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Critical Aspects Influencing the Construction Projects' Performance in Rwanda, A Case of Rubavu Modern Market

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Abstract: Different examples explain challenges faced by construction projects in Rwanda along with their development also known to cause projects' low quality and overruns. This study aimed at assessing the critical factors affecting the performance of construction projects in Rwanda considering the case of Rubavu Modern market. A cross sectional research design (a non-experimental descriptive survey)considered both the stratified and simple random sampling techniques was applied to sample the targeted populationincluding engineers, consultants, project planners' team and contractors among others. Pre-tested, structured questionnaire were used for data collection and distributed among the target population. These quantitative data were analyzed using the univariate and bivariate analyses in the statistical package for social sciences (SPSS V.20). The results exhibited a positive and a very high correlation between consultants, designer's factors and construction project of the Rubavu modern market construction project with a Pearson correlation equivalent to .658**. The results also revealed a very high correlation between contractors' factors and the Rubavu modern market construction project with a Pearson correlation equivalent to .839**. Furthermore, the findings confirmed a very strong correlation between technical equipment and material factors and construction project with a Pearson correlation equivalent to .777**. Lastly,findings confirmed the significant relationship between contract management factors and Rubavu modern market construction project with a Pearson correlation value equal to .571**. However, there is a need to strengthen construction and post-constructive phase in numerous trainings to the concern stakeholders in the project to avoid any risk of construction failure or delays. The stakeholders should have the duties like management skills in the site and use them effectively to reach on project goals.

Keywords: Construction projects, Modern market, Performance, Rwanda, Rubavu

I. Introduction

Construction has an important role in the economy of many countries and especially developing countries. The construction industry contributes to the Gross Domestic Product (GDP) and employment rate of many nations and for this reason it is considered as vital for the economic development of any nation (Oladinrin, Ogunsemi, & Aje, 2012). The construction industry became famous as one of the important industries throughout the globe, and it is one of the funders for a country's GDP. In the United State of America (USA), the engineering and construction (E&C) industry has had a robust year, where E&C firms have been positioned as active participants in commercial real estate's building which are smart, and connected future (Han & Michelle, 2018). In European countries like England, managers of construction projects are responsible to manage the risks, and generally representing contractors, and their contributions towards the successfulness of construction projects particularly during projects schedule and construction phase (Iqbal, Choudhry, Holschemacher, Ali, & Tamošaitienė, 2015). Timely completion of the projects is an indicator of performance of construction projects. However, a construction project is commonly said to be successful when it is completed on time, within budget, in accordance with specifications and to stakeholders' satisfaction and those are said indicators of performance of construction projects (Nguyen & Ogunlana, 2004). However, major critical factors affecting construction projects in developing countries of Africa were specifically caused by the lack of commitment in construction project performance, inefficient site management, poor site coordination, improper planning, lack of clarity in project scope, lack of communication between team members, and substandard contracts in various countries(Han & Michelle, 2018).

Some of the construction projects in African countries failed due to various issues and even some of those projects did not respect their scheduled duration (Memon, Abdul Rahman, & Aziz, 2011).

Over the past two decades, Rwanda has been one of the fastest growing economies in Africa(Behuria & Goodfellow, 2016)Between 2000 and 2017, the Rwandan economy grew by 7.8 per cent annually and GDP percapita growth rate was 7 per cent per annum.The construction sector plays an important role in Rwanda's economy both in its contributionto the national economy and employment creation. As one of the key sectors of the economy,data from the past five years shows that it contributes around 7 per cent to national GDP, and8 percent to national employment(Gahigi, 2017; Malunda & Serge, 2012). However,Rwanda has been challenged with various difficulties causing them not to meet project deadlines and consequentlylead to low quality and overruns(Amade, 2015; Amade, Ubani, Omajeh, & Njoku, 2015). The expenditure on development projects in Rwanda for year 2014-2015 is projected at 784.1 billion Rwandanfrancs (Rwf), which is equivalent to 44.7% of total budget (Tuyishime, 2020). Most construction projects in Rwanda experience cost variations and completion delay problem that affect its performance. For instance, the Kigali Convention Centre has been under construction for 6 years while the contract period was less than three years. The Auditor general's annual report highlights delays and cost overruns in Bushenge hospital and wasteful expenditure in the proposed King Faisal expansion project, Kibuye Hospital in Karongi District among others(Gitau, 2015).

Beside delays in completing the construction of major hospitals, other infrastructure that are seen to be impeded by multiple factors include modern markets. This study extends to the modern market of Rubavu district which has stalled for 11 years due to sustained disputes between the district and investors leading to the agreement termination. The construction of Rubavu modern market is a single posture with a construction period set to be completed within three years but the project has not been handed over to the use of beneficiaries hitherto. Owing to this, this study sought to assess the critical factors affecting the performance of construction projects in Rwanda taking the Rubavu modern market as case study. The objectives of this study are to:(1) assess the effect of consultants and designer's factors on performance of Rubavu modern market construction project; (2) evaluate the effect of contractor's factors on performance of Rubavu modern market construction project, (3) examine the effect of technical equipment and materials factors on performance of Rubavu modern market construction project; and (4) scrutinize the effect of the contract management on the performance of Rubavu modern market construction project of in the Western province of Rwanda.

II. Methodology

2.1 Data and processing

A non-experimental study design was adopted to assess the critical factors affecting construction projects in Rwanda where both qualitative and quantitative approacheswere used to collect data to support statistic data from questionnaire (Blundell & Costa Dias, 2000). The coefficient of determination was used to highlight the relationship between the variables under study. Questionnaires were distributed among 134 staffs from the team management of construction project of Rubavu modern market construction project sampled from 202 people involved in the project. The sample was computed using the Taro Yamane's formula of sampling (equation 1)considering amargin error of 5% and confidentiality level of 95%. Thestratified samplingwas used to sample concern categories from the project to eliminate bias since each member of the total population had an equal chance or probability of being selected.The random sampling technique was adopted to select respondents from each stratumnamed concerned categories considering equation 2. The categories included engineers (25 staffs); consultants, architect and designer's unit (15 staffs); project planners' team (28 staffs); finance and accounting unit (9 staffs); procurement unit (7 staffs); logistic and storekeepers' unit (9 staffs); contractors (4 staffs); technicians (65 staffs); directors and HR (6 staffs), project manager and assistants (4 staffs), follow up committees and monitoring team and other related management team (30 staffs).

$$n = \frac{N}{1 + [N * (e)^2]} \rightarrow n = \frac{202}{1 + [202 * (0.05)^2]} = 134 \quad ---------- (1)$$

Where **n =** sample size **N=** population **e =** margin error

$$Sample = \frac{S * n}{T} \quad ---------- (2)$$

Where **S**=concern category **n**= sample size **T**= total population size

Each questionnaire was comprised of both open and closed ended questions and was preferred because of its convenience to the respondents to be free to answer questions according to their time availability. The structured

questionnaire was designed through five Likert- scales, where 1=Strongly Disagree; 2= Disagree; 3= Neutral; 4= Agree; 5= Strongly Agree.

2.2 Validity of instrument

Research validity was based on accuracy of data collection instruments. In this study, validity ensured some adjustments that was made after collecting needed information. The researcher also constructed validity by using confirmation factor analysis (CFA) and this was to determine the covariance between the main construct and the items. The questionnaire was given to the supervisor and other lecturers to evaluate if it can give relevant information.

2.3 Reliability of Instrument

For this study, questionnaire was given to different groups of respondents two different times to check if they give the same view in terms of responses. Here, the researcher pre-tested the respondents using the test of Cronbach's Alpha of 0.70 (Table 1).

Table 1. Legend Cronbach's Test of Reliability

Cronbach's Alpha	**Internal consistency**
$\alpha \geq 0.9$	Excellent
$0.8 \leq \alpha < 0.9$	Good
$0.7 \leq \alpha < 0.8$	Acceptable (Surveys)
$0.6 \leq \alpha < 0.7$	Questionable
$0.5 \leq \alpha < 0.6$	Poor
$\alpha < 0.5$	Unacceptable

2.4 Data Analysis and presentation

Apart from data processing which concerned of putting the responses into meaningful categories, the datawere first edited, coded, recorded, classified and tabulated.SPSS IBM V. 20.0 software was used to analyze the data of this research.Thelatter was used to describe frequency and percentages. Moreover, the multiple regression models were formulated to assess the critical factors for each indicator of performance of construction projectsitself.

The models were as follows:

$$y = \beta 0 + \beta 1xi1 + \beta 2xi2 + \cdots + \beta pxip + \varepsilon \quad (3)$$

Where:

Y is the predicted value, $\beta 0$ is the y- intercept, β1 and β2 are the regression coefficients representing the change in y relative to a one-unit change in xi1 and xi2, respectively; βp is the slope coefficient for each independent variable; ϵ is the model's random error (residual) term.

X is theindependent variable, CF stands for critical factors**,** which has four indicators namely x1 representingthe consultant and designer factors, x2 for the contractors' factors, x3 for the technical equipmentand material factors, x4 for the contract management, and Yspecifying the dependent variable (performance of Rubavu construction).

Based on these functional relationships followed econometric models have been formulated using multiple regression or polynomial models.

III. Results

Respondents are very much linked to construction in order to reply to the questionnaire, and the majority of the respondents are experienced in providing useful data on variables impacting construction performance. One to two construction projects are completed by the owner staffs and contractors as indicated by 61.2% and 64.9%, respectively. This was an excellent opportunity to obtain pertinent information on factors influencing construction progress in the Rubavu modern market construction project.

3.1Characteristics of respondents

The table indicated that 69.4% of owners' employees have up to 5 years of building project experience, while 76.1% of contractors' personnel have the same amount of experience (Table 2), which is extremely perfect for obtaining appropriate information in the Rubavu modern market construction project.

Table 2. Characteristics of respondents

The influence of consultants and designer's factors	SA		A		N		D		SD	
	fi	%	fi	%	fi	%	fi	%	fi	%
Consultant and designers experience.	51	38.1	42	31.3	12	9.0	16	11.9	13	9.7
Conflicts between consultant and design engineer.	67	50.0	27	20.1	19	14.2	15	11.2	6	4.5
Major changes approval delays by consultant and designers	62	46.3	34	25.4	13	9.7	19	14.2	6	4.5
Changes in government regulations and laws.	70	52.2	40	29.9	11	8.2	7	5.2	6	4.5
Delay in progress payments.	63	47.0	40	29.9	11	8.2	8	6.0	12	9.0

3.2 The effects of consultants and designer's factors on performance of construction project of Rubavu modern market

According to the researcher, the following factors have an impact on the construction of the Rubavu modern market in Western Province: a lack of experience among consultants and designers; disagreements with the design engineer; delays in the consultant's approval of significant changes; and change to governmental rules and regulations.

Table 3. Perception of respondents on the effect of consultants and designers' factors on the performance of construction project of Rubavu modern market

Description	Owner		Contractor	
	Respondents	%	Respondents	%
Job title of the respondent				
Project Manager	10	7.5	25	18.7
Site Engineer	15	11.2	30	22.4
Owner	0	0	28	20.9
Office Engineer	4	3	12	9
Others	105	78.4	39	29.1
Total	134	100	134	100
Years of experience of the respondents				
0 to 5	93	69.4	102	76.1
6 to 10	24	17.9	24	17.9
11 to 15	10	7.5	5	3.7
Above 15	7	5.2	3	2.2
Total	134	100	134	100
Number of executed projects				
1 to 2	82	61.2	87	64.9
3 to 5	32	23.9	30	22.4
More than 5	20	14.9	17	12.7

fi indicates frequency, % refers to percentage, **SA**: Strongly Agree; **A**: Agree; **N:** Neutral**; D**: Disagree; and **SD:** Strongly Disagree.

The findings on respondents' perceptions of the effect of consultants and designers' factors on the performance of Rubavu modern market construction project stated that the experience of consultant and designers has affected the successful completion of Rubavu modern market as strongly agreed and agreed by 38.1% and 31.3% of respondents, respectively (Table 3). Conflicts between consultants and design engineers hampered the Rubavu modern market

construction projectas 50.0% and 20.1% of respondents strongly agreed and agreed respectively while 5.2% and 4.5% of respondents strongly disagreed and disagreed respectively(Table 3)

3.3 The effect of contractor's factors affecting the performance of construction project of Rubavu modern market

Discernment of respondents regarding the influence of contractors on the performance of construction project of Rubavu modern market include contractor's policies; unreliable subcontractors; and construction methods as detailed in table 4.

Table 4.Perception of respondents on the effect of contractors on the performance of construction project of Rubavu modern market

The effect of contractors on construction project	SA		A		N		D		SD	
	fi	%	fi	%	fi	%	fi	%	fi	%
Contractor's policies	54	40.3	60	44.8	7	5.2	8	6.0	5	3.7
Unreliable subcontractors	55	41.0	48	35.8	7	5.2	13	9.7	11	8.2
Construction methods	50	37.3	43	32.1	13	9.7	16	11.9	12	9.0

fi imply frequency, % refers to percentage, **SA**: Strongly Agree; **A**: Agree; **N:** Neutral**; D**: Disagree; and **SD:** Strongly Disagree.

The results indicated that contractor's policies affect the construction project in the Rubavu modern market as confirmed by 40.3% and 44.8% of respondents that respectively strongly agreed and agreed while 5% and 3.7% of respondents strongly disagreed and disagreed respectively that contractor's factors didn't have any effect on the Rubavu modern market construction project (Table 4).

3.4 The role of technical equipment and materials on the performance of construction project of Rubavu modern market

Acuity of respondents on the role of technical equipment and materials affecting performance of construction project of Rubavu modern market is inveterate by equipment allocation problem; frequent equipment breakdowns; improper equipment; inadequate modern equipment; shortage of equipment; delay in manufacturing materials; damage of sorted materials; escalation of material prices; late delivery of materials; and procurement of construction materials having effects on the construction project of Rubavu modern market.

Table 5. Perception of respondents ontherole of technical equipment and materials affecting performance of construction project of Rubavu modern market in western Province

Role of technical equipment and materials on construction project	SA		A		N		D		SD	
	fi	%	fi	%	fi	%	fi	%	fi	%
Equipment allocation problem,	96	71.6	32	23.9	0	0.0	6	4.5	0	0.0
Frequent equipment breakdowns	65	48.5	55	41.0	0	0.0	7	5.2	7	5.2
Improper equipment.	49	36.6	60	44.8	6	4.5	15	11.2	4	3.0
Inadequate modern equipment.	74	55.2	53	39.6	0	0.0	0	0.0	7	5.2
Shortage of equipment.	73	54.5	47	35.1	0	0.0	7	5.2	7	5.2
Delay in manufacturing materials.	57	42.5	45	32.6	13	9.7	12	9.0	7	5.2
Damage of sorted materials.	58	43.3	47	35.1	4	3.0	11	8.2	14	10.4
Escalation of material prices.	70	52.2	44	32.8	0	0.0	6	4.5	14	10.4
Late delivery of materials.	79	59.0	55	41.0	0	0.0	0	0.0	0	0.0
Procurement of construction materials.	68	50.7	42	31.3	12	9.0	7	5.2	5	3.7

Findings showedthat the equipment allocation problem had an effect on the performance of construction project as confirmed by 71.6% and 23.9% of respondents who strongly agreed and agreed respectively. Furthermore, procurement

of construction materials didn'taffect the performance theconstruction project of the Rubavu modern market as stated by 5.2% and 3.7% of respondents who strongly disagreed and disagreed respectively.(Table 5).

3.5 The effect of the contract management on the performance of Rubavu modern market construction project of in Western province

Respondents' perception confirmed that contract management influenced the performance of the Rubavu modern market construction project, which included the communication system among project participants, contract type, contract duration, finance, control mechanism of project activities, and manager's skills.

Table 6. Perception of respondents on the effect of contract management on the performance of construction project of Rubavu modern market in Western province

	SA		A		N		D		SD	
The role of contract management factors	**fi**	**%**	**fi**	**%**	**fi**	**%**	**fi**	**%**	**fi**	**%**
Communication system among project participants	76	56.7	22	16.4	6	4.5	18	13.7	12	9.0
Contract type	78	58.2	23	17.2	0	0.0	23	17.2	10	7.5
Contract duration	12	9.0	11	8.2	7	5.2	50	37.3	54	40.3
Finance	121	90.3	9	6.7	0	0.0	0	0.0	4	3.0
Control mechanism of the project's activities	59	44	44	32.8	29	21.6	0	0	2	1.5
Managers skill	65	48.5	39	28.1	13	9.7	10	7.5	7	5.2
Respect of the contract closes	80	59.7	54	40.3	0	0.0	0	0.0	0	0.0

Resultsrevealed that 90.3% and 6.7% of respondents respectively, stronglyagreed and agreed (Table6)that the disrespect of contract closes affected the performance of the Rubavu modern market building projectwhile 3% only among respondents disagreed that the Finance had an effect on the performance of the Rubavu modern market project (Table6).

3.6 The indicators of performance or failure of construction project completion in Rwanda

Regardless of whether we are assessing construction project success or failure, we must emphasize concrete results, which are specifically defined as successful when assessed against declared goals, objectives, and indicators throughout project design. Project management success is assessed against traditional performance indicators such as project completion within schedule, cost, budget, scope, and quality. As a result, judgments verified that cost overruns, project length, quality performance, beneficiary satisfaction, utilization of funds/budget, and attainment of project goals were markers of Rubavu modern market building success or failure.

3.6.1 Thecost overruns of project construction

Answers on the perception of respondents specified that cost overruns considered by the costs of project arisen from variations in inception to completion; modification during construction period; cost arising from the legal claims; and project was over budget during the construction of Rubavu modern market.

Table 7.Opinion of respondents on the cost overruns of Rubavu modern market construction in Western province

The cost overruns of Rubavu modern market	SA		A		N		D		SD	
	fi	%	fi	%	fi	%	fi	%	fi	%
Costs of project arise from variations in inception;	74	55.2	27	20.1	12	9.0	15	11.2	6	4.5
Modification during construction period;	69	51.5	38	28.4	12	9.0	8	6.0	7	5.2
Cost arising from the legal claims;	56	41.8	39	29.1	19	14.2	6	4.5	14	10.4
Project is over budget.	68	50.7	47	35.1	6	4.5	0	0.0	13	9.7

The findings in table 7 demonstrated the respondents' perceptionof cost overruns of the Rubavu modern market construction project confirmed that the cost of the project arising from variations in inception affected the project as stated by 55.2% and 20.1% of respondents that strongly agreed and agreed respectively (Table 7).Besides, 4.5 % and 10.4% of respondents argued respectively by strongly disagreed and disagreed that the cost arising from legal claims (Table 7).

3.6.2 The length of project or time performance of Rubavu market construction

Findings confirmed that the length of project or time performance of Rubavu modern market construction was determined by the long timely-delivery of project; delays of site works' commencement to the completion; delays of handover of a building to the clients; and delays of construction time of a building as planned.

Table 8. Opinion of respondents onlength of project or time performance of Rubavu modern market construction in Western province

Length of project or time performance	SA		A		N		D		SD	
	fi	%	fi	%	fi	%	fi	%	fi	%
Long timely delivery of project.	68	50.7	55	41.5	0	0.0	6	4.5	5	3.7
Delays of commencement of site works to the completion.	63	47.0	54	40.3	7	5.2	0	0.0	10	7.5
Delays of handover of a building to the clients.	93	69.4	40	29.9	1	0.7	0	0.0	0	0.0
Delays of construction time of a building as planned.	80	59.7	52	38.8	2	1.5	0	0.0	0	0.0

Findings revealed 69.4% and 29.9% of respondents strongly agreed and agreed respectively that that the delays in starting the work at siteaffecting the length of project or time performance of Rubavu modern market construction while 7.5% strongly disagreed that the delays in starting the work at site affecting the length of project or time performance of Rubavu modern market construction(Table 8).

3.6.3 The quality performance of Rubavu modern market construction in Western province

The failure to obtain quality performance of Rubavu modern market construction in Western province was rooted in the fact that the project did not meet the totality of features required by a product or service to satisfy a given need; low quality that meet the purpose of project; low meeting with owner's quality expectations; and misunderstanding in all parties of the project to acquire expectations.

Table 9. Opinion of respondents on failure of Quality performance of Rubavu modern market construction

Quality performance of Rubavu modern market construction	SA		A		N		D		SD	
	fi	%	fi	%	fi	%	fi	%	fi	%
No meet with totality of features required by a product or services to satisfy a given need.	50	37.3	42	31.3	12	9.0	18	13.4	12	9.0
Low quality that fitness for purpose of project.	55	41.0	53	39.6	11	8.2	6	4.5	9	6.7
Low meeting with owner's quality expectations.	67	50.0	49	36.6	6	4.5	5	3.7	7	5.2
Misunderstanding in all parties of project to acquire expectations.	83	61.9	51	38.1	0	0.0	0	0.0	0	0.0

On this part, findings revealed the misunderstanding in all parties of project to acquire expectations as stated by 61.9% and 38.1% of respondents that strongly agreed and agreed respectively that the misunderstanding in all parties affected the project(Table 9) and 3.7% and 5.3% of respondents disagreed and strongly disagreed respectively that the no meeting with totality of features required by a product to satisfy a given affected the construction project of the Rubavu modern(Table 9).

3.6.4 The failure to meet with beneficiaries' satisfaction of Rubavu modern market construction

Verdicts on the beneficiaries' satisfaction with Rubavu modern market construction was confirmed by the dissatisfaction widely experienced by construction project clients; attributable to project cost overruns, project delays, inferior quality, and incompetent service providers.

Table 10.Opinion of respondents on failure to meet with beneficiaries' satisfaction in Western province

Failure to meet with beneficiaries' satisfaction	SA		A		N		D		SD	
	fi	%	fi	%	fi	%	fi	%	fi	%
Dissatisfaction is widely experienced by clients of construction project;	49	38.6	42	31.3	31	23.1	12	9.0	0	0
Attributable to overrunning project cost;	55	41.0	42	31.3	12	9.0	12	9.0	13	9.7
Delayed of project completion;	91	67.9	34	25.4	0	0.0	3	2.2	6	4.5
Inferior quality and incompetent service providers.	68	50.7	48	35.8	7	5.2	6	4.5	5	3.7

Results showedthat there is dissatisfaction which is widely experienced by clients of the construction projects, as strongly agreed by 38.6% and agreed aby 31.3% of respondents (Table 10). Moreover, 67.9% and 25.4% of respondents strongly agreed and agreed respectively that the delay of project completionimpeded with the beneficiaries 'pleasure with Rubavu modern market(Table 10).

3.6.5 The use of funds/budget, health and safety of Rubavu modern market construction in Western province

According to respondents' perceptions, the use of funds/budget, health and safety of Rubavu modern market construction in Western province was characterized by accidents occurring during the project implementation stage; the presence of hazardous activities; people being disabled by injuries in construction accidents; no single reliable measure of health and safety performance; and the absence of control health and safety risks.

Table 11.Opinion of respondents onthe use of funds/budget and health and safety of Rubavu modern market construction in Western province

The use of funds/budget and health and safety of project construction	SA		A		N		D		SD	
	fi	%	fi	%	fi	%	fi	%	fi	%
Accidents occur during project implementation stage;	67	50.0	49	36.6	6	4.5	6	4.5	6	4.5
Presence of hazardous activities;	68	50.7	36	26.9	12	9.0	18	13.4	0	0.0
People are disabled with injuries in construction's accident.	67	50.0	61	45.5	0	0.0	6	4.5	0	0.0
No single reliable measure of health and safety performance;	74	55.2	42	31.3	0	0.0	11	8.2	7	5.2
Absence of control health and safety risks.	62	46.3	48	35.8	7	5.2	10	7.5	7	5.2

Findings show respondents' opinions on the use of funds/budget, health and safety of Rubavu modern market construction that accidents occurred during project's implementation stage affected the project as respondents strongly agreed and agreed respectively by 50% and 36.6% of (Table 11).Furthermore, 7.5% and 5.2% of respondents disagreed and strongly disagreed that absence of health control and safety didn't affect the performance of the Rubavu modern market construction.

3.6.6 The failure to achieve the goals of Rubavu modern market construction

Findings exhibited that the failure to achieve goals of Rubavu modern market construction was characterized by how the project was not completed and delivered to service far along; inappropriate financial and technical aspects implemented; technical specifications are not totally considered; and less achievement of fitness for purpose objective.

Table 12. Opinion of respondents on failure to achieve goals of Rubavu modern market construction

Failure to achievement of goals of project construction	SA		A		N		D		SD	
	fi	%	fi	%	fi	%	fi	%	fi	%
Project is not finished and delivered to service far along;	49	36.6	42	31.3	12	9.0	19	14.2	12	9.0
Unappropriated financial and technical aspects implemented;	66	49.3	54	40.3	0	0.0	7	5.2	7	5.2
Technical specifications are not totally considered;	74	55.2	36	26.9	18	13.4	0	0.0	6	4.5
Less achievement of fitness for purpose objective.	68	50.7	54	40.3	10	7.5	2	1.5	0	0.0

Findings showed thatthe less attainment of fitness for purpose target was respectively strongly agreed and agreed by 50.7% and 40.3% by 91% of respondents to affect the performance of the Rubavu modern market project (Table 12). Besides, 14.2% and 9% of respondents disagreed and strongly disagreed that the project to not finish and delivered to service far along affected theRubavu modern market project. (Table 12)

3.7 Correlation Matrix

Each cell in the table represents the relationship between two variables. A correlation matrix can be used to summarize data, as an input for a more advanced study, or as a diagnostic for further studies.

Table 13.Correlations Matrix

Correlations						
		Consultants & Designer's factor	Contractor's factors	Technical material & Equipment factors	Contract management	Construction performance
Consultants & Designer's factor	Pearson Correlation	1	.573**	.553**	.389**	.658**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	134	134	134	134	134
Contractor's factors	Pearson Correlation	.573**	1	.524**	.437**	.839**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	134	134	134	134	134
Technical material & Equipment factors	Pearson Correlation	.553**	.524**	1	.724**	.777**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	134	134	134	134	134
Contract management	Pearson Correlation	.389**	.437**	.724**	1	.571**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	134	134	134	134	134
Construction performance	Pearson Correlation	**.658****	**.839****	**.777****	**.571****	**1**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	134	134	134	134	134

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

According to the results of the above correlation matrix table, there is a strong positive correlation between consultants and designers' factors and the performance of the Rubavu modern market construction project, with a Pearson correlation of **.658****and a p-value of 0.000 (Table 13), which is less than the standard significance levels of 0.01. This suggests that, among the other examined elements impacting the Rubavu modern market construction project, only consultants and designers had a substantial impact on the project.

There is a very strong positive connection between contractors' variables and construction projects, as Pearson correlation is. **839**.** The p-value is 0.000, which is less than the conventional level of significance of 0.01(Table 13). This implies that, among the other essential elements influencing the execution of a construction project, only contractors' factors obligated a substantial association with the Rubavu modern market building project in Western Province.

Additionally, the findings revealed that there is a substantial association between the technical equipment and material elements and building projects, with a Pearson correlation equivalent to**777****and a p-value of 0.000, which is less than the conventional level of significance of 0.01(Table 13). This means that, of the other elements studied, only technical equipment and material considerations had a substantial association with the building project. The researcher confirmed a correlation between contract management and building projects in this study. Because the Pearson correlation value was .571**(Table 13), the researcher established aweak positive association between contract management and construction projects.

3.8 Regression Analysis Test

This study hypothesized that there is no significant relationship between the consultants and designer's factors on the performance of construction project of Rubavumodern market where findings through the ANOVA showed a p-value of 0.000, which is less than the conventional significance limits of 0.05 and 0.001. Hence, followed the alternative hypothesis that the independent variable significantly affected the performance of Rubavu modern market construction projects in Western province.

However, R-square value was measured to indicate the proportion of Rubavu modern market building projects (dependent variable) and showed tobe not much explained by the consultants and designers (independent variable). The independent variable even though significant, is not accounting for much of the mean of the dependent variable. This implies that the model is somewhat low. The modified R-square is used to account for extra variables in the model. Further, the regression equation revealed that the success of the Rubavu modern market building project is always dependent on a constant factor of 1.007, independent of the presence of other essential elements. The other variables explain why every unit change in consultants and designers influenced the Rubavu modern market construction project by a factor of 0.392.

Moreover, the study also hypothesized no significant relationship between the contractor's factors on performance of construction project of Rubavu modern market where the ANOVA revealed a p-value of 0.000, which is less than the conventional significance values of 0.05 and 0.001. With this, the study rejected the null hypothesis, that no significant relationship between contractors' factors and the performance of Rubavu modern market construction projects was found, and was instead driven by the alternative hypothesis, which stated that the independent variable represented by contractors' factors affects the performance of Rubavu modern market construction projects. Findings alsorevealed that the value of R-square in this study is 70.4%, which implies the performance of the Rubavu modern market building project (dependent variable) is strongly explained by the independent variables (contractor's factors). This implies that the model is good because the independent variable described the dependent variable well. The modified R-square is used to account for extra variables in the model. The corrected R-square in this situation is similarly 70.4%. The regression equation revealed that the success of Rubavu modern market building projects was always dependent on a constant factor of 1.168, independent of the presence of other essential elements. The remaining variables illustrate how every unit change in contractor parameters influenced the performance of the Rubavu modern market building project by a factor of 0.306.

Moreover, the study also hypothesized that technical equipment and materials factors don't have any significant relationship with the performance of construction project of Rubavu modern market where results revealed an ANOVA with a p-value of 0.000, which is less than the conventional significance limits of 0.05 and 0.001. This rejected the null hypothesis, that technical equipment and materials played no significant role in the performance of the Rubavu modern market construction project, and pursued the alternative hypothesis, which stated that the independent variable affected the performance of the Rubavu modern market construction project. Also, the value of R-square in this study is 60.4%, which implies that the performance of Rubavu modern market building projects (dependent variable) is described by the independent variables (technical equipment and material elements). This shows that the model is strong since the independent variable explains the dependent variable very well. The modified R-square is used to account for extra

variables in the model. The corrected R-square in this situation is similarly 60.4%.The regression equation revealed that the success of Rubavu modern market building projects was always determined by a constant factor of 0.798, independent of the presence of other drivers. The remaining variables revealed how every unit increase in technical equipment and material elements influenced the performance of the Rubavu modern market building project by a ratio of 0.567.

Lastly, the study also revealed no significant relationship between the contract management factors and the performance of construction project of Rubavu modern market where the ANOVA showed a p-value of 0.000, a value less than the conventional significance values of 0.05 and 0.001. This signifies that the researcher rejected the null hypothesis and accepted the alternative hypothesis, which indicated that the independent variable influenced the performance of the Rubavu modern market building project. Results showed that the R-square value in this study was of 32.6%, indicating that the proportion of performance of Rubavu modern market building project (dependent variable) is explained by the independent variables (contract management elements) at the mentioned percentage. As the independent variable explains the dependent variable, this suggests that the model is extremely low. The modified R-square is used to account for extra variables in the model. The regression equation further revealed that the success of Rubavu modern market building projects was always dependent on a constant factor of 0.990, independent of the presence of other factors. The remaining variables illustrate how every unit change in contract management elements influenced the performance of the Rubavu modern market building project by a factor of 0.397.

3.9 Combined regression test analysis

Findings showedthat the R-square of all combined values in this study is .868 or 86.8%, indicating that the proportion of performance of Rubavu modern market project (dependent variables) is explained by the independent variables (Consultant & Designer's, Contractors, equipment & materials, Contract management) which indicated that all data fit the model since the value is strongly high. As the independent variables explains the dependent variables, this suggests that the model is extremely high. The modified R-square is used to account for extra variables in the model.

However, the ANOVAexhibited a p-value of 0.000, which is less than the conventional significance values of 0.05 and 0.001. This led the researcher to reject all null hypothesis and accepted the alternatives hypothesis, which indicate that the independent variables strongly influenced the performance of the Rubavu modern market construction project. The analysis alsorevealed a F value of 211.7 meaningthat there was a statistically significant difference between the means of variables.

As described from the above findings, all independent variables have statistically significant relationship with the dependent variable since their p-value is below the alpha level (0.05). Considering the standardized beta coefficients, the strongest predictor of the dependent variable (performance of construction project of Rubavu modern market) is contractors related factors with 0.560 value. The regression analysis support that all excepted contract management relationship factors groups were positively related to performance of construction project in the same direction. The standard beta coefficients (β) gave a measure of the contribution of each variable to the dependent variables. A large value indicated that a unit change in this independent variable has a large effect on the dependent variable.

1. Discussion of Results

The new millennium brought with it a slew of obstacles that muddled the performance of construction projects around the world, including Rwanda. Our findings revealed that designers and consultants influenced the performance of the Rubavu modern market by 65.8%. This is consistent with (Omar & Mahdjoubi, 2022)'s findings that initiatives including consultants and designers, if done poorly, have a negative impact on the project's performance. According to the regression results, there was a positive association between Rubavu modern market building, consultants, and design-related elements. A 1-unit increase in consultants and design-related elements can improve the performance of the Rubavu modern market building project by 65.8%. This is consistent with the findings of (Gokpinar, Hopp, & Iravani, 2010)and(Noble & Kumar, 2010)who discovered in their separate research that raising the consultants-related parameters had a good influence on construction performance.

The second variable under investigation was contractor-related characteristics, which, according to the regression results, have a positive link with Rubavu modern market building performance. A one-unit increase in this variable can result in an 83.9% increase in Rubavu modern market construction performance. These thoughts were echoed in the study of(Dissanayaka & Kumaraswamy, 1999), who discovered that the contractor's associated elements might make a major contribution to project success.This is consistent with the findings of(Kassem, Khoiry, & Hamzah, 2020), who discovered that increasing contractor-related characteristics had a beneficial influence on construction performance in their respective research. They stated that strong expertise and credentials of individuals participating in a construction project will help project parties achieve their project goals professionally, resulting in superior project performance in

terms of quality, time, cost, productivity, and safety which were also reported by (A. P. Chan & Chan, 2004)in line with the findings from this study where the authors reported that construction planning is a critical factor in project success. Technical and material-related parameters, on the other hand, had a positive link with Rubavu modern market construction performance with a magnitude of 1unit intensification in improvement of such elements, which may cause up to 77.7% increase in construction performance. This conclusion increased in tandem with that of (Alhajri & Alshibani, 2018)who remarked on their separate findings that the materials factors might be hampered by the selection of the most appropriate equipment and materials, operator's factors, unskilled labor, and poor raw material quality. These variables must be considered in order to avoid problems throughout the construction project process. Furthermore, (Doloi, Sawhney, Iyer, & Rentala, 2012)revealed that material resources that were not properly matched to the building project contributed considerably to poor project performance.

In terms of contract management, replies from respondents indicated that there is a favorable association between contract management and construction performance. As a result, in order to meet the expected time, budget, and quality of the construction project, stakeholders must devote all of their efforts to contract management in order to respond to the evidence shown by the regression analysis that only a 1-unit increment in improvement of contract management related factors can cause a 76% increase in construction performance in the Rubavu modern market. The findings of this goal corroborate the findings of(W. K. Chan, Suhaiza, & Yudi, 2009), who investigated elements influencing the success of a construction project and identified contractors as one of the critical components to project success.

IV. Conclusion

This study assessed the critical factors in the performance of construction projects in Rwanda taking in consideration the case of Rubavu Modern market.The results revealed a substantial connection between consultants and designers' variables and the success of the Rubavu modern market building project, with a Pearson correlation of.658** and a p-value of 0.000, which was less than the normal significance threshold of 0.01. This suggests that, among the other elements studied, consultants and designers have a substantial impact on the performance of the Rubavu modern market building project in Western Province. The results once again have shown that there is a very strong connection between contractors' characteristics and construction project performance, with a Pearson correlation of.839** and a p-value of 0.000, which is less than the conventional level of significance of 0.01. This suggested that, of the other essential elements influencing construction project success, Only the contractors' criteria have a substantial association with the performance of the Rubavu modern market building project in Western Province.

The findings demonstrated a substantial association between technical equipment and material parameters and construction project performance, as measured by Pearson correlation. 777**. The p-value is 0.000, which is less than the conventional level of significance of 0.01. This demonstrated that, among the other elements evaluated impacting building projects, only technical equipment and material considerations had a substantial link with Rubavu modern market construction projects. The Pearson correlation value was.571**, which is substantial, and the researcher demonstrated that there is a strong and favorable association between contract management and Rubavu modern market building projects.

Based on the findings of this investigation, the study's problem was addressed, the research objectives were met, research questions were re-joined, and research hypotheses were proven. As a consequence, the findings confirmed that there were several crucial elements impacting the performance of the Rubavu modern market building project in Western Province, including consultants and designers, contractors, technical equipment and supplies, and contract administration and thus the researcher recommended to consultants to be more concerned with design cost by doing multi-criteria analysis and selecting the most cost-effective criterion to enhance their performance and raise owner satisfaction as well as to construction companies to review projects as they progress through construction in order to increase and improve project time and cost performance and Furthermore, it is suggested that the most relevant elements be studied and evaluated as a case study of construction projects in Rwanda for future researchers.

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Conflict of interest

The authors declare no existing competing financial interests or any conflict that could have appeared to influence this publication.

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