



PROJECT MANAGEMENT TRIPLE CONSTRAINTS AND PERFORMANCE OF INDOOR NETWORK COVERAGE ENHANCEMENT PROJECTS: A CASE OF SAFARICOM, KENYA

Edwin Njoroge

Jomo Kenyatta University of Agriculture and Technology

P.O Box 62 000 – 00200 Nairobi, Kenya

Muchelule Yusuf 

Lecturer, Jomo Kenyatta University of Agriculture and Technology

P.O Box 62 000 – 00200 Nairobi, Kenya

yusuf.muchelule@jkuat.ac.ke

Abstract

Despite the guidelines set out by county governments of Kenya on the implementation of various projects, the projects' performance is wanting. Safaricom Company funded network coverage enhancement projects indicate that underperforming projects, have failed by the relevant stakeholders due to time, cost, quality or scope overruns. The study examined how project triple constraints management influences the performance of the Indoor network coverage enhancement project in Safaricom, Kenya. Specifically, the study aimed to examine how scope, time, quality, and cost management influence county government construction project performance in Safaricom. The study adopted descriptive research design on 185 individuals from the target group of 430 employees working in the project. The study intended to collect both qualitative and quantitative data to determine the relationship between project triple constraints and performance. Quantitative data were analyzed using SPSS descriptively and inferential statistics were used to validate the association among the study variables. The results were presented in tables and graphs. Results revealed that all the project triple constraints had a significant and positive association with the performance of indoor network coverage enhancement projects by Safaricom. However, the magnitude of the influence was

different for the specific project triple constraints with time management having the largest effect followed by cost management then scope management and finally community participation. The study recommended county government need to manage project triple constraints in the projects in order to improve performance.

Keywords: Triple constraints, Scope Management, Quality Management, Time Management, Project Performance

INTRODUCTION

Background of the Study

The project performance is based on a set-criteria anchored on the standards or principles from which stakeholders can judge the project's success (Nibiyza, 2015; Rugenyi & Bwisa, 2016). These are the key predictors that are very crucial for every successful project in terms of achievement of the goals and objectives. Many authors thought have argued that performance of a project is more or less based on the client's satisfaction as a prerequisite; a project success is controlled by time, cost and scope, commonly referred to as Project Triple Constraint (Baymount, 2015; Akinyde, 2014; Wanjau, 2015). For every successful project, considerations are based on the triple constraint before, during, and after project implementation. The project constraints sometimes referred as the iron triangle are common in construction projects (Catanio, Armstrong & Tucker, 2015; Nasir, Nawi & Radzuan, 2016). The failure to understand and interpret the iron triangle appropriately may affect a construction project though project activities are carried out effectively (Omondi, 2017; Chin & Hamadi, 2015; Kiarie & Wanyoike, 2016; Kariungi, 2014; Leong *et al.* 2014).

To understand Network coverage enhancement projects performance in Kenya, this study was grounded on the triple constraint theory trying to explain the influence of time, cost and scope which bounds the universe of every performing project (Osedo, 2015; Hassan & Adeleke, 2019; Banda & Pretorius, 2016; Nibyza, 2015). The key standards and principles which must be accomplished in every project as stated by (Van Wayngaad, Pretorius, & Pretorius, 2012) are the definitely the project triple constraint in a construction project which must be balanced appropriately (Catanio, Armstrong & Tucker, 2015; Nasir, Nawi & Radzuan, 2016). The cause and effect of new or changing triple constraint requirements are constantly negotiated during all phases of a project (Lukale, 2018; Rugenyi & Bwisa, 2016; Omondi, 2017). The three key project triple constraints association indicate that at least one of the constraint variables is constrained and at least one of the constraints must have capacity for exploitation

(otherwise quality may be affected) (Abulkhaim & Adeleke, 2019; Beleu, Crisan & Nistor, 2015; Omondi, 2017; Rugenyi, 2017).

Based on this argument, Osedo (2015) stated that the county government-funded projects in Kenya have indicated puzzling underperforming statistics whereby the existing records have reported that 60% to 82% of projects have failed. These projects are struggling in terms of being accomplished within the budget, time without compromising quality (Omondi, 2017). Similarly, Omolo (2016) found out that county governments funded construction projects have issues regarding project scope management. This means that they rarely follow the accepted processes for project implementation, activities, and tasks associated and for the successful finalization of the project (Sikudi & Otieno, 2017; Mwangi, 2018).

Global Perspective of Project performance

In the global arena concerning the performance of construction projects, there have been indicating a lack of adherence to project constraints management which yields to the underperformance of the projects and failing to meet the stakeholder's expectations (Rugenyi, 2015). From the past studies, it has been reported that time plus cost overruns are common in most projects (Omondi, 2017; Sterman, 2015). For example; according to a 2018 IBM survey on project management change, it was established that about 40% of the projects were able to be accomplished within time, scope and cost. In another report, it was found out that one in six of the 1,471 projects carried out had an average of time plus cost overrun that is 200% and 70% respectively (Flyvbjerg & Budzier, 2018).

Further, the Standish Group in 2012 reported that an estimated 43% of projects had time plus cost overruns and 18% failed to be completed. In other words, they were terminated prematurely. In another study of 5400 large government-funded projects, 45% indicated cost overruns and 7% of the projects had time overruns and 56% of these projects had values than the ones earlier predicted (Bloch, Blumberg & Laartz, 2014). Further, Price Waterhouse Coopers (PwC) (2014), based on the survey on several construction projects in 34 industries in 38 countries, established that 86% failure of projects being delivered within time, cost, and budget.

Further, 60% of the project failed to be accomplished within the project constraints and less than 10% failed to deliver on their time, scope, and quality based on the established criterion. Gwaya, Wanyona, and Musau (2014), Kiarie and Wanyoike (2016), and Kariungi (2014) also suggested that the construction projects were a common ridiculous time plus cost overruns globally. This call for an assessment of the influence of triple constraint in project management to comprehend how they affect particularly the indoor network coverage

enhancement projects in the country (Leong *et al.*, 2014; Osedo, 2015; The Kenya Alliance of Resident Associations, 2012).

Kenyan Perspective on Projects Performance

In Kenya, the focus has been mainly on construction projects undertaken by the government and parastatals. Time and cost performance of projects in Kenya is unacceptable with over 70% of established projects are likely to reach time overruns of over 50%. Further, it is reported that 50% of the projects are likely to have a cost overrun of over 20% (Rugenyi, 2016). For example, Thika Road (KARA, 2016), and Langata Road projects have finished late and over budget, just to mention a few. These reports contradict the inverse proportionality between time and cost as envisioned by the 'iron triangle' and the direct proportionality between scope and time and cost.

Rugenyi (2016) reported that over the last few decades cost overruns especially in the government funded construction projects have remained common with some projects recording up to 60 % increase from the original contract sum (Foster & Briceño-Garmendia, 2014). Of even more concern is the fact that historical data shows no improvement in cost performance in the last few decades indicating that no significant learning has occurred in this area (Flyvbjerg *et al.*, 2019).

Researchers have shown different magnitude and frequency of cost overruns especially for the government funded construction projects in the country. For example, in one study the average cost overrun for large scale projects was estimated to range between 20.4 to 44.7 % (Chantal C. Cantarelli, Flyvbjerg, Molin, & Van Wee, 2018). Another study by the African Development Bank(AfDB) found the average cost overrun to be 35 % with some cases recording as high as 50% and even 100% (Mthuli, Mugerwa, Lufumpa, & Murinde, 2014). The later also found strong evidence of scale effect where cost overruns were higher in smaller projects less than 50 kilometers than in larger projects. This is consistent with the World Bank study that recorded 90% of the road projects have experienced cost overruns averaging 80% (Foster & Briceño-Garmendia, 2016).

Profile of Safaricom Company

The history of Safaricom dates back to 1993 when it commenced as a department in the Kenya Post and Telecommunications Corporation. In 1997, it was incorporated as a private limited company. At the time, Vodafone Kenya Limited owned 40% of the company shares. Later, in the year 2002, it turned into a public company. Currently, Safaricom PLC is a cohesive communications company that provides voice, data and mobile financial products and services to businesses, individual consumers and public sector clients. It operates solely in Kenya with

its headquarters located at Safaricom House in Nairobi. As an organization, Safaricom has annual revenues of about 163.4 billion Kenya shillings and about 23.35 million customers in Kenya. Its operations consist of the Safaricom Care Centre, 42 retail stores and a 2G-enabled network of 3,382 base stations, 1,943 3G-enabled network base stations and a further 236 base stations, which are 4G-enabled.

Safaricom shareholding structure comprises Vodafone (40%), the Government of Kenya (35%) and free float at 25%. The company is listed on the Nairobi Stock Exchange, transacting in telecommunications and technology segments. Safaricom is composed of five subsidiaries that are 100% held and disclosed in annual financial statements (Safaricom Sustainability Report, 2015). The company is currently involved in projects aimed at providing a range of services such as fixed lines wireless services and mobile solutions, which include fiber and leased lines. In addition, it aims at delivering devoted internet solutions for hosted services and enterprises.

Indoor Network coverage enhancement projects

Typically, at least two thirds of voice traffic on cellular networks originates or terminates inside buildings, and for data services the proportion is still higher – probably in excess of 90%. Previously, most indoor service had been provided from outdoor systems requiring high transmit powers, major civil engineering works and using a relatively large amount of spectrum to serve a given traffic level. The need for reliable communications does not stop at the door of a building. Reliable network coverage and quality is often essential throughout both indoor and outdoor environments. There is no substitute for a properly designed network solution to provide the level of signal required for reliable coverage anywhere within the jurisdiction, whether outdoors, indoors or tunnels where applicable.

Rapid construction of multi storied commercial buildings in areas of Nairobi and indeed urban towns throughout the country has introduced a challenge in signal penetration and signal interference to customers located indoors. The new multi storied buildings are blocking Safaricom's Base stations preventing signals from reaching deep indoor. To add even more complexity to the matter, the higher up a building the users are, the more likely it is that they will be prone to signal interference due to overlapping radio signals from various surrounding and distant base stations. Construction of high capex-rooftop base stations have not been able to address coverage challenges on the deep indoor sections of these buildings.

This project aims to solve the problem of indoor cellular network coverage. A typical solution may require Distributed Antenna Systems (DAS), which aims at making the indoor cell the dominating cell throughout the building. The indoor cell needs to dominate the total area

from along the windows and all the way into the center of the building, without leaking signal out to the outdoor network. This solution is much cheaper than the active system and would be suitable for a building of this nature. Minimal additional cost required for future upgrades. In addition, The equipment is future proof in that it will support 4G, WiFi and 5G deployments in future with minimal hardware changes.

Statement of the Problem

Project performance criteria are anchored on the set of standards or principles on which a performing project can be judged (Nibiyza, 2015; Rugenyi & Bwisa, 2016). Based on these standards, most of the projects fail to meet them according to the stakeholder's expectations. Stakeholder satisfaction is a prerequisite for performing a project. However, most of the indoor network coverage enhancement projects in the country have failed since they have shown to have time and cost overruns over 50% (Baymount, 2015; Akinyde, 2014; Wanjau, 2015). The construction projects fail in the project triple constraint considerations which are very crucial in projects' decision making in the country. The failure to understand, interpret and apply this criterion is regarded as one of the factors which have led to underperformance of the projects being funded by Safaricom Company in the country (Omondi, 2017; Chin & Hamadi, 2015; Kiarie & Wanyoike, 2016; Kariungi, 2014; Leong *et al.* 2014). Lukale (2018) found out that project triple constraints management significantly improves the performance of projects by more than 70%.

Despite the guidelines set out by county governments of Kenya on the implementation of various projects, the projects' performance is wanting (Osedo, 2015; Sikudi & Otieno, 2017; Mwangi, 2018). According to Osedo (2015) Safaricom Company funded projects have shown puzzling statistics which presently indicate that underperforming as between 60 and 82 percent of projects have failed or completely abandoned by the county governments. Safaricom Auditor-I report (2017) indicated that 75% of the indoor network coverage enhancement projects had time plus cost overruns. The question now remains; projects triple constraints management the actual missing factor for the performance of indoor network coverage enhancement projects in Kenya? If it has been implemented, how has it improved the performance of indoor network coverage enhancement projects in Kenya?

Besides, local studies related to project triple constraints management and performance of projects have been carried out in different sectors. For instance, Omondi (2017) study focused on the triple constraint management and WASH projects completion in Nakuru County, Kenya. Rugenyi and Bwisa (2016) study were on project triple constraint and the project manager's perspective on the management of projects in Nairobi. Further, Kiarie and Wanyoike

(2016) study focused on the government-funded projects and specifically integrated financial management information system (IFMIS) project was used as a case study. Sikudi and Otieno (2017) sought to examine factors affecting the implementation of development projects funded by Kilifi County government. Mwangi (2018) study looked at the county government projects performance specifically Gatundu Modern Market, Kiambu County, Kenya. Musau and Kirui (2018) focused on the project management practices and implementation of the county government in Machakos. Kimiti and Moronge (2018) focused on project management practices and Nakuru county governments' project implementation.

From the aforementioned studies, no study has focused on the relationship between project triple constraints management and indoor network coverage enhancement projects performance in Safaricom, Kenya. A gap this study sought to fill. Moreover, due to the sectorial, contextual, and managerial differences among the sectors, the influence of the management of project triple constraints indoor network coverage enhancement projects and their application would not be assumed to be similar, unless empirical findings reveal so. It is on this premise the study, therefore, examined the influence of project triple constraints management (cost, time, quality, and scope) on construction project performance in Safaricom, Kenya.

Objectives of the Study

The study aimed at examining the influence of Project Triple Constraints on Performance of Indoor network coverage enhancement projects in Safaricom, Kenya.

The study was guided by the following specific objectives;

- i. To establish the influence of time management on the performance of indoor network coverage enhancement projects in Safaricom, Kenya.
- ii. To determine the influence of cost management on the performance of indoor network coverage enhancement projects in Safaricom, Kenya.
- iii. To examine the influence of scope management on the performance of indoor network coverage enhancement projects in Safaricom, Kenya.
- iv. To assess the influence of community participation on the performance of indoor network coverage enhancement projects in Safaricom, Kenya.

Research Hypotheses

H₀₁: Time management does not significantly influence the performance of indoor network coverage enhancement in Safaricom, Kenya.

H₀₂: Cost management does not significantly influence the performance of indoor network coverage enhancement in Safaricom, Kenya.

H₀₃: Scope management does not significantly influence the performance of indoor network coverage enhancement in Safaricom, Kenya.

H₀₄: Community participation does not significantly influence the performance of indoor network coverage enhancement projects in Safaricom, Kenya.

Justification of the Study

Project Triple constraints have been described as a global phenomenon common in many Government funded projects around the world and has been constant over the last decade (Omondi, 2017). While many researches types of research have been done on the magnitude and causes of time plus cost overrun, there is little concurrence on the frequency and extent of actual project triple constraints have affected the performance of projects especially those funded by the governments and the associated causes. Its occurrence is said to lead to inefficient allocation of resources while causing delays and reducing the benefits associated with the project. Scope creep, time and cost overruns also destabilize policy, planning, implementation, and operations of the projects as in some cases they constantly increase as the project size increases (Flyvbjerg, 2015). This research is therefore considered invaluable to various stakeholders. The study is expected to provide relevant information on the extent of project triple constraints in indoor network coverage enhancement projects in Kenya and the associated factors. Different stakeholders and industry players including project managers, contractors, implementing agencies as well as policymakers are likely to benefit as they will be able to direct their resources and energies to the particular factors identified thereby reducing project failure rate.

Regulators and Policy Makers

These are government watchdogs that monitor the professional conduct of the parties during the project implementation. They are also involved in providing policy guidelines that guide the regulators and policymakers with others. The results of the study will guide for the policymakers to direct resources and energies to the specific determinants to impact scope, time, and cost performance in future projects.

Contractors

Contractors may find the study results useful to understand the relationship between project triple constraints when they are implementing various construction projects concerning network coverage enhancement projects. Contractors are constrained on how to use the available resources to deliver their projects in time. The effect of time plus cost overrun on the

contractor's bottom line is evident not to mention the reputation risk that eventually may result in poor credit rating by the banks and being awarded contracts in the future. This study is beneficial to this group especially on the determinants that may be within their control to improve on their bottom-line.

Consultants

Consultants are responsible for design and documentation and for supervising the projects during the implementation of the projects. From the study results the consultants may use the study to improve on their methodologies both in design and supervision to reduce scope creep, time plus cost overrun.

Project Financiers

Financiers provide funds for the project implementation and include the government of the day and in some cases development partners. It is therefore in their best interest to demand value for money. This study helps them to initiate controls geared towards safeguarding their investments in the network coverage enhancement projects.

Researchers and Scholars

The study focused on the project triple constraints management and indoor network coverage enhancement project performance. The study may be important to scholars and academicians by adding to the available information concerning the existing body of knowledge about the study problem. The study will also give recommendations for further researchable areas that will be useful in understanding the link between project triple constraints and project performance. Further, it will widen knowledge on the existing literature on the time, scope creep and cost overruns in government-funded construction projects.

Scope of the Study

The study mainly focused on the indoor network coverage enhancement projects implemented by the Safaricom Company in Nairobi households. All projects including completed ones as well as those in progress were considered. The study specifically gathered data on the constraints of project management (project time, scope, quality, and cost) and community participation, and indoor network coverage enhancement projects performance in Safaricom, Kenya. The study was undertaken within a duration of five months (January to May 2020) and focused on indoor network coverage enhancement projects in Safaricom County, Kenya.

LITERATURE REVIEW

Theoretical Review

This subsection provided an insight into theories revolving around project triple constraints that enhanced the foundation of this study. According to Trochim and McLinden (2017), theories are formulated to express, predict, and understand phenomena, and in many cases to challenge and extend existing knowledge within the limits of critical bounding assumptions. The theoretical framework is a structure that supports and holds a research study; it introduces and describes the theory or theories that explain why the research problem under study exists. This study sought to be guided by the following theories;

Theory of Triple Constraints

The theory of triple constraints is examined from the project definition that it's a temporary group of activities that are designed to produce the desired service or unique product (PMI, 2015). The theory of the triple constraint depicts that the project triple constraint management is an iron triangle of (cost, scope, quality and time) which bounds the project universe which must be achieved (Dobson, 2004). Construction projects brings complications in project management, needs and constraints and therefore for effective project management, constraints have to be managed. Projects take place inside organizations where, there is a finite amount of resources with which to accomplish infinite tasks. This results in scarcity and the triple constraints; a deadline, a budget, and a minimum acceptable level of performance (Dobson, 2004).

The theory of the triple constraints is anchored on the project management with an understanding that a project should be a balance of the three interdependent project constraints (time, scope and cost) to achieve the desirable results. The cause and effect of new or changing triple constraint requirements are constantly negotiated during all project processes, and the three key triple constraint relationships signify that at least one of the triple constraint variables must be constrained (Wayngaad, Pretorius & Pretorius, 2012).

Implying that most of adopted project management strategies to enhance project performance like planning process, scheduling process, a methodology for introducing work that actually leads to increased capacity, execution processes that provide excellent project control, visibility and decision support and work behaviors that are more conducive to good project performance (Jacob & McClelland, Jr, 2001). The theory enhance the understanding of the project manager contribution deliverables per the clients satisfactions. Further, the theory requires continuous improvement to sustain quality in the project dimensions (Nyakundi, 2015).

While, triple constraints criteria in project management have been accepted as a measure of project success. Due to uncertainty and involvement of three different and opposing

factors time, cost, and quality, most projects are difficult to manage (Jacob & McClelland, Jr, 2001). Every one of the three limitations have their individual impacts on project execution yet since these components have some relationship, one imperative bear an impact on the other two, in the long run influencing ventures expectations (Hamid, *et al.*, (2012).This theory from organizational perspectives may work well or fail hence leading to delays if it isn't well embraced. For the network coverage enhancement projects, time plus cost delays are a common problem not only with an immeasurable cost to government and public but also with debilitating effects on the contracting parties (Ondari & Gekara, 2013).

Complexity Theory

The complexity theory is grounded on the performance of projects (Koskcia, 2000) and based on the citation by Richards (2010) and as discussed by Curlee and Gordon (2011) is anchored to management rarely belief that order is not based on the adequate flexibility to solve problems in many situations. Always there are complexities in every possible situation, thus complexities do exists in construction projects especially the county government funded ones. In other words, this theory recognizes that county funded projects by nature have different situations or parts that must work together to enhance the system. Based on this normally the complexities may bring several changes in the projects which the stakeholders' may have not been prepared for them. This will require changes in regard to the procedures and process for effective implementation.

The complexity theory examines construction projects as a system with components which interacts and self-organized to form a potential evolved structures which show properties of systems with an hierarchy (Lucas, 2009). The projects life cycles are basically involving team members with an intended achievement as expected. The project team sometimes due to complexities involved in the construction projects may exhibit failure of the targets or goals and may not be able to achieve the projects based on the project constraints. This means that the project may have time plus cost overruns. This will result to scope creeps of the construction projects.

The complexity theory in construction projects is based a disruption which can result from scope creeps due to various change requests resulting from a or which come a long with complexities experienced during project implementation. This will lead to the project team members and project managers to make several adjustments on the project scope to achieve the expected results of objectives to avoid further time plus cost overruns (Baca, 2005). The recommendations which can come up from the project complexities is to analyze and do more work out of the time and cost to expend or rectify the expected changes based on the impact of

the complexities (disruptions). The current study used complexity theory to explain the influence of project scope management on performance of indoor network coverage enhancement projects in Safaricom County, Kenya.

Goal Setting Theory

Goal-setting theory was developed by Latham and Locke (1994) is basically about motivation and states that individuals are able to deliver certain tasks when they feel recognized by the employer or supervisor. The projects fail to achieve project constraints since the project team feels not motivated. The challenges in regard to implementation of construction projects are due to various issues concerning team members not appreciated in terms of monetary and non-monetary. This has a serious impact on achievement of project objectives in the long run. The goals are achievable when the project team is given the appropriate support to enhance performance (Armstrong, 2005). Goal setting is understood to mean the identification process in the stages of performance to achieve the desirable outcomes. The basic tenets of goal setting theory in projects is to look for means to achieve the project constraints (time, scope and cost) without compromising quality (PSU WC, 2015). It is understood that if the project team find that the project performance is not achievable to the desired goals, they will find new strategy not compromise the project constraints (goals) (Locke & Latham, 2006).

Locke and Latham (2006) further indicated that the Goal Setting Theory is premised on the human interaction with the projects, which is directed to conscious goal achievement. Purposive fully aimed at ensuring the project constraints are achieved as they are the ultimate goals of a construction project. The decision to set a goal results from dissatisfaction with current performance levels. Kleemn (2016) reiterates that Goal setting theory is enhanced through construction projects achievement of objectives, stakeholder satisfaction, benefit realization and completion of the project to reduce time plus cost overruns.

Saleemi (2006) indicated that goal setting theory is applicable in the construction projects since the project team is set to achieve targets to accomplish them with their project managers and team. The county government construction projects require adequate participation in goal setting as means of achieving the desired goals (Armstrong, 2005). This theory is applicable in the network coverage enhancement projects as the stakeholders set goals to meet or achieve project constraints to their satisfaction. This is expected as the county provides the construction contractors to meet the set goals in order to be paid in time. If the construction contractors are not able to deliver the project as to the set goals and within the expected principles standards then the project constraints are compromised, thus the project

goals are not met. The theory is in line with quality management in project management of indoor network coverage enhancement projects.

ABJ Sticky Cost Theory in Project Management

Traditional models of cost behavior usually posit a linear relation between activities and costs where in the short run, total costs equal fixed costs plus unit variable costs \times activity volume. This model implies a mechanical relation between changes in costs and contemporaneous changes in sale activity. According to Müller and Jugdev (2012) recent research has begun to focus on how managerial incentives affect the trade-off between fixed and variable costs.

The starting point of the sticky costs theory is that many (but, not necessarily, all) costs arise as a result of deliberate resource commitment decisions made by managers (Shahu, Pundir and Ganapathy, 2012). Lugusa and Moronge (2016) opined that the concept of cost stickiness is consistent with the thought that costs arise as a result of deliberate resource commitment decisions made by managers. This means that the absolute change in selling, general, and administrative cost associated with decreased sales activity is systematically less than those associated with increased sales activity and they interpret this as evidence of overt cost management (Tabish & Jha, 2012). Lugusa and Moronge (2016) argue that when sales decrease, managers choose to retain slack resources to avoid resource adjustment costs such as severance payments to dismissed workers or disposal losses on equipment. When demand increases beyond available resource capacity, managers can meet the demand only if they add the required resources.

The main obligations of a project team towards a client are usually reduced to concerns around functional requirements, specific quality, and delivery within acceptable budget and time-frame. Usually for most clients, the cost aspects seem to rank highest (Lugusa & Moronge, 2016). A project manager needs to have a clear understanding of cost behavior since this forms the basis for many decisions such as budgeting, controlling, and compensation. The concept of cost stickiness is thus important in this study as it portrays a clear connection on how managerial incentives affect the trade-off between fixed and variable costs. The above theory relates to influence of project cost management on performance of county government funded projects.

The Pareto Principle of Time Management

In 1895, Vilfredo Pareto, an Italian economist, noted that about 80% of the land in Italy was owned by about 20% of the people. As he examined his ideas, he noticed that this 80/20 rule was equally valid in other ways (Wells, 2012). The idea, which is now called the Pareto

principle, relates to time management because 20% of work usually generates about 80% of positive results.

Zwikael and Globerson (2006) explain that time management consists of process of establishing the needs, setting the needs goals, prioritize and plan the tasks to achieve the expected objectives. Wells (2012) defines time management as behaviours that aim at achieving an effective use of time while performing certain goal-directed activities. This definition highlights the fact that the use of time is not an aim in itself but more of focusing on some goal-directed activity, such as performing a work task which is carried out in a manner that implies an effective use of time (Lugusa & Moronge, 2016).

Time management is not controlling every seconds of life, but it is showing new ways through which people can use the time properly to improve their lives (Cheng, 2014). Thus, by focusing on the vital few (the critical 20%) rather than the trivial many (the remaining 80%), one can get far more accomplished. The 80/20 Rule is therefore a shortcut that helps to manage our affairs and focus our energies since the ability to choose the important tasks is the key to success (Ward & Daniel, 2013).

The Pareto principle of time management differs with the 100% rule states that 100% of the work required to be accomplished must be included in the WBS. In large, complex projects, there are typically multiple phases and multiple levels of work that must be done to achieve the project objective. By focusing and prioritizing the project work using the Pareto principle of time management theory then the project manager will be able to achieve deadlines in a realistic manner. The theory relates to effect of project time management on performance of county government funded projects.

Conceptual Framework

According to Chepkwei (2019) when conducting a study, a conceptual framework should be developed to show the relationship between the independent variables. For this study the independent variables consisted of project scope management, project time management, cost project management and project quality management) and dependent variable (project performance of indoor network coverage enhancement projects). Out of the literature reviewed various variable were suggested, but in this study the variables are scope management (scope planning, creep and control), time management (define activities, estimating activity duration and sequencing activities & tasks), cost management (cost management plan, estimation or budgeting and control), quality management (quality planning, control and continuous improvement). This is illustrated in Figure 1.

Independent Variables

Dependent Variable

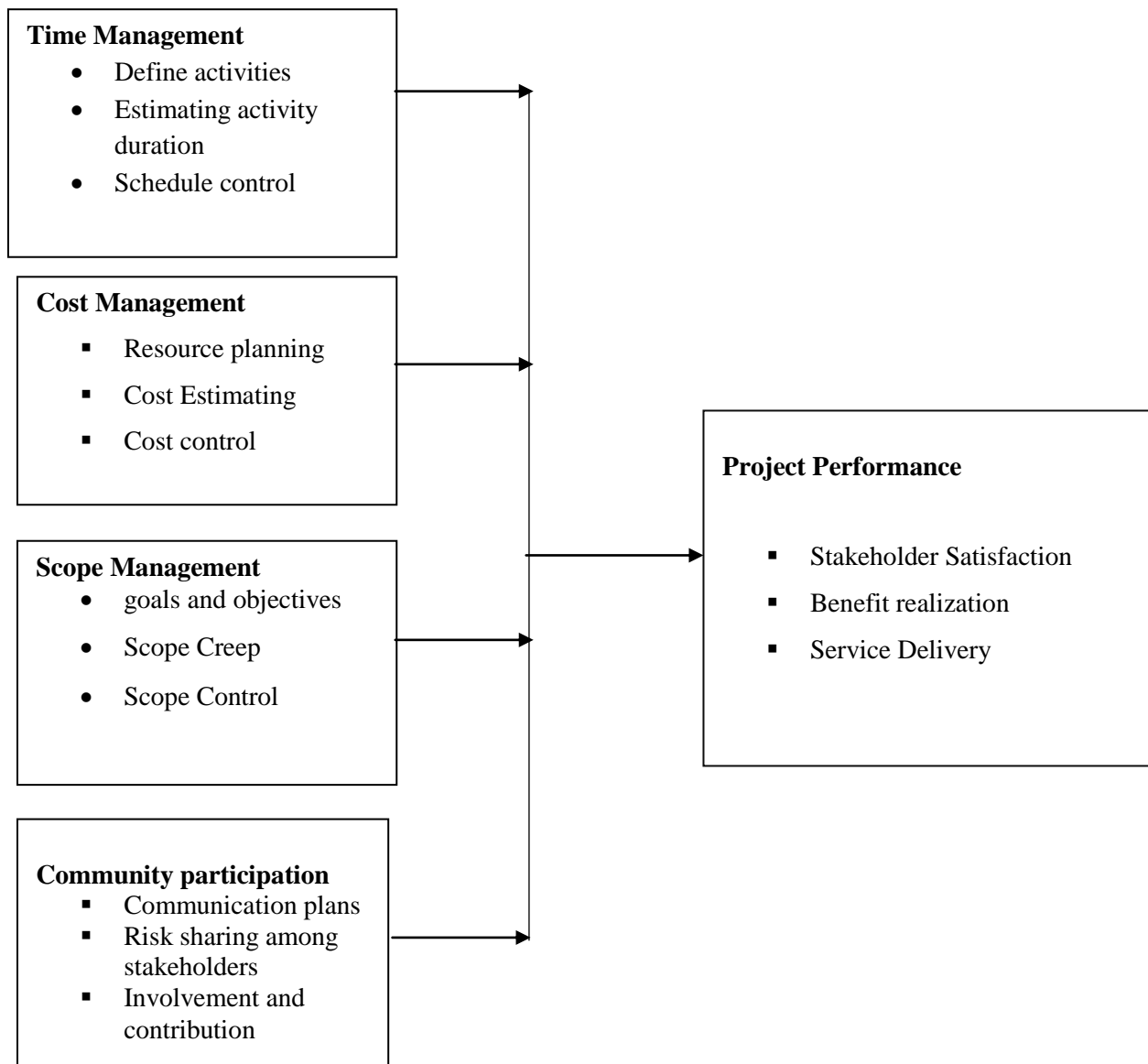


Figure 2.1: Conceptual Framework

Variables Review

Scope Management

Project scope management is the process which involves definition and mapping appropriately. It is the procedure of ensuring that a project comprises all of the necessary activities for the achievement of specific targeted objectives. Project scope enlists structure of a project and base of other related factors especially cost and time. Effective project implementation is based on the success of scope management whereby the project boundaries are well defined and are clear. PMI (2014) postulates that successful completion of a project is based on the ensuring all

the project activities and tasks are well defined and accomplished to the satisfaction of the stakeholders.

Project scope planning is anchored to the boundaries and the expected deliverables from the project (Adek, 2016). The basic matrix that is used for scope planning analysis involves the initiation, planning and definition. This can call for verification and change control when interspersed (Band & Pretorius, 2016). Initiation inputs require the description of program deliverable, selection program criteria, planning, strategically and historical information. Tools and techniques involved are methods of program selection and expert judgment of the same. The initiation phase output involve the project charter identification, assignments of the project manager , constraints and identification of the assumptions (Baymount, 2015). The project scope planning also includes the deliverables descriptions, assumptions and constraints, program charter. The project tools and techniques involved consist of a benefit/cost, identification of alternatives deliverable analysis (Apiyo & Mburu, 2014).

Omondi (2017) states that if the project scope variations remain uncontrolled, they can lead to scope creep which has the propensity for the project to incorporate a number of tasks which were not early planned for in the project. This can in turn lead to time plus cost overruns for the project being implemented since the project duration which was early specified will be lengthened. Conceptually, scope creep is actually additional tasks and duties which were never planned for in the project thus likely to have an effect on the cost and time of the project (Osedo, 2015). Usually when the project is being implemented, the project manager and team may have to do some scope changes and if not well done can lead to scope creep. Jones, Snyder, Stackpole & Lambert (2011) and Rugenyi (2015) also indicated that during a project life cycle, sometimes scope changes are inevitable and if not well managed can lead to cost plus time overruns of the project.

According to Sikudi and Otieno (2017) project activities can be well controlled through effective scope which is well planned and tracked. The scope control is monitoring of duties and tasks of the project to ensure they are achieved as per the scope management plan. Osedo (2015) found out that delivery of the project requires scope control, adequate project documentation, enhanced leadership with effective communication to ensure project deliverables are achieved. The project variances are due to lack of scope control in the projects (Nibyiza, 2015). The expected outputs of the scope controlling process can lead to changes of the request, project management plan updates, project activities documentation updates, updates of the organizations process asset's and project performance (Rugenyi, 2015).

Time Management

Project time management refers to a component of overall project management in which a timeline is analyzed and developed for the project completion. Project time management consists of six different components or steps (Lukale, 2015). The project time management is dynamic and may require input from several different teams each with individual project time management process in order to integrate the various interdependent component parts of the project to attain the expected project goal (s) (Osedo, 2015). Raza and Shah (2012) posit that the procedure of maintaining time of project activities and tasks to their achievement as expected by the stakeholders is regarded as project time management. It is understood as the project activities scheduling which involves process of project tasks and activities definition, activities sequencing, estimation of project activity duration and estimation of activities required resources (Rugenyi, 2015).

Project time management encompasses the activity definition which is the identifying and scheduling different components of the project management sequence that are required for completion of project deliverables (Sikudi & Otieno, 2017; Rugenyi, 2015). Project time management also is the activity sequencing which is the process of project time management that defines the order in which deliverables must be completed (Githenya & Ngugi, 2014).

Project time management can be understood to consist of the activity resource estimation which is the identification and definition of the different types of quantities and qualities of resources and materials to enhance the deliverables (Lukale, 2015; Rugenyi, 2015). This can improve on the activity duration estimation in terms of the estimation timelines or duration to improve the project deliverables (Munyoki, 2015; Raza & Shah, 2012).

Project time management improves the resource scheduling in order to be consistent with the project planned activities, resources and timeliness. Project time management intention is to control project activities and tasks as per the plan and try to remove any barrier to the project schedule (Rugenyi, 2015; Raza & Shah, 2012). Project time management can improve project performance as the deliverables can be easily achieved to the stakeholder's satisfaction in consideration with the project constraints (Sikudi & Otieno, 2017).

Cost Management

This is ensuring the project is kept within its defined budget (cost). It is also an essential part of management of projects. Cost estimating, cost budgeting and cost control are three cost related processes that interact with each other and with other areas of management of projects (Lukale, 2015). All of these processes require effort and a working knowledge project costing. The project complexity determine the requirements in such away it may require one person, and

they may occur more than once during the life of a project (Khwesira, Wambugu & Wanyoike, 2016). Cost management also require planning of resources to eliminate changes in regard to scope which can affect activities and tasks of the project which may prompt reworking of the project costs for the project work planned or not planned.

Rugenyi (2015) states that the intention of conducting project cost estimation in a project is to have knowledge of the project cost estimates for the resources, budget establishment, and monitoring the project costs to ensure that the project deliverables are as per the stakeholders expectations. This knowledge area is primarily concerned with the costs of resources, but project manager should think about other costs as well. This means that the project will stay within the cost to avoid cost overruns. Project cost budgeting can be very simple, or extremely complex. This may enhance project scrimping which may lead to an increase in maintenance costs of the project before completion after it ends since the project budgeting still need a cost management strategy need to be factored from the project inception stage (Osedo, 2015). This approach is sometimes` called life cycle costing, and can help to reduce project cost and improve the quality of the deliverable. But Project management should also consider what the project stakeholders think about the project cost. They will measure cost in different ways and at different times. Like looking at a brick from a different angle (Muriithi, Makokha & Otieno, 2017).

According to Gichuki (2014), the traditional cost systems were based on controlling costs and quality and balancing them temporary, and also focus on internal efficiency of the projects being implemented. On the contrary, cost controlling is a process of quality planning and cost decreasing that manages the costs before their occurrence. A well-planned cost control system will provide improvements in quality, cost/price and functionality of a project (Muriithi, Makokha & Otieno, 2017). Construction projects use modern cost control techniques in their daily operations which has a great impact on their project performance (Njau & Ogolla, 2017).

Community participation

Community involvement is an element of organizational capability that deals with stakeholder-related decision making, in the context of project performance (PMI, 2013). One way to help satisfy stakeholder concerns and promote transparency is to involve project affected stakeholders in monitoring the implementation of risk mitigation measures in projects and programs. Such involvement, and the flow of information generated through this process, can also encourage local stakeholders to take a greater degree of responsibility for their environment and welfare in relation to the project, and to feel empowered that they can do something practical to address issues that affect their project (Verbrugge et al., 2017).

As with community participation and participatory management, participation in monitoring projects does not happen impulsively. The advantages of stakeholder participation in project monitoring include a common undertaking, enhancing accountability, better decisions, performance improvement, improved design, and more information. Participative monitoring helps stakeholders to get a shared understanding of the problems facing humanitarian based projects, regarding their causes, magnitude, effects and implications (Voinov & Bousquet, 2010).

Understanding of the project environment and having the necessary tools incorporated into the projects are the key project control needed. The key project controls needed include an understanding of the project environment and making sure that all necessary controls are incorporated into the project. Optimal sharing of risks across stakeholders reduces the overall cost of shouldering project risks and thereby lowering the project cost (Marsh, 2016). This is because heightened public awareness on environmental issues has led to a boosted potential for third-party claims for environmental pollution and damages, and the potential to infer costs for re-habitation and restoration on humanitarian based organizations.

According to Butt et al., (2016), effective communication among the stakeholders during implementation process of projects is a key factor for effective change management. Change should be communicated effectively and continuously to all stakeholders to ensure full participation of the stakeholders in the project success. The stakeholder's participation in the change management process ought to be monitored and their contribution to the change process established to ensure improvement and enhancement of project success through the stakeholders' participation (Verbrugge et al., 2017).

Project Performance

The term project performance is quite ambiguous in most of the construction projects, which are considered and evaluated from the project management triangle perspective (Njau & Ogolla, 2017). Performance of a project is based on task accomplishment as determined by its completeness, adherence to accuracy of the standards, speed and cost (Omondi, 2017). This is the success level of a program based on the following criteria: effectiveness, relevance, impact, efficiency, timeliness and sustainability. This model suggested that a project is successful when it is completed on time, budget estimates and meets all predetermined specifications. However, the concept of project performance has been enriched and expanded beyond the three project constraints (Hassan & Adeleke, 2019).

Kabirifar and Mojtahidi (2019) recommended the inclusion of stakeholder satisfaction and realization of benefits as an additional measures of project performance. They noted that a

project may be completed on time, budget and meet all pre-established requirements, but fail to meet the expectations of key stakeholders such as the customer. Stakeholders' satisfaction can be an important measure of project success in the construction projects in the building industry (Rugenyi, 2015). Due to its technical nature, key stakeholders may not be able to articulate their expectations and preferences at the beginning of the projects. Therefore, projects managers have the responsibility of ensuring that key stakeholders are involved at every step of the project so as they can clarify their expectation on continual basis (Osedo, 2015; Sikudi & Otieno, 2017). The current study measured the performance of indoor network coverage enhancement projects by focusing on the achievement of the objectives, stakeholder satisfaction, benefit realization and service delivery.

Empirical Review

Hassan and Adeleke (2019) investigated the effects of project triple constraints focused the building projects in Kuantan, Malaysia. The study employed quantitative research technique because it is most suitable for the investigation. The findings clearly showed that the project triple constraint had a positive relationship with the construction companies' building projects. Kabirifar and Mojtahidi (2019) analyzed construction phases based on the ranked engineering while focusing on the procurement which involves the activities which are critical especially for the residential large scale construction projects in Iran. The project triple constraints and leading factors defined the projects that were being investigated. The results indicated that engineering design, project planning and controls are significant factors which contributed to the project performance. In addition, engineering has a pivotal role in project performance and this significance is followed by the construction phase.

Rugenyi and Bwisa (2016) study used on the triple constraints and projects performance in Nairobi from the project manager perspective. The study revealed that statistically there were no significant relationship between triple constraint and projects management in Nairobi. Relatedly, Omondi (2017) examined triple constraints specifically project scope and completion, schedule and cost management on completion of NGO projects in Nakuru County, Kenya. A descriptive survey design was adopted in the study and involved quantitative methods. It was established that the relationship between the scope, schedule and cost and project completion was significant for the NGO projects.

Nibyiza (2015) study focused on the scope change management as a means of successful project implementation in Rwanda. Specifically, the study examined the scope change; project activities adjustment, project costs changes, product, time or quality of services which were derived and identified with the challenges associated with the project scope

changes for the Akazi Kanoze projects. The study results indicated that project triple constraints especially project scope changes affected performance of Akazi Kanoze projects.

Raza and Shah (2012) study sought to investigate how the project triple constraints impacted projects in the IT industry. They were determined in terms of environment for work of the team members in the project in terms of the satisfaction of the job, remuneration, work hours. Based on the study findings it was revealed that the work environment affected performance of the projects in the IT industry in consideration with project constraints. Similarly, Kwasira, Wambugu and Wanyoike (2016) study aimed to examine contractors for the building projects based in Nakuru and how these practices affected successful projects completion. The study findings indicated that management of quality was significant for the completion of the projects in the study area. Finally,, Ahmed (2018) study addressed the effectiveness of critical path method scheduling on project delivery. The aim was to establish whether the projects have been completed in terms of project constraints. According to study findings indicated that critical path method was necessary to track project activities to meet the project.

Critique of the Existing Literature Relevant to the Study

From the past studies such as Rugenyi and Bwisa (2016) accentuated that project triple constraints had influence on the performance of construction projects. The study findings results indicated that project constraints significantly influenced NGOs projects performance. The relationship between projects constraints management and performance of county funded projects is yet to be comprehensively covered. The current study seeks to show how project constraints management can influence construction projects performance. Goswami (2015) view, the distinction between the project triple constraints and project performance there is no clear cut. They give an illustration of meeting site personnel in a construction site which can be regarded as an element of both project execution and project management. It is therefore concluded that project constraints, which involve project scope, time, cost and quality management, has vital implications on a project's fate, success or failure.

Studies by Mwakajo and Kidombo (2017); Adek(2016); Tabishi and Jha (2011); Osedo,(2017) and Ogutu and Muturi (2017) study examined the factors and project successful implementation determinants in county government infrastructure funded projects in terms of costs and time, and monitoring, however, they are case based studies, while applying little or none a cross-sectional survey research methods and the role of stakeholders participation is scanty. Nyakundi (2015), Kweyu (2018) and Justin *et al.*, (2016) concluded that project management process is significantly correlated to project success, however, the studies were case studies based on state entity, power and HIV AIDS projects respectively and the delivery

of project was on 'iron triangle'. The current study seeks to examine the relationship between project triple constraints and performance of network coverage enhancement projects in Safaricom, Kenya.

Research Gaps

A review of the existing literature showed that research has been done on project triple constraints and project performance (Hassan & Adeleke, 2019; Catanio, Armstrong & Tucker, 2013; Lukale, 2018; Kabirifar & Moitahidi, 2019). However, most studies examining the influence of project triple constraints on project performance have been conducted in developed countries (Barbalho *et al.*, 2016; Ahmed, 2018; Yahootkar & Gil, 2012). To fill this gap, and to establish existence of such a relationship, it is imperative to conduct research in developing economies context such as Kenya with specific reference to county construction projects. The reviewed literature pointed out a number of conflicting understandings on the relationship between project triple constraints and project performance which is also one of the key concerns of government funded construction projects research. This provides evidence that much research is needed to add to the debate in this area.

Additionally, literature reviewed indicates there is imbalance on the attention that has gone into studies on project triple constraints and performance of projects. In measuring performance of projects, most studies tend to concentrate on implementation aspects and disregards other dimensions of performance such as stakeholder satisfaction, benefit realization and service delivery (Mwakajo & Kidombo, 2017; Adek, 2016; Tabishi & Jha, 2011; Osedo, 2017; Ogutu & Muturi, 2017). Empirical evidence on the links between project triple constraints and project performance measured by stakeholder satisfaction, benefit realization and service delivery are evidently lacking. One notable exception is a study in Kenya by Rugenyi and Bwisa (2016) which examined the role of project triple constraints and project performance. The researchers used accessibility, availability, reliability and quality of services of the projects as a measure of performance of construction projects. However, the study findings could not be generalized due to different sectoral context. It would therefore be prudent for other researchers to make a remarkable contribution in this field by establishing the impact of project triple constraints on performance of network coverage enhancement projects (measured by stakeholder satisfaction, benefit realization and service delivery).

Moreover, there is need to question the veracity of the link between project triple constraints and performance of construction projects. Analysis of previous research relating to the question of a link between project triple constraints and performance of construction projects reveals there is uncertainty as to the direction of the link. Empirical evidence on the impact of

project triple constraints on project performance is mixed and inconclusive. A cross section of studies provides evidence that project triple constraints leads to improved project performance (Mwakajo & Kidombo, 2017; Adek, 2016; Tabishi & Jha, 2011; Osedo, 2017). In contrast, other studies found that project triple constraints negatively influence project performance (Osedo, 2017; Ogutu & Muturi, 2017). The inconclusive nature of evidence suggests that more empirical work is required on the relationship between project triple constraints and performance of construction projects. It is on this premise the current study seeks to establish the influence of project triple constraints on performance of construction projects which were county funded in Safaricom County Government, Kenya.

RESEARCH METHODOLOGY

Research Design

The study used a descriptive research design. Brymann (2016) asserts that choosing an appropriate research design depends on; the nature of the research questions, the variables involved in the research settings, sample of participants, data collection and analysis methods. The type of the study whether it is exploratory, descriptive or experimental depends on the stage to which understanding about the research problem has advanced (Yin, 2017). Van Manen (2016) states that a descriptive research design as a data collection method from which a sample of individuals being investigated using research instruments by use of data collection instrument which has both the closed-ended and open-ended questions, interviews and observations. Descriptive research design is most widely used non-experimental research designs across disciplines to collect large amounts of survey data from a representative sample of individuals sampled from the targeted population. In view of the above explanations and understanding, the study adopted the descriptive research design to conduct the study.

Target Population

A target population is the total collection of all units of analysis, which a researcher wishes to consider for specific intended study (Rugenyi & Bwisa, 2016). The target population for this research included individuals involved in and affected by indoor network coverage enhancement projects done by Safaricom. The unit of analysis was 430 individuals, which included employees for Safaricom and contracted companies working on indoor network coverage enhancement projects initiated by Safaricom from the year 2013 to 2019. The unit of analysis for this study consisted of 430 individuals; 39 project managers, 95 project accountants, 245 project beneficiaries and 51 project contractors.

Sample Size

According to Cresswell, (2012), sample size is the number of units or population elements in a study sample. Similarly, Evans et al., (2000) indicate that a sample size is the number of observations in a sample. In determining a sample size, this study will adopt Krejcie and Morgan (1990) formula for a known or finite population.

$$S = \frac{X^2 NP(1-P)}{d^2(N-1) + X^2 P(1-P)}$$

Where:

S = Required Sample size

X = Z value (1.96 for 95% confidence level)

N = Population Size

P = Population proportion (expressed as decimal) (assumed to be 0.5; 50%)

d = Degree of accuracy (5%), expressed as a proportion (.05); It is margin of error

Based on the formula a calculated sample size was 185, which was approximately 185 individuals. Using the required sample size, a computation will be made for every category of prospective respondents to determine the sample required. Stratified random sampling will further be applied in picking sample respondents from the different categories.

Sampling Frame

According to Ngechu (2004), a sampling frame is important in helping selecting representative samples. It is a list that contains the elements of population where the researcher of study. A sample frame is a set of units that are drawn and contains all those properties identified in every element in a given sample (Martyn, 2008). Saunders, Lewis, and Thornhill (2007), defined a sample frame as the complete list of all the cases in the population from which the sample is drawn. The sample from each category was chosen using the following formula;

$$\text{Sample size determination per strata} = \frac{\text{Number in the category} \times \text{Total sample size}}{\text{Target population}}$$

Table 3.1 The Sampling Frame

Strata	Population (N)	Sample (185/430*N)
Project Managers	39	17
Project Accountants	95	41
Project clients	245	105
Project Contractors	51	22
Total	430	185

Sampling Technique

The study applied stratified, purposive and systematic random sampling techniques to obtain response from the targeted population. Stratified sampling will be used as the target population is made up of different cohorts who have similar characteristics. The stratified random sampling is the probability of selection in which units are randomly sampled from a population that has been divided into categories or strata (Bryman, 2008). Stratified sampling has three basic advantages: it increases sample's statistical efficiency; provides adequate data for analyzing subpopulations; and enables different research methods and procedures to be used in different strata (Cooper & Schindler, 2008).

Purposive sampling will be used in selecting the respondents from the cohorts of project accountants and project managers so as to bring fairness and balance of the responses of the study as well these are the people who gave the important information based on their knowledge and experience. Purposive sampling is a technique where participants are deliberately selected based on the quality, knowledge, and experiences they possess (Creswell, 2012). Systematic sampling will be used in selecting the project employees and the project management office respondents.

Data Collection Instruments

This study will use self-designed questionnaires to collect data. According to Kasomo, (2007) respondents in a questionnaire have enough time to reflect on before answering questions and since respondents do not indicate their names, they tend to give honest answers. This also concurs with Jwan (2010) suggestion that questionnaires is preferable since they are more efficient, upholds confidentiality, requires less time and are less expensive to use. The self-designed questionnaire will have both open and closed-ended questions, which are self-administered; dropped and picked from the sampled respondents. The closed ended questions provide a more structured response to facilitate tangible recommendations, while the open ended questions provide additional information that would not have been captured in the close-ended questions. The researcher intends to make follow-ups to ensure the questionnaires are accurately filled and returned on time.

Validity

Validity refers to the utility of a tool, data or information. Mugenda and Mugenda (2008) define validity as the accuracy and meaningfulness of inferences that are based on research results. The study will ensure content validity by checking on the responses from the questionnaires by experts, to see if they give the intended answers to the research questions. Based on the

analysis of the pre-test, the researcher will make corrections, adjustments and additions to the research instruments. Consultations and discussions with the supervisors will be done to establish content validity (Kombo & Tromp, 2006).

Reliability

Donald and Delno (2006) defined reliability of research instrument as the consistence of scores obtained and have two aspects: stability and equivalency. Creswell (2012) defines reliability as the measurement of internal consistency of measurements and stability of measure of a research instrument. Cronbach's alpha technique will be used to test the reliability of the research instrument. An alpha value of 0.7 and above as recommended in Mugenda (2012) will be used to qualify the instrument as reliable or not.

Pilot Test

According to Bell (1999), a pilot study represents a replica of the larger study in a smaller scale. Typically, pilot studies are carried out before the actual study so as to establish and readdress any concerns on the research instruments before the actual study. Pilot study is also used to test the reliability and validity of data collection instruments. In order to get the sample for a pilot study, Mugenda (2010) recommends 6-10% proportion of the sample size to be used. In the case of the current study, the researcher will select 9%, that is, 08 of prospective respondents to participate in the pilot study. Respondents participating in the pilot will not be included in the main study. The results of the pilot study will be to test the reliability and validity of the research instrument.

Data collection procedure

Data collection is a key requirement for this study to be whole and realize its envisioned aims. The study made use of primary data to realize these objectives. The researcher will sought research permissions from the Safaricom headquarters and thereafter wrote an introduction letter to the employees in order to be allowed to do the study. The selected employees were visited and the questionnaires administered to them. The respondents were assured that strict confidentiality would be maintained in dealing with their identities. Some questionnaires were hand delivered to different respondents, while others were emailed to respondents who cannot be reached physically. The hard copy completed questionnaires will be collected immediately after gathering responses.

Data Processing and Analysis

Burns and Grove (2003) defined data analysis as a mechanism for reducing and organizing data to produce findings that require interpretation by the researcher. Hyndman (2008) explained that data processing involves translating the response from a questionnaire into a form that can be manipulated to produce statistics which involve coding, editing, and data entry. Data was collected using questionnaires, then the results coded, sorted and keyed into Statistical Package for Social Sciences (SPSS) version 25.0 for analysis.

This study employed a mixture of descriptive and inferential data analysis techniques in both data collection and analysis. Descriptive statistics such as measures of central tendency, dispersion, percentages and frequency distributions were used to analyze the scores distribution. Inferential statistics was used to derive conclusions and generalization regarding the population. Pearson product-moment correlation coefficient will also be used as a measure of the strength and direction of association that exists between independent and dependent variables. A Pearson's correlation attempts to draw a line of best fit through the data of two variables, and the Pearson correlation coefficient, r , indicates how far away all these data points are from this line of best fit. Multiple regression analysis was applied to analyze relationships between variables as follows.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e_0$$

Where; Y = performance of indoor network coverage enhancement projects (dependent variable)

β_0 = Coefficient of intercept (Constant)

X_1 = project scope management

X_2 = project timemanagement

X_3 = project costmanagement

X_4 = community participation

e_0 = Error term, whereas $\beta_1, \beta_2, \beta_3$ and β_4 = regression coefficients of four (4) variables.

RESEARCH FINDINGS AND DISCUSSION

Reliability Test

By utilizing the Cronbach's alpha, the reliability of the questionnaire was tested to measure its internal consistency. Cronbach alpha test is a statistical procedure used to examine the extent to which all the items in two sets of questions measure the same concept or construct. The findings were presented in Table 1. Project performance had an alpha value of 0.929 that is a sound and reliable measure.

Table 4.1: Cronbach Alpha Coefficients

	Cronbach's Alpha	Items
Project performance	0.929	05
Time management	0.928	05
Cost management	0.835	05
Scope management	0.958	05
Community participation	0.894	05
Scale Combination	0.909	05

The findings in Table 1 showed Cronbach's alpha values ranging between 0.835 and 0.929. These discoveries were in line with the level suggested by Hair *et al.* (2010) in which a coefficient of 0.60 is viewed as relating to an average reliability whereas a coefficient of at least 0.7 indicates that the research mechanism has a high reliability standard. Even though most investigators generally contemplate an alpha value of 0.7 as the adequate reliability coefficient, lower coefficients are also suitable (Sekaran & Bougie, 2010). This pilot study entailed an investigation that was carried out on a sample of 19 respondents (10% of actual sample size) from indoor network coverage enhancement projects initiated by Safaricom in Machakos County, whose data did not form part of the actual study.

Response Rate

The study findings in Table 2 revealed that the researcher distributed 185 questionnaires to the respondents. 170 questionnaires were retrieved successfully, leading to a response rate of approximately 92.0%. While the rate of response was high, the number of circulated questionnaires may have repercussions on the rationality of statistical analyses.

Table 2: Response Rate

Response	Frequency	Percentage (%)
Returned Questionnaires	170	92.0
unreturned Questionnaires	15	8.0
Total	185	100

Descriptive statistics

Demographic Information

Demographic information assists in demonstrating the social and economic fundamentals that might inspire the direction of the research. The study assessed the age of the respondents, the

gender and their experience in the project management field. The findings were put down in Table 3.

Table 3: Demographic information

		Frequency	Percent
Gender	Female	52	30.8
	Male	118	69.2
	Total	170	100.0
Age	20- 30 yrs.	13	7.7
	31- 40 yrs.	36	21.2
	41-50 yrs.	61	35.8
	over 50 yrs.	58	34.3
	Total	170	100.0
Nature of role in Safaricom projects	Project managers	16	9.4
	Project accountants	38	22.4
	Project Contractors	20	11.8
	Project clients	96	56.4
	Total	170	100.0
Years of experience in Network enhancement projects	Below 2 years	96	56.4
	Between 2 – 5 years	58	34.0
	Above 5 years	16	9.6
	Total	170	100.0

The results in Table 3 revealed that 69.2% of the respondents were male besides 30.8% of them being female. These outcomes indicate a HIGH disparity between male and female persons participating in indoor network enhancement projects. As regards age, 34.3% of the respondents were over 50 years, 35.8% between 41 and 50 years and 21.2% of them between 31 and 40 years. There were thirteen (n=13) respondents between ages of 20 and 30 years, corresponding to 7.7%. Moreover, the findings disclosed that project managers accounted for 9.4% of the all respondents, while 22.4% denotes the percentage of project accountants that played a part in the research. The project contractors accounted for 11.8% of the total number of respondents, whereas 56.4% represents the percentage of project clients that took part in the study.

34% of all respondents indicated that their experience in indoor network enhancement projects was between 2-5 years, whereas 56.4% of respondents had less than 2 year-experience while 16 respondents specified above 5 years of experience in handling indoor

network enhancement projects. These findings pointed out that majority of research participants had less than 2 years' experience because such projects have not been existing for a long period in Kenya.

Project time management and project performance

This section of the analysis focused on respondents' knowledge and insights on project time constraint. Thus, the study sought to establish the views of the respondents regarding management of project time constraint. A five-point Likert scale, rated 1 for strongly disagree (SD), 2 for disagree (D), 3 for undecided (N), 4 for agree (A), and 5 for strongly agree (SA), was used. The findings were presented in Table 4.

Table 4: Project time management

		Frequency	Percent
There is delay in making payments to project contractors	SD	6	3.5
	D	13	7.6
	N	13	7.6
	A	104	61.2
	SA	34	20.0
	Total	170	100.0
Poor communication leads to project delay	SD	14	8.2
	D	11	6.5
	N	25	14.7
	A	82	48.2
	SA	38	22.4
	Total	170	100.0
There is delay in approval by the project client	D	16	9.4
	N	37	21.8
	A	88	51.8
	SA	29	17.1
	Total	170	100.0
Adverse weather conditions lead to delays in project activities	D	26	15.3
	N	3	1.8
	A	84	49.4
	SA	57	33.5
	Total	170	100.0

Equipment failure and unavailability leads to delay in project delivery	SD	8	4.7
	D	11	6.5
	N	14	8.2
	A	96	56.5
	SA	41	24.1
	Total	170	100.0

Table 4...

The findings in Table 4 showed that, 61.2% and 20.0% of the respondents agreed and strongly agreed respectively that there is delay in making payments to project contractors while 3.5%, 7.6% and 7.6% strongly disagreed, disagreed and were undecided respectively. Further, the findings showed that 48.2% and 22.4% agreed and strongly agreed respectively that poor communication leads to project delay.

While 51.8% agreed that there is delay in approval by the project clients, 17.1% established that adverse weather conditions lead to delays in project activities. The respondents that agreed to the fact that equipment failure and unavailability leads to delay in project delivery accounted for 49.4%. As a whole, the results on the respondents' discernment of project time constraint had a mean of 3.9327 meaning that majority of the respondents were in agreement with the various aspects of project time management besides how they affected project performance.

Project cost management and project performance

Aspects of cost management are critical at this stage. Thus, this study sought to establish the influence of project cost constraints based on the views of the respondents and its impact on project performance. The findings regarding this were presented in Table 5.

Table 5: Project cost management

		Frequency	Percent
Sourcing of project funds influences the delivery of indoor network coverage enhancement project	SD	6	3.5
	D	13	7.6
	N	16	9.4
	A	94	55.3
	SA	41	24.1
	Total	170	100.0
Processes of procurement of project materials cause project delay	SD	14	8.2
	D	11	6.5

	N	4	2.4
	A	84	49.4
	SA	57	33.5
	Total	170	100.0
Funding sources are documented and established at the project planning stage	D	16	9.4
	N	23	13.5
	A	51	30.0
	SA	80	47.1
	Total	170	100.0
Funding phase schedules affect performance of indoor network coverage enhancement projects	D	26	15.3
	N	3	1.8
	A	107	62.9
	SA	34	20.0
	Total	170	100.0
Financial budgeting and reporting system in projects help in delivering of projects on time in our organization.	SD	8	4.7
	D	11	6.5
	N	11	6.5
	A	89	52.4
	SA	51	30.0
	Total	170	100.0

Table 5...

From the findings in Table 5, it was revealed that 55.3% agreed that sourcing of project funds influences the delivery of indoor network coverage enhancement projects; whereas 49.4% of the respondents agreed that, lengthy processes of procurement of project materials cause project delay. Furthermore, the findings show that 47.1% of the participants in the study properly strongly agreed that funding sources are documented and established at the project planning stage, whereas 62.9% of the respondents agreed that funding phase schedules affect performance of indoor network coverage enhancement projects. Moreover, the findings show that 52.4% the respondents agreed that financial budgeting and reporting system in projects help in delivering of projects on time. The overall mean response was 3.7092, indicating agreement with the aspects of project cost management by majority of the respondents.

Project scope management and project performance

The study sought to establish the degree of the influence of project scope constraints on project performance from the perspective of respondents. The findings were presented in Table 6.

Table 6: Project scope management

		Frequency	Percent
My organization plans for scope before the project is initiated	SD	4	2.4
	D	19	11.2
	N	6	3.5
	A	98	57.6
	SA	43	25.3
	Total	170	100.0
A work break down structure is normally used in my organization to plan the project activities	SD	8	4.7
	D	15	8.8
	N	33	19.4
	A	76	44.7
	SA	38	22.4
	Total	170	100.0
Scope definition which is clear always guides all the inputs in the project in my organization	SD	9	5.3
	D	10	5.9
	N	40	23.5
	A	85	50.0
	SA	26	15.3
	Total	170	100.0
A collection of project requirements is mandatory before any project is implemented in my organization	SD	14	8.2
	D	11	6.5
	N	4	2.4
	A	84	49.4
	SA	57	33.5
	Total	170	100.0
Control of scope is one of the key factors that is considered before implementing any project in my organization	SD	7	4.1
	D	12	7.1
	N	18	10.6
	A	92	54.1
	SA	41	24.1
	Total	170	100.0

From the findings in Table 6, 57.6% of the respondents agreed that Safaricom Company plans for scope before initiating projects. 44.7% of the study participants observed that work break down structures are normally used to plan project activities. 50.0% of the study

participants acknowledge that clear scope definition always guides all the inputs in the project, while 49.4% agreed that collection of project requirements is mandatory before any project is implemented. 54.1% of respondents agreed that Control of scope is one of the key factors that is considered before and during implementation of any project. Overall, mean response was 3.5923 representing agreement by majority of the respondents in Nairobi County.

Community participation and project performance

The study sought to assess the level of community participation in relation to performance of indoor network enhancement projects. The findings regarding this study were presented in Table 7.

Table 7: Community participation

		Frequency	Percent
Utilizing community teams well leads to timely completion of projects	SD	4	2.4
	D	19	11.2
	N	6	3.5
	A	107	62.9
	SA	34	20.0
	Total	170	100.0
Some projects were delayed due to community opposition in relation to lack of agreement on sharing benefits	SD	8	4.7
	D	15	8.8
	N	30	17.6
	A	79	46.5
	SA	38	22.4
	Total	170	100.0
Training of community on project issues leads to minimal project disputes	SD	9	5.3
	D	10	5.9
	N	34	20.0
	A	88	51.8
	SA	29	17.1
	Total	170	100.0
Risk sharing between the organization and the community is carried out periodically to minimize risk impact on projects	SD	14	8.2
	D	11	6.5
	N	4	2.4

	A	84	49.4
	SA	57	33.5
	Total	170	100.0
Procedures for community participation and contribution are available, though uncertain	SD	7	4.1
	D	12	7.1
	N	16	9.4
	A	94	55.3
	SA	41	24.1
	Total	170	100.0

Table 7...

The findings in Table 7 show that, 62.9% of the respondents agreed that Utilizing community teams well leads to timely completion of projects, as 46.5% of the participants observed that Some projects were delayed due to community opposition in relation to lack of agreement on sharing benefits. In addition, the respondents who agreed that training of community on project issues leads to minimal project disputes accounted for 51.8%, whereas 49.4% of the respondents approved of the fact that risk sharing between the organization and the community is carried out periodically to minimize risk impact on projects. Finally, 55.3% of the respondents agreed that procedures for community participation and contribution are available, though uncertain. The overall mean response was 3.6500, which showed that majority of the respondents agree that, largely, the various aspects of community participation are applied in the management of indoor network enhancement projects.

Performance of indoor network enhancement projects

Finally, the study sought to establish the level of project performance given the extent of application of project constraint management in indoor network enhancement projects. The views of respondents were sought regarding completion of the processes in time, within the set budget, ability of the project products to serve their purpose as well as other aspects of project implementation. The findings were presented in Table 8.

Table 8: Project Performance

		Frequency	Percent
The most significant risks that impact more on our projects are related to cost, time and scope	SD	4	2.4
	D	19	11.2
	N	30	17.6
	A	83	48.8

	SA	34	20.0
	Total	170	100.0
Projects are implemented completed within the expected time frame	SD	4	2.4
	D	19	11.2
	N	6	3.5
	A	98	57.6
	SA	43	25.3
	Total	170	100.0
Completed projects normally meet the required scope and quality standards	SD	3	1.8
	D	15	8.8
	N	15	8.8
	A	86	50.6
	SA	51	30.0
	Total	170	100.0
The organization gives regular project progress reports on its performance	SD	13	7.6
	D	12	7.1
	N	4	2.4
	A	84	49.4
	SA	57	33.5
	Total	170	100.0
Before the beginning of any project, all stakeholders usually agree on the inputs and outputs of the project.	D	16	9.4
	N	22	12.9
	A	55	32.4
	SA	77	45.3
	Total	170	100.0

Table 8...

From the findings in Table 8, 48.8% of the respondents agreed that the most significant risks that impact more on Safaricom projects are related to cost, time and scope, while 57.6% of them agreed that Projects are implemented completed within the expected period. Additionally, 50.6% of the respondents agreed that Completed projects normally meet the required scope and quality standards. Furthermore, 49.4% of the respondents agreed that the organization gives regular project progress reports on its performance; however, 45.3% of the study respondents strongly agreed that before the beginning of any project, all stakeholders usually agree on the inputs and outputs of the project. The overall mean response was 3.3962 indicating agreement by majority of the respondents regarding various aspects in relation to project performance.

Inferential Statistics

To establish the relationship between independent variables and the dependent variable the researcher conducted inferential analysis that comprised coefficient of correlation, coefficient of determination and multiple regression.

Coefficient of Correlation

Correlation analysis is imperative in a research task. Correlation analysis offers a means of understanding the magnitude and direction of the existing relations and provides a way of founding whether there exists a linear relationship among the variables being surveyed. Generally, for scale measures, the value of Pearson Correlation coefficient (r) varies between -1 and +1 with values close to -1 or +1 signifying a strong relationship while values close to 0 in either case are indicative of a weak relationship. Furthermore, although correlations are important, they do not infer cause and effect relationship. The study sought to establish the nature of the relationships existing between the independent variables and the dependent variable by examining the correlation coefficients. The findings were presented in Table 9.

Table 9: Coefficient of Correlation

Variables		Project Performance	Project time management	Project cost management	Project scope management	Community participation
Project performance	Pearson Correlation	1				
	Sig. (2-tailed)					
Project time management	Pearson Correlation	.899**	1			
	Sig. (2-tailed)	.000				
Project cost management	Pearson Correlation	.927**	.885**	1		
	Sig. (2-tailed)	.000	.000			
Project scope management	Pearson Correlation	.878**	.853**	.807**	1	
	Sig. (2-tailed)	.000	.007	.000		
Community participation	Pearson Correlation	.868**	.841**	.833**	.875**	1
	Sig. (2-tailed)	.000	.005	.004	.154	

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

According to the findings as indicated in table 9, there was a positive correlation between project time management and project performance as depicted by a correlation value of $r = 0.899$ ($p\text{-value}=0.000$). The study also illustrated that there is a positive correlation between project cost management and project performance with a correlation value of $r = 0.927$, ($p\text{-value}=0.000$). The study also noted that there was a positive correlation between project scope management and project performance, having a correlation value of $r = 0.878$ with $p\text{-value}=0.000$ and a positive correlation between community participation, and project performance with a correlation value of $r = 0.868$, ($p\text{-value}=0.000$).

This shows that all the four independent variables that were studied had a positive influence on performance of indoor network enhancement projects in Nairobi County.

Analysis of Variance (ANOVA)

An examination was conducted on the relationship between the project time management, project cost management, project scope management and community participation, and performance of indoor network enhancement projects. From Table 10 below, the model was significant ($p\text{-value} = 0.000$) at 0.05 level of significance in explaining the linear relationship between the study variables. Additionally, the F-statistic is significantly greater than 1, indicating the relevance of the model in testing the relationship between the study variables. This means that the model is appropriate for use in running a factor analysis.

Table 10. Analysis of Variance (ANOVA)

		Sum of				
Model		Squares	df	Mean Square	F	Sig.
1	Regression	477.645	4	99.411	103.863	.000 ^b
	Residual	11.715	20	.586		
	Total	489.360	24			

a. Dependent Variable: Project performance

b. Predictors: (Constant), Community participation, Project time management, Project scope management, Project cost management

Df= degree of freedom (indicates the number of independent values that can vary in an analysis without breaking any constraints)

Coefficient of Determination of Research Variables

The coefficient of determination was ascertained to assess the fittingness of the statistical model in forecasting future results. Adjusted R squared is the coefficient of assurance that

shows the changes in the dependent variable because of variations in independent variables. Results in Table 11 show that the value of R square was 0.896, which shows that there was change of 89.6% in the performance of automated tea processes due to changes in the application of project time management, cost management, scope management and community participation at 95% confidence interval. R is the correlation coefficient, which represents the connection between the study variables. Findings in Table 11 show a strongly positive connection between the variables in the analysis as reflected by R= 0.947.

Table 11: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.947 ^a	.896	.891	.76534

Predictors: (Constant), Community participation, Project time management, Project scope management, Project cost management

Multiple Regression

The researcher further carried out a multiple regression analysis. The main aim of multiple regressions is to understand the relationship between various study variables.

Table 12: Regression model and Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.899	.735		2.584	.018
Project time management	.078	.130	.080	.600	.032
Project cost management	.046	.314	.044	.145	.024
Project scope management	.229	.204	.206	1.126	.014
Community participation	.689	.228	.666	3.023	.007

Dependent Variable: Performance of automated processes

Hence, the equation,

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e_0$ becomes;

$$Y = 1.899 + 0.078X_1 + 0.046X_2 + 0.229X_3 + 0.689X_4$$

The results show that, holding project time management, cost management, scope management and community participation at constant zero, project performance would be at

1.899. The researcher found out that a unit change in project time management would cause a change in project performance by a factor of 0.078, while a unit variation in cost management would contribute to variation in project performance by a factor of 0.046. A unit variation in scope management would contribute to variation in project performance by a factor of 0.229 and a unit variation in community participation would contribute to change in project performance by a factor of 0.689. In addition, all the predictor variables had their p-values less than the threshold of 0.05 level of significance, implying that they are significant in the model.

SUMMARY OF FINDINGS

The purpose of the study was to find out how management of project constraints influence performance of indoor network enhancement projects in Kenya. Data was presented in relation to the study findings; all staff levels were well represented in the study, majority of the respondents had been involved in the network enhancement projects for less than 2 years. In this study, 78.7% of those who responded were found to use some type of time management approach or technique to manage time constraints in indoor network enhancement projects. This finding is in agreement with the Economist Intelligence Unit (2011) findings, which showed that 70% of companies in the renewable energy sector are highly successful in managing project time constraints.

Project time management and project performance

The findings show that project time management does have a positive and significant influence on performance of indoor network enhancement projects. In line with this first objective: The study revealed that project time management influences performance of indoor network enhancement projects at $\beta_1 = 0.078$, ($p=0.032$). Findings established that the Safaricom Company employed sequencing project activities to avoid resource over-allocation or otherwise; duration of each activity is estimated during planning; project management software is utilized in controlling schedules for projects; most projects are completed within the scheduled time limit and in case of delays, crashing and fast trucking is done to recover lost time.

Project cost management and project performance

In line with objective two: findings established that there is a positive and significant relationship between project cost management and performance of indoor network enhancement projects with $\beta_2 = 0.046$, ($p=0.024$). Nevertheless, the respondents pointed out that the cost of every project activity is estimated before projects commence; Constant accountability through funding

limit reconciliation has enhanced trust among stakeholders and adequate budgetary allocation is made to ensure that projects are efficiently implemented.

Project scope management and project performance

In line with objective three: findings established a positive correlation between project scope management and performance of indoor network enhancement projects at $\beta_3 = 0.229$, ($p=0.014$). This is attributed to the fact that majority of the respondents agreed that the main challenge of indoor network enhancement projects is fast changing technology that makes it difficult to achieve defined process scope. They also act to apply Work Breakdown Structure to divide project activities into manageable work components and clearly communicate project scope before work is commenced. Further, company top management carries out quality assurance training of staff on output specifications for indoor network enhancement projects.

Community participation and project performance

In line with objective four: the study revealed that community participation influences performance of indoor network enhancement projects both positively and significantly at $\beta_4 = 0.689$, ($p=0.007$). Findings established that that some projects were delayed due to community opposition in relation to lack of agreement on sharing benefits and procedures for community participation and contribution are available, though uncertain. The company's risk audit department ensures risk sharing between the organization and the community is carried out periodically to minimize risk impact on projects. Utilizing community teams well leads to timely completion of projects as well as training of community on project issues, hence leading to minimal project disputes.

CONCLUSIVE REMARKS

Conclusion

The researcher was able to achieve the study objectives whereby it was established that project time management, cost management, scope management and community participation influence performance of indoor network enhancement projects in Kenya. Nonetheless, the extent to which these project management constraints influenced performance of these projects differed. The findings established that all the four project management constraints that were studied had a positive influence on performance of indoor network enhancement projects in Kenya. It is also confirmed that community participation, and scope management influenced the performance of indoor network enhancement projects in Kenya largely, followed by project time management and cost management respectively.

Recommendations

Based on the findings of this study, it is recommended that:

- i. There is need to enhance project constraint management by strengthening already existing practices and investing more in managing time constraints in indoor network enhancement projects in Kenya. In addition, there is need for more investment in control systems and ensure they are effective in decision-making by company top managers.
- ii. This research project recommends a formal and structured cost management practice during process planning with involvement of telecommunication network professionals and end users.
- iii. There is need to enhance the knowledge of project scope management, identification of sources of scope creep and ensuring the management board exhibits diversity in terms of project scope performance.
- iv. To manage the risk effectively and efficiently, the managers and support staff must understand risk responsibilities, risk event conditions, risk preference, and risk management capabilities during project implementation.
- v. Adequate project management training or courses should be conducted, to increase the knowledge of practitioners about different project tools and techniques available for appropriate choice at the early stage.

Areas for Further Study

This study focused on the influence of project management constraints on performance of indoor network enhancement projects in Kenya, especially in Nairobi County. The scope of this study only concentrated on indoor network enhancement projects in Nairobi County by Safaricom. However, there is need to increase the scope to cover other telecommunication firms and other regions in Kenya so as to confirm the findings of this study and to add more knowledge.

Furthermore, because of the difference in operations between sectors, there is need to include the perspective of the external forces or factors as well as policies in order to widen the net of the factors that can have an influence on indoor network enhancement projects in Kenya.

Furthermore, while there are firm-inherent factors that determine the direction of effects of project management constraints; there are factors that are inherent from product customers and operational procedures that might have an effect on the practices involved in indoor network enhancement projects. Thus, there is need to have a deeper look into the role of the customers, in terms of network project management and policies, so as to get an overview of the challenges with view of addressing them from all angles.

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