Brainae Journal of Business, Sciences and Technology
ISSN "2789-374X (print)" "2789-3758 (online)
Volume 18, Issue 2, November 2022
http://www.brainae.org, info@brainae.org

PROJECT FINANCING DELAYS AND DELAYS IN HYDROPOWER PROJECTS COMPLETION IN RWANDA

BY:
Francine UMUTONIWASE[1]
REG NO: MBA/PM/20/09/6407
Tel.: +250 788 330 331
E-Mail: francinewatony@gmail.com
(Award of Degree of Master of Science in Project Management of the University of Kigali "UoK")
Co-Supervisor: Dr. KABANDA Richard[2]
Lecturer of UoK,
Tel.: +250 788 447 070
E-mail: richacha2000@yahoo.fr

Co-Author: Dr. HATEGEKIMANA Jean Paul[3]
A Director of Administration and Academic Services of BRAINAE UNIVERSITY, Delaware, USA
Assistant Registrar of BRAINAE UNIVERSITY, Delaware, USA
Lecturer of Research Methodology at BU,
Private Writer,
Tel.: (+250) 783 590 293 -RW; +1 (251) 237-9112 -USA
E-mail: hategejp6@gmail.com
Received: 05 November 2022**; Accepted:** 07 November 2022**; Published:** 11 November 2022
https://brainajournal.com/paper?Id=101

ABSTRACT:
Despite the efforts made by Government of Rwanda in partnership with private sector in implementing hydropower projects to reach on Rwanda electrification vision, these projects are still facing the challenges like pre-feasibility study of the construction of hydropower projects, unproper monitoring and evaluation of the projects, the project financing issue, and big plants from other sources are required to dilute the generation cost. The study analyzed the effect of the delay in payment due to a contractor on hydropower projects completion in Rwanda; to identify effect of poorer cash flow management on hydropower projects completion in Rwanda; and to find out the effect of shortage of financial resources on hydropower projects completion in Rwanda. Methodology of this study based on a descriptive survey design was used in this study, where data describing the prevailing situation was obtained from across collected data of the respondents. The study is targeting 20 employees worked with hydropower. Data collection instruments were questionnaire, while method of data analysis was correlation coefficient matrix, and multiple linear regression analysis. The findings revealed that the level of significance was $0.000^{(b)}$ this implies that the regression model is significant in predicting the relationship between project financing related delays factors (i.e.: lack of financial resources, delay in payment, poor in cash flow management) and delays of Hydropower Project completion in Rwanda. The findings showed level of fitness model of 17.924 which is positive with p-value of 0.000^{b} less than both standard significance levels of 0.05 and 0.01.

Key Words: *project financing, delays, hydropower, projects completion*

INTRODUCTION

Construction industry in Sub-Sahara countries, especially hydropower is one of the main sectors that contribute to the economic development of the countries. Many construction projects experience extensive delay by exceeding planned time and cost. The success of construction project is measured in term of time, cost, quality and safety (Muhammed, 2015).

A number of factors, which can broadly be divided into two categories: technical risks, such as engineering and business issues, and non-technical risks, such as social and environmental issues, local problems, and health and safety concerns, are currently causing delays in the hydropower sector at the EAC, where Rwanda is located. Although there is a dearth of thorough information on the causes of hydropower project delays, a study of oil, gas, and mining projects by the environmental consultancy ERM suggests a tendency that is probably similar to what the hydropower industry has seen (Muhammed, 2015).

The large construction projects in Uganda frequently experience delays, and hydropower projects are no exception. Although delays are always expensive for the developer, when a project's advantages are provided later than anticipated, all stakeholders may incur significant economic and social costs. The project's costs increased, rising from USD 580 million at its commencement to USD 902 million when it was finished (USD 3.6 million per MW).

In Rwanda, according to Rwanda's Energy Policy, the country's energy sector's mission objectives are as follows (MININFRA, 2015); ensuring the sustainability of energy exploration, extraction, supply, and cogeneration, (a) ensuring that sufficient, dependable, and affordable energy supplies are available to the entire population of Rwanda, (b) creating and promoting an enabling environment for increased private sector participation in energy supply and service provision, (c) encouraging and incentivizing more rational, efficient use of energy in public institutions, among industrial and household end-users, and (d) promoting safe, efficient, and competitive energy production, procurement, transportation, and distribution; ensuring the sustainability of energy exploration, extraction, supply, and consumption to prevent harm to the environment and habitats; and (f) developing the necessary institutional, organizational, and human capacity to increase accountability, transparency, national ownership, and decentralized implementation capacity for sustainable energy services (MININFRA, 2015).

By 2023/24, the Rwandan government hopes to increase installed power producing capacity to 512 MW from its existing 216 MW capacity and attain universal access (100%) for everybody. By 2023/24, it is also planned to reach 52% on-grid connections and 48% off-grid connections. Review of the available literature, analysis, and site visits to several Rwanda Energy Group (REG) branch offices were utilized to gauge how well the electricity sector had performed in terms of accomplishing its objectives. Hydropower has a high generating percentage (46.8%) because to its longer plant lives, better capacity factors, availability, and multiple rivers, as well as Rwanda's aggressive development and improvement programs (Samuel Bimenyimana, Godwin, *et al.,* 2019).

A total of around 1,613 MW of electricity may be produced profitably using regional resources such geothermal energy, peat, lake gas, and hydropower. As a result, the country is only utilizing 10% of its natural electrical potential, ignoring a huge solar resource, and witnessing a sizable outflow of foreign capital. Rwanda's electricity tariff is around 22.2% more expensive when compared to the highest electricity tariff in other East African Community (EAC) countries. More than 700,000 families (31% of all Rwandan households) were linked to the grid in 2017 compared to 364,000 households in June 2012, according to data from the Electricity Access Roll-out Programme (EARP) (Samuel Bimenyimana *et al.,* 2019).

STATEMENT OF THE PROBLEM

Despite the efforts made by Government of Rwanda in partnership with private sector in implementing hydropower projects to reach on Rwanda electrification vision, these projects are still facing the challenges like pre-feasibility study of the construction of hydropower projects, unproper monitoring and evaluation of the projects, the project financing issue, and big plants from other sources (methane, peat,…) are required to dilute the generation cost (Samuel Bimenyimana, Godwin, *et al.*, 2019).

Most of the banks are not interested in financing hydropower projects because they are long term projects leading severe electricity projects to be pended Hydropower Plant that started from long years ago since 1989 and some of them not complete up to now also the Regional Rusumo Falls Hydroelectric project located in Kirehe District on the Rwanda-Tanzania border, and Shema power plant which was expected to generate 56 megawatts (Williams Buningwire, 2021).

According to the studies reviewed which have all made significant contributions to the current study, sadly none of them have specifically addressed the region of Rwanda using the conceptual model presented in this study.

None of these studies also demonstrate the correlation between the variables under study by demonstrating a relationship, particularly between project financing delays and the completion of hydropower projects in Rwanda. This suggested a dearth or scarcity of studies in certain Rwandan regions. This gap was filled by the study's evaluation of Rwanda's hydropower project completion and project finance delays.

OBJECTIVES OF THE STUDY

The study was to assess the effect of project financing delays and delays in hydropower projects completion in Rwanda,

Specific Objectives

(1) To analyze the effect of the delay in payment due to a contractor on hydropower projects completion in Rwanda;
(2) To identify effect of poorer cash flow management on hydropower projects completion in Rwanda;
(3) To find out the effect of shortage of financial resources on hydropower projects completion in Rwanda.

HYPOTHESES OF RESEARCH

The study verified and tested two research hypotheses including null (H0) and Alternative (H1) hypotheses as follows:

(1) **H0:** There is no significant relationship between project financing related factors on hydropower projects completion in Rwanda
(2) **H1:** There is greater significant relationship between project financing related factors on hydropower projects completion in Rwanda

DEFINITIONS OF KEY CONCEPTS

This section presents an overview on the project financing delays and hydropower projects completion.

Project Financing

The long-term financing of industrial and infrastructural projects through project finance is done using the project's predicted cash flows rather than the sponsors' balance sheets. Project financing is a type of loan where the assets, rights, and interests of the project are kept as secondary collateral and the project's cash flow is used as the primary source of repayment (Koh, Jae Myong, 2018).

Project Delays

Project delays occur when certain project activities take place later than anticipated for reasons linked to the client, consultant, contractor, etc. Miscommunication between contractors, subcontractors, and property owners frequently causes construction delays in residential and light construction (Trauner, Manginelli, and Furniss, 2009).

Hydropower Projects

Hydropower Project means any development which uses a flow of water as a source of electrical or mechanical power, or which regulates the flow of water for the purpose of generating electrical or mechanical power. Hydropower Project means a facility that would utilize for the generation of electricity a natural water feature, such as a natural lake, tidal power, waterfall, the gradient of a natural stream, a dam, or impoundment (Sambasivan and Soon, 2017)

Project Completion

Successful project completion in project management refers to delivering what was agreed upon in the project's scope while making sure that all acceptance criteria have been met, the stakeholders are happy, and the business objectives have been achieved.

THEORETICAL FRAMEWORK

Financial-related causes contributing to project delays

Delay is defined as a time overrun that occurs after the contract's expiration date or after the date that the parties have established for the project's completion (Lo *et al.*, 2016). Well-known building delay factors have been developed by Sambasivan and Soon (2017) and are divided into eight main classes. These include external elements as well as client-related, consultant-related, contractor-related, material-related, labor- and equipment-related, financial- and contract-related, and material-related factors.

Late payment

Failure of a paymaster to pay within the contract's specified period for certificate honoring constitutes late payment (Harris and McCaffer, 2013). The Construction Industry Working Group on Payment (2017) asserts that issues with payments at the top of the hierarchy trigger severe cash flow issues farther down the chain of contracts.

Poor cash flow management

Cash flow forecasting is a crucial technique for analyzing a project's cash flow and preventing cash flow issues. Poor cash flow management has several root causes, including (1) a contractor handling too many projects concurrently, (2) a contractor with unstable finances, (3) a contractor underbidding the project cost who is not qualified, (4) a lack of regular cash flow forecasting, (5) a bad credit arrangement with creditors and debtors, and (6) capital lock-up.

Insufficient financial resources

Abdul-Rahman et al., (2006) noted that a shortage of money could impair the project's cash flow and postpone site possession, which would then delay the project as a whole. Insufficient financial resources could result from a number of issues, including (1) trouble getting a loan from a lender and (2) insufficient government budget allocation.

Financial market instability

According to Wa'el Alaghbari (2015), external factors of poor economic conditions, such as currency and inflation rate, would significantly affect the project's cash flow and, as a result, would delay the project's timely completion. The causes of financial market instability, which finally lead to problems with cash flow in building projects, include (1) rising loan payback interest rates, (2) rising material, labor, and transportation costs, and (3) rising foreign exchange rates for imported plants and materials.

HYDROPOWER PROJECT COMPLETION

There is a significant body of research into construction delays and the identification of tools to model and manage these delays. The claim that "projects with longer implementation stages tend to have bigger cost escalations" was examined by Flyvbjerg (2014). The following, given in typically decreasing order of importance, served as the foundation for this:

Construction Project Life Cycle

Throughout the course of a project's life cycle, various stages are experienced. Each project began with the owner's idea, which is then developed and goes through a number of stages before becoming the finished product (Scoot, 2017).

Stage of feasibility study

The purpose of this stage, according to (Jammaz, 2010) is to describe to the owner the viability of his idea and to demonstrate to him how the intended objectives are accomplished. The following steps are recommended as a next step: identify the target; create alternative solutions; evaluate alternative solutions; and evaluate alternative alternatives in more detail.

The design phases

The stage includes architectural designs, structural designs, detailed and implementation plans, bill of quantities, specifications, invitation of contractors to inter into tendering finally selecting contractors who fulfill the conditions set by bidding committee. The consultant office is required to visit the site to be aware of what to do to avoid extra work of adjusting and changing during implementation phase (Ashraf and Bekr, 2016).

The contracting phase

The main concern of this phase is preparation and processing of tender's documents and inviting contractors to tenders. (Jammaz, 2010).

The implementation phases

This stage's focus is on putting things into action that are consistent with the plans, specifications, and conditions. The owner of the project must mobilize around 80% of the project's total cost during this phase, making it the most crucial (Jammaz, 2010).

Delivery phase

Jammaz, (2010) have divided this phase into two main types: first handing over of the project where this primary handing over consists of putting all works in the hand of contractor who has been agreed to perform the duties.

Operation (investment) phase

The final stage involves using the project's output in accordance with its intended use; in other words, it involves using whatever built in accordance with why it was built

THEORETICAL FRAMEWORK REVIEW

Competence Motivation Theory

Competence motivation theory is a conceptual framework created to explain why people are motivated to take part, stick with something, and put in a lot of effort in any given situation for achievement (Horn, 2004).

The theory and studies on competence motivation in the physical realm are reviewed in the entry that follows. The idea and its constructs are briefly introduced historically. The findings of the research are then briefly discussed for the portions listed below: (a) correlates of competence motivation, (b) developmental trends in perceived competence, and (c) the impact of significant others on competence motivation (Elliot, and Dweck, 2005). According to current research and theory, people can develop more favorable perceptions of competence when they succeed at activities that are optimally difficult and when others around them provide them supportive, motivating, consistent, and information-based feedback.

Stakeholder Theory

Stakeholder theory was developed by Mitroff in 1983 and later advanced by Freeman in late 1983. The theory postulates that the relationship between project stakeholders and the organization is one that is designed to create value for the stakeholders. The theory explains how to manage the various interests of the legitimate stakeholders that exist in a project. There are stakeholders who have contractual obligations and derivatively legitimate stakeholders whose relationship to the project is derived from their ability to affect the project work, organization or other stakeholders (Kolesnikov, 2014).

Stakeholder management expertise is crucial for the execution of megaproject deliverables. The project team's top responsibility is to achieve project goals that fully satisfy stakeholder expectations throughout the project's lifespan.

To identify stakeholders and create a project brief that best meets their diverse, frequently conflicting wants and desires is a significant effort that must be completed while creating a project's strategic goals. This theory is predicated on the idea that project managers need to integrate into the organizational grid, recognize important stakeholders and their value propositions, and manage them.

EMPIRICAL STUDIES REVIEW

Soomro, (2019) study the causes of time construction of building projects in Pakistan. The main objective of the research was to identify main causes of time overrun in the construction of building projects and its possible mitigation measures. They used relative importance weight RIW to analyze collected data through questionnaire. Financial issues faced by the contractors was ranked the first, then comes inexperienced contractors, followed by weather impact and delays in supply of materials at the site. Mistake in design, shortage of skilled labor, incomplete subcontractors and errors in time estimation were respectively ranked the least affecting parameters.

The study by Hindawi (2007) identified the primary causes of delays in building projects in Iraq. For each of the 78 causes of delays, a thorough questionnaire was created and sent to 27 experts, including engineers, owners, and contractors. The lowest price at the time of bidding, the contractor's financial incompetence and weakness in time scheduling, the frequent changes in material prices, and occasionally delays resulting from laboratory tests were shown to be the most important reasons. The study revealed that the owner's related factors are most critical shadowed by contractor's related factors.

CONCEPTUAL FRAMEWORK

A conceptual framework is used to show how independent and dependent variables are related. Figure 1 illustrates the conceptual structure as follows:

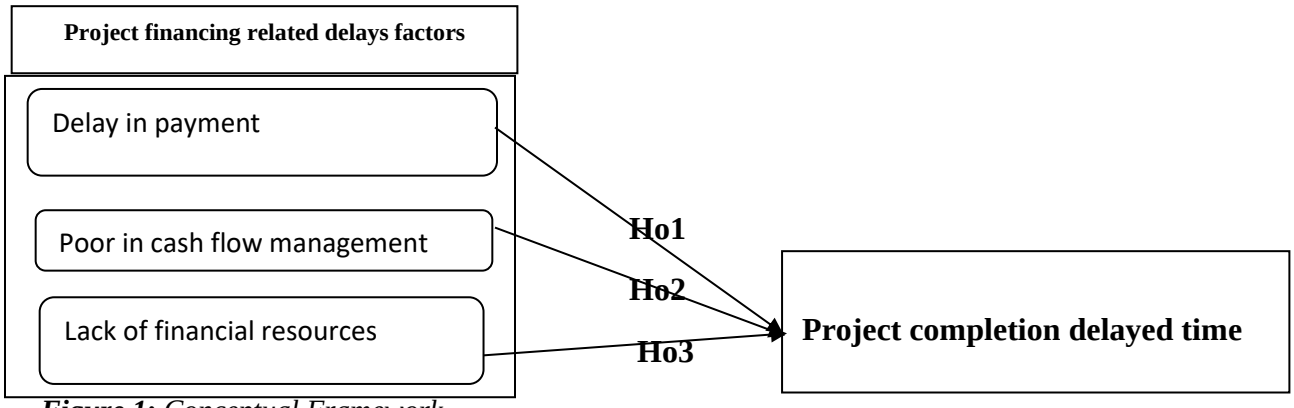

Figure 1: *Conceptual Framework*
Source: *Researcher Conceptualization, (2022)*

RESEARCH METHODOLOGY

This study applied quantitative research designs. While quantitative described statistics in terms of mean and standard deviation on how project financing related delays factors affecting hydropower projects completion in Rwanda. A survey was administered to a selected sample from REG and their contractors. Correlative approach also was used as coefficient of determination to highlight relationship between the variables under study through using statistical packages for social sciences. The study was targeting 20 employees worked with hydropower of Rwanda.

The study was targeting sub-contractors, consultants, and employees in charge the follow up this construction of hydropower. The study took small number available as staff implemented the hydropower.

Sample size and sampling techniques, the stratified sampling and universal sampling

techniques were then used to sampling 20-hydropower representatives. Systematic sampling was similar to simple random sampling, but it was usually slightly easier to conduct. Every member of the population was listed with a number, but instead of randomly generating numbers, individuals were chosen at regular intervals.

Data-collection instruments were questionnaires that was addressed to 20 respondents. The methods were used to analyze data were descriptive statistical method which was used to describe mean and standard deviation.

The correlation coefficient matrix and multiple regression models were also used where estimated X as independent variable represented by project financing related delays factors included by x1= delay in payment; x2 = poor in cash flow management; x3= lack of financial resources and with Y which is dependent variable represented by project completion delayed time. Based to econometric models, Y=f(x); $Y= B0 + B1X1 + B2X2 + B3X3 + \alpha$. That means Bo is constant, B1-B3 are coefficients while α is standard error.

FINDINGS AND DISCUSSIONS

Data obtained in this survey were analyzed quantitatively using computer software of SPSS IBM version 23.0. The participation rate was 100.0% of responding the questions. Results were interpreted and presented in accordance with the study's objectives.

Socio-Demographic Characteristics of Respondents

The respondents' profile included by gender, ages, marital status, educational level, and professional experiences of respondents worked with the project of hydropower of Rwanda. The tables present the results from respondents' profile as follows.

Table 1: Distribution of respondents by Gender

Gender Distribution		Frequency	Percent
Valid	Male	17	85.0
	Female	3	15.0
	Total	**20**	**100.0**

Source: *Primary Data (2022)*

Table 1 presents findings on the social demographic characteristic of respondents in term of gender of respondents. Findings indicated that majority of the respondents in this survey were males, this was justified by 85.0% of respondents who confirmed that they are males, while 15.0% of respondents were females from Rwanda hydropower projects.

Table 2: Distribution of Respondents by Ages

Ages distribution		Frequency	Percent
Valid	21 and 30 years	4	20.0
	31 and 40 years	8	40.0
	41 and 50 years	8	40.0
	Total	20	100.0

Source: *Primary Data (2022)*

Findings in table 2 show respondents' distribution by Ages where there is no teenage among the respondents participated in survey; this is justified by 20.0% of respondents who have the age between 21 and 30 years old; 40.0% respondents have age between 31 and 40 years, and also 40.0% respondents have ages between 41 and 50 years. Rwanda hydropower projects employed mature people who are able to deal with technical and financial issues in the project implementation of the Hydropower projects.

Table 3: Education level of Respondents

Education level		Frequency	Percent
Valid	Masters and above	5	25.0
	Bachelor's degree	9	45.0
	Secondary level	6	30.0
	Total	20	100.0

Source: *Primary Data (2022)*

Concerning to education level, majority of 45.0% of respondents have bachelor's degree among the participants from Rwanda hydropower projects; 25.0% respondents have master's level and above, while 30.0% of respondents have secondary school, but most of them have confirmed that they are still studying university courses.

Table 4: Working experience with hydropower plant in Rwanda

Working experience		Frequency	Percent
Valid	2- 5years	2	10.0
	6- 10years	7	35.0
	11- 14years	11	55.0
	Total	20	100.0

Source: *Primary Data (2022)*

Finding in table 4 show perception of respondents about their experiences indoors of hydropower plant in Rwanda, the results stated that 10.0% of respondents have experience between 2-5years; 35.0% respondents have between 6-10years of experience in working with hydropower projects in Rwanda; while 55.0% of respondents have experience between 11-14years.

The effect of the delay in payment due to a contractor on hydropower projects completion in Rwanda

The client, consultant, contractor, etc.-related factors led to project delays occurring later than anticipated. Miscommunication between contractors, subcontractors, and property owners frequently causes construction delays in residential and light construction projects. The failure of a paymaster to honor certificates within the timeframe specified in the contract results in a late payment. The results of the poll conducted by RWANDA reveal what the respondents thought would happen if a contractor's payment was delayed, as shown in Table 5 below.

Table 5: Perceptions of respondents on the effect of delays in payment due to a contractor on hydropower projects completion in Rwanda

Statements	Mean	Std. Dev.
(1) Delay in payment stops early completion of hydropower projects	3.9000	1.25237
(2) Delays in payment extends time & acceleration for hydropower projects	3.5000	1.23544
(3) Delay in payment generate the loss of productivity & efficiency of hydropower projects	3.6500	1.08942
(4) Delay in payment become source of re-scheduling & re-sequencing for hydropower projects	3.5500	1.14593
(5) Due to delays in payment, increase time-related costs of hydropower projects	3.5000	1.23544
(6) Due to delay in payment, there is an abandonment of hydropower projects	3.5000	1.23544
Overall Average rate of mean and standard deviation	**3.6**	**1.1991**

Source: *Primary data (2022)*

The findings in Table 5 confirmed the perceptions of respondents on the effect of delays in payment due to a contractor have presented a usual average of (**$\bar{x}$=3.6** and **SD=1.1991**) on the hydropower projects completion of *RWANDA* in Rwanda; this indicates that there is a mean tend to strong which show the evidence of existence of facts and standard deviation which is categorized as heterogeneity of responses agreed that delay in payment stops early completion of hydropower projects; delays in payment extends time & acceleration for hydropower projects; delay in payment generate the loss of productivity & efficiency of hydropower projects; delay in

payment become source of re-scheduling & re-sequencing for hydropower projects; due to delays in payment, increase time-related costs of hydropower projects; and due to delay in payment, there is an abandonment of hydropower projects especially *RWANDA*.

The effect of poorer cash flow management on hydropower projects completion in Rwanda;
The underlying causes of poor cash flow management are, however, the following: (1) contractor manages too many projects concurrently; (2) contractor's unstable financial background; (3) unqualified contractor underbids the project cost; (4) lack of regular cash flow forecasting; (5) poor credit arrangement with creditors and debtors; and (6) capital lock-up which affects hydropower projects completion as confirmed by the perception of respondents on the effect of poorer cash flow management on hydropower projects completion in Rwanda, as detailed in table 6 below.

Table 6: Perceptions of respondents on the effect of poorer cash flow management on hydropower projects completion in Rwanda;

Statements	Mean	Std. Dev.
(1) Poor management of incoming finance within a (2) construction company affect negatively hydropower projects completion in Rwanda;	3.5000	1.23544
(3) Poor management of profit margins were highest ranked financial factor influence contractors' failure of hydropower projects;	3.5500	1.14593
(4) Decreases profits due to higher prices paid (5) is negatively influencing the projected cash for hydropower projects;	3.5500	1.14593
(6) Poor management of cash disbursed, shortage of (7) cash, loans and cost of money as well as earnings received affect hydropower projects completion;	3.4000	1.39170
(8) Poor monitoring and controlling project progress and associated cash flow mis-management is as signs of cost overrun and program delay;	3.5500	1.14593
(9) Poor expense flow and overheads (including both on-site project and office overheads) management affect hydropower project completion	3.4000	1.39170
Overall Average rate of mean and standard deviation	**3.491667**	**1.242772**

Source: *Primary data (2022)*

Findings in Table 6 present the perceptions of respondents on the effect of poorer cash flow management have close-fitting on the average rate of (**$\bar{x}$=3.491667**and **SD=1.242772**) on hydropower projects completion; this means there's a practical mean showing evidence of facts, and heterogeneity of responses which confirmed that most of respondents have same understanding on how poor management of incoming finance within a construction company affect negatively hydropower projects completion; poor management of profit margins were highest ranked financial factor influence contractors' failure of hydropower projects; decreases profits due to higher prices paid is negatively influencing the projected cash for hydropower projects; poor management of cash disbursed, shortage of cash, loans and cost of money as well as earnings received affect hydropower projects completion; poor monitoring and controlling project progress and associated cash flow mis-management is as signs of cost overrun and program delay; and poor expense flow and overheads (including both on-site project and office overheads) management affect hydropower project completion.

The effects of shortage of financial resources on hydropower projects completion in Rwanda

Findings in Table 7 present the perception of respondents on the effects of shortage of financial resources on hydropower projects completion in Rwanda as follows.

Table 7: Perceptions of respondents on the effects of shortage of financial resources on hydropower projects completion in Rwanda

Statements	Mean	Std. Dev.
Shortage of working capital (e.g., stocks, debtors) already invested in the business affecting hydropower projects completion in Rwanda;	3.5500	1.14593
Operational and maintenance cost is higher than other power plants and affect hydropower projects completion;	3.4500	1.31689
Shortage of cash balances in hydropower construction projects affecting its completion in Rwanda;	3.5500	1.14593
Reservoirs drastically change the landscape and rivers they are built on affecting hydropower projects completion;	3.5000	1.23544
Lack of interested Banks and other loans to finance hydropower projects affecting these projects completion;	3.6500	.98809
Absence of Shareholders' capital involvement led to the delay of hydropower project completion;	3.550	1.1910
Overall Average rate of mean and standard deviation	**3.541667**	**1.170547**

Source: *Primary data (2022)*

Table 7 show the findings on the perceptions of respondents which have presented average rate of (**x=3.541667** and **SD=1.170547**) on the effects of shortage of financial resources on hydropower projects completion in Rwanda; this means that there is a truthful submit mean indicating evidence of existing the facts and heterogeneity of responses stated that shortage of working capital (e.g., stocks, debtors) already invested in the business affect hydropower projects completion in Rwanda; operational and maintenance cost is higher than other power plants and affect hydropower projects completion; the shortage of cash balances in hydropower construction projects affecting its completion in Rwanda; reservoirs drastically change the landscape and rivers they are built on affecting hydropower projects completion; the lack of interested banks and other loans to finance hydropower projects affecting these projects completion; and the absence of shareholders' capital involvement led to the delay of hydropower project completion in Rwanda.

Correlation Coefficient Matrix Analysis between the variables

A correlation matrix is used to summarize data obtained from respondents from respondents, as input into a more advanced analysis, and as a diagnostic for advanced analyses. Table 8 shows the findings on correlation coefficient matrix results as follows.

Table 8: Correlation coefficient matrix between the variables

		Delay in payment	Poor in cash flow management	Lack of financial resources	Project Financing Delays	Delays of Hydropower Project completion Rwanda
Delay in payment	Pearson Correlation	1	.981**	.965**	.992**	**.846****
	Sig. (2-tailed)		.000	.000	.000	**.000**
	N	20	20	20	20	**20**
Poor in cash flow management	Pearson Correlation	.981**	1	.965**	.992**	**.867****
	Sig. (2-tailed)	.000		.000	.000	**.000**
	N	20	20	20	20	**20**
Lack of financial resources	Pearson Correlation	.965**	.965**	1	.986**	**.868****
	Sig. (2-tailed)	.000	.000		.000	**.000**
	N	20	20	20	20	**20**
Project Financing Delays	Pearson Correlation	.992**	.992**	.986**	1	**.869****
	Sig. (2-tailed)	.000	.000	.000		**.000**
	N	20	20	20	20	**20**
Delays of Hydropower Project completion Rwanda	Pearson Correlation	**.846****	**.867****	**.868****	**.869****	**1**
	Sig. (2-tailed)	**.000**	**.000**	**.000**	**.000**	

N	**20**	**20**	**20**	**20**	**20**

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

Findings in correlation matrix table 8 show that there is a positive and very strong correlation between delay in payment in the project financing delays and delays of hydropower project completion Rwanda as Pearson correlation is 0.846** with the p-value of 0.000, which is less than standard significance level of 0.01. This indicates that, out of the considered other factors of project financing delays that influence delays of hydropower project completion Rwanda, only delay in payment have significant influence on 84.6% of delays of hydropower project completion Rwanda.

The results show that there is a positive and very strong correlation between poor in cash flow management in the project financing delays and delays of hydropower project completion Rwanda as Pearson correlation is 0.867** with the p-value of 0.000 which is less than standard significance levels of 0.01. This indicates that out of the considered other factors of project financing delays of delays of hydropower project completion Rwanda, only poor in cash flow management have significant relationship of 86.7% with delays of hydropower project completion Rwanda.

Findings show also that there is a positive and very strong correlation between lack of financial resources in the project financing delays and delays of hydropower project completion Rwanda as Pearson correlation is .868** with the p-value is 0.000, which is less than standard significance level of 0.01. This indicates that, out of the considered other determinants affecting delays of hydropower project completion Rwanda, only lack of financial resources has significant and positive relationship of 86.8% on delays of hydropower project completion Rwanda.

Generally, the results show positive and very strong correlation between project financing delays and delays of hydropower project completion Rwanda as Pearson correlation is .869** with the p-value is 0.000, which is less than standard significance level of 0.01. This indicates that, out of the considered factors that can affect delays of hydropower project completion Rwanda, project financing delays has significant relationship of 86.9% on delays of hydropower project completion Rwanda.

Multiple Linear Regression Analysis

Tables presented below show results from multiple linear regression analysis test done to verify the research hypotheses.

Testing hypothesis Ho & H1:

Ho: There is no significant relationship between project financing related factors on hydropower projects completion in Rwanda;

H1: There is greater significant relationship between project financing related factors on hydropower projects completion in Rwanda;

Table 9: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	**.878[a]**	**.771**	**.728**	3.89104

a. Predictors: (Constant), Lack of financial resources, Delay in payment, Poor in cash flow management

The model summary in Table 9 in coefficient of determination was used to explain whether the model is a good predictor. From the results of the analysis, the findings showed that project financing related delays factors (i.e.: lack of financial resources, delay in payment, poor in cash flow management) has contributed R= 0.878[a] of the variation of delays of Hydropower Project completion in Rwanda as explained by r^2 of 0.771 which indicates that model is very strong

correlated, as the independent variable represented by project financing related delays factors by very highly explained the dependent variable (delays of hydropower project completion in Rwanda) and show that the model is a good prediction.

Table 10: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	814.104	3	271.368	**17.924**	**.000[b]**
	Residual	242.243	16	15.140		
	Total	1056.347	19			

a. Dependent Variable: Delays of Hydropower Project completion in Rwanda

b. Predictors: (Constant), Lack of financial resources, Delay in payment, Poor in cash flow management

The results of the findings above revealed that the level of significance was 0.000(b) this implies that the regression model is significant in predicting the relationship between project financing related delays factors (i.e.: lack of financial resources, delay in payment, poor in cash flow management) and delays of Hydropower Project completion in Rwanda. The findings also showed level of fitness model of 17.924 which is positive with p-value of 0.000[b] less than both standard significance levels of 0.05 and 0.01. This means that the null hypothesis (H_0) stated that There is no significant relationship between project financing related factors on hydropower projects completion in Rwanda, was rejected, and alternative hypothesis (H1) stated that There is greater significant relationship between project financing related factors on hydropower projects completion in Rwanda, was retained.

Table 11: Regression Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.709	3.307		.214	.003
	Delay in payment	.490	.851	.382	.576	.000
	Poor in cash flow management	.834	.800	.697	1.041	.001
	Lack of financial resources	.730	.630	.565	1.159	.000

a. Dependent Variable: *delays of hydropower project completion in Rwanda*

From the above Table 11, the study sought to establish the extent to which project financing related delays factors (i.e.: lack of financial resources, delay in payment, poor in cash flow management) as representing independent variable impact delays of hydropower project success in Rwanda as Y. Based on these variables the following regression equation was obtained: as Y is f(X); therefore, $Y= 0.709+0.490x_1+0.834x_2+0.730x_3+3.307$. The multiple linear regression equation showed that delays of hydropower project completion in Rwanda will always depend on a constant factor of 0.709 nevertheless of the presence of other factors in project financing related delays factors. The other variables explain that; 1-unit change project financing related delays factors lead to 0.490-unit for x1, 0.834-unit for x2, 0.730-unit for x3 change on delays of hydropower project completion in Rwanda, respectively with standard error of 3.307 in the model.

CONCLUSION AND RECOMMENDATIONS

Based to the findings obtained, research problem was solved, research objectives were achieved, and research questions were answered. It is therefore the study confirmed that there is significant relationship between project financing related delays factors and delays of hydropower projects completion in Rwanda. Delay is a serious issue in construction industry as it impacts the time and cost of projects. Delay in construction projects would cause for extra cost and loss in financial return or other benefits from project. Thus, delay is costly for both owner and contractor. The extent of delays should be reduced by identifying the root causes of financial-related problems and find out the solutions that are able to reduce the extent of delays in construction project.

The survey findings indicated that the root causes of financial-related delays are because of poor cash flow management followed by late payment, insufficient financial resources and financial market instability. Contractor' s instable financial background, client' s poor financial and business management, difficulties in obtaining loan from financiers and inflation were identified as the most significant underlying causes to each of four main factors mentioned above. All parties involved in the construction project agreed on the fact that clients should bear the greatest responsibility and play the most important role in lessening the impact of financial problems and delays.

REFERENCES

[1] Abdul-Rahmanand Yahya, (2016) *Delay mitigation in the Malaysian construction industry*. Journal of Construction Engineering and Management 132 (2): 125 – 133.

[2] Ahmed, and Gollapudial, (2013) *Delays in Construction: a brief study of the Florida Construction Industry, Proceeding of the 39th Annual ASC Conference*, Clemson University, Clemson, SC, pp. 257 –266.

[3] Aibinu , and Jagboro (2012) *The effects of construction delays on project delivery in Nigerian construction industry.* International Journal of Project Management 20: 593 – 599.

[4] Alaghbari (2015) Factors affecting construction speed of industrialized building system in Malaysia. Master's thesis, University Putra Malaysia, Serdang.

[5] Alaghbari , Salimand Ernawati (2017) The signifi cant factors causing delay of building construction projects in Malaysia . Engineering, Construction and Architectural Management 14 (2) : 192 – 206 .

[6] Al-Khalil and Al-Ghafl (2015) Delays in public utility projects in Saudi Arabia. International Journal of Project Management 17 (2): 101 – 106.

[7] Arditi , Akan , and Gurdamar(2017) Reasons for delays in public projects in Turkey. Construction Management and Economics 3: 171 – 181.

[8] Assaf, and Al-Hejji(2016) Causes of delay in large construction projects. International Journal of Project Management 24: 349 – 357.

[9] Bartholomew, (2017) Construction Contracting/Business and Legal Principles. Upper Saddle River, NJ: Prentice-Hall.

[10] Benedict Amade (2015). Factors for containing failure and Abandonment of Public sector construction projects in Nigeria. Journal of Building Performance, 2-3.

[11] Benedict Amade. (2015). Factors for containing failure and Abandonment of Public sector construction projects in Nigeria. Journal of Building Performance, 2-3.

[12] Brambleand Callahan (2017) Construction Delay Claims. New York: John Wiley

[13] Bromilow, (2017) Measurement of scheduling of construction time and cost performance in the building industry. The Chartered Builder 10 (9) : 57 – 65 .

[14] Chan, and Kumaraswamy, (2016) Contributors to construction delays. Construction Management and Economics 16 : 17 – 29 .

[15] Construction Industry Working Group on Payment (WG10) . (2017) The Importance of

Payment in the Construction Industry. Report on Enactment of Construction Industry Payment and Adjudication Act (CIPAA), p. 2.
[16] Frimpong and Oluwoye (2013) Signifi can't factors causing delay and cost overruns in construction of groundwater projects in Ghana. Journal of Construction Research 1 (2) : 175 – 187 .
[17] Harrisand McCaffer (2013) Modern Construction Management, 5th edn. UK: Blackwell Science.
[18] Kadenesi Eric (2016). Causes of projects' failure to deliver the value presented in their business cases. Kigali: UR.
[19] Kaming, Olomolaiye, and Harris (2017) Factors influencing construction time and cost overruns on high-rise projects in Indonesia . Construction Management and Economics 15: 83 – 94 .
[20] Koh, Jae Myong. (2018). Green Infrastructure Financing: Institutional Investors, PPPs and Bankable Projects. Palgrave Macmillan, pp.109-130.
[21] Lo, Fung, and Tung, (2016) Construction delays in Hong Kong civil engineering projects. Journal of Construction Engineering and Management © ASCE (June) 132 (6): 636.
[22] Malbex (2015) Market Watch – Construction Industry. Kuala Lumpur. Kuala Lumpur Exhibition Center Report, pp. 1 – 8.
[23] Mansfield, Ugwu, and Doran (2016) Causes of delay and cost overruns in Nigerian construction projects. International Journal of Project Management 12 (4) : 254 – 260 .
[24] Noulmanee, Wachirathamrojn and Sittivijian (2017) Internal causes of delays in highway construction projects in Thailand, http://www.sciencedirect.com/ science?_
[25] Sambasivanand Soon (2017) Causes and effects of delays in Malaysian construction industry. International Journal of Project Management 25: 517 .
[26] Samuel Bimenyimana, Godwin, et al. (2019). The State of the Power Sector in Rwanda: A Progressive Sector with Ambitious Targets. State Key Laboratory of Reliability and Intelligence of Electrical Equipment, Department of Electrical Engineering, Hebei University of Technology, Tianjin, China.
[27] Shen, Fisher and Sun (2011) An analysis of the distribution of cost variance for building projects. Journal of Construction Research 2: 35 – 40.
[28] Sweis Hammadand Shboul, (2017) Delays in construction projects: The case of Jordan. International Journal of Project Management 26: 665 – 674 .
[29] Trauner, Manginelli, Lowe, Nagata, and Furniss. (2009). Construction Delays, 2nd Ed.: Understanding Them Clearly, Analyzing Them Correctly. . Burlington, MA: Elsevier. p. 266. ISBN 978-1-85617-677-4.
[30] Ward (2015) Cash flow analysis, http://sbinfocanada.about.com/cs/management/g/cashfl owanal. htm, accessed 4 February 2018.
[31] Williams Buningwire. (2021). Construction of 43 MW Nyabarongo II Hydropower Plant. https://www.ktpress.rw/2022/05/construction-of-43-mw-nyabarongo-ii-hydropower-plant-to-start-this-week/.
[32] Yap & Chia (2010). Causes of Abandoned construction Projects. Department of Built Environment, Faculty of Engineering and Science, University Tunku Abdul Rahman Jalan Genting Kelang, 53300 Setapak, Kuala Lumpur, Malaysia., 5-8.