Effects of Delayed Mobilization of Resources on the Completion of Infrastructural Projects: A Case of Sondu-Miriu Hydropower Project, Kisumu County, Kenya*

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The study examined the effects of delayed mobilization of resources on the completion of Sondu-Miriu Hydropower Project (SMHP) in Kisumu County, Kenya. The project's completion was scheduled for end of 2005, but was later revised to 2011 due to delay, which periodical reports are associated with delayed mobilization of resources, among other challenges. Causes of project delays have attracted relatively more studies than the effects of such delays. The study addressed two research questions: What is the relative importance of mobilization of resources among other components of contractual delays? What is the perceived effect of delayed mobilization of resources on the project's completion? A causal-comparative design was adopted and primary data sourced in May 2011 from 39 senior management staff of contractual parties. Relative Importance Index (RII) was used to determine the relative importance of perceived effects of delayed mobilization of resources on the project's completion; while Kendell's coefficient of concordance was applied to determine the degree of agreement among participants regarding perceived effects of delays. The study found that delayed mobilization of resources led to re-scheduling and re-sequencing of activities (92.3%), loss of productivity and efficiency (82.1%), increase in time-related costs (79.5%), prevention of early completion (76.9%), as well as extension of time and acceleration of works (74.4%). Based on the results, the study concluded that it is important for stakeholders to develop and share resource mobilization plans, which should ensure timely availability of equipment and human resource. However, having comprehensive plans is not sufficient, if funds are not released to contractors in time. The study recommends the need for comprehensive resource mobilization plans; timely payment of contractors, in accordance with contractual schedules, to facilitate resource mobilization plans; as well as citizen participation to influence the flow of resources at higher levels of government as well as ensure accountability at the project level.

Keywords: infrastructural projects, resource mobilization, equipment, human labor, time overruns, budget overruns

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Introduction

Sondu-Miriu Hydropower Project (SMHP) was initiated by Kenya Electricity Generating Company Limited (KenGen) to inject an additional 80 Mega Watts of electricity into the national grid. The project which is located in Kisumu County, was financed by the Government of Japan through Japanese International Corporation Agency (JICA), under the Overseas Development Agency (ODA) loans at a cost of KES 18 billion (JICA, 1985). The project's construction began in 1999 and was scheduled to end in 2005, covering a number of facilities, including a headrace pressure tunnel, a surge tank, access roads, schools, a base camp, a penstock line, a power station, and an outlet channel. Additional facilities included hydro-mechanical works, generating equipment, transmission line, and substations (Nippon Koei, 2008). Due to various circumstances, the project's completion date was revised from December 2005 to November 2011. Among the factors that contributed to revision of the project's completion date was delay in the mobilization of resources, including equipment and human labor (Nippon Koei, 2008; Abiero, 2010).

As noted by Assaf and Al-Hejji (2006), mobilization of resources in large infrastructural projects is often the obligation of contractors and one of the key preliminary steps in ensuring that such projects are successful by being delivered within scheduled duration, allocated budget, and specified quality (Majid, 2006). Paradoxically, delayed mobilization of resources is often a critical challenge to infrastructural projects world over, leading to increased construction costs, due to time extension, acceleration of works, as well as loss of productivity; disruption of work, loss of revenue through lawsuits, as well as project abandonment (Sambasivan & Soon, 2007; Owolabi et al., 2014). According to Melton and Vann (2013), mobilization of resources consists of preparatory work and operations necessary for the movement of equipment and personnel, supplies, and incidentals to project site before onset of works. Whereas some contractors purchase equipment, others rent them from dealers or individuals (Melton & Vann, 2013). However, in many developing economies, it is challenging for contractors to own all necessary equipment for the construction of large infrastructural facilities. More specifically, the cost of purchasing and maintaining excavators, track hoes, trucks, scaffolds, compactors, and other large equipment is prohibitive for many contractors, thus, renting from dealers or leasing companies is an easier option (Melton & Vann, 2013).

Furthermore, human labor is an important factor in construction projects. Mobilization of human labor entails identification of adequate skilled and unskilled workers to operate equipment and provide manual labor (Raj & Kothai, 2014). The duration taken by contractors to mobilize equipment and human labor is a key indicator of successful completion of infrastructural projects within specified timeframes, budgets, and quality specifications. Delay is a common challenge experienced in the construction of infrastructural projects in developed and developing countries alike (Sambasivan & Soon, 2007; Alaghbari, Kadir, Salim, & Ernowati, 2007; Aziz, 2013). Whereas causes of delays in the construction of infrastructural projects have attracted many studies, particularly in developing economies (Sambasivan & Soon, 2007; Aziz, 2013; Owolabi et al., 2014); the effects of such delays have not received as much attention.

In Kenya, a few studies, such as Talukhaba (1999), Abiero (2010), as well as Ondari and Gekara (2013), assessed various factors causing delay in the completion of infrastructural facilities; however, none focused on the effects of delayed mobilization of resources on the completion of such facilities. This study examined the effects of delayed mobilization of resources on the completion of SMHP project. Unlike its predecessors, the study aggregated perspectives of the project's key stakeholders, including KenGen (the employer), Nippon

Koei Company Limited (the engineer), Sinohydro (the contractor), and JICA (the financier), to determine the relative importance of delayed mobilization of resources in the timely completion of SMHP project. The study further applied a coefficient of concordance to determine the degree of agreement among the four categories of participants with respect to their ranking.

The purpose of the study was to inform stakeholders of large infrastructural projects about the potential negative effects of delayed mobilization of resources on the successful completion of such projects, within planned time, budget, and quality standards. The findings of this study are therefore, likely to influence the planning and execution of large infrastructural projects in various contexts. However, the findings are particularly relevant for stakeholders in resource-poor contexts, where loss of public resources through project delays is likely to have significant ripples-effect across all sectors of the economy.

Literature Review

A review of existing literature reveals that delay in the completion of infrastructural projects is a global phenomenon, affecting both developed and developing countries (Sambasivan & Soon, 2007; Alaghbari et al., 2007; Aziz, 2013). For instance, in developed countries, De Souza (2009) linked delays in the completion of infrastructural projects in Canada with various factors, including reduced funding by sponsors, communication breakdown, delayed disbursement of funds, poor site management by contractors, and tedious legislative procedures. In the United States, SNL Financial (2010) reported delay in the completion of a pipeline project connecting Florida State and Bahamas, particularly due to design changes; while Baldwin and Manthei (1971) associated project delays in the United States with weather vagaries, low labor supply, and poor management of sub-contractors. Delays in the completion of infrastructural projects have also been reported in countries such as Australia and Britain, among others (Bromilow, 1974; Sambasivan & Soon, 2007; Aziz, 2013).

In developing countries, delays in the completion of infrastructural projects have been reported in India, Malaysia, Indonesia, Qatar, Jordan, Egypt, Ghana, South Africa, and Kenya, among other countries. For instance, in India, a government *Infrastructure Delay Report of 2006* reported delays in the completion of a rail project in West Bengal and a coal project for about three and two decades, respectively, which were attributed to slow design processes and late disbursement of project funds (Government of India, 2006). In Qatar, a *Public Works Report of 2009* linked delays in the completion of about one-third of infrastructural projects to contractors' lack of capacity, escalation of construction material prices, prolonged transfer of land ownership rights to contractors, deferral of payments due to design issues, as well as legislative challenges in the procurement of necessary equipment and machinery from overseas market (Government of Qatar, 2009).

In Malaysia, Sambasivan and Soon (2007) identified causes of delays in the completion of infrastructural projects, including contractor's improper planning, poor site management, inadequate experience, inconsistent flow of payments for completed works, poor management of sub-contractors, inconsistent communication between parties, shortage of materials, as well as delay in the mobilization of resources, such as equipment and labor. In South Africa, a government report linked infrastructural project delays with changes in project design, inconsistent flow of financial resources, and contractor's lack of capacity to deliver (Government of South Africa, 1999); while in Ghana, delay in payments, poor contractor management, delays in material procurement, poor technical performances, and escalation of material prices were identified as key factors

accounting for about 80% of delays in the completion of infrastructural projects (Frimpong, Olowoye, & Crawford, 2003).

In Kenya, delays in the completion of infrastructural facilities have been associated with factors, such as poor financial management by clients, inadequate designs, and poor management of the construction process by contractors (Talukhaba, 1999). Arguably, these factors are compounded by secondary issues, such as poor management of materials and equipment by contractors, inadequate recognition and response to risks emanating from the physical and socio-economic environments, as well as inadequate regard for stakeholders' needs (Talukhaba, 1999). Another study conducted by Ondari and Gekara (2013), which focused on factors influencing completion of road projects in Kenya, reported significant correlation between project delays and factors, such as management support ($r = 0.625$), design specifications ($r = 0.836$), contractor's capacity ($r = 0.567$), and supervision capacity ($r = 0.712$). Delays in the completion of infrastructural facilities were also identified by Abiero (2010), who reported that such delays led to loss of both time and possession utility of the projects. Some of the cases cited in the report included the Kisii-Chemosite Road which delayed for more than 15 years as well as the Nyanza Provincial Headquarters which stalled for more than two decades (Abiero, 2010).

Existing literature revealed that a lot of studies conducted in various contexts were skewed towards causes of delays in the completion of infrastructural facilities; few identified delayed mobilization of resources as one of the causes of delay in the completion of infrastructural projects. Similarly, very few studies examined the effects of delays in the mobilization of resources on the completion of such projects.

Research Methods

The study adopted a causal-comparative design which permitted the application of quantitative approaches in data collection, processing, and analysis. Causal-comparative designs employ natural selection principles, rather than manipulation of dependent variables to establish relationships with independent variables (Oso & Onen, 2005). Self-administered questionnaires were issued to senior management staff of contracting parties, including KenGen (the employer), Nippon Koei Company Limited (the engineer), Sinohydro (the contractor), and JICA (the financier), to source the requisite information. Primary data were supplemented with secondary data, which was sourced from the project's archives. Senior management staff members were targeted, because contractual issues formed part of their responsibility. A sampling frame of all senior management staff was prepared using organizational management charts and the process identified 54 eligible participants, who were all included in the sample to avoid the risk of sampling error (Table 1).

Table 1

Sampling Frame

Contracting partner type	Frequency	Percent
Employer	15	27.8
Contractor	20	37.0
Engineer	15	27.8
Financier	4	7.4
Total	54	100.0

Self-administered questionnaires were used to source the information, because they provided the flexibility that targeted participants would require, considering their complicated itineraries. The approach

enabled participants to provide the requisite data at their convenience. One module of the instrument was applied across the board to permit comparison of perspectives from different contracting parties. The instrument, which had both closed- and open-ended questions, captured information on contractual delay typology, perceived causes and effects as well as mitigative measures.

The instrument was pre-tested at the Kisumu Airport Expansion Project, which had a similar contractual management structure. The pre-testing was important for testing reliability of the instrument and validity and feasibility of data collection approaches. Primary data were collected in May 2011 after obtaining necessary approval from University of Nairobi, National Council of Science and Technology, as well as KenGen. Questionnaires were delivered to targeted participants and follow-ups were made through e-mails and telephone calls. Of the 54 targeted participants, 39 (72%) successfully completed and returned the questionnaires. Table 2 shows the questionnaire return rate for each category of participants.

Table 2

Questionnaire Return Rate

Contracting partner type	No. targeted	No. of participants	Return rate (%)
Employer	15	14	93.3
Contractor	20	12	60.0
Engineer	15	10	66.7
Financier	4	3	75.0
Total	54	39	72.2

Primary data were listed, coded, digitalized, and cleaned for logical inconsistencies and misplaced codes. The methods used included descriptive, factorial comparative, and rank analyses, to develop relative importance of causes and effects of contractual delay on the project's completion. Relative Importance Index (RII) was computed using the formula (Kometa, Oloimolaiye, & Harris, 1994).

$$RII = \frac{\sum W}{AN} \quad (1)$$

where W is the weighting assigned to each response on a scale of 1 to 5 corresponding with lowest to highest; A is the highest weight; and N is the total number of participants.

RII yielded values in the range of $0 < x \leq 1$. The higher the value of RII, the more important the identified factor on contractual delays. This ranking enabled cross comparison of the relative importance of the factors as perceived by the four categories of participants. RII is a non-probabilistic rank statistic derived from ordinal data; hence, its accuracy is non-dependent on sample size or the population.

Furthermore, Kendell's coefficient of concordance was applied to determine the degree of agreement among the four categories of participants with respect to their ranking (Frimpong et al., 2003). The coefficient states that the degree of agreement on a 0 to 1 scale is given by W , such as that:

$$W = \frac{12U - 3m^2n(n-1)^2}{m^2n(n-1)} \quad (2)$$

$$U = \sum_{j=1..n} (\sum R)^2 \quad (3)$$

where n is the number of factors; m is the number of groups; and j represents the factors 1, 2, 3, ... n .

As noted by Frimpong et al. (2003), Kendell's coefficient of concordance is strong on both probabilistic

and non-probabilistic distributions, because it is not sensitive to sampling error. In addition, Chi-square statistic was used to determine whether there was a significant difference in the ranking of contractual delay factors perceived to be influencing delays in the project's completion. The Statistical Package for Social Scientist (SPSS) and Microsoft Excel were used to analyze the data.

Results

The results of this study have been presented and interpreted under five thematic areas, including participants' profile, types of delay experienced in SMHP project, components of contractual delay, and effects of delayed mobilization of resources on the project's completion. Details are provided in the following sub-sections.

Participants' Professional and Work Experience

The study covered 39 senior management staff of the contractual parties, including 14 (35.9%) from KenGen (the employer), 12 (30.8%) from Sinohydro (the contractor), 10 (25.6%) from Nippon Koei (the engineer), and 3 (7.7%) from JICA (the financier). The duration of professional and work experience is an important factor in successful management and administration of construction projects. In view of this, participants were requested to indicate the duration of experience in managing construction projects and more specifically, the duration of experience in managing SMHP project. The results are summarized in Table 3.

Table 3

Professional and Work Experience

Contractual party	Frequency	Average experience (years)		Relative weighted management
		Construction projects	Sondu-Miriu HP	
Employer	14	2.6	2.3	0.9
Contractor	12	2.1	1.7	0.7
Engineer	10	3.0	2.1	1.0
Financier	3	2.0	1.3	0.6
Total	39	2.4	1.9	

The results show that the employer's staff reported an average professional experience of 2.6 years in the management of construction projects and 2.3 years in the management of SMHP project. The contractor's staff indicated an averaged experience of 2.1 years and 1.7 years in the management of construction projects and SMHP project, respectively. Engineer's staff reported an average experience of 3.0 and 2.1 years; while the Financier's staff stated the least experience of two years in the management of construction projects and 1.3 years in SMHP project.

The results suggest low variability of experience among participants. The average experience was 2.4 years in management of construction projects and 1.9 years in management of the project. The engineer's staff was the most experienced with a relative weight of 1.0 compared to the employer's 0.9 and the contractor's 0.7. The least relative management experience was noted among the financier's staff, which was weighted at 0.6. Low variability further suggests that the participants were fairly homogenous in terms of professional experience and therefore provided reliable information with negligible internal deviation of ± 0.03 years.

Furthermore, the contractual documents revealed that the employer set a minimum professional experience in managing construction projects at three years, upon which the reported duration of professional experiences

was compared. The results show that it is only the engineer's staff that met the minimum threshold, which may suggest that the employer might have failed to exercise the authority to ensure adherence to qualification standards by all contractual parties. Projects which are managed by highly experienced personnel have a relatively lower risk of experiencing contractual delays, due to the management's ability to proactively assess and mitigate potential risk factors that might lead to delays. In view of this, the staff of most contractual parties reported a professional experience, which is lower than the threshold set in the contractual documents, which might have contributed to the contractual delay experienced in SMHP project.

Participants were requested to indicate their perspectives on whether SMHP project was on time or in delay. The results presented in Table 4 show that out of the 14 staff of the employer, 11 (78.6%) indicated that the project was in delay. The same status was confirmed by all the staff members of the contractor (12), the engineer (10), and the financier (3).

Table 4

Perception on the Timeliness of the Project

Contractual partner type	Yes		No	
	Frequency	Percent	Frequency	Percent
Employer	3	21.4	11	78.6
Contractor	0	0.0	12	100.0
Engineer	0	0.0	10	100.0
Financier	0	0.0	3	100.0
Total	3	7.7	36	92.3

Overall, 36 (92.3%) participants across the contractual parties affirmed that the project was not on schedule, while 3 (7.7%) expressed contrary opinions, suggesting that some participants might not be having sufficient experience in the project's delay aspects. Nonetheless, the high proportion of participants (92.3%), affirming that the project was in delay, is a robust indication that the project's completion was behind schedule.

Types of Delay Experienced by SMHP Project

Three main types of project delay, namely, contractual, stakeholder, and force majeure, were listed in the data collection instrument and participants requested to indicate their opinion regarding the frequency of occurrence on a five-point integer scale ranging from 1 to 5 and corresponding to "very low", "low", "medium", "high", and "very high". A mean statistic, indicating convergence among groups, was computed to establish agreement among participants on the frequency of occurrence. Table 5 provides a summary of the findings.

Table 5

Types of Delay at SMHP Project

Contractual partner type	Contractual delay		Stakeholder delay		Force majeure	
	Mean	Category	Mean	Category	Mean	Category
Employer	3.8	High	3.8	High	1.8	Low
Contractor	2.8	Medium	2.3	Low	2.9	Medium
Engineer	3.8	High	1.5	Low	1.5	Low
Financier	3.7	High	2.1	Low	1.7	Low
Convergence	3.5	High	2.4	Low	2.0	Low

The results show that the most common type of delay was contractual, scoring an average of 3.8 (high) among the employer's staff, 2.8 (medium) among the contractor's staff, 3.8 (high) among the engineer's

staff, and 3.7 (high) among the financier's staff. Overall, the analysis obtained a convergence of 3.5 (high) across all the groups. Regarding the stakeholder type of delay, the analysis obtained a mean score of 3.8 (high) among members of the employer's group, 2.3 (low) among members of the contractor, 1.5 (low) among members of the engineer, and 2.1 (low) among employees of the financier. The overall convergence was 2.4 (low) across all the groups, which is an indication that the frequency of stakeholder delay was lower than contractual delay.

The results in Table 5 further show that force majeure was the least common type of delay with scores of 1.8 (low) for the employer, 2.9 (medium) for the contractor, 1.5 (low) for the engineer, 1.7 (low) for the financier, and a convergence of 2.0 (low) across all the groups. This also implies that the frequency of force majeure was least common type of delay in the context of SMHP project. The results indicated the relative importance and hence, agreement among contractual parties regarding the order of importance.

Components of Contractual Delay: Resource Mobilization

Contractual delay is a manifestation of failure by parties involved to perform their contractual obligations. Timely mobilization of necessary equipment and human labor for the construction process is one of the key contractual obligations that were laid on the contractor's shoulder. Taking cognizance of this, the study sought to establish perceptions of the management staff regarding the occurrence of resource mobilization delay within the context of SMHP project. In this regard, participants were requested to state at a nominal scale of "yes" or "no", whether resource mobilization component of contractual delay ever occurred during the project's implementation. Table 6 presents the results.

Table 6

Components of Contractual Delay (%)

Components of delay	Employer		Engineer		Contractor		Financier		Overall		RII
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	
Design	57.2	42.8	79.9	20.1	92.3	7.7	100.0	0.0	82.4	17.6	0.8
Payment	42.8	57.2	40.0	60.0	49.7	50.3	67.0	33.0	49.9	50.1	0.5
Site possession	56.7	43.3	9.8	90.2	58.0	42.0	0.6	99.4	31.3	68.7	0.3
Mobilization	50.3	49.7	90.2	9.8	33.3	66.7	99.6	0.4	68.4	31.6	0.6
Legal procedures	42.5	57.5	80.4	19.6	66.8	33.2	67.4	32.6	64.3	35.7	0.5
<i>n</i>	14		12		10		3		39		

The study found that delay in resource mobilization was experienced during the project's construction. Overall, 68.4% of the participants across all groups affirmed that the project experienced delays in the mobilization of necessary equipment and human labor. The analysis obtained RII for each form of contractual delay to facilitate ranking in terms of seriousness. The results show that delay in resource mobilization might have been serious, with an RII of 0.6.

Effects of Delay in Resource Mobilization on Project's Completion

During the project planning phase, stakeholders consider and plan for how the equipment and human labor required to facilitate the construction process will be accessed. Timely availability of such resources is essential for successful completion of infrastructural projects within specified timeframes and budgets. Even though mobilization of resources to execute construction works is a contractual responsibility of contractors, employers/clients have an important role of facilitating the process through early payment as per contractual

schedule. In this study, 68.4% of the participants identified delayed mobilization of resources as one of the factors that contributed to delay in the completion of SMHP project. Participants attributed the delay to late disbursement of funds by the national treasury, as well as the contractors' inefficiency. Based on this, the study sought to determine the effects of delayed mobilization of resources on the project's completion. Table 7 presents the findings.

Table 7

Effects of Resource Mobilization Delay on the Project's Completion (%)

Effect	Employer		Contractor		Engineer		Financier		Total	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Prevents early completion	78.6	21.4	83.3	16.7	70.0	30.0	66.7	33.3	76.9	23.1
Extends time & acceleration	71.4	28.6	91.7	8.3	60.0	40.0	66.7	33.3	74.4	25.6
Loss of productivity & efficiency	85.7	14.3	75.0	25.0	80.0	20.0	100.0	0.0	82.1	17.9
Re-scheduling & re-sequencing	92.9	7.1	91.7	8.3	90.0	10.0	100.0	0.0	92.3	7.7
Increase time-related costs	71.4	28.6	91.7	8.3	80.0	20.0	66.7	33.3	79.5	20.5
Abandonment of project	21.4	78.6	25.0	75.0	10.0	90.0	0.0	100.0	17.9	82.1
<i>n</i>		14		12		10		3		39

The results show that up to 92.3% of the participants perceived that delayed mobilization of necessary resources instigated re-scheduling and re-sequencing of project activities. Participants pointed out that re-scheduling and re-sequencing of project activities were necessitated by postponement of work plan activities due to late arrival of necessary equipment and machinery. Although the processes enabled project stakeholders to adapt to the situation caused by untimely mobilization of resources, participants pointed out that the re-scheduling and re-sequencing of project activities had implications on the project's budget. Participants further indicated that the processes touched all project activities and their relationships to each other *vis-à-vis* resources, such as time, funds, and human labor, among others, which necessitated the participation of all stakeholders.

The results further show that 82.1% of the participants associated delayed mobilization of resources with loss of productivity and efficiency among workers. Participants noted that workers' optimal productivity was a function of many variables, among them being the work environment, as well as availability and functionality of equipments. Thus, delay in availing such equipment, meant that workers were not supported and motivated to give their optimal output, leading to inefficient utilization of financial and time resources.

Furthermore, 79.5% of the participants reported that delay in the mobilization of resources contributed to an increase of time-related costs. Notably, time-related costs are those the contractor incurred with the passage of the time, regardless of the amount of works carried out. In this regard, participants identified time-related costs that were incurred, due to delayed mobilization of resources, including maintenance of managerial staff, overhead costs, interest payable on loans, insurance premiums, as well as security services. During the delay period, the project incurred expenditures that did not translate into progression of construction works.

As indicated in Table 7, up to 76.9% of the participants expressed the perception that delayed mobilization of resources prevented early completion of the project, which resulted to expenditure of more financial and time resources in order to make-up for the period of delay. More still, 74.4% of the participants indicated that

delayed mobilization of resources led to the extension of timeframe and acceleration of works, which saw the introduction of measures, such as overtime, night and day shifts, as well as inflation labor force, albeit with significant implications on the project's budget.

Participants pointed out that despite the introduction of such measures, which increased the project's costs, stakeholders had to extend the project's timeframe; which may suggest that measures taken to accelerate construction works did not contribute significantly to early completion of the project. Participants hypothesized that acceleration of works might have led to loss of productivity, particularly due to delays in payment of the contractor, which meant that workers were not paid and motivated consistently.

Discussions

The study aimed at determining the effects of delayed resource mobilization on the completion of SMHP project, based on the perspectives of senior management staff of the contractual parties, including KenGen (the employer), Nippon Koei Company Limited (the engineer), Sinohydro (the contractor), and JICA (the financier). The purpose was to contribute to existing literature on infrastructural project delays, particularly in SSA countries, with a view to sensitizing stakeholders to work towards lessening such delays, in order to deliver inspirational, durable, efficient, and safe infrastructural facilities within scheduled timeframes and allocated budgets. Enhancing efficiency in the construction of infrastructural facilities is particularly important for SSA countries, where additional financial resources are required most to develop more facilities in order to spur social and economic development.

The results showed that delayed mobilization of resources led to re-scheduling and re-sequencing of activities (92.3%), loss of productivity and efficiency (82.1%), increase in time-related costs (79.5%), prevention of early completion (76.9%), as well as extension of time and acceleration of works (74.4%). Delayed mobilization of resources is likely to drag the onset of works as well as heighten the risk inefficient utilization of time, equipment, and human labor to expedite infrastructural projects.

Cost-overruns associated with delayed mobilization of resources often run into billions of dollars annually, which have obvious implications regarding the number of infrastructural projects that SSA countries can initiate over a period of time. There is no doubt that extra resources spent in offsetting the effects of delayed projects undermine the ability of many SSA countries to meet the need for infrastructural facilities. Again, cost overrun caused by delayed mobilization of resources is likely to cause bad reputation and even constrain relationship with external funding agencies, whose contribution to the construction of infrastructural facilities in SSA remains indispensable.

Coping measures, such as re-scheduling and re-sequencing of project activities as well as extending time and accelerating works, though important, bring aboard significant budgetary implications, which increase the risk of cost-overruns. Whereas re-scheduling and re-sequencing entail drawing up new plans for project activities and resources, acceleration of works introduces new measures aimed at expediting timely completion of infrastructural projects. However, acceleration of works without adequate and consistent compensation of workers is likely to reduce labor productivity. Besides, inflating the labor force may not necessarily translate to acceleration of works, as new workers often take considerable time before gaining necessary skills and achieving optimal levels of productivity.

Conclusions

Delayed mobilization of resources negatively affects the completion of infrastructural projects, particularly in resource-poor contexts. Consequently, it is important for stakeholders to develop and share resource mobilization plans, considering the type of resources and quantities required, as well as acquisition, rental, and maintenance costs, among other parameters. The selection and utilization of equipment in a project should always be considered as an integral component of the entire resource mobilization plan. Such plans should also ensure availability and adequacy of skilled human resource to put the equipment to optimal use. Timely mobilization of adequate human resource of appropriate skills is essential for early completion of infrastructural projects within allocated budget and timeframe.

Nevertheless, stakeholders should realize that having comprehensive plans for the mobilization of resources cannot be of much importance, if such plans are not facilitated through timely payment of contractors. In view of this, employers should work towards ensuring timely release of funds by national treasuries and timely payment of contractors. Being government agencies, most employers may not have the influence to expedite the flow of funds from higher hierarchies. This is where citizen participation becomes important, by influencing government expenditure priorities, especially through their leaders. Citizen participation is also crucial for enhancing accountability in the handling and management of project funds by employers and contractors.

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