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Determinants of Efficiency in the Construction Industry in Kigali City, Rwanda

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Abstract

This paper aims at highlighting the main factors affecting efficiency in the construction industry in Kigali, Rwanda. This is because the contribution of the construction industry in growth and development is widely recognized. The desire to maximize returns from sector has thus forced stakeholders to identify ways of reducing wastage and ensure optimal utilization of key re-sources like finance, human resource and time among others. This paper uses selected high rise building projects in Kigali city explain the main forces influencing efficiency in a country like Rwanda. The study adopted a descriptive method that involved administration of question-naires, observations and document reviews. In the end, the study concluded that five factors ex-plain construction projects time overruns and thus inefficiency. The factors were identified in order of significance as follows: i) variations and design changes during project execution period, ii) late payment to the contractor; iii) slow decision making, iv) delays in delivery of build-ing materials; and financial challenges by the building contractors. In the end, the study rec-ommended among others that efficiency in the construction industry would require adequate preparation including risk analysis, understanding the local conditions and that for more gener-alization of the results there would be need for similar studies covering other parts of Rwanda.

Keywords: Construction industry, Kigali, Rwanda, efficiency, performance

INTRODUCTION

Construction industry is key to the realization of a nation's desire for provision of physical infrastructure and social amenities (Knight Frank, 2017). This is more urgent in African countries especially Rwanda. Data from Rwanda Housing Authority (2015) and National Institute of Statistics of Rwanda (2012) indicate that despite the recent rise housing production, the housing deficit still remains. For instance, it was estimated that between the year 2012 and 2022, the demand for housing in Kigali was 186,163 housing units. When annual demand of 16,923 affordable housing units is added, the result confirms increasing gap in supply. The gap may attributed to several factors among them high cost of construction (Ibarinda and Obala, 2022).

There is consensus on the contribution of the construction industry to the growth and development of any country. For instance, Navon (2005) asserts that it contributes around 10% of the Gross National Product especially in developed economies. Olwale and Sung (2010) reinforces this argument by highlighting the fact that it contributes to increased employment opportunities and should be considered as a pillar of a country. Data from Rwanda Development Board (2015) confirms the critical role of the sector in the economy as the sector contributed over 7% of Gross Domestic Product in Rwanda. This coupled with the sector's strong backward and forward linkages makes it critical to socio-economic transformation of any country (Morris and Hough, 1988). Indeed, the sector's supply of space needed for production (manufacturing, retail, distribution and service delivery) is critical to economic development. The production of the facilities is however undertaken through complex arrangements involving large teams of experts, different parties from different sectors as clients, contractors, consultants, suppliers and regulators. The great achievement of a construction project is determined by its good performance, which is basically measured based on its completion within the planned period, within the allocated budget

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and required quality standards and customers satisfaction (Omran, 2012).

However, as Clough & Sears, (2005) the industry is one of the most turbulent and challenging industries in many countries. And in Rwanda despite good intentions, the construction industry has been unable to efficiently deliver and has continued to experience time and cost overruns. As Mehta et al.; (2022) argues the need for improvement in efficiency in the construction indus-try remains a pressing issue. This is particularly critical due to limited research on the phenom-enon despite its potential positive contributions for instance; increase in savings in resources. This paper highlights the challenge to achieving efficiency within the construction industry in Rwanda and attempts at improving our understanding of the interactions in the construction in-dustry. A better understanding of the concepts such efficiency, performance and the construc-tion industry is critical to the appreciation of issues affecting the sector.

THEORY

Efficiency as a concept lends itself to several meanings. For instance, in economic sense it re-fers to optimization of resources. Thus the market is seen to allocate a resource like to the high-est and best use. In the case of construction industry several scholars have been grasping with the concept. However, as Cordova and Alberto (2018) assert the beginning of the concept can be attributed to the works of Debreu (1951), Shepard (1953) and that of Farrell, (1957). How-ever, Farrell (1957) is credited with promotion of the concept as well as grounding it in the in-dustrial sector. In addition, his work influenced others and led to the development a mathemat-ical programming technique Data Envelopment Analysis (DEA) which as Cordova and Albert (2018) posit allows the construction of an envelopment surface that is efficient frontier or an empirical production function. In the end, efficiency is calculated in relation to the surface.

In the end, a firm is considered technically efficient if does not find another way of producing more with the same number or quantity of factors of production. And as Cordova and Alberto (2018) assert, efficiency should be seen as the relationship between the results obtained and the resources used that is input output relationship. Efficiency is to a great extent linked to perfor-mance of firm or a sector. Performance in construction industry is seen as undertaking a con-struction project according to plan and as Panneerrselvam and Sentilkumar (2010) assert it is looked at in terms of the end result with key indicators linked to desired state weighted against the actual outcome. Many authors have come to the conclusion that overall performance is as capable of comprehensively describing what construction is and how it works (Liu and Fellows, 1999). What this brings to focus is that performance is thus an indicator for measuring efficien-cy and effectiveness in the construction industry. As El-Mashaleh et al; (2007) assert evaluation of overall performance further helps in safeguarding overall firm efficiency. Thus performance measurement is central to determining efficiency and effectiveness of an action (Neely et al., 2007).

As Kasimu (2012) asserts that performance of a construction firm depend on the characteristics of the individual construction project. Kaniaru, 2014; Ugwu and Haupt (2007) all agree perfor-mance of a construction project are site and project specific. They argue that stakeholders for instance vary in terms of demands and satisfaction. As such, measurement of project perfor-mance requires a better understanding of the prevailing environment for instance; where are raw materials sourced from, who are the stakeholders, how about sources of funding for the project among others.

Kaniaru, (2014) and Tuyishime, (2019) both cite Ogunlana et al., (1996) assertion that perfor-mance problems in the construction industry in developing countries can be categorized into three as: i) problems of shortages or insufficient infrastructure mainly to be used for material and resource supply; ii) problems caused by clients and consultants and iii) problems caused by contractor incompetence/inadequacies and poor communication. This is contradicted by Navon's (2005) assertion that performance problems in construction industry can be classified into two namely: i) unrealistic target setting; and ii) causes originating from the actual construction.

Overall, there appears to consensus on main causes of inefficiency and poor performance in the construction industry. For instance,

Okuwoga, (1998), Long et al (2004), Samson and Lema (2002) all attribute poor performance to cost related issues, incompetence of designers and con-sultants, technological issues and complexity of projects among others. These arguments rein-forces Ogunlana et al; (1996) assertion on categorization of factors influencing performance in the sector. It should however be appreciated that the issues affecting performance are numerous and similar Kasimu, (2012), Kaniaru, (2014); Ugwu and Haupt (2007) and as they all agree the problems are largely context specific that is project complexity and site specific.

Poor performance of construction projects is attributed to diverse but similar factors for in-stance; a survey by Enhassi (2009) identified the causes of poor performance to include: delays due to materials shortage; resources unavailability, inappropriate leadership skills of the project, escalation of materials price; lack of highly experienced and qualified construction participants and poor quality of available equipment and raw materials among others. On the other hand, Dissanayaka and Kumaraswamy (1999), have attributed the problems to inappropriateness of the selected procurement system.

Thomas et al. (2002) established that main issues affecting performance include: i) relationship with clients, ii) financial stability, iii) health and safety, iv) progress of work, v) standard of quality, vi) availability of resources, vii) relationship with consultants, viii) management capa-bilities, ix) claim and contractual disputes, x) relationship with subcontractors, xi) reputation and amount of subcontracting. On the other hand, Chan and Kumaraswamy (2002) argue that time is main issue asserting that it is often considered as an important benchmarking for analyz-ing the performance of a project and the efficiency of the project organization. Cheung et al (2004) identified project performance categories such as people, cost, time, quality, safety and health, environment, client satisfaction, and communication.

Existing literature further highlights the relationships between key performance factors; for in-stance; Pheng and Chuan, (2006), Ugwu and Haupt (2007); Abdullah et al., (2009), Kaming et al. (1997), have variously asserted that there are links between human factors such as early stakeholder involvement and project performance on the one hand and time and costs overruns on the other hand as linked and influencing project performance. The linkage between time and cost overruns as critical in influencing project performance is summarized by Shen (1997) as-sertion that delays in completion of construction projects might be the main cause for the addi-tional cost and loss in financial return or other reimbursements from project.

RESEARCH METHODS

A descriptive case study approach was selected for the study. It involved collection of data through administration of questionnaires, observation and document reviews especially site meeting minutes and site diaries to establish main causes of extensions, variation orders and budget changes among others. This was to help better understand the main causes of delays and cost overrun. This approach was adopted as it considered foolproof (Harper, 1994). This cou-pled with literature was able to help develop a catalogue of factors construction efficiency. Like Mehta et al.; (2022) the literature review helped identify many factors that contributed to con-struction projects inefficiency. In addition, literature review helped in appreciating the con-struction industry in Rwanda especially its growth and development. In this respect it helped highlight the challenges it is facing but also its potential contribution to the economy.

Primary data was obtained from a randomly selected sample of representatives of the delayed high-rise building projects in Kigali City for the period 2014 to 2018. The period was consid-ered because it was possible to find those who were directly involved in the execution of pro-jects. Forty construction projects were selected after preliminary survey that established that they had experienced delays. In the end, primary data was collected from 160 respondents that were largely Architects, Project Managers, Engineers and Quantity Surveyors. In addition, liter-ature review was used to gather secondary information. The information mainly related project delays, costing and their causes. Data analysis was undertaken using SPSS version 22 for quantitative data while qualitative data was analysed through description of the case and themes. The study results were

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presented using pie-charts, graphs and tables.

RESULTS AND DISCUSSION

Status of the construction industry in Rwanda

The construction industry in Rwanda is seen to comprise the building, transport to contribute about a infrastructure, and civil engineering sectors.The sector is estimated half of non-agriculture employment. It provides the physical infrastructure that is key to the country's economic development while its activities create business opportunities for suppliers and manufacturers and at the same time, provides employment for professionals, semi and unskilled labor (Rwanda National constrution Policy, 2009). It is thus viewed as potentially key to economic growth (Rwanda Development Board, 2014). For instance, 44.7 % of the country's total budget in 2014 – 2015 fiscal year was spent in the sector (Ministry of Finance and Economic Planning, 2014). Evidence from government records indicate that the construction sector contributes positively to the GDP. It is estimated the construction sub-sector of the larger industrial sector contributes to the country's industrial sector by 52% followed by manufacturing, mining and quarrying, electrical and water with percentage of 43%, 3% and 2% respectively (National Industrial Policy, 2011). Despite the positive contribution to the economy, the sector is constrained by a number of challenges: i) insufficient project continuity; ii) insufficient access to finance and credit; iii) unfavorable conditions for accessing donor credit; and iv) lack of a database for per-formance indicators in the (Rwanda National constrution Policy, 2009). It has been observed that in general specific projects are affected by a number factors including: i) changing contrac-tors during project execution, and ii) change of original design. The East African Newspaper, (2015) reported that among the factors affecting performance of the sector in Rwanda were: i) poor communication; ii) incompetent participants, iii) importation of most of raw materials; and iv) poor economic conditions. Indeed, a study undertaken by Cytonn Real Estate (2018), rein-forced the argument that poor economic situation is impacting on the performance of the sector.

Construction Projects Performance

Results indicate a general doubt in projects being completed within schedule and budget. For instance, about 40 percent of the respondents felt that it was not likely for a project to be completed within the contract period, 31 percent of the indicated that it is less likely while 23 percent of the respondents thought that it is likely while only 6% were certain of completion within time **Figure 1**. Similarly, on completion within costs, about 39 per cent of the respondents felt that it was not likely for a project to be completed within the contract cost, 37% less likely. 15% of the respondents thought that it is likely while about 9% of the respondents agreed that it is very likely for a high rise building project to be completed within the contract cost **Figure 2.**

As depicted in **Figure 3**, 59% of the respondents saw time overruns as the factor that mostly affects the performance of construction projects. Another 30% felt that cost overrun is the leading factor, whereas 11% of the respondents felt that poor quality of work is the major factor affecting construction performance. The findings show that time overruns and cost overruns are the major factors affecting the performance of construction projects. It could be interpreted that less time is paid to project schedules in comparison to costs.

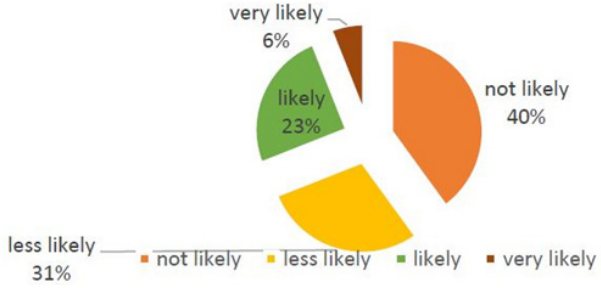

FIGURE 1
Likelihood of buildings completion in time
Source: Field survey 2019

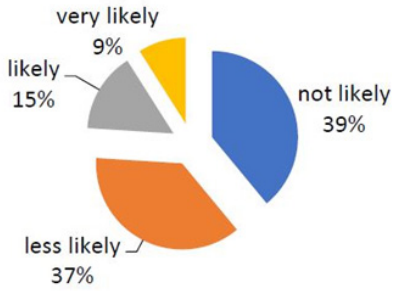

FIGURE 2
Likelihood of buildings completion within contract cost
Source: Field survey 2019

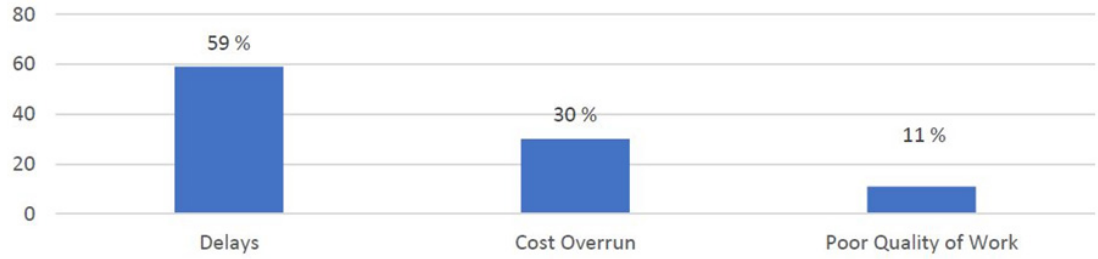

FIGURE 3
Meeting project time goals
Source: Field survey 2019

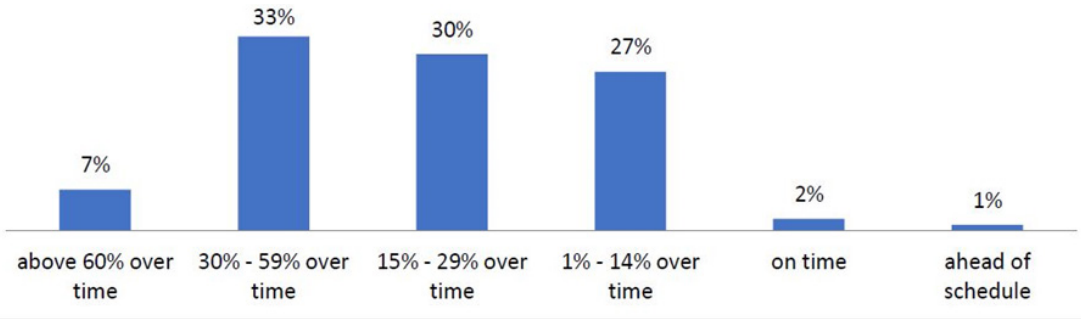

FIGURE 4
Performance in terms of time and costs
Source: Field survey 2019

These results confirm earlier findings by Shen (1997) and Kaniaru (2014) among others.

Overall, results indicated that about 33 per cent of the respondents were of the view that project delays were experienced in between 30 and 59 percent of the construction projects. Another 30 percent felt that project delays were experienced in between 15 and 29 percent of the projects. 7 per cent of the respondents indicated that delays were experienced in about 60 percent of the projects, while 2 percent of the respondents were completed in time and 1percent reported that the projects were completed a head of scheduled time. Overall the majority reported delays in completion of construction projects.

The findings are in consonance with existing literature that highlight construction project delays and their links to poor preparation and limited appreciation of local conditions (Pheng and Chuan, (2006), Ugwu and Haupt (2007); Abdullah et al. (2009), Kaming et al. (1997) and Shen (1997).

On the question of cost overrun, about 32% of the respondents indicated that the project cost overrun was between 1% to 14% of the projects, another 30% (n=38) of respondents reported that cost overruns were experienced in between 15 and 29 per cent of the projects. While 3% of the respondents indicated that the project was completed on budget. Another 1% reported that about 1 percent of the study projects had cost overrun. Over all the results show that most of the projects did not meet project budget goals and that it is very rare for a project to be finished on the budget or over the budget.

Tables 1 and **2** present the results of analysis of the causes delays and cost overrun in construction projects and their levels of significance in as perceived by the respondents. In the case construction project delays; 73% of the respondents identified variation and changes in de-sign at execution stage significant issues. About 55%of the respondents saw late payments as being another significant cause of project delays. While 41% of the respondents felt that slow decision making by the client is another very significant factor that causes delay in construction projects. Delays in obtaining construction materials, poor management and supervision, and in-adequate experience by consultants were considered very significant by 35%, 27% and 25% re-spectively. These results are consistent with findings by the likes of Kagiri and Wainaina, (2008); Fugar and Agyankwah, (2010) and Vitalis and Najafi (2002). As they argued delays in construction projects could be client oriented, consultant oriented and/or project specific. For instance, clients slow decision making, consultant limited experience and delay in material sourcing due to importation cover the various dimensions.

Figures 4 and 5 on the other hand, the results on construction project cost overruns as depicted in **Table 2** indicate that about 27% of the respondents felt that fluctuations in the cost of building materials is the most significant cause of cost overrun in Highrise building while 49% felt that it is very significant. 39% of the respondents felt that frequent changes in specifications and design is the second leading cause of building cost overruns and about 29% of the respond-ents felt that it is very factor.

In addition, as illustrated in Table 2, 34% and 32% felt that inaccurate estimation of price or costs of construction is sig-nificant and very significant respectively. High transport cost came to the fourth significant cause of building cost overrun with a high response rate of 29% and 33% the for significant and very significant respectively. Poor contact management emerged as the fifth significant factors according 25% of the respondents and very significant according to 32% of the respondents. About 30% of the respondents felt that unexpected government regulations were significant in influencing construction projects cost overruns, while 43% felt that it was not significant. On the other hand, political interference was seen to be significant by about 26% while 39% felt that it was not significant in influencing project cost overrun.

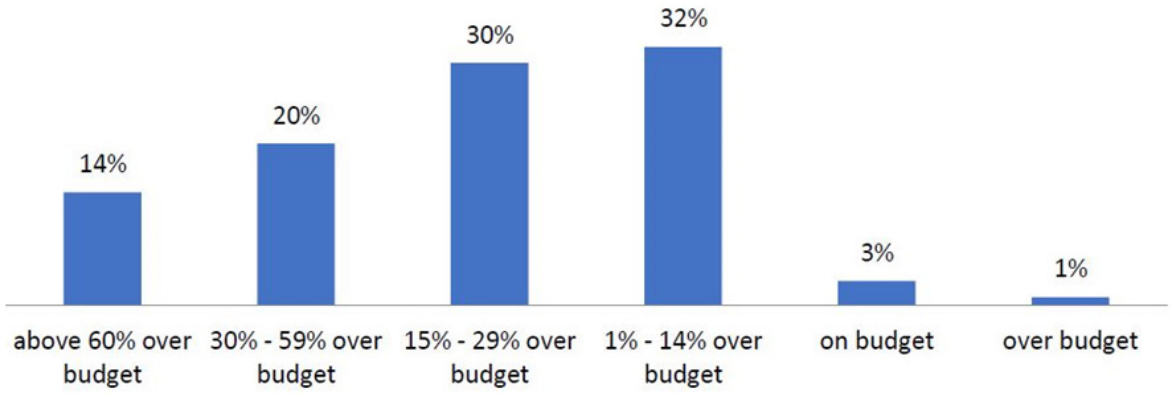

FIGURE 5
Meeting project budget goals
Source: Field survey 2019

TABLE 1
Factors causing delays in construction projects

Statement Where (1 = Not significant, 2 = Low Significant, 3 = Uncertain, 4 = Significant and 5 = Very Significant)		1	2	3	4	5	Totals
Late payments during works progress	n	5	7	2	43	71	128
	%	4	5	2	34	55	100
Unrealistic contact period imposed by the owner	n	20	26	9	41	32	128
	%	16	20	7	32	25	100
Late payment to subcontractors by main contractor.	n	37	35	11	27	19	128
	%	29	27	9	20	15	100
Delay in receiving clearances through customs of the imported materials.	n	11	18	10	56	33	128
	%	9	13	8	44	26	100
Slowness in decision making by owner	n	15	23	9	45	52	128
	%	12	18	7	35	41	100
Client's interference in contractual duties	n	17	24	8	42	37	128
	%	13	19	6	33	29	100
Delay in handing over the construction site to the contractor	n	18	27	10	36	37	128
	%	14	21	8	28	29	100
Ambiguities, Mistakes, inconsistency and discrepancies drawings and specifications	n	20	28	7	40	33	128
	%	16	22	5	31	26	100
Suspension of work by client	n	27	49	10	19	23	128
	%	21	38	8	15	18	100
Inadequate experience of the consultant	n	17	46	11	22	32	128
	%	13	36	9	17	25	100
Delay in subcontractor's works	n	41	35	10	20	24	128
	%	32	27	8	16	17	100
Unclear delegation of responsibilities	n	22	31	10	32	33	128
	%	17	24	8	25	26	100
Provision incomplete information	n	26	36	11	27	31	128
	%	20	28	9	21	24	100
Late preparation of tests by contractor	n	22	47	11	33	15	128
	%	17	37	9	26	12	100
Late preparation of shop drawings	n	24	33	10	29	31	128
	%	19	26	8	23	24	100
Inadequate contractor's experience	n	22	29	6	38	32	128
	%	17	23	5	30	25	100
Rework due to mistakes and errors	n	19	28	10	35	36	128
	%	15	22	8	27	28	100
Poor construction site management and supervision	n	20	29	10	33	35	128

	%	16	23	8	26	27	100
Inadequate technical study during the bidding	n	36	33	9	17	33	128
	%	28	26	7	13	26	100
Frequent change of subcontractors	n	32	32	9	19	36	128
	%	25	25	7	15	28	100
Variation and changes in design during project execution	n	2	8	0	25	93	128
	%	2	6	0	19	73	100
Ineffective scheduling of the project	n	32	33	11	22	29	128
	%	25	26	9	17	23	100
Delay in site mobilization	n	27	49	10	19	23	128
	%	21	38	8	15	18	100
Improper construction method / techniques	n	35	32	8	28	26	128
	%	27	25	6	22	20	100
Financial Difficulties encountered by the contractor	n	15	20	6	52	35	128
	%	12	16	5	40	27	100
Poor communication with project parties	n	40	33	10	22	23	128
	%	31	26	8	17	18	100
Late procurement of materials by the contractor	n	37	35	12	26	19	128
	%	29	27	9	20	15	100
Use of low productive equipment	n	20	26	9	41	32	128
	%	16	20	7	32	25	100
Unfavorable weather conditions	n	42	37	8	17	24	128
	%	33	29	6	13	19	100
Unexpected government regulations	n	31	27	10	36	24	128
	%	24	21	8	28	19	100
Construction materials cannot be procured on the local market and have to be imported	n	19	20	10	35	45	128
	%	15	16	8	27	35	100

Source: Tuyishime, 2019

TABLE 2
Factors causing building cost overruns

Statement Where (1 = Not significant, 2 = Low Significant, 3 = Uncertain, 4 = Significant and 5 = Very Significant)		1	2	3	4	5	Totals
Adjustment of prime cost and provisional sums	n	22	46	13	32	15	128
	%	17	36	10	25	12	100
Frequent change in specifications and designs	n	19	22	0	50	37	128
	%	15	17	8	39	29	100
Fluctuation in materials costs	n	9	15	6	35	63	128
	%	7	12	5	27	49	100

Inadequate review of drawings	n	24	38	26	22	18	128
	%	19	30	20	17	14	100
Omissions and errors in the bills of quantities	n	22	40	13	24	29	128
	%	17	31	10	19	23	100
Government's Unstable economic conditions	n	26	30	21	13	38	128
	%	20	23	16	10	30	100
Lack of local skilled labour	n	13	48	6	26	22	128
	%	10	38	5	20	17	100
Poor contract management	n	8	38	8	33	41	128
	%	6	30	6	25	32	100
The high transport cost	n	9	20	6	37	42	128
	%	7	16	5	29	33	100
Political interference	n	50	36	16	19	15	128
	%	39	28	6	15	12	100
Poor site financial control	n	24	27	8	30	39	128
	%	19	21	6	23	30	100
Inaccurate project estimation	n	9	24	11	43	41	128
	%	7	19	8	34	32	100
Lack of updated cost data on specifications	n	9	15	14	36	34	128
	%	7	12	6	44	31	100
Unexpected government regulations	n	38	55	6	20	8	128
	%	30	43	5	16	6	100

Source: Field survey 2019

Regression Analysis

The regression model used in the study used the following regression model:

$Y = X1\beta1 + X2\beta2 + X3\beta3 + X4\beta4 + €$

Where: X1, X2, X3 and X4 = Client related causes, Contractors related causes, Consultant related causes and External environment related causes

β1, β2, β3 and β4= are the coefficient of Client related causes, Contractors related causes, Consultant related causes and External environment related causes

€ = Standard Error

Y = Time Performance of Construction Projects

The study finding in **Table 3** indicate that the independent variable in the study explained a sig-nificant proportion of variance in Time Performance of Construction Projects in Rwanda, R2= .769 which implies that 76.9% of the proportion in time performance of construction projects in Rwanda can be explained by the independent variables while other variables not covered by this study contributes to 23.1% of the variance as indicated in **Table 2**. The findings in **Table 3** indicate that the significance value in testing the reliability of the model for the relationship between independent variable and the dependent variable was $F(1, 13) = 69.175$, $p = 0.00$; therefore, the model is statistically significant in predicting the relationship between the independent and the dependent variables.

Based on the linear regression model, $Y = \alpha + \beta1X1 + \beta2X2 + \beta3X3 + \beta4X4 + u$, the model therefore becomes; $Y = 0.852 + 0.302 X1 + 0.289X2 + 0.296X3 + 0.167X4 + 0.990$.

TABLE 3
Model Summary for all the variables

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.877a	.769	. 752	1.743

Source: Field survey 2019

A. Independent variables: (Constant), Client related causes, Contractors related causes, and Consultant related causes and External environment related causes.

TABLE 4
ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.654	4	8.654	69.175	.000b
	Residual	4.978	9	.365		
	Total	13.632	13			

Source: Field survey 2019

a. Dependent Variable: Time Performance of Construction Projects
b. Independent variables: (Constant), Client related causes, Contractors related causes, Consultant related causes and External environment related causes

TABLE 5
Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.852	.990	.236	1.256	.000
Client related causes	.302	.198	.252	1.443	.000
Contractor related causes	.289	.569	.147	1.546	.000
Consultant related causes	.296	.479	.175	1.387	.001
External environment causes	.167	.236	.054	1.234	.002

Source: Field survey 2019

a. Dependent Variable: Time Performance of Construction Projects

Testing at 5% significant level, the regression analysis in **Table 4 and 5** are significant since all the p-values are less than 0.025 (Sig. p<0.025) at 2 tail test. The findings also indicate that every 30.2% change in client related causes, 29.6% change in consultant related causes, 28.9% change in contractors' related causes and 16.7% change in external environment together will cause a unit change in time performance of construction projects.

CONCLUSION

The objective of this paper was to highlight the challenges to achieving efficiency in the con-struction industry in Rwanda. In the end, it concluded that several factors explain the challenge to achieving efficiency in the sector. They include: i) variations and design changes during pro-ject execution period, ii) late payment to the contractor; iii) slow decision making, iv) delays in delivery of building materials; and financial

challenges by the building contractors. Similarly, slow decision making processes by clients' impacts negatively on project implemen-tation especially contributing to delays as consultants are unable to make timely decisions to do with building project implementation. This results in loss of time which ultimately make it practically impossible for contractors to finish the execution of the works within the required project duration and it ends up with the contractors requesting for extension of time to cover up for the lost time.

Construction materials are very important in the implementation of construction projects. Alt-hough most countries have construction materials locally produced, there are instances where they have to be imported. It is in such situations that poor planning for resourcing of materials may lead to significant delays. This is even worse in situations of land locked countries like Rwanda. Thus clearance may take inordinately longer than anticipated thus causing significant delays in project execution. Further, financial incapability of the contractor seriously affects the project performance. This reinforces arguments by Thomas et al. (2002) and Enhassi (2009) who established that financial health or stability among other factors is critical efficiency in construction projects.

In the end, the results confirmed the position that construction projects are influenced by di-verse factors relating to both the client and consultant who are key stakeholders and critical to the delivery of a construction project within cost, time and good quality. The consultants and the client are responsible for project planning, design and funding. As such late payment to the contractor, variations, changes design requirements, slowness in decision making, delay in re-ceiving clearances for imported materials, and financial difficulties encountered by contractor are attributed to them. In addition, it is clear that environmental factors such as changes in eco-nomic circumstances, project specifics (location) laws and regulations that are beyond the con-trol of the client and consultants may lead to delays and cost overruns as well and consequently impact on efficiency.

RECOMMENDATIONS

The study thus recommended that for any construction project to be successfully implemented in Rwanda, there will be need to among others:

i. Undertake comprehensive risk analysis which means the identification of the poten-tial risks together with an assessment of their probability, their likely cost conse-quences and the time of which they may occur.
ii. Provide reasonable allowances for unforeseen changes in contractual conditions, types of clients, labour availability and the general state of building industry.
iii. Select the most economical design for basic elements without compromising the quality as well as safety.
iv. Employ adaptive management approaches.
v. Need for the professional bodies to produce semi-annual journal containing cost data of construction materials in different locations of Rwanda because the techniques used to produce estimates vary according to the information available at the time of preparation.
vi. Provision of reasonable contingency allowance to cover the increase in cost of con-struction materials originated from inflation.

In addition, the study proposed that there would be need for a similar study but covering other parts of Rwanda as this study was limited to Kigali City.

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