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Stakeholder Management and Execution of Fibre Optic Infrastructure in Nairobi County, Kenya

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Abstract: ***The main purpose of this study was to investigate the extent to which stakeholder management influences execution of fibre optic infrastructure implemented by mobile telecommunication and internet service providers in Nairobi County, Kenya. The objective of the study wasto assesses the extent to which stakeholder management influences execution of fibre optic infrastructure. The research design that guided this study was cross-sectional survey. The study adopted mixed methods research and pragmatism paradigm approach. A self-administered structured questionnaire was used to collect quantitative data while an interview guide and document review guide were used to collect qualitative data. Prior to data collection, preliminary testing of research instruments was done using content analysis and test retest principle to ascertain validity and reliability respectively. Census was used to select 187 respondents from a target population of 187 functional staff in fibre optic infrastructure departments of two mobile telecommunication and four internet service companies through stratified and purposive sampling. The study used summary statistics to analyze descriptive data. Inferential statistical analysis were performed using simple regression and hypotheses tested for significance using F tests. To ensure validity of statistical investigation, tests of statistical assumptions were done prior to data analysis. The nullhypothesis, which stated thatStakeholder management does not significantly influence execution of fibre optic infrastructure($H_0$1), was rejected and conclusion made that stakeholder management has a significant positive influence on execution of fibre optic infrastructure with R^2 = 0466, β=0.600, p-value=0.000 < 0.05. It was recommended that telecommunication and internet service companies should ensure that stakeholders are involved in all the phases of a project from inception to closure. The study also recommended that companies should make use of conflict management and communication skills to ensure change is managed well. This study was delimited to consider the extent to which stakeholder management influencesexecution of fibre optic infrastructure in Nairobi County, Kenya. It was therefore suggested that more studies should be conducted on other factors that may influence execution of fibre optic infrastructure in Kenya.***

Keywords: Stakeholder Management, Execution of Fibre Optic Infrastructure

1. Introduction

In projects, things often do not go according to plans and this can cause conflict among stakeholders. Stakeholder management is important in a project organization (Vinten 2000). Belief of stakeholders in life of a project ensures effective and efficient delivery (Cleland, 1995). Fibre optic network as infrastructure provides universal communication services and as such, their execution covers a large area, involves many stakeholders and various construction scenarios (Huawei, 2016). In fibre optic infrastructure, Governments, Operators, Constructors and Equipment vendors are the main stakeholders that take major responsibilities (Huawei, 2016). Hence, the need to strike a balance to see that fibre optic infrastructure has right response from stakeholders is important to policy makers. However, with multiple stakeholders, successful execution of fibre optic infrastructure is a challenge (Ilavarasan & Srinivasan, 2014). Inability of project players to address fears of stakeholders in projects also results in myriad project disappointments world over (Bourne & Walker, 2005).

Telecommunication and internet service enterprise has drastically evolved in the last 10 years across the globe. Consequently, customers, and business enterprises with smart devices consume huge amount of data and increased voice traffic (Ernst & Young, 2015). One of the innovations to beat this new development in telecommunication industry is the emergence of fibre optic telecommunication network. Optical fibre is the globally preferred technology to supply high-speed broadband to end users (Beardsley, Enriquez, Guvendi& Sandoval, 2011), and therefore a major building block in telecommunication infrastructure (Ezeh, Ogbuehi, Eleke & Diala, 2013; Massa, 2013). Torlak (2013) defines optic fibre as flexible, long, transparent thin strands of glass or plastic about a diameter slightly thinner than human hair. Light signal from fibre optic cables do not cause interference among other fibre cables in same channel. Optical fibre is therefore, suited for transmission of digital information, useful in computer and telecommunication networks (Sankara, 2014; Massa, 2013).

Nevertheless, fibre optic network involves construction challenges far beyond those associated with traditional construction projects on a contained and easily controlled site (Crocker, 2012). Crocker (2012) also noted that fibre optic construction involves huge risks from weather as well as in safety and land access. Similarly, Deloitte (2016) noted that logistics in procurement, staff mobilization, equipment and materials transport to sites also present significant challenges in fibre optic network. Furthermore, fibre construction happen in communities for short periods and therefore a complex program of proactive community engagement with operators, constructors, government agencies, environment groups and property owners is essential part of meeting schedules and budget (Huawei, 2016).

This study was informed by Stakeholder theory. Patton, (2008) noted that the purpose of this theory is to enable managers identify, analyze, and know stakeholders and purposefully manage them. As applied in this study, stakeholder theory relates to the independent variable, stakeholder management whose indicators are stakeholder list with areas of interest, stakeholder analysis, dynamics of stakeholders in the project life cycle, stakeholder's reaction

to project decisions and stakeholder's engagement through the project life cycle

In a study on demonstrating the aspect of stakeholders in project scope and execution in United Arab Emirates, Saad (2011) observed that for successful delivery of a project, the stakeholders within the organization authorizing the project must be involved and managed very closely at every stage when defining the project scope. In Romania it was found out that the first steps in stakeholder management should be identification and listing of stakeholders and their interests in the project (Nieto, Milcu, Leventon, Mikulcak & Fischer, 2016). In Hong Kong, Yang, Shen, Bourne, Hoand Xue (2014) opined that attribute of stakeholder legitimacy was imprecise and hard to put in operation, and that made the researchersto prefer proximity, which was easier to explain and put into practice. Empirical studies (Fageha & Aibinu, 2012;Bourne, 2015) in Australia revealed that it was important to have effective communication both internally and externally to relevant stakeholders for successful project implementation and that identifying stakeholders early enough was very important for significant trans-disciplinary investigation into the supervision of resources.Similarly, Leonardo and Antonio (2013) in Brazil revealed that identification of stakeholders at earlier stages of a project reduced possible problems especially those related to late request for new requirements that end up delaying delivery of the project goals in a timely manner.

In Canada, Bourne (2006) postulated that a key element of project success involves proactive management of stakeholder expectations. In addition, expectations and perceptions of stakeholders strongly influence success or failure of a project and lack of stakeholder involvement leads to failure of most projects (Chinyio& Akintoye, 2013). Moreover, conflict among stakeholders negatively affects performance of construction projects (Akintoye, Hardcastle, Beck, Chinyio,& Asenova 2003). Nash, Chinyio, Gameson and Suresh (2010) noted that the interest of stakeholder can change as the project progresses and these adjustments can take place any time in the process of developing the project and hence the importance of leadership skills in managing the change. As such, stakeholder involvement in project planning phase enables project managers to overcome challenges that could be encountered during project development life cycle such as execution phase.

Mega construction projects in Africa represent a strategic option towards attaining sustainable development objectives (Ahmed & Othman, 2013). To guarantee sustainability, Kobusingye, Mungatu and Mulyungi (2017)in Rwanda noted that stakeholders should be involved in all the phases of a project including the planning phase that covers vision and goals development. Bashir (2010) in Uganda argued that stakeholder identification and analysis is the first step to the management of identifying and resolving conflicts in a project.In Kenya, Moenga and Moronge (2016) findings showed that stakeholder participation is a significant factor in utilization of ICT infrastructure. In addition, the study revealed that human resource capacity, implementation strategy and government policy are positively correlated to effective utilization of ICT infrastructure. In a similar study, Wanjiku and Keraro (2015) findings showed that government policies to a great extent influence performance of ICT projects in Kenya followed by human resource management practices, then innovations and systems adopted. However, these studies did not factor in the aspect of stakeholder management and execution of fibre optic infrastructure.

Fibre optic infrastructure involves a complex stakeholder management framework across a wide range of groups requiring constant engagement to provide management oversight through formal reporting, audit and assurance mechanism to ensure successful execution (Crocker, 2012). Despite advanced project management methodologies, many projects including fibre optic infrastructure in Kenya and indeed across the world continue to fail, delivered beyond projected timelines, budget and scope for a number of reasons including poor stakeholder management. The need for sound stakeholder management is therefore acceptable among professionals in project planning and management.

Studies in stakeholder management notwithstanding, the extent to which stakeholder management influences execution of fibre optic infrastructure is not clear. The issue is that projects remain unsuccessful because of ineffective stakeholder management. However, empirical evidence suggeststhat effective stakeholder management may possibly contribute to overcoming challenges faced by projects including fibre optic infrastructure.Even with previous studies focusing on ICT infrastructure and construction projects in general, none has focused on the extent to which stakeholder management influences execution of fibre optic infrastructure and interaction among the variables. Hence, this study was carried out to fill this knowledge gap with reference to theexecution of fibre optic infrastructure in Nairobi County, Kenya.

2. Methodology

The study adopted the pragmatism research paradigm approach, with cross-sectional survey design. Target population was 187 comprising of functional members of staff in fibre optic infrastructure departments of two mobile telecommunication organizations, four internet service providers and two policy making and regularity authorities. The functional staffs were distributed as follows: Telkom Ltd – 25, Safaricom PLC – 45, Liquid Telecom – 30, Jamii Telecom – 25, Access Kenya – 30, Wananchi Group – 30, ICT Authority – 1 and Communication Authority – 1. Size of study sample comprised the entire target population of 187 respondents, with target organizations arranged in strata. The researcher used a raffle containing eight names of the target organizations to choose organization from where survey started among the eight organizations. The researcher used first raffle to start survey.

The study used qualitative and quantitative data with questionnaire, interview schedule and document review guide as data collection instruments.The questionnaire had Visual analogue scale with a range of 0 to 10 and 5 point grouped Likert scale. On the Likert scale 5 represented strongly agree, 4 represented agree, 3 represented neutral, 2

represented disagree while 1 represented strongly disagree. The visual analogue scale measured the opinion ratings on an interval scale (Dexter & Chestnut, 1995). Prior to data collection, preliminary testing of research instruments was done through content analysis and test retest principle to verify validity and reliability respectively. Census was used to select 187 respondents from a target population of 187 functional staff in mobile telecommunication and internet service companies through stratified and purposive sampling.

Data analysis proceeded in three steps: data preparation, data analysis and reporting. Mixed methods of data analysis were adopted in this study incorporating descriptive, inferential and content analysis. The instruments were assembled, sorted and prepared for analysis after completion of data collection exercise and quantitative data coded and analyzed using descriptive and inferential statistics.The study used summary statistics to analyze descriptive data. Inferential statistical analysis was performed using simple regression and hypotheses tested for significance using F tests. Prior to the main data analysis, statistical investigation involving tests for statistical assumptions of linearity, normality, homoscedasticity, multicollinearity and autocorrelation were performed.

3. Findings

The objective of the study was to assess the extent to which stakeholder management influences execution of fibre optic infrastructure. The indicators of stakeholder management included stakeholder list with areas of interest, stakeholder analysis, and dynamics of stakeholders in the project life cycle, stakeholders' reaction to project decisions and stakeholders' engagement through the project life cycle.

3.1 Descriptive Analysis of Stakeholder Management from Likert scale data

The functional staff in fibre optic infrastructure departments of the two mobile telecommunication and four internet service organizations were asked to indicate their level of agreement with various statements on stakeholder management in their organizations. The results were as shown in Table 1. With a mean of 3.802 and a standard deviation of 1.142, the functional staff agreed, that they communicated properly and frequently, instituting feedback mechanism to promote positive relationship with stakeholders. They also agreed, with a mean of 3.779 and a standard deviation of 1.085, that there was careful identification and listing of stakeholders.

The functional staff further agreed that their companies involved relevant stakeholders at the inception stage, to refine project mission and whenever necessary, in decision-making throughout project life cycle as shown by a mean of 3.732 and a standard deviation of 1.030. With a mean of 3.709 and a standard deviation of 1.035, they agreed that their companies identify and understand stakeholders' areas of interest. In addition, the functional staff agreed, with a mean of 3.662 and a standard deviation of 0.950, that they manage change of stakeholders' interest, influence relationship among stakeholders attributes and how project decision affect stakeholders. Furthermore, they agreed, with a mean of 3.651 and a standard deviation of 1.023, that in their companies, they determined and assessed the power, urgency, legitimacy and proximity of stakeholders. Moreover, they agreed, with a mean of 3.639 and a standard deviation of 1.047, that they predicted stakeholders' likely reactions for implementing project decisions.

The functional staff also agreed, that their companies effectively resolved conflict among stakeholders as shown by a mean of 3.604 and a standard deviation of 1.040. With a mean of 3.500 and a standard deviation of 1.000, the functional staff further agreed that they appropriately classified stakeholders according to their attributes/characteristics (power, legitimacy, urgency, proximity and level of interest). However, they were neutral on the statement indicating, that they identified and classified possible conflicts and coalitions among stakeholders as shown by a mean of 3.488 and a standard deviation of 1.045.

Table 1: Stakeholder Management from Likert scale data

	1	2	3	4	5	Mean	Std. deviation
In my company stakeholders are carefully identified and listed	4.7	8.1	19.8	39.5	27.9	3.779	1.085
We identify and understand stakeholder areas of interest	3.5	7.0	30.2	33.7	25.6	3.709	1.035
In my company, we determine and assess the power, urgency legitimacy and proximity of stakeholders	4.7	5.8	30.2	38.4	20.9	3.651	1.023
We approximately classify stakeholders according to their interest level, power, legitimacy, urgency and proximity.	2.3	14.0	31.4	36.0	16.3	3.500	1.000
We identify and classify possible conflicts and coalitions among stakeholders	4.7	12.8	26.7	40.7	15.1	3.488	1.045
We effectively resolve conflict among stakeholders	4.7	8.1	29.1	38.4	19.8	3.604	1.040
In my company, we manage change of stakeholders interest, influence, relationship among stakeholders attributes and how project decision affect stakeholders	3.5	4.7	32.6	40.7	18.6	3.662	0.950
We predict stakeholders' reaction before implementation of project decisions	3.5	10.5	26.7	37.2	22.1	3.639	1.047
In my company we involve relevant stakeholders at the inception stage, to refine project mission and whenever necessary in decision making throughout project life cycle	3.5	8.1	24.4	39.5	24.4	3.732	1.030
We communicate properly and frequently, instituting feedback mechanism to promote positive relationship with stakeholders	4.7	10.5	17.4	34.9	32.6	3.802	1.142
Average						**3.656**	**1.039**

Descriptive Analysis of Stakeholder Management from Visual Analogue scale data

The respondents were asked to rate the performance of their companies in stakeholder management using a scale of 0 to 10, where 0 represented least performance and 10 represented best performance as shown in Table 2. From the findings, most of the respondents gave performance of their companies in stakeholder management a rating of 8.00 (22.1%), followed by 9.00 (17.4%), 6.00 (17.4%), 5.00 (16.3%), 10.00 (11.6%), 7.00 (7.0%), 2.00 (3.5%), 3.00 (2.3%) and 4.00 (2.3%). These findings show that the performance of mobile telecommunication and internet service providers in stakeholder management were rated as 8 on visual analogue scale by 51.16% of respondents.

Table 2: Stakeholder Management from Visual analogue scale data

	Frequency	Percent
2.00	6	3.5
3.00	4	2.3
4.00	4	2.3
5.00	28	16.3
6.00	30	17.4
7.00	12	7.0
8.00	38	22.1
9.00	30	17.4
10.00	20	11.6
Total	**172**	**100.0**

The key informants indicated that stakeholders in fibre optic infrastructure include government, ICT operators, users and the public. They also indicated that stakeholders' management contributes to effective execution of fibre optic infrastructure. In addition, the key informants reported that their organizations had stakeholder management plan, stakeholders register, and communication plan and stakeholder engagement matrix.

Inferential Analysis of Stakeholder Management and Execution of Fibre Optic Infrastructure

Simple regression analysis was used to assess the extent to which stakeholder management influences execution of fibre optic infrastructure. The null hypothesis stated that:

$H_0$1. Stakeholder management does not have a significant influence on execution of fibre optic infrastructure

The R^2 shows variation in the dependent variable that can be explained by the independent variable (Bryman, 2012). The R^2coefficient was 0.469 as shown in Table 3. This inferred that stakeholder management may well explain 46.9% of the execution of fibre optic infrastructure among mobile telecommunication and internet service providers in Nairobi County, Kenya.

Table 3: Model Summary for Stakeholder Management

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.685[a]	.469	.466	1.32174

The analysis of variance is used in regression analysis to assess whether the model is a good fit for data analysis (Bryman, 2012). The F-calculated (149.978) in Table 4 was greater than the F-critical (3.94) and the p-value (0.000) was less than the significant level of (0.05), which inferred that the model was a good fit for the data. This showed that the model may well be used in predicting the extent to which stakeholder management influences execution of fibre optic infrastructure among mobile telecommunication and internet service providers within Nairobi County, Kenya.

Table 4: ANOVA for Stakeholder Management

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	262.010	1	262.010	149.978	.000[b]
	Residual	296.990	170	1.747		
	Total	559.000	171			

The regression model for the hypothesized relationship was as follows:

Y=3.254+ 0.600X

The results indicated that stakeholder management has a significant positive influence on execution of fibre optic infrastructure as shown by a regression coefficient of 0.600 (p-value=0.000) in Table 4. The p-value (0.000) was less than the significance level (0.05). The null hypothesis was therefore rejected and the alternative hypothesis accepted indicating that Stakeholder management had a significant positive influence on execution of fibre optic infrastructure.

Table 5: Coefficients for Stakeholder Management and Execution of Fibre Optic Infrastructure

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.254	.361		9.013	.000
	Stakeholder management	.600	.049	.685	12.247	.000

4. Discussion

Stakeholder theory highlights the importance of identifying, analyzing, and understanding stakeholders and managing them effectively. In fibre construction context, stakeholders are the parties that influence or are influenced by installation of fibre optic infrastructure from the beginning until its closure. Stakeholder management encompasses involvement, information sharing and consultation of groups or people with an influence on the project's outcome and the extent to which it is done may well influence project success. In this study, the components of stakeholder management included stakeholder list with areas of interest, stakeholder analysis, and dynamics of stakeholders in project life cycle, stakeholder reaction to project decisions and stakeholder engagement through the life cycle of a project.

The study found out that stakeholder management has a significant influence on execution of fibre optic infrastructure. These findings concur with Chepkoech and Waiganjo (2016) findings that stakeholder management has a significant influence on execution and performance of projects. The study revealed that mobile telecommunication and internet service providing companies communicate properly and frequently, instituting feedback mechanism to promote positive relationship with stakeholders. These findings also agree with those of Fageha and Aibinu (2012)

who, in their study, showed that it is important to have effective communication both internally and externally to relevant stakeholders for successful project implementation.

The study also found out that stakeholders were carefully identified and listed and mobile telecommunication and internet service providing companies identified and sought to understand stakeholders' areas of interest. These findings agree with the assertion of Nieto *et al.*(2016) that the first steps in stakeholder management should be identification and listing of stakeholders and their interests in the project. In addition, Bourne (2015) indicated that identifying stakeholders early enough was very important for significant trans-disciplinary investigation into the supervision of that resource. In addition, the study revealed that mobile telecommunication and internet service providing companies involved relevant stakeholders at the inception stage to refine project mission and, whenever necessary, in decision-making throughout project life cycle. These findings concur with the argument by Kobusingye, Mungatu and Mulyungi (2017) that stakeholders should be involved in all the phases of a project including the planning phase that covers vision and goals development.

Stakeholder analysis involves identification, assessing stakeholders' interests and the level to which their interests affect project delivery. The findings of this study showed that the companies manage change of stakeholders' interest, influence relationship among stakeholders' attributes and how project decision affected stakeholders. These findings agree with the argument byNash *et al.*(2010) that interest of stakeholder can change as the project progresses and these adjustments can take place any time in the process of developing the project and hence the importance of leadership skills in managing the change.
Furthermore, the study found out that mobile telecommunication and internet service providing companies determined and assessed the power, urgency legitimacy and proximity of stakeholders. In addition, the study found out that mobile telecommunication and internet service providing companies appropriately classified stakeholders according to their attributes/characteristics (power, legitimacy, urgency, proximity and level of interest). These findings agree with those of Yang *et al.* (2014) who showed that the attribute of stakeholder legitimacy was imprecise and hard to put in operation, and that made them to prefer proximity, which was easier to explain and put into practice.

Moreover, the study found out that mobile telecommunication and internet service providing companies predicted stakeholders' likely reactions for implementing project decisions. These findings agree with those of Leonardo and Antonio (2013) that identification of stakeholders at earlier stages of a project reduced possible problems especially those related to late request for new requirements that end up delaying delivery of the project goals in a timely manner. The study findings also showed that the companies moderately identified and classified possible conflicts and coalitions among stakeholders contradicting the assertion byBashir (2010) that stakeholder identification and analysis is the first step to the management of identifying and resolving conflicts in a project and that likely issues should be actively identified and classified at this step.

5. Conclusion

The objective of this study was to assess the extent to which stakeholder management influences execution of fibre optic infrastructure. Results from inferential statistical analysis and key informant interviews indicated that stakeholder management has a significant positive influence on execution of fibre optic infrastructure.

The study was anchored on stakeholder theory that highlights responsibility of project leaders to the stakeholders. The model insists on the identification of stakeholders and their interests, which is the first step in stakeholder management and involvement. This is supported by the findings of this study, which indicated that the companies were carefully identifying and listing stakeholders and their interests. In addition, this study found that resolving of conflicts among stakeholders is one of the most effective ways of ensuring project success.

6. Recommendations

The study found out that stakeholder management in terms of identification, listing and identifying their interests influence execution of fibre optic infrastructure. The study therefore recommended that all the companies should ensure that stakeholders are involved in all the phases of a project from inception to closure to help in improving acceptance by all stakeholders thus ensuring efficiency, effectiveness and sustainability of fibre optic infrastructure.

The execution of fibre optic infrastructure involves change and stakeholders can decide to make changes in their interests thus changing project scope during implementation. The study therefore recommended that mobile telecommunication and internet service providing companies should make use of conflict management and communication skills to ensure appropriate management of change.

The study was delimited to Nairobi County, which is the capital city of Kenya. However, fibre optic infrastructure projects have also been implemented in other counties in Kenya. Different counties in the country experience different levels of stakeholders' involvement depending on other factors such as literacy level. This study therefore recommended that similar and comparable studies may well be conducted in other counties in Kenya.

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