quality. The analysis from one-way ANOVA revealed that clients, contractors, and consultants have similar perceptions of the five quality attributes, leadership, people and policy and strategy, partnership and resources and process. Results from this research can be used by construction firms to improve their quality management systems, as they will indicate where the emphasis should be focused to ensure the ongoing improvement of project quality and sustainability.

Keywords: Project, Project Quality, Leadership Policy and Strategy, Partnership and Resource

How to Cite:

Aenet, Y., Maniha, N. (2022). Factors Influencing The Quality of Construction Projects in Public Universities. *International Journal of Business, Management, and Economics*, 4(1). 13 - 31. DOI: <https://doi.org/10.47747/ijbme.v4i1.990>

1. Introduction

1.1 Background

As in most developing countries, Ethiopia's construction industry has significantly contributed to the economy's growth through infrastructure development. (Kuhil and Seifu,

2019). It also shared a considerable amount of the country's scarce financial resources. Construction is booming in Ethiopia, accounting for 18% of the country's GDP during 2017-2018. The construction sector is currently the largest employer in the country, with more than two million people employed in full-time and temporary jobs. (BBC News, 2019). For many people, a project is considered successful if it is finished on time with the agreed quality, on time and within budget, and to everyone's delight. Functionality, profitability to contractors, absence of claims and legal action, and "fitness for purpose" for occupants have also been used to gauge project success (Assaf and Al-Hejji, 2006). There is solid evidence that most construction projects fail in terms of quality and timely completion. Despite this, the construction industry has developed significantly and contributed significantly to the country's economy. It is not uncommon for these important variables to be below the national average in the construction business. A wide range of issues affect the sector, and the consequences are dire. The difficulty facing the construction business is identifying the important variables that influence the quality, taking proactive efforts to ensure customer satisfaction, and maintaining continual progress in the industry (S Shanmugapriya and Subramanian, 2015)

A vital aspect of the building industry is ensuring that the project meets all established standards and specifications. The goal is to win over clients from other businesses. In order for a company to be successful, it must have the ability to create, implement, and demonstrate the right management systems. (Gherbal *et al.*, 2012). "Quality has become an important means of competition and a strategic weapon to boost the market share and profitability" (Harris *et al.*, 2021). Construction companies are under enormous pressure to enhance the quality of their goods and establish efficient quality management systems in order to remain competitive. This pressure comes from the market, their competitors, and the growing demands of their customers. Rework, bad contract paperwork, inept craftsmanship, lack of attention to quality, and inadequate monitoring and inspection can all contribute to quality failures and flaws. (Love and Edwards, 2004). All quality failures have one thing in common: they reduce project efficiency, increase time and expense, and negatively impact the construction industry's overall performance.

1.2. Statements of the problem

Time, cost and quality have been accepted as key project success factors (Joslin and Müller, 2015). Among these three generally accepted constraints, the quality dimension is studied as the least explicit feature of project success. Quality is currently becoming an imperative distinguishing factor as the cost and time of public infrastructure projects. In order to accomplish the time and cost objectives, project quality is mostly ignored (Atkinson, 1999; Hamid, 2015). quality might sometimes be overlooked by the contracting parties in the construction industry to cut back the project costs and schedule. (Turk, 2006). Better quality in construction projects is a well-known factor in the global success and sustainability of projects by the public construction industry. In the construction industry, quality is defined as the effective sustainability and successful accomplishment of contracted project goals between the client and the service provider or main contractor (Fan, 1995) and conformance with requirements (Samuels, 1994). Quality requires proper supervision in every project phase, which is the particular accomplishment of the quality assurance system (Jraisat, Jreisat and Hattar, 2016). Currently, quality is given extra attention to clients' expectations of quality are increasing (Gan *et al.*, 2017) because it relates to the durability and sustainability of the project. Quality means a product or service meets the established criteria in the construction

sector. To win over clients from competitors is a business strategy. Organizations that consistently produce high-quality products and services do so by implementing effective management systems, which they then publicly display to their consumers. (Abd-El-Hamied and Mohamed, 2014). Quality awards like the European Foundation for Quality Management model (EFQM) (Uygur and Sümerli, 2013) are used to improve an organization's quality. Studying how the five EFQM enablement criteria might improve quality performance in public university construction projects is the goal of this research.

1.3. Objectives of the project

This study aims to investigate the factors that affect the quality of building projects using evidence from Public University Construction Projects in Ethiopia. The specific goals are as follows:

- 1) To examine the factors influencing the quality of the construction projects
- 2) To rank the relative importance of factors influencing quality as perceived by the respondents.
- 3) To examine the perception of the client, contractor, and consultant towards the relative importance of factors influencing quality by analysis of variance.

1.4. Research hypotheses

To achieve the research objectives, the researcher formulated six hypotheses,

H_{A1}: There is a positive and significant relationship between Leadership and Project quality.

H_{A2}: There is a positive and significant relationship between partnership & resources and Project quality.

H_{A3}: There is a positive and significant relationship between policy & strategy and Project quality.

H_{A4}: There is a positive and significant relationship between partnership & resources and Project quality.

H_{A5}: There is a positive and significant relationship between processes and Project quality.

H_{A6}: There is a significant difference in the perception of the client, contractor, and consultant towards the relative importance of influencing factors of project quality.

2. Literature Review

Based on the European Foundation for Quality Management Model, a conceptual framework is established to explore the elements that influence quality performance in the construction industry (EFQM Model, 2003). For the five constructs of leadership, people, policy and strategy, collaboration, and resources and procedures, the broad research of quality literature generated the following indicators.

2.1 Leadership

Leaders can be defined as persons who identify the need for and implement change, set up direction, support people, motivate and inspire, communicate a vision of where the organization is headed, build teams and share decision-making, mentor and guide subordinates, and demonstrate a high degree of integrity in their professional interactions (Zenger and Folkman, 2002). Leadership is a significant aspect influencing quality in the firm, which relates to the quality system's various components. (S Shanmugapriya and

Subramanian, 2015) A construction project requires management, and the effective manager exhibits good leadership. A major obligation of the project manager is to give effective leadership during the life of a construction project (Gharehbaghi and McManus, 2003). The project manager's competence, top management support and interaction between project participants are external contributors to enhancing project quality performance from its existing level, while the owner's competence is an internal contributor as owners tend to retain the quality performance at the existing level itself (Jha, 2011). (Yusuf, Mofio and Ahmed, 2007) stated that quality management principles should be implemented continually by effective leadership. (Criado and Calvo-Mora, 2009) The degree of support management takes in implementing total quality management is critical to the success of quality management systems.

2.2. People

People enabler emphasizes how well the firms are able to utilize the full potential of its most valuable resource and asset, its people. (Matlhape and Lessing, 2002) stated that an important component of introducing quality management systems in an organization is training, development, and empowerment of employees and confirming that quality is not only for shareholder value creation but that it becomes a personal goal for them. The (EFQM Model, 2003, 2013) revealed that the competencies and skills of the employees are to be continuously developed to result in quality improvement. The firms have to create a culture that values their people and results in achieving personal and organizational goals. They have to motivate people with awards and recognition, encouraging communication and enabling the people to use their knowledge and skill for performance improvement of the organization. In high-performance organizations, people are enabled to do their best work. (S Shanmugapriya and Subramanian, 2015)

2.3. Policy and Strategy

An enabler for policy and strategy explains how policies and strategies are created and implemented. Organizational policies and strategies are critical in deciding quality efforts. Companies seeking to implement a quality system must define a quality policy. (Juran, 1992; S. Shanmugapriya and Subramanian, 2015) emphasized the importance of integrating quality goals into the overall company plan for successful total quality management. Organizations that use policy development to ensure that their employees are aware of the company's goals and how they may contribute to reaching those goals have a better chance of succeeding in quality management (Olian and Rynes, 1991). The quality policy should be utilized to define priorities, according to (Sureshchandar, Rajendran and Kamalanabhan, 2001). People tend to construct their unique standards of conduct with no official guidelines. When implementing overall quality management, organizations and facilities must have good quality policies in place, as detailed in (Oakland, 2014).

2.4. Partnership and Resources

It's important to note that partnership and resource enablers focus on the organization's ability to manage its resources efficiently and effectively, both internal and external. According to the (EFQM Model, 2003), the best and most remarkable businesses plan and manage external partnerships, suppliers, and internal resources in order to keep the policy and strategy in place and the process running smoothly. The organization's current and long-term needs should be taken into consideration while forming and managing partnerships and allocating resources. (S. Shanmugapriya and Subramanian, 2015). To formulate and implement business

strategies, tangible and intangible assets, such as financial resources and technical skills along with personal traits and experience of the firm's executives, were outlined by (Dansoh, 2005). The external emphasis of the company is encouraged, and the relevant expertise is brought in through partners.

2.5. Process

A number of processes make up a company, and each process is organized by a collection of interrelated actions that change input into output and consequence. According to (Juran, 1992; S. Shanmugapriya and Subramanian, 2015)(Juran, 1992), an effective quality planning process is the key to bridging the gap between the firm's aspirations for quality improvement and the identification of the benefits. As part of the firm's quality planning process, quality planning is one of the most important parts of TQM and the International Standardization of Organizations (ISO). Quality planning and strategic planning should be integrated into companies, according to (Inyang-Udoh, 2002). Customers and stakeholders benefit from great firms' efforts to improve processes, as outlined by the (EFQM Model, 2003, 2013). Internal processes and procedures are critical for construction companies if they are to operate efficiently and improve the quality of their work. A process enabler is one of the most important factors in any framework's successful deployment (Chinda and Mohamed, 2008).

2.2 Conceptual framework

The study's conceptual framework was based on an extensive review of the literature and the European quality award (EFQM) model. The indicators for each construct and a hypothetical model for the study are presented in Table 1 and Figure, respectively.

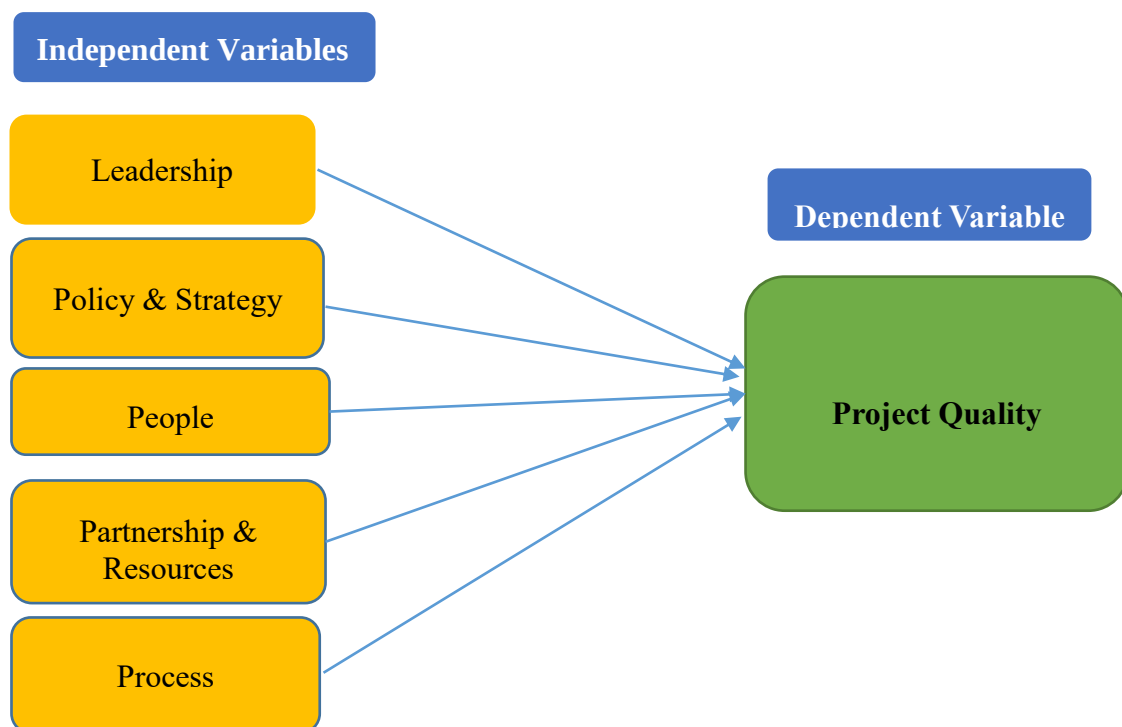


Figure 1 Conceptual framework

Table .1 Identification of Indicators for Project Quality

Construct	Code	Indicators	Reference
Leadership	L1	Role model for cultural excellence in quality	(Anderson, Fornell and Lehmann, 1994)
	L2	Responsibility for quality performance	(Jha, 2011).
	L3	Specifying quality objectives	(Gryna and Juran, 2001)
	L4	Commitment	(Chan and Tam, 2000).
	L5	Encouraging the employees	(Gherbal <i>et al.</i> , 2012).
	L6	Acknowledgement and rewarding employees	(Mahaney and Lederer, 2006).
	L7	Collaborate with employees in quality training	(Özutku, 2012).
	L8	Updating the knowledge	(Arditi and Gunaydin, 1997)
	L9	Planning & detailing the different stages of change in the project	
	L10	Measure and review the effectiveness of quality	
People	P1	Planning and managing human resources	(Gul <i>et al.</i> , 2012)
	P2	Incentives and rewards	(Jha and Iyer, 2006).
	P3	Understanding quality as their responsibility, project participants	(Serpell <i>et al.</i> , 1999)
	P4	Recruitment depends upon their skills and experience	(Lai, Weerakoon and Cheng, 2002)
	P5	Two-way communication	(McAdam and Kelly, 2002)
	P6	People are responsible for the end results of the quality	Nanda & Panda, 2013)
	P7	Giving the opportunity to implement solutions	(Lam and Tang, 2003)
	P8	Motivation systems	(Nepal, Park and Son, 2006)
	P9	Training in the principles of quality	(Ahire, Golhar and Waller, 1996)
	P10	Suggestions, feedback and complaint system	(Elsaid, Okasha and Abdelghaly, 2013)
Policy & Strategy	POS1	Satisfying the needs and expectations of the stakeholders	
	POS2	Periodic review and update of policies	
	POS3	Benchmarking techniques	
	POS4	SWOT analysis	(Wang and Huang, 2006)
	POS5	Specific and measurable objectives for quality policies	(Bassioni, Price and Hassan, 2004)
	POS6	Systematic measurement of quality costs and non-quality costs	(Samson and Terziovski, 1999).
	POS7	Systematic procedures to plan, evaluate and control project goal achievements	(Boljevic, 2007).
	POS8	Systematic procedures based on information from performance measurement of projects, research, learning and external related activities	
	POS9	Systematic assessment of the effectiveness of projects	
	POS10	Stakeholders' analysis	
Partnership &	PAS1	Long-term relations with the suppliers	(Watts and Hahn, 1993)
	PAS2	Suppliers help in providing technical assistance	

Resources	PAS3	Quality agreements with suppliers	(Inyang-Udoh,
	PAS4	Quality documentation	2002)(Rezaian,
	PAS5	The quantity of materials should be specified	2011).
	PAS6	Allocation of financial resources to meet the actual budgeted cost	(Tan and Lu, 1995)
	PAS7	Proper allocation of equipment and materials	
	PAS8	Using technology with higher operational efficiency	
	PAS9	Focus on research and development	
	PAS10	Site quality inspection of materials	
	PRO1	Systematic design and management of process	
	PRO2	Comprehensive documents	
Process	PRO3	Regular assessment of processes to bring in change and improvement	(Yasamis, Arditi and Mohammadi, 2002)
	PRO4	Using a system of indicators to revise the change	
	PRO5	Promoting efficient behaviour patterns in the process	(Vargo and Lusch, 2004)
	PRO6	Improvement of processes using an innovative technique	(Arditi and Gunaydin, 1997)
	PRO7	Satisfying customer needs	
	PRO8	Improvement of customer relationship	
	PRO9	Conformance to codes and standards	
	PRO10	Improvement of the internal working process	
Project Quality	PQ1	Identification of the quality status of work	
	PQ2	Identification of the causes of quality errors	(Yasamis, Arditi and Mohammadi, 2002)
	PQ3	Integrated quality management for projects in the company	(Vargo and Lusch, 2004)
	PQ4	Analysis and comparison of respective project quality	(Arditi and Gunaydin, 1997)
	PQ5	Review of the link with cost and schedule	
	PQ6	The setting the quality goals of the project	
	PQ7	Identification of the quality status of a project	

3. Research Method

3.1 Research Design

This research applied a descriptive survey and causal (explanatory) design to determine the cause-and-effect relationship between Project quality and the factors affecting it.

3.2. Target populations and Sample size

The total populations of this study were 252 contractors, clients, and consultants working on construction projects at Haromaya and Jigjiga universities. Using R.V.Krejcie and W. Morgan's sample size Determination formula (Krejcie and Morgan, 1970), a sample of 152 was determined. Simple random sampling, a probabilistic sampling technique, was used to select respondent samples from each University.

3.3. Instruments of data collection

This investigation used a structured questionnaire. The survey's first section collects organization and respondent information. Part two of the questionnaire contains 57 items that affect construction quality under six constructs: leadership, people, partnership & resources,

policy & strategy, process, and results. Each statement requires respondents to rate the attributes in the context of quality enhancement on a 5-point Likert scale.

3.4. Data analysis techniques

The Relative Importance Index (RII) was used to determine the relative importance of the various factors on Project quality. The equation used to find the RII is given in equation (1).

$$RII = \frac{\sum W}{(A \cdot N)} \dots \dots \dots (1)$$

Where W is the weighting given to each factor by the respondents (ranging from 1 to 5), A is the highest weight (i.e. 5 in this case), and N is the total number of respondents. The relative importance index (RII) ranges from 0 to 1 (0 not inclusive). The researcher's also used Analysis of Variance (ANOVA) and Ordinary least squares (OLS) regression.

The linear multiple regression equation was used as follows:

$$PQ = b_0 + b_1L + b_2POS + b_3P + b_4PAR + b_5PRO \dots \dots \dots (2)$$

Where: b_i & b_{ii} ($i = 0, 1, 2, 3 \dots$) are the coefficients, ε is the error variable, PQ is the dependent variable related to Project Quality, and L, POS, P, PAR, and PRO are independent variables.

4. Findings and Discussions

4.1 Demographic information of respondents

Questionnaires were distributed to 152 contractors, clients, and consultants; however, 148 questionnaires were collected. Table 2 provides respondent demographics. 38% were Contractors, 18% were Consultants, and 45% were Clients. 104 respondents (70%) have bachelor's degrees. Most respondents had 6–10 years of professional experience in public construction projects.

Table 2 Demographic information of respondents

Character	Respondents' Profile	Frequency	Percentage (%)
Education	Diploma	19	13%
	Bachelor degree	104	70%
	Master degree	25	17%
Experience	Less than 3 years	11	7%
	3 - 6 years	19	13%
	6 - 10 years	93	63%
	Above 10 years	25	17%
Type of Respondents	Contractors	56	38%
	Consultants	26	18%
	Clients	66	45%

4.2. Reliability

In order to ensure the reliability of the data collected, Cronbach's coefficient alpha (α) was used to test the internal consistency among items included in each factor. As a general

guideline, an instrument's internal consistency should be at least 0.70. (Zikmund, 2013), Table 3 shows that all variables' alpha (α) values are greater than the threshold value. Therefore, the result indicates that the questionnaire is more reliable.

Table 3. Reliability test

Variables	Number of Items on the scale	Cronbach's Alpha/	Decision
Project Quality	8	0.890	Reliable
Leadership	10	0.924	Reliable
Policy & Strategy	10	0.905	Reliable
People	10	0.735	Reliable
Partnership & Resources	10	0.910	Reliable
Process	10	0.914	Reliable
Overall	57	0.949	Reliable

4.3. Ranking of Quality factors using RII

Table 4 lists the perceived effect of the top ten factors influencing quality based on the ranking of factors by RII are Updating the knowledge, conformance to codes and standards, Planning and managing human resources, Quality documentation, satisfying customer needs, specifying quality objectives, Proper allocation of equipment and materials, Specific and measurable objectives for quality policies, Periodic review and update of policies and collaborate with employees in quality training. This is supported by the findings of (Juran, 1992; S. Shanmugapriya and Subramanian, 2015)

Table 4 Ranking of Quality factors using RII

Sno	Construct	Description of factors influencing quality	RII	Rank
1	Leadership	Updating the knowledge	0.835	1
2	Process	Conformance to codes and standards	0.834	2
3	People	Planning and managing human resources	0.823	3
4	Partnership & Resources	Quality documentation	0.820	4
5	Process	Satisfying customer needs	0.819	5
6	Leadership	Specifying quality objectives	0.799	6
7	Partnership & Resources	Proper allocation of equipment and materials	0.796	7
8	Policy & Strategy	Specific and measurable objectives for quality policies	0.795	8
9	Policy & Strategy	Periodic review and update of policies	0.792	9
10	Leadership	Collaborate with employees in quality training	0.791	10

4.4. Regression Assumptions Test

The study checked that data conforms to the Classical Linear Regression assumptions before carrying out regression analysis, and they are discussed in this section

4.4.1. Test of normality

Shapiro-Wilk test is a non-graphical test whereby if the test results are insignificant (above

0.05), it implies that the data being used follows a normal distribution. However, when the p-value for the variables is less or equal to 0.05 (significant), it implies that the data is not good for OLS analysis. Regarding the normality test of this subsection, the study adopted the statistical measures for the normality test, which is hypothesized as follows.

Ho: Normally distributed errors

Ha: Non-Normal Distribution error

Table 5. Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Studentized Residual	.083	148	.015	.989	148	.325

a. Lilliefors Significance Correction

The results obtained from the Shapiro-Wilk test in Table 5 indicate that all the variables had a p-value greater than (0.05); therefore, it can be concluded that the residual value is normally distributed so that the regression analysis procedures have been fulfilled.

4.4.2. Test for multicollinearity

According to (Gujarati and Porter, 1999), explanatory variables should not exhibit a high correlation with each other because that may cause unrealistic results during regression. The Variance Inflation Factor (VIF) and Tolerance were utilized in this study to see if there was a multicollinearity effect between the variables.

Ho: There is a multicollinearity problem

Ha: There is no multicollinearity problem

As indicated in Table 6, all the VIF column values are less than ten, and Tolerance values are greater than ten, respectively, indicating no multi-co linearity between the explanatory variables. As a result, we failed to reject the null hypotheses.

Table 6. Collinearity Statistics

Model	Collinearity Statistics	
	Tolerance	VIF
Leadership	0.477	2.098
People	0.955	1.047
Policy and Strategy	0.582	1.718
Partnership and Resources	0.546	1.832
Process	0.934	1.070

a. Dependent Variable: Project Quality

4.4.3. Test for Heteroscedasticity

The pattern of errors should remain constant throughout the observations, and violation of this assumption renders the Ordinary Least Square (OLS) results biased (Gujarati and Porter, 1999).

Ho: There is no heteroskedasticity problem

Ha: There is heteroskedasticity

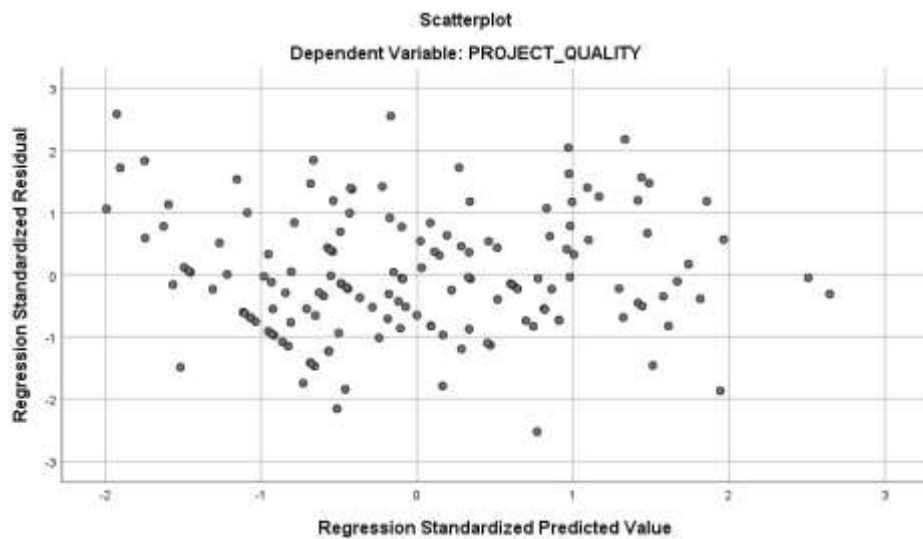


Figure 2. Test for Heteroscedasticity

Figure 2 shows a scatterplot with diffused spots, indicating that the regression model does not have heteroskedasticity.

4.4.4. Test of Outliers

The extreme values pull the regression line towards them, therefore significantly impacting the model's coefficients. Outliers are observations where the observed dependent value does not follow the general trend given the independent value.

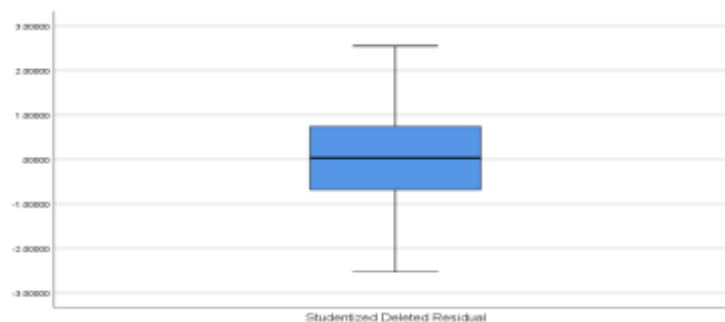


Figure 3 test of outlier

Figure 3 shows if neither end has any circles or asterisks. The box plot indicates that there are no outliers observed.

4.5. Correlation Analysis

The Pearson correlation matrix result in Table 7 shows a positive correlation between the dependent and independent variables. The relationship between Project Quality and the predictor variables was found to be positively correlated and significant

Table: 7 Pearson Correlation Coefficient

	Leadership	People	Policy & Strategy	Partnership & Resources	Process	Project Quality
Leadership	1					
People	0.011	1				
Policy & Strategy	.619**	-0.025	1			
Partnership & Resources	.647**	0.022	.536**	1		
Process	0.091	.205*	0.115	0.146	1	
Project Quality	.707**	.220**	.634**	.659**	.502**	1

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

* . Correlation is significant at the 0.05 level (2-tailed).

4.6. Multiple regression Analysis

4.6.1. Coefficient of determination

The coefficient of determination indicates the proportion of variance in the dependent variable explained by the study's explanatory variables. Table 8 shows 78.1 % of the changes in the Project Quality could be attributed to the combined effect of the predictor variables. However, 21.9 % of the variance is explained by other factors not covered in the study.

Table 8-Multiple Regression Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.888 ^a	.788	.781	.30308

a. Predictors: (Constant), Process, Leadership, People, Policy & Strategy, Partnership & Resources

b. Dependent Variable: Project Quality

4.6.2. Overall Significance of the Model.

The ANOVA tests whether the overall regression model fits the data well. If the p-value is < 0.05, the regression model is a good fit for the data. Accordingly, Table 9 shows that the p-value < 0.05, Thus, it is found that the model is statistically significant with ($R^2 = .788$, $F(5, 142) = 105.773$, $p < .000$).

Table 9 Overall model fit

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	48.579	5	9.716	105.773	.000 ^b
	Residual	13.044	142	.092		
	Total	61.623	147			

a. Dependent Variable: Project Quality

b. Predictors: (Constant), Process, Leadership, People, Policy and Strategy, Partnership and Resources

4.6.3. Hypothesis testing:

A significant test is performed to determine whether independent variables influence the dependent variable. If the p-value is below 0.05, the results have a significant effect. The results of the significance test are shown in Table 10:

Table: 10 Tests variables' level of significant

Model				Standardized Coefficients Beta	t	Sig.
1	(Constant)	-1.791	0.382		-4.687	0.000
	Leadership	0.331	0.050	0.373	6.678	0.000
	People	0.314	0.089	0.139	3.515	0.001
	Policy And Strategy	0.232	0.049	0.240	4.740	0.000
	Partnership And Resources	0.214	0.049	0.230	4.407	0.000
	Process	0.380	0.040	0.378	9.471	0.000

a. Dependent Variable: Project Quality

Accordingly, by looking down at the standardized beta coefficients column, it is observed that process ($\beta = 0.380$, $p < .000$), Leadership with ($\beta = 0.373$, $p < .000$), Policy and Strategy ($\beta = 0.240$, $p < .000$), Partnership and Resources ($\beta = 0.230$, $p < .000$), and People ($\beta = 0.230$, $p < .000$), (0.230), respectively is positively related to project delay. Further, the 'sig' column tells whether the variable is making a statistically significant unique contribution. If $p < 0.05$, it indicates that the variable is making a significant and unique contribution to the prediction of the dependent variable.

4.7. ANOVA

The results of the ANOVA test are shown in Table 11; it has been observed that factors such as Project Quality, Leadership, Policy & Strategy, and People. Partnership & Resources and Process had the value of an insignificant value of more than 0.05, indicating the same point of view regarding the factors influencing quality in construction projects.

Table 11 ANOVA Results

		Sum of Squares	df	Mean Square	F	Sig.
Leadership	Between Groups	.036	2	.018	.033	.967
	Within Groups	78.581	145	.542		
	Total	78.617	147			
People	Between Groups	.041	2	.020	.246	.782
	Within Groups	12.004	145	.083		
	Total	12.044	147			
Policy & Strategy	Between Groups	.075	2	.038	.083	.921
	Within Groups	65.761	145	.454		
	Total	65.836	147			
Partnership & Resources	Between Groups	.092	2	.046	.094	.910
	Within Groups	71.082	145	.490		
	Total	71.174	147			
Process	Between Groups	.802	2	.401	.964	.384
	Within Groups	60.305	145	.416		
	Total	61.107	147			

4.8. Discussion and Interpretation of Findings

The model analysis results revealed that the entire hypothesis in the project quality model is significant and makes a unique contribution to the prediction of the dependent variable. This finding is supported by the study of (Juran, 1992; S. Shanmugapriya and Subramanian, 2015). The summary of the regression model and hypothesis test is presented in Table 12.

Table 12. Summary of Hypothesis testing:

Hypothesis	P- Value	Decision
Ha1: There is a positive and significant relationship between Leadership and Project quality.	.000	<i>Confirmed</i>
Ha2: There is a positive and significant relationship between partnership & resources and Project quality.	.000	<i>Confirmed</i>
Ha3: There is a positive and significant relationship between policy & strategy and Project quality.	.000	<i>Confirmed</i>
Ha4: There is a positive and significant relationship between partnership & resources and Project quality.	.000	<i>Confirmed</i>
Ha5: There is a positive and significant relationship between processes and Project quality.	.000	<i>Confirmed</i>
Ha6: There is a significant difference in the perception of the client, contractor, and consultant towards the relative importance of influencing factors of project quality.	>0.05	<i>Confirmed</i>

5. Conclusion

This research aims to help the construction industry identify quality-affecting factors and examine their interactions and causal relationships. Understanding how leadership, people,

policy and strategy, partnership and resources, and process affect quality helps construction firms achieve their goals and find opportunities for improvement. This research resulted in the following findings.

- The top five factors influencing quality in construction projects based on the ranking factors by RII are Updating the knowledge of leaders, conformance to codes and standards, Planning and managing human resources, quality documentation, satisfying customer needs, specifying quality objectives,
- The computed Relative Importance Index provided a benchmark for ranking the factors influencing quality in construction projects to inform the basis for determining the top-ranked factor and the least-ranked factors. It is recommended that construction professionals need to be aware of these factors to improve project quality
- Statistical analysis is carried out using one-way ANOVA to study whether the difference exists in the perceptions of three parties, namely clients, contractors and consultants; the analysis revealed that clients, contractors and consultants have similar perceptions of the five quality attributes, leadership, people and policy and strategy, partnership and resources and process.
- The model outcome on the rank of quality factors as a strategic tool to identify potential causes and effects. It will accelerate and improve construction quality if its possible effects are correctly identified and understood.
- Because the data used to develop the model was current, the results will provide clients, consultants, and contractors with awareness in updating their understanding of the critical factors affecting project quality in dealing with recent construction Projects from public universities.
- The model results can also inform new company policies to improve construction workers' and engineers' skills to find the best solutions for potential challenges in project quality, particularly long-term effects.

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