

Assessment of the Triple Constraints in Projects in Nairobi: The Project Managers' Perspective

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ABSTRACT

The study sought to assess the triple constraints in projects in Nairobi taking the perspectives of the project managers. Through a survey of 26 project managers registered by The Kenya Association of Project Managers and Project Management Institute, Kenya Chapter, the study found that constraints are experienced in projects carried out in Nairobi with project scope and project cost each being the most experienced by 20% of the respondents. The study concludes that project scope and project cost are the most common triple constraint elements faced in project management in Nairobi.

KEY WORDS

Project management, triple constraint, Nairobi, project manager.

INTRODUCTION

Generally, projects are undertaken because they are part of the plans to take organisations to new levels of performance and to meet business needs (Van Wayngaag, Pretorius, & Pretorius, 2011). Project management is planning, organizing, coordinating, leading and controlling resources to accomplish the project objective. The successful accomplishment of the project objective could be constrained by many factors, including scope, quality, schedule, budget, resources, risks, customer satisfaction, and stakeholder support (Gido & Clements, 2015).

The triple constraint is a triangle of time, cost and performance that bounds the universe within which every project must be achieved (Dobson M. S., 2004). Project managers must focus on three dimensions of success- completing all project deliverables on time, within budget and to the level of quality that is acceptable to sponsors and stakeholders (Greer, 2008). Although variations and different dimensions exist, these constraints are listed as project scope, time and cost. Performance is sometimes referred as "scope" or "quality" and "cost" and "resources" are often listed separately (Dobson M. S., 2004).

The triple constraint is also referred to as the iron triangle (Atkinson, 1999) reflecting the fact that the three constraints are interrelated and involve trade offs.

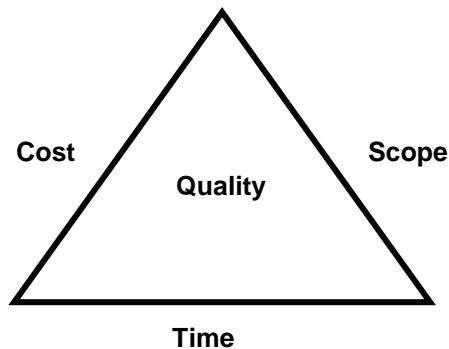


Figure i: Iron Triangle (Atkinson, 1999)

Project quality take root in all three variables of the triple constraint and is affected by balancing the three factors (Van Wayngaad, Pretorius, & Pretorius, 2012).

From the novice to the most experienced and senior project manager, triple constraint issues are at the core of the most crucial decisions about a project. Further, Dobson, (2014) tells us that the great secret of the triple constraint is that they are not equally constraining. They exist in a hierarchy of “driver”, “middle” and “weak” constraint. The driver being the constraint we have to meet or else the project fails. The weak constraint, at the other extreme, has the greatest flexibility and furnishes the opportunity that can be used creatively to ensure that the driver constraint does not fail.

Project management has spread in recent years from its traditional dominance of the fields of construction and engineering into sectors as diverse as education, IT, media, health care, and surgery (Hodgson, 2002). As the data proves, most projects fail to meet their goals. They do not meet time and budget goals, do not meet their business objectives, or both (Shenhar & Dvir, 2007). Time and cost performance of projects in Kenya are unacceptable with over 70% of initiated projects likely to escalate in time with a magnitude of over 50% and 50% of the projects likely to escalate in cost with a magnitude of over 20% (Mbatha, 1986), (Talukhaba, 1988), (Mbeche & Mwandali, 1996). Recently, Thika dam (Olima & K'akumu, 1999). Thika Road (The Kenya Alliance of Resident Associations, 2012), and Langata Road projects have finished late and overbudget, just to mention a few.

A project manager is the person responsible for accomplishing the project objectives within the project constraints (Chiu, 2010). The emphasis and project goals may differ from project to project, but the total responsibility for overall project success rests on the shoulders of the project manager, the one who is running the project day-to-day (Shenhar & Dvir, 2007). As such, the research aimed to seek views from project managers. In Kenya, there are two project management associations; The Kenya Association of Project Managers (KAPM) and the Project Management Institute, Kenya Chapter. The Kenya Association of Project Managers (KAPM) had 180 registered members (Mtunda, 2015) while Project Management Institute, Kenya Chapter

had 108 registered members with around 35 members having the professional certification of Project Management Professional (PMP) (Kititu, 2015) at the start of the study. As such, there were 288 registered by the Kenyan project management associations. This consisted of the target population for the study.

Problem Statement

Despite the much acquired knowledge in project management, history shows a pattern of project underperformance, with most projects not meeting one or more of these expectations (Thompson, 2012). Delay and cost overrun are an inherent part of most projects (Ambituuni, 2011). They are the rule rather than the exception in construction, defence, power generation, aerospace, product development, software and other areas (Serman, 1992). In a 2008 IBM survey on change management projects, only 40% of projects met schedule, budget and quality goals (IBM, 2008). One in six of the 1,471 IT projects studied had an average cost overrun of 200% and a schedule overrun of 70% (Flyvbjerg & Budzier, 2011). The Standish Group in 2012 found that 43% of projects were challenged (late, over budget and/or with less than the required features); and 18% failed (cancelled prior to completion or delivered and never used) (The Standish Group, 2013). In a study of 5400 large IT projects, on average run 45% over budget and 7% over time, while delivering 56% less value than predicted (Bloch, Blumberg, & Laartz, 2012). In their survey of projects in 34 industries across 38 countries, Price Waterhouse Coopers (PwC) (2012), found that 86% of projects fail to deliver against their budget, schedule, scope, quality and benefits baseline. Of these, more than 60% of the project failed to deliver against their budget and schedule and less than 10% failed to deliver on their quality and scope against each criterion.

In Kenya, (Gwaya, Wanyona, & Masu, 2014) suggested the need for Kenya to adopt a different approach in the application of project management, in its construction industries. This is due to research indicating ridiculous cost and time overruns in projects undertaken in Kenya, (Mbatha, 1986), (Talukhaba, 1988), (Mbeche & Mwandali, 1996), (Olima & K'akumu, 1999), (The Kenya Alliance of Resident Associations, 2012).

Need therefore arises to assess the triple constraint in project management in Nairobi, Kenya in order to understand their occurrence to enhance future exploitation by project managers and enhance project management. Project managers in Nairobi were taken as the target population.

Objectives

The general objective of this study was to assess the triple constraints in project management in projects carried out in Nairobi as faced by project managers'.

Literature Review

This chapter contains literature revealed from a number of published journals and project management books.

Theoretical Review

This study was based on the theory of constraints and the triple constraints theory.

Theory of Constraints

Theory of Constraints is a form of systems thinking that suggests that any complex system at any point in time often has only one aspect or constraint that limits its ability to achieve more of its goal. There is need to exploit the constraint and adjust scheduling and resource usage. The theory was put forth by Goldratt (1990) in his book 'The Goal'.

This theory has found application in two areas within project management; scheduling of a single project to reduce project duration and simplify control, and allocating resources that are shared by concurrent projects (Steyn, 2002). This is because; Positive cash flow can be obtained faster as a result of extended duration, contingency cost of delays could be very high, and extended project duration not only leads to escalation of overhead costs, but also lead to scope changes because stakeholder needs change over time (Steyn, 2002).

Theory of Triple Constraints

The theory of the triple constraint states that: the triple constraint, is a triangle of time, cost and performance that bounds the universe within which every project must be accomplished (Dobson M. S., 2004). The key attributes, as stipulated by (Van Wayngaad, Pretorius, & Pretorius, 2012), are; 1) The triple constraint constitutes a balance of the three interdependent project elements of scope, time and cost as a function of the project higher purpose; 2) The cause and effect of new or changing triple constraint requirements are constantly negotiated during all phases of a project. 3) The three key triple constraint relationships signify that at least one of the triple constraint variables must be constrained (otherwise there is no baseline for planning), and at least one of the variables must have capacity for exploitation (otherwise quality may be affected).

Conceptual Framework

The conceptual framework for this research was the working hypothesis. The research was exploratory and linked with the micro-conceptual framework "working hypothesis," which signalled that conceptualization was in its preliminary stages (Shields & Tajalli, 2006). Working hypothesis are statements of expectations with tremendous capacity for variation and are flexible enough to contain both relational and non-relational expectations (Shields & Rangarajan, 2013). The working hypotheses were developed after reviewing theoretical and empirical literature on the concepts of the research objectives.

The Triple Constraint

The Project Management Institute (PMI) and numerous other text books on the subject define project management as the application of a body of knowledge and techniques to manage the

trade-off or 'triple constraints' between the time, cost, and quality specification (Davies, 2014). To successfully complete a project, the deliverables must match the requirements. To produce this outcome, the project manager is constantly dealing with decisions designed to keep the triple constraint; within schedule and budget, while meeting the requirements (Richardson, 2015). The reason for a constraint and the way in which a constraint is expressed don't have to be related. Budgets can put pressure on deadlines; deadlines can alter performance (Dobson & Feickert, 2007).

Through their survey of 1386 projects, (Serrador & Turner, 2015) found that project efficiency is 60% correlated with project success and fell to 51% if efficiency was defined as time and budget only. Thus, project efficiency is an important contributor to project success. Project constraints introduce limitations and influence management of the project. The interrelated constraints of time, cost and scope are considered central considerations alongside project quality and risk and hence a balanced trade-off needs to be negotiated as a function of the project goal in order to optimise project success (Van Wayngaag, Pretorius, & Pretorius, 2011).

To be able to adequately address the triple constraints, we must first identify and document the constraints faced by our system. Once the constraints are documented, the first step is to intuitively identify and prioritize the constraints according to their impact on the goal (Goldratt, 1990). This is analogous to (Dobson M. S., 2004) secret of the triple constraint- that they are not equally constraining.

Studies conducted in this line include (Flyvbjerg, Holm, & Buhl, 2003), who assessed the commonality and size of cost overruns in transport infrastructure projects across twenty nations while (Sovacool, Gilbert, & Nugent, 2014), conducted an international comparative assessment of construction cost overruns for electricity infrastructure by identifying the frequencies of occurrence. (Gideon & Bwisa, 2013) Found that politics in project management led to stalled projects in government institutions, while (Ojwang' & Bwisa, 2014) found that political regimes and government were the joint highest influencers of CDF projects. (Otieno & Bwisa, 2013) Identified enhanced project risk management as a major contributor to meeting the triple constraint in core software projects in the banking industry.

As a result of the foregoing literature, the following hypotheses, which involves the documentation and ranking of constraints and the triple constraints, were constructed:

Working Hypothesis 1 (WH1)

Project management practice in Nairobi faces constraints that inhibit its ability to deliver projects.

Working Hypothesis 1a (WH1a)

The triple constraints experienced by project management practice in Nairobi occur in hierarchical order.

Working Hypothesis 1b (WH1b)

The triple constraints experienced in project management practice in Nairobi are caused by few similar problems.

RESEARCH METHODOLOGY

The study adopted an exploratory approach using a descriptive survey design. Descriptive research focuses on *what* questions (de Vaus, 2001). Descriptive research studies are those studies which are concerned with describing the characteristics of a particular individual, or of a group (Kothari, 2004) and the said design can also be appropriately referred to as a survey design. When the term survey is used, it usually refers to a sample survey, meaning that information is gathered from only a part of the population (Vogt, Gardener, & Haeffel, 2012).

The study adopted purposive sampling which is a non-probabilistic technique where the participants will be self-selected. This is because, project managers registered under the associations would provide unique and rich information of value to the study (Suen, Huang, & Lee, 2014). Study participants completed an online survey using Survey Monkey®. The survey web link and a letter of introduction from university was sent to the presidents of the KAPM and PMI, Kenya chapter who then forward the web link to its members.

RESEARCH FINDINGS

A total of 40 people started the survey with 29 of the targeted 30 completing the survey. 3 surveys were discarded due to the participants not working in the capacity of project manager. This constitutes a response rate of 86.67%.

Reliability

A Cronbach alpha was performed on the triple constraint measures. The Cronbach alpha is a number that ranges from 0 to 1; a value of 1 indicates that the measure has perfect reliability, while a value of zero indicates that the measure is not reliable and variations are due to random errors. In general, an alpha value of 0.9 is required for practical decision making situations, whereas a value of 0.7 is considered to be sufficient for research purposes (Nunnally, 1978 as cited in (Serrador & Turner, 2015)). The Cronbach alpha was 0.759 and thus the instruments were reliable for research purposes.

Table i: Alpha Coefficients

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.759	0.759	3

Working Hypothesis 1: Project Management Constraints

The first working hypothesis sought to identify and document the constraints faced by project managers in execution of projects. This was achieved by asking an open ended questions from which respondents were to indicate the most constraining aspect that hinders the successful management of projects they have carried out.

The research supported hypothesis one, and found that project managers practising project management in Nairobi face constraints in their day to day management with 25 out of a possible 26 of the survey respondents identifying a constraint. The results were in support of the goal theory advanced by (Goldratt, 1990). The following figure 4-2 is a display of the constraints faced by survey respondents;



Figure ii: Constraints that Hinder Successful Project Management

Working Hypothesis 1a: The Most Common Triple Constraint

To identify the most common triple constraint, the constraints faced were ranked in their frequency of occurrence and the most common triple constraint element identified. Of the constraints faced, project scope (20%) and project cost (20%) were the highest constraints faced with the survey respondents attributing them as hindrances to successful project management. Planning in the aspect of poor planning of activities and estimation and lack of involvement of project managers during initial costing was attributed by 16% of the respondents as a hindrance to project management success. 12% of the survey respondents attributed the hindrances to human resources. The human resource aspect was highlighted in terms of manpower management and lack of capacity among project management teams. Project time and stakeholders tied at 8%. Of the 8% who attributed stakeholders as a hindrance, they viewed it as lack of stakeholder buy-in and management of stakeholder expectations. A system constraint was identified by 4% of the respondents in that organizational processes were not aligned through Project Management Office (PMO). External risks were identified by 4% of the respondents, effective communication by 4% of the respondents, and procurement and approval timelines by 4% of the respondents.

Hence, the data supported working sub-hypothesis 1a. Project managers practising in Nairobi face constraints in their day to day management of projects which occur in a hierarchy.

Working Hypothesis 1b: Causes of the Constraints

Sub-hypothesis 1b was concerned with the causes of the triple constraints. The causes of project scope, project time and project budget were investigated by asking respondents what caused occurrence that lead to the non-achievement of the set out objectives of project scope, project time and project cost.

Project Scope

Scope change was the biggest cause of non-achievement of project scope objectives as mentioned by 31% of the respondents. Project risk due to newer version of technology, change in strategy, uncertainties, climatic problems and security threats were identified by 27% of the respondents. 19% identified specifications in the aspect of poor definition of requirements, project donor requirements, and unclear specification as a cause of the non-achievement of scope objectives. Poor planning was identified by 12%, and delays in execution were identified by 8% while lack of finances was identified by 4% of the respondents respectively.

Table ii: Causes of Project Scope Constraint

Causes of project scope constraint	Frequency	% Frequency
Change	8	30.8
Risk	7	26.9
Specification	5	19.2
Planning	3	11.5
Delays	2	7.7
Finance	1	3.8
Total	26	100.0

Project Time

The non-achievement of project time objectives due to scope change was identified by 27% of the respondents. This was closely followed by project risks from environmental factors, security threats and land acquisition experienced by 23% of the respondents. Poor planning was identified by 15% of the respondents, finance constraints due to payment delays and budgetary approvals by 12%, lack of specification during project initiation by 8%, delay due to customs and onsite contractor, and decision making and procurement processes by 8%, and improper utilisation of resources by 4% of the respondents respectively. 4% of the respondents achieved their project time objectives.

Table iii: Causes of Project Time Constraint

Causes of time constraint	frequency	% Frequency
Change	7	26.9
Risk	6	23.1
planning	4	15.4
Finance	3	11.5
Delay	2	7.7
specification	2	7.7
Resources	1	3.8
No time constraint	1	3.8
Total	26	100.0

Project Cost

Project cost objectives were influenced as follows according to the respondents;

Project scope change was identified by 42%. Risk due to currency fluctuations, unplanned interruptions, cost variation of material and labour, and inflation was identified by 23%. Delays caused by customs and on-site contractors, implementation, customer demands, and time was identified by 19%. Poor planning by 8%. Administrative meetings and travel by 4% of the respondents. 4% of the respondents achieved their project cost objectives.

Table iv: Causes of Project Cost Constraint

Cause of Cost Constraint	Frequency	% Frequency
Change	11	42.3
Risk	6	23.1
Delay	5	19.2
Planning	2	7.7
Administrative	1	3.8
No cost constraint	1	3.8
Total	26	100.0

The results concur with (Dobson & Feickert, 2007), who argued that the reason for a constraint and the way in which a constraint is expressed don't have to be related. Budgets can put pressure on deadlines; deadlines can alter performance. Thus, from the foregoing, the results supported sub-hypothesis 1b that the triple constraints experienced by project managers practising project management in Nairobi are caused by a few similar problems.

Conclusion and Recommendations

Conclusion of the Study

The goal of any project manager or indeed stakeholders in a project is to complete it successfully within the triple constraint. The study sought to assess the triple constraints by taking the perspectives of the project manager. We found that project scope and project cost are the most common triple constraint elements faced in project management in Nairobi as highlighted by the project managers. The constraints are mainly caused by project scope changes, project risks, poor project planning, and project delays.

Recommendations of the Study

The study recommends that on the basis of causes of the triple constraint elements, at the onset of a project, project specification should be clearly captured and a robust change management system put in place. The study also recommends the use of risk management experts in project teams to enhance a projects ability to respond to risks it faces in its life cycle. The early hiring of project managers can also go a long way in enhancing management of the triple constraint by enhancing early definition of project success factors and criteria.

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