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## **Influence of Implementation Factors on Effective Delivery of Energy Projects in Rwanda: Case of Nyabarongo I Hydro Electric Power Project**

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### **Abstract:**

*In Rwanda, the electric power supply is significantly insufficient and covers a mere 18% of the population. Experience has shown that past electric power projects have not realized the expectations in terms of their implementation and quality at entry. It is therefore important that adequate measures are put in place to ensure timely delivery of energy projects. This study sought to determine the factors influencing effective delivery of energy projects in Rwanda. This research study was specifically based on hydro-power energy projects considering the Nyabarongo I Hydro Electric Power project in the southern province of Rwanda. The literature for this study was reviewed basing on the following factors; project planning tools, procurement procedures, stakeholder's analysis, managerial skills among project managers, climatic conditions and timely availability of funds. The study adopted a descriptive research design. Stratified random sampling will be used to determine the sample size. Primary data for the study was collected using structured questionnaires that will be administered to the respondents by the researcher. A pilot test was conducted at Rukarara hydropower project to check on validity and reliability of the research tool. Data collected was analyzed using SPSS version 21. Measures of central tendency and correlation analysis was used to establish an interaction between the independent and dependent variables. Project planning tools, managerial skills amongst project managers, procurement procedures and timely availability of funds were factors that were found to influence effective delivery of the energy project. Monitoring and evaluation of the project undertakings was among the recommendation made.*

### **1. Background**

Completion of projects within schedule is a major contribution towards the competitive edge in organizations. This is based on the realization that the achievement of the targeted objectives is determined by the ability to deliver the targeted output within the stipulated time, (Stephen 2014).

Throughout the world, the business environment within which construction organizations operate continues to change rapidly. Organizations failing to adapt and respond to the complexity of the new environment tend to experience survival problems (Lee et al. 2001). With increasing higher users' requirements, environmental awareness and limited resources on one side, and high competition for construction business marketplace on the other side, contractors have to be capable of continuously improving their performance (Samson and Lema 2005). A project is considered successful if the project is delivered on time, on schedule and acceptable quality. However, measuring project success is a complex task since success is tangible and can hardly be agreed upon (Xiao & Proverbs, 2003).

According to African Development Bank (ADB) the key challenges facing Africa's power sector are inadequate generation capacity, limited electrification, low power consumption, unreliable services, high costs, and a financing gap of approximately \$23 billion a year. These challenges call for a paradigm shift in the development of the power sector that seeks to use the vast renewable resources of the continent, including hydro-potential. In electrical power installation projects, different activities are involved and hence the need for proper management to ensure that materials and works are procured and supplied within schedule, (Chandra, et al. 2012).

According to Mateus 2009, Brazil is covered by a huge amount of rivers, which makes more than 75% of electric energy framework, about 100,000 MW, is constituted by hydro power plants. This characteristic allows Brazil to be in an advantageous position comparing to other countries. Mateus adds that the hydropower plant construction has been in existence since 1970s, and mostly during the military government, an important support for the national economic development. However, even though Brazil still has a great hydropower potential to be explored, the hydropower generation expansion has been very restricted. Considering that the implementation of a hydropower plant is a long-term project, uncertainties reflect right on the development of these projects and if

there is any unexpected stop, the project can take a very long time to be restarted. As a result of that, there is a lack of new projects to be developed in the sector portfolio, which decreases the quantity of enterprises that can be offered in the energy auctions, Divakar 2009.

Hydropower projects are complex in that they involve many different stakeholders with divergent views and expectations. Social and environmental issues are often covered by the media and other parties to a far greater extent than technical issues, emphasizing a need to improve upon how social and environmental issues are handled, studied and presented to NGOs, governments, the media, the donor community and the general population Hemalie Nandalal 2007. Focus on the social dimensions of hydropower development has increased recently due to a number of detailed and critical studies on the effects of hydropower on affected communities (World Commission of Dams). One conclusion or observation that is often presented by reviewers is that consultation played or should have played an important role in various stages of project development and implementation. As a result, donor organizations and lenders like the World Bank now insist upon a formal consultation process as part of a Social Impact Assessment. Consultation ensures that the interests and concerns of local people are presented and integrated into other aspects of project planning. It also ensures transparency or openness in terms of information dissemination and participation in aspects of decision-making Wijsekara & Weerakkody 2006.

Research by Athena *et al.*, 2013 on the series that focus on expanding the delivery of affordable, renewable energy in developing countries describes the core business strategies employed by a group of socially oriented energy enterprises and organizations working to provide distributed, renewable energy services to low-income, rural communities and provides examples of how these strategies were implemented. The Role of Project Implementation Units contributes to a wider debate in the donor community regarding project implementation units (PIUs), particularly their efficiency and role in capacity development, W. Kolkma 2005. The debate revolves around the observations that PIUs as supported by external agencies would have high direct and indirect costs, have a propensity to develop into parallel organizations, and dilute central government policy through their allegiance to donor agendas. PIUs, although widely used on account of their supposed efficiency, are alleged by some to be less efficient than assumed.

According to Stephen 2014, the electric power supply in Kenya is significantly insufficient and covers a mere 20% of the population. Experience has shown that past electric power projects have not realized the expectations in terms of their implementation and quality at entry. He adds that in 2009, Kenya witnessed a significant reduction in electric power supply compared to the demand. This situation is attributed to the country's overreliance on hydroelectric power, which is greatly influenced by climatic variations. Many projects have therefore emerged with an intention of mitigating this deficit. One of such projects is Thika Power project, which was expected to generate 80 MW on its completion. It is therefore imperative that these projects are delivered in time to boost industrial and technological capacity of the region. According to the European Investment Bank, the Bujagali dam was expected to have a generating capacity of 250 MW, so as to meet the current electricity shortfall and the growing future demand in electricity in Uganda as reported from EIB news in 2007. However, there was not enough water to sustain and ensure that the project would generate its designed capacity of 250MW and due to the decline in water of the Victoria Lake it has continuously contributed to the inefficiency of the dam. The same mistake was made in the generation construction and implementation of Nalubaale and Kiira dams which were expected to produce up to 380 MW. Yet their current average output ranges between 110 and 135 MW this made the PPP scheme objective of capacity of the Bujagali PPP project challenged and more challenged as noticed today by the daily reduction of water levels and lower generating capacity than that expected.

The World Bank Inspection Panel Report confirmed in its report volumes (2010) the project's economic viability was overestimated in relation to hydrological risks. The impacts of the project on the changing levels of Lake Victoria were not assessed whereby the project preparation and assessment reports did not address climate change and its possible impact on power production at Bujagali and no corrective actions were identified by the World Bank management in response to the Panel's findings. Furthermore the Bujagali falls was completely submerged by the dam's reservoir by drowning Bujagali Falls.

The Government of Rwanda has fully recognized that the availability of reliable power supply is essential for economic growth, social prosperity and human development (Rwanda Energy Sector Review & Action Plan 2013). Rwanda's economy continues to move forward and this creates demand for energy for its rapid growth. Considering the current shortfall in electricity supply, power generation is set to grow to over 563 MW from its current capacity of 122.6 MW (MININFRA October 2014); a projected growth targeted by the year 2017. The generation capacity installed in Rwanda, hydropower accounts for about 59%, thermal generation, primarily hired diesel and heavy oil fuel based generation units, for 40%, and methane gas for about 1%. The high reliance on thermal generation comes at a significant cost to Rwanda, especially given the present high prices for oil products (MININFRA Energy: The Opportunity in Rwanda).

According to Rwanda Energy Sector Review and Action Plan (2013), the Government of Rwanda demonstrates commitment to partnering with investors in delivering this potential; by offering generous incentives and guarantees to its investors including those in the energy sector. Due to energy projects complexity, this creates unequalled factors affecting their effective implementation given the availability of the financial support opportunities for investment in electricity generation. For the target to be reached there has to be a well-defined and clear development and implementation process that will avoid or minimize the challenges to meet the set target.

The government projects implementation phase takes much longer time than the expected due to some of the factors that lead to the project delays in meeting the planned schedules. This can be envisaged clearly on Nyabarongo I project whose contract commencement date was on May 2009 with an expected completion date of February 2013. But the project incurred two deadline extensions that are April 2014, then finally October 2014 which counts to about 20 months extra time to the initial set deadline. This delay affected the project in terms cost and time.

In consideration of the above for the purpose of business development in Rwanda, the energy power requirement has been increasing drastically and its cost has affected the cost of production for industries and factories products. This has mainly come from the higher implementation cost involved in the energy projects due to long implementation period involved as a result of unexpected delays caused. This means that as the factors affecting the effective energy projects implementation increase the project cost also increasing thus increases the cost of the energy to the end user. It is from this point that, Rwanda has to find means of reducing costs of energy power production through optimizing the effective implementation phase by avoiding the delays of the projects.

### 1.1. The Statement of the Problem

For many years effective project delivery has been a topic of debate. The issue of completion of projects on stipulated time has become of great importance, especially with the evergrowing concerns and demands from various players in the market. Bureaucratic procedures and high unit cost due to dependency on thermal energy have been some of the factors that have discouraged new investment in the sector (Stephen 2014).

Effective project delivery in Rwanda has been an issue with ever increasing, pushing ahead of completion dates. Energy projects are established and implemented, with an aim of boosting energy generation at the planned cost and time of energy projects implementation. This has however not been achieved as expected, to date due to failures to meet planned schedules, planned budget, engineering designs that cause changes or errors, timely procurement process, to mention but a few. In addition to the above, weather changes, delivery delays and specified quality outcome in various unforeseen negative effects on the projects are the reasons for the occurrence of the project implementation delays. This has been an ongoing issue, where these projects are not implemented on timely delivery.

The above can be envisaged clearly on Nyabarongo I project whose contract commencement date was on May 2009 with an expected completion date of February 2013. But the project incurred two deadline extensions; April 2014, and finally October 2014 which counts to about 20 months extra time to the initial set deadline. According to Karuhanga, 2013 completion of Akagera fence was pushed to march due to the issues concerning land and managerial skills of the project managers. This was a follow up on another extended project Rukarara II hydro power that also experienced timely delivery delays where the German company that was contracted to build the plant decided to stop the construction early January 2013. On this issues the company was seeking an additional \$4.7m (Rwf2.9b) owing to 'extra-works' it carried out at the site (Jean, 2013).

In addition to the Nyabarongo I project, the Rukarara I project also experienced delays where the construction of the plant started in 2007 and was supposed to be completed in a period of 18 months, but according to the Minister, the contractor; a Sri Lankan firm; ECOPOWER-Global had technical problems that hampered the execution of the project. There was a lack of sufficient capacity on the part of the contractors to execute the project. This was further worsened by the rugged terrain of the area that made the transportation of construction materials difficult.

To respond to these postponements on the effective delivery of projects most organizations have resorted to adopt and implement operations management strategies that have been seen to work elsewhere in as much as quality management is concerned. However, this has not been successful (Salaheldin, 2008). Following the challenges to the construction industry raised above, the Rwanda Energy Board recommended power projects to adopt and implement their contracts as stipulated.

The researcher will therefore conduct this study to evaluate the factors that influence effective delivery of energy projects in Nyabarongo I Hydropower project and provide recommendations in order to avoid more problems in future planned projects in Rwanda.

## 2. Literature Review

### 2.1. Conceptual Framework

In this study the dependent variable is Effective delivery of energy projects while the independent variables are the factors influencing implementation of effective delivery of projects which are: project planning tools, procurement procedures, managerial skills amongst project managers and timely availability of funds.

The variables and their relationship are shown in the figure below:

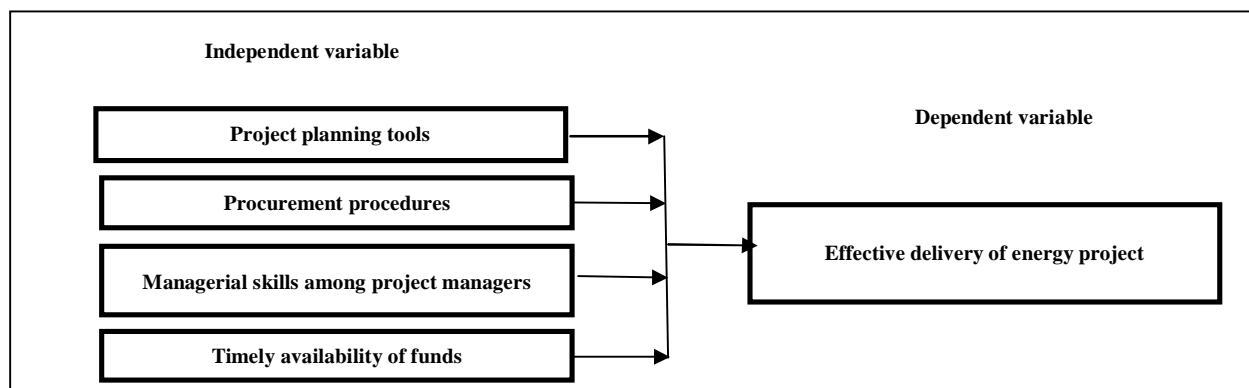


Figure 1: Conceptual framework

### 2.2. Project Planning Tools

During project planning sufficient attention for establishing goals and objectives lacks; yet these are vital elements of planning. A good project plan does not necessarily lead to a good project. However, a project plan built on a weak foundation can lead to a good idea resulting into a poor project (Anderson, 2004). Project planning involves collection of baseline data, needs assessment, developing an action plan, implementation and evaluation. Target groups need to be well understood before goals, activities and resources required are formulated. In this study, timely completion of a project involved formal closure and transfer of lessons learnt from the project to other projects. To enhance the understanding of project management process, the following tools are applied: project management work book and methodology, and project management guide. Carol Weiss (1995) hypothesized that the main reason for the challenges experienced by complex projects is poor articulation of the assumptions during evaluation stage. Stakeholders are uncertain about how the change process will progress and tend to pay little attention to the early and midterm changes that occur in the quest for longer term goal. Anderson (2004) postulates that clarity of the early steps needs to be undertaken towards the realization of the long-term outcome. The TOC process identifies the necessary and sufficient preconditions required to realize a certain long term outcome. Backward mapping is applied to enable the planners to think from the long term goals backwards to the intermediate and later early term changes expected to cause the targeted change.

### 2.3. Procurement Procedures

Procurement is the entire process of acquiring materials, property and services required for a particular project. The process starts with the identification of need, followed by a decision on procurement requirements. The process continues through risk assessment, identification and evaluation of alternative solutions, contract award, delivery and payment of the property or service. World Health Organization report (2007) explains that an effective procurement process ensures that materials are available at the right time, right quantity, for the right client, and at a reasonable price and quality. Ombaka (2009) further emphasizes that it does not merely entail the act of buying, but a wide range of business, operational, information technology, legal systems, safety and risk management, all undertaken to address an organization's needs. The ability to satisfy desired needs depends on the speed at which the good is delivered; otherwise a negative externality is created on the end users.

### 2.4. Managerial Skills among Project Managers

Kalinova (2007) convey that planning and management of a project, irrespective of its complexity require the opinions of a system based on the number of stakeholders involved. Mutual communication between these stakeholders enhances division of labour, development of individual competencies and responsibilities for effective decision making. Smallwood (2006) puts competencies into threshold or surface and differentiating or core competencies. Threshold competencies need to be practical while core competencies are yardsticks for top performers.

Organizational learning theory develops managerial competencies by incorporating informal practices in the development strategy. The theory has enabled organizations to respond better to competition needs and engage more inclusive employee participation (Bitencourt, n.d). Through training individual competencies are enhanced and translated to organizational competencies. Organizational learning enhances the interaction between people, vision and pragmatic matter, which is a major challenge to organizations in their quest for competitive advantage.

### 2.5. Timely Availability of Funds

Although project delivery process does not have a stage called funding, budgetary constraints affect each stage of the process (Sullivan & Mayer, 2010). The Right of Way to a project is not identified by a project that only fulfills the environmental process, only for the policy makers to disagree with the chosen source of funding. Mansfield et al (1994) reviewed the correlation between cost overruns and project delays and realized that a good agreement exists between the two factors.

### 2.6. Critical Review

By considering the Atkinson (1999) study that opened the research channel for further concepts such as: the effectiveness of administration of project management processes, the customers' satisfaction of project's deliverables, the creation of adding value to the enterprise, the meeting of stakeholder's satisfaction and the achievement of scope of the project (Freeman & Beale, 1992, Jonas, 2010, Lock, 2007, as cited by Pandremmenou et al (2013) were added.

In their empirical research, Pinto and Slevin (1987) developed a collective set of factors that are critically related to project implementation success in 1986. Their study on project implementation profile (PIP) model identified ten critical success factors related to project implementation success. The ten factors included; Project Mission: Initial clarity of goals and general directions; Top Management Support: Willingness of top management to provide the necessary resources and authority/power for project success; Project Schedule/Plans: A detailed specification of the individual action steps required for project implementation; Client Consultation: Communication, consultation, and active listening to all impacted parties; Personnel: Recruitment, selection, and training of the necessary personnel for the project team; Technical Tasks: Availability of the required technology and expertise to accomplish the specific technical action steps; Client Acceptance: The act of "selling" the final project to its ultimate intended users; Monitoring and Feedback: Timely provision of comprehensive control information at each stage in the implementation process; Communication: The provision of an appropriate network and necessary data to all key actors in the implementation; Trouble-Shooting: Ability to handle the unexpected crises and deviations from plan. Although these critical factors create a measurement platform for the project manager to identify aspects of a project that determines its implementation success, (Pinto and Slevin 1987)

According to the research by Pervaz, M., & Rahman, L. (2012) in South Asia, the critical factors that have contributed to the success of RE projects includes but not limited to the following: The presence of an approved policy for the renewable energy sector as a whole, or sub-sector policies relating to each technology or sub-sector, Availability of reliable resource assessment data, Well-established, efficient, institutional arrangements for planning and implementation of RE projects/programmes, Incentives–financial, fiscal, and supportive feed-in tariff systems, Community participation, Project identification and prioritization according to the needs of the beneficiaries, Project financing tied up fully in advance for smooth flow of funds for implementation, Standardization of design, technology and specifications, Due diligence of the needs, locally available capability, and resources of the area in advance, The training needs identification and provision of capacity building assistance ahead of launching a programme and continuous capacity augmentation support throughout the life of the project, Availability of efficient consultancy companies and well-established and reliable contracting firms and Availability of knowledge support from reputed academic or technical institutions.

### 3. Methodology

#### 3.1. Research Design

The study sought to establish the factors that influence effective delivery of energy projects in Rwanda. It adopted a case study survey. A case study involves careful and complete observation and analysis of a unit in its relationship to any other unit in the group(Kothari,2004). A survey design is associated with a guided and quick collection, analysis and interpretation of observation(Mugendaand Mugenda, 1999).

#### 3.2. Target Population

The target population of this study comprised of 30 employees of Rwanda Energy Group. This included 20 engineers, 5 managers and 5 procurement officers.

#### 3.3. Sample Size and Sampling Procedure

The entire population constituting 30 employees was used as the sample size. This is because the target population is too small and information can be collected from the entire. Census method was employed to collect data from all the 30 respondents. According to Karuna (2007) this method involves data collection about every unit in a group or population. There is no sampling variability attributed to the statistic because it is calculated using data from the entire population.

#### 3.4. Data Collection Instrument

Primary data was collected regarding factors affecting effective delivery of energy projects.The respondents for this study will be selected employees from various functional areas in the company. Data was collected using structured questionnaires which were self- administered. Questionnaires were preferred because of the simplicity in their administration and low cost associated.

### 4. Research findings and discussion

#### 4.1. Demographic Information

Demographic information of the respondents was based on gender, position held by the respondents and the department where they work.

	N	%
<b>Gender</b>		
Male	20	71
Female	8	29
Total	28	100
<b>Age</b>		
21-30	3	11
31-40	8	29
41-50	11	39
51-60	4	14
60 and above	2	7
Total	28	100
<b>Functional Areas</b>		
Engineers	18	64
Managers	5	18
Procurement managers	5	18
Total	28	100

Table 1: Demographic characteristics

From Table 4.2, male participants constituted 71% while female were the minority 29%. The percentages of respondents from Engineers, Managers and procurement managers 64%, 18% and 18% respectively.

#### 4.2. Effect of Implementation Factors of Nyabarongo I hydropower Energy Project effective delivery of projects

Respondents' opinion on the effect of Implementation Factors of Nyabarongo I hydropower Energy Project on effective delivery of projects was captured using 1-Strongly disagree; 2 – Disagree; 3 – Not sure; 4 – Agree; 5 –Strongly agree. The statements, respondents' opinions and their percentages are as shown below:

Implementation Factors of Nyabarongo I hydropower Energy Project						
Part 1	Project planning tools	Strongly disagree	Disagree	Not sure	Agree	Strongly agree
	1) Baseline data was collected before commencement of Nyabarongo I Hydropower project			20 (71%)	8 (29%)	
	2) Needs assessment was done before embarking on Nyabarongo I Hydropower project		5 (18%)		23 (82%)	
	3) An action plan was for the implementation of the project was developed		10 (36%)		18 (64%)	
	4) Target groups were understood before setting the goals of the project		14 (50%)		14 (50%)	
	5) All the activities and resources required for successful project were considered		5 (18%)	3 (10%)	20 (71%)	
Part 2	<b>Procurement procedures</b>					
	1). Effective delivery of energy product is influenced by procurement procedures				26 (93%)	
	2). There are procurement procedures to follow when procuring materials		5 (18%)		23 (82%)	
	3). All procurements done follows the set procedures		4 (14%)		24 (86%)	
	4). All required materials are procured at the right time			2 (7%)	26 (93%)	
	5). All procurements in the right quantities and quality		3 (10%)		25 (90%)	
Part 3	<b>Managerial skills among project managers</b>					
	1) Managers has necessary skills for effective delivery of the energy project				78(%)	22(%)
	2) The managers of Nyabarongo I Hydropower project interacted freely with their subordinates		20(%)		65(%)	15(%)
	3) The Nyabarongo I Hydropower project implementation was supervised as planned.		56(%)	26(%)	18(%)	
	4) The Nyabarongo I Hydropower project team had the required Technical Skills				86(%)	14(%)
	5) The management is committed to effective delivery of energy of the project			2(%)	25(%)	73(%)
Part 4	<b>Influence of Timely availability of funds on effective delivery of energy of the project</b>					
	1). Effective delivery of energy project in influenced by lack of funds		20%		30%	50%
	2). Funding of the project is accessible from local financial institutions				80%	20%
	3). Available funds allocated to the project are properly utilized		50%		40%	10%
	4). Project funds are available when needed		60%		40%	
	5). There is an a proved budget for effective delivery of energy of the project		40%		40%	20%

Table 2: Implementation Factors of Nyabarongo I hydropower Energy Project

From the Table 2, 71% of the respondents were not sure that baseline data was collected before commencement of Nyabarongo I Hydropower project whereas 29% agreed with the statement. 82% of the respondents agreed that needs assessment was done before embarking on Nyabarongo I Hydropower project while 18% disagreed. While 64% agreed that action plan for the implementation of

the project was developed 36% disagreed. 50% of the respondents agreed that target groups were understood before setting the goals of the project while 50% disagreed. On whether all the activities and resources required for successful project were considered, 71% agreed, 18% disagreed while 10% were not sure.

Ninety three percent (93%) of the respondents agreed that effective delivery of energy product is influenced by procurement procedures while no other verdict was given by the rest of respondents. 82% of the respondents agreed that procurement procedures were followed when procuring materials while 18% disagreed with the statement. 86% of the respondents agreed that all procurements done followed the set procedures while 14% disagreed. Ninety three percent (93%) of the respondents agreed that all required materials are procured at the right time while 7% of the respondents were not sure. Ninety percent (90%) of the respondents agreed that all procurements were done in the right quantities and quality while 10% disagreed with the statement.

Seventy eight percent of the respondents agreed that managers had necessary skills for effective delivery of the energy project while 22% strongly agreed with the statement. Seventy five percent of the respondents agreed the managers of Nyabarongo I Hydropower project interacted freely with their subordinates, while 15% strongly agreed while 20% of the respondents disagreed. Regarding supervision 56% of the respondents disagreed while 26% were not sure and 18% agreed with the statement that Nyabarongo I Hydropower project implementation was supervised as planned. Most of the respondents agreed on the statement that Nyabarongo I Hydropower project team had the required technical skills. Concerning management commitment to effective delivery of energy of the project 2% of the respondents were not sure while the rest strongly agreed that management was committed to the energy project.

Fifty percent of the respondent strongly agreed that effective delivery of energy project is influenced by lack of funds 30% agreed while 20% disagreed. Regarding funding of the project is accessible from local financial institutions 80% of the respondents agreed while 20% strongly agreed with the statement. As whether available funds allocated to the project are properly utilized 50% disagreed, 40% agreed while 10% strongly agreed. 60% of the respondents disagreed that project funds are available when needed while 40% agreed with the statement. As regarding the presence of approved budget for effective delivery of energy of the project 40% of the respondents disagreed, 40 % agreed while 20 % strongly agreed.

#### 4.3. Discussions

Table 1 shows that male participants were more (71%) than female (29%). The percentages of respondents from Engineers, Managers and procurement managers 64%, 18% and 18% respectively.

From the research findings, majority of respondents agreed that project planning needed to be improved if the challenges of late project closure are to be mitigated. Baseline data should be a pre-requisite before commencement of any project. 82% of the respondents stated that needs assessment a tool for any project was done within the stipulated time. However, the respondents agreed that project planning was done, but adoption of planning tools was compromised during implementation.

From the table 2 the study revealed that management commitment on the skills of project managers (63%) and strongly agreed (35%) with the statement in the questionnaire. This means that the management provides the suitable environment, needed to improve quality and productivity of the company. This finding differ from those of a similar study conducted by Usman (2005) to investigate the impact of total quality management implementation in Construction Company in Nigeria. He revealed that there was poor management commitment to quality. Without clear and consistent quality leadership, quality cannot hope to succeed (Everett, 2002)

Fifty percent of the respondent strongly agreed that effective delivery of energy project is influenced by lack of funds 30% agreed while 20% disagreed. Regarding funding of the project is accessible from local financial institutions 80% of the respondents agreed while 20% strongly agreed with the statement. As whether available funds allocated to the project are properly utilized 50% disagreed, 40% agreed while 10% strongly agreed. 60% of the respondents disagreed that project funds are available when needed while 40% agreed with the statement. As regarding the presence of approved budget for effective delivery of energy of the project 40% of the respondents disagreed, 40 % agreed while 20 % strongly agreed. This is in agreement with a study by Mohamed, Wafi& Ahmad (2013) to analyze the influence of timely availability of funds on effective delivery of project in an era of global marketing. Their findings provide support for the notion that organizations that value teamwork, cohesion, employee involvement, human resource development, flexibility, creativity and timely funds drive are able to implement effective delivery practices better than organizations that do not focus on these values.

The main respondents involved project engineers, supervisors and technical staff. Most of the respondents expressed that managerial skills did not pose a great challenge to projects completion in the area. The engineers were responsible for providing leadership to the project team and few challenges of lack of competency were witnessed. Seventy eight percent of the respondents agreed that managers had necessary skills for effective delivery of the energy project while 22% strongly agreed with the statement. Seventy five percent of the respondents agreed the managers of Nyabarongo I Hydropower project interacted freely with their subordinates, while 15% strongly agreed while 20% of the respondents disagreed.

#### 4.4. Correlation Analysis

In order to investigate the relationship between factors influencing implementation of effective delivery of energy projects, Pearson correlation was used. Table 4.3 shows the result:

		<b>Project Planning Tools</b>	<b>Procurement Procedures</b>	<b>Managerial Skills Of Managers</b>	<b>Timely Availability Of Funds</b>
Project planning tools	Pearson Correlation	1	.078**	.035**	.005**
	Sig. (2-tailed)		.491	.759	.968
	N	28	28	28	28
Procurement procedures	Pearson Correlation	.078**	1	-.151	.194
	Sig. (2-tailed)	.491		.181	.084
	N	28	28	28	28
Managerial skills of managers	Pearson Correlation	.035**	-.151	1	.048**
	Sig. (2-tailed)	.759	.181		.673
	N	28	28	28	28
Timely availability of funds	Pearson Correlation	.032**	.194*	.048**	1
	Sig. (2-tailed)	.781	.084	.673	
	N	28	28	28	28
	N	28	28	28	28

Table 3: Correlation between independent variables

\*\* Correlation is significant at 0.01 levels

Most of the factors evaluated had positive correlation with strongest correlation being between timely availability of funds and project planning tools. Negligible correlation was observed between Managerial skills of managers and procurement managers.

		<b>Effective Delivery</b>	<b>Project planning tools</b>	<b>Procurement procedures</b>	<b>Managerial skills of managers</b>	<b>Timely availability of funds</b>
Effective Delivery	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	28				
Project planning tools	Pearson Correlation	.376**	1			
	Sig. (2-tailed)	.000				
	N	28	28			
Procurement procedures	Pearson Correlation	.895**	.750**	1		
	Sig. (2-tailed)	.000	.000			
	N	28	28	28		
Managerial skills of managers	Pearson Correlation	.430**	.387**	.277**	1	
	Sig. (2-tailed)	.000	.000	.022		
	N	28	28	28	28	
Timely availability of funds	Pearson Correlation	.537**	.427**	.453**	.810**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	28	28	28	28	28

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

Table 4: Correlation between Independent and Effective delivery of projects

The results from table 4 indicate that project planning, managerial skills among project managers, procurement procedures and timely availability of funds and positively relate to effectively delivery of projects. This implies that in order to effectively deliver a project, procurement procedures should be highly involved in the activities of the project, ensure that the managerial skills of project managers is good, taking into consideration of project planning tools and timely availability of funds.

## 5. Conclusions and Recommendations

### 5.1. Conclusions

The main aim of this study was to determine the factors that influence effective delivery of energy projects in Rwanda. The study was based on four objectives:

The first objective was to establish the influence of project planning tools on effective delivery of energy projects in Rwanda. The study concluded that project planning tools is a critical factor in implementation of effective delivery of energy projects. It was further



concluded that project planning tools has a positive influence on implementation of effective delivery of energy projects. This means that with increased use of the implementation of effective delivery of energy projects is likely to be more successful.

The second objective of the study was to determine the influence of managerial skills amongst project manager's influence on effective delivery of energy projects in Rwanda. The study concluded that managerial skills amongst project managers is a critical factor in implementation of effective delivery of energy projects in Rwanda. The study further concluded that managerial skills amongst project managers has positive influence on implementation of effective delivery of energy projects in Rwanda. This means that managerial skills amongst project managers can be used to enhance implementation process of effective delivery of energy projects in Rwanda.

The third objective of the study was to determine the influence of procurement procedures on effective delivery of energy projects in Rwanda. The study concluded that procurement procedures is a critical factor in implementation of effective delivery of energy projects. In addition, the study concluded that procurement procedures positively influences implementation of effective delivery of energy projects. This means that successful implementation of effective delivery of energy projects is directly affected by procurement procedures.

The last objective of the study was to establish the influence of timely availability of funds on effective delivery of energy projects in Rwanda. The study concluded that timely availability of funds is a critical factor in implementation of effective delivery of energy projects. The study further concluded that timely availability of funds positively influence implementation of effective delivery of energy projects. This means that implementation of effective delivery of energy projects is directly affected by timely availability of funds.

### 5.2. Recommendations

From the study, it was evident that project planning tools is a critical factor in implementation of effective delivery of projects. This study therefore recommends that energy related companies as well as other organizations who are implementing effective delivery of projects should have improved project planning tools to enhance the capacity to forecast the expected project activities and their financial implications. This study further recommends that project activities need to be properly documented irrespective of the nature and magnitude of the project. This would provide information necessary for monitoring and evaluating various project challenges and hence prevent recurrence in future projects.

The study also recommends that Procurement procedures should be adopted according to the Public Procurement and Disposal Act. Further studies may be done to explore the relationship between these factors and organizational performance and customer satisfaction and other variables.

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