

EFFECT OF PROJECT ACTIVITIES SCOPING AND DESIGN IMPLEMENTATION ON FINAL PROJECT OUTCOME

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ABSTRACT

The aim of this study was to evaluate the effect of project scope planning and implementation on the final project outcome using a survey of 10 completed jobs in the public and private sectors within the south East and South-Southern parts of Nigeria. Specific objectives were to: determine the effect of project scope planning on project outcome, examine the effect of proper scoping of the structural designs on final project outcome and explore the effect of scope implementation on final project outcome. The study used Chi-square non-parametric statistic on a sample of 160 employees of the construction companies responsible for the selected projects, all the three variables were found significant at 5% critical level with chi-square values of 45.8, 43.4, and 16.1 respectively all of which were greater than the control value at the 5% critical point which was 11.92. These findings led to the conclusion that there is a significant effect of project scope planning, implementation and design scope implementation on final project outcome. The study recommended that contractors should lay out a sequential plan of the scope of jobs they are to execute and implement the designs in consultation with the design architects and other key stakeholders.

INTRODUCTION

The Project Management Institute in Clarke, (1999), defines project as a temporary, definitive beginning and definitive end, endeavor undertaken to create a unique product or service. Projects can be considered as an achievement of a specific objective which involves the utilization of resources on a series of activities or tasks (Rønneest, 2002). Many projects fail because of difficulties in controlling the scope of the project. Scope definition is the process by which projects are defined and prepared for execution. It is at this crucial stage that risks associated with the project are analyzed and the specific project execution approach is defined (Rønneest, 2002).

In project management, the word “scope” has two distinct meanings. First, project scope connotes the activities and tasks that needs to be accomplished in order to deliver a product, service or result with the specified features and functions and product scope refers to the features and functions that characterize a product, service or result. Project scope is mainly work oriented (the How) while product scope is more oriented toward functional requirements (the what) (Elinwa & Joshua, 2011).

In both instances, defining scope is an exercise in fact finding, documenting and gaining agreement on what needs to be done and how. This can be a time consuming process and those project team members involved in the scoping exercise may find it frustrating because stakeholders whose inputs are usually needed may not always be available for interviews and meetings and always assign this a lower priority than their day-to-day work. This is understandable since many of them will not be part of the project team eventually (Alexander & Stevens, 2002).

Most construction problems that result in time and cost overrun and poor project outcome have been traced to improper project scoping from the start of the job and poor design implementation. For instance, in a study by Flyvbjerg, Glenting, and Rønne (2002), states that ten transportation infrastructure projects costs are underestimated and that for all project types, the actual costs are on average 28% higher than estimated costs. This was traced to improper initial project activities planning which is all about scoping. In a study on the Nigerian Construction industry by Elinwa & Joshua (2011), 44% of the respondents in the research indicated that, cost and time overruns occurred mainly as a result of poor project scoping.

Statement of the Problem

In Africa, the major reason for the huge overruns incurred by the 2010 world cup projects was also linked to issues of project scoping, activities coordination and planning and design implementation, (Doloi, 2013). Walker (1995) of 56 completed projects which incurred significant cost and time overruns revealed a problem with scope analysis and design errors. There is a noticeable lack of research on the knowledge required to define project scope and stakeholders’ management and in the area of design implementation in Nigeria and in most developing countries. These findings reveal that project scoping and design implementation and management remains a central problem to quality and timely project delivery. It is a general problem and requires a concerted focus to be solved.

In the case of Nigeria, we witness various cases of project abandonment in both the public and private sectors. According to premium times, (July 26, 2019) a report in 2012 indicated that Nigeria has about 12000 abandoned projects in the public sector between 1962 and 2012. Another report by the Chartered institute of project management informed that on a strictly monetary perspective, abandoned projects with regards to existing structures amount to over N12 trillion which is about 10% of the Nigerian economy. A former minister of works put the cost of abandoned projects at about N17trillion based on an investigation conducted during the Goodluck Jonathan administration.

On a casual bases, it is easy to observe the sheer waste attributable to project abandonment in the country with regards to projects like Ajokuta steel mill, River State Monorail project, National Stadium Abuja, Ekiti state airport, and several others. The failure of these multi-billion Naira projects could partly be traced to scope and design issues among other factors. This becomes a strong motivation for further investigations into the problems posed by scope and design management in construction projects.

This study adopted four public projects and four private projects selected based on specific criteria within the south-east and south-south as case studies. The main selection criteria is that these projects all suffered significant delays in their design and implementations stages due to changes in the project requirements, inappropriate stakeholders' involvement, whether in time or the content, which explains a stakeholder management problem.

Study Objectives

The aim objective of this study was to examine the effect of project activities scoping and design implementation on final project outcome. The following specific objectives were to.

- i) Determine the effect of project scope planning on project outcome
- ii) Examine the effect of proper scoping of the structural designs on final project outcome.
- iii) Explore the effect of scope implementation on final project outcome.

Research Hypotheses

H₀₁: Project scope planning has no significant effect on Project outcome.

H₀₂: scoping of the structural designs has no significant effect on the final project outcome.

H₀₃: project scope implementation has no significant effect on final project outcome.

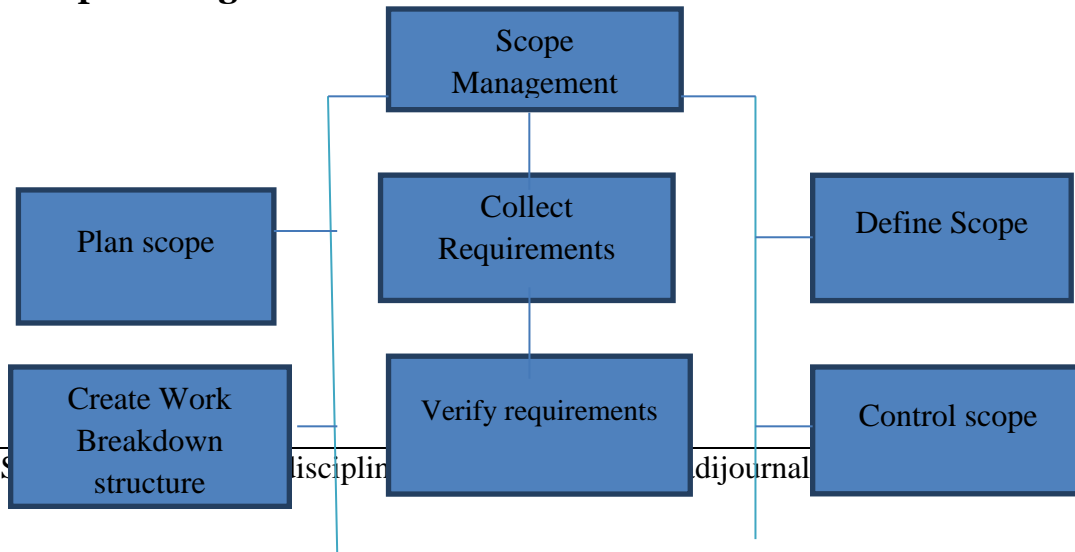
REVIEW OF RELEVANT LITERATURE

Conceptual Literature

Scope and Requirement Engineering

Project management scholars have identified two major perspectives of project scope, namely: product scope and project scope. According to Alexander et al (2009), the product scope is related to everything that is within the boundaries of the product, as features, restrictions and details that allow us to define the results or product desired in a project. On the other hand, the project scope is related to description of all necessary work to achieve what was defined on the product scope, attending all features and functions previously specified (PMBOK, 2013). The area of scope management has a group of six processes that, together, aim to register, monitor and control which belongs or do not belongs to the project boundaries, besides managing the product requirements and ensure that the project include all necessary work and just the necessary to the project conclusion (PMBOK, 2013; Bjamason, Wnuk, Regnell 2012; Kumari, & Pillai 2014; Hall & Wood, 2003) show that 48% of failures noticed on the project were related to poorly defined requirements (Bjamason *et al*, 2012; Ballejos *et al* 2008).

Fig. 1. Scope Management Process



Work Breakdown Structure (WBS)

The Project Work Breakdown Structure is an outcome oriented analysis of the work involved in the project and defines the total scope of the project. It is a foundation document in project management because it provides the basis for planning and managing the project schedule, budget and requests for any changes or deviations from plans. The WBS is developed in the form of an inverted tree structure, organized by objectives; it looks like an organizational chart which helps visualize the whole project and all its main components (Alexander *et al*, 2009).

A Work Breakdown Structure (WBS) is a project management technique for defining and organizing the total scope of a project, using a hierarchical tree structure. The first two levels of the WBS define a set of planned outcomes that collectively and exclusively represent 100% of the project scope. At each subsequent level, the children of a parent node collectively and exclusively represent 100% of the scope of their parent node. A well-designed WBS describes planned outcomes instead of planned actions. Outcomes are the desired ends of the project, and can be predicted accurately; actions comprise the project plan and may be difficult to predict accurately. A well-designed WBS makes it easy to assign any project activity to one and only one terminal element of the WBS (Mitchell *et al*, 2017).

The Work Breakdown Structure (WBS) is an important planning tool used to define a project in terms of its outputs while providing a method for breaking these deliverables into meaningful work units (Di Thommazo *et al*, 2015). The WBS allows the project manager to clearly describe the hierarchical nature of the work to be performed and establishes a foundation for other elements of the project planning documents including the project’s resource plan, budget, implementation plan, and project schedule.

Fig. 2.1 Project scope management – Decomposition of Major Deliverables

		Identify Major Deliverables		
		Check if cost and duration estimates can be developed with the available details		
Identify constituent components of the deliverables	If No	-	if yes,	Verify correctness of decomposition
		Adapt the scope		

Practical Approaches in Project Scope Definition

Having described the steps involved in project scoping, it is also important to take step in practical literature of project activities scoping. A high level of pre-project planning effort can save up to 20% from cost and 39% from schedule in facilities projects (Cho & Gibson, 2011). In order to address the problem of poor project definition, a scoring tool called the Project Definition Rating Index (PDRI) has been developed by the Construction Industry Institute (CII) of America. The tool can be used to evaluate the definition completeness on projects (Olander, 2007; Olander and Landin, 2005).

The Essence of Project Scope Management for the Contractor

In project management, the term “scope” takes into account three components: product content, the content of works, project content. According to the Guide to the Project Management Body of Knowledge (PMBOK Guide, 2008), the term “scope” refers to the content of the product or the content of the project as a whole. In the paper (Mazur *et-al*, 2009), the project scope is considered as the content of works, for the effective management of which it is necessary to determine: the work to be performed; sequence of works; work duration; need for resources, and cost of work.

Moroz and Nemchenko (2017) consider the content of works as “actions, descriptions of works to be performed, and resources to be secured”. ISO 21500 (ISO 21500:2012, 2012) defines scope as the processes necessary for identifying and defining works and results, as well as only the required work and results. In terms of ISO 21500 (ISO 21500:2012, 2012), the project scope management takes into account the definition of content, the design of the project work, the definition of the composition of works, content control.

Common Tools for Scope Analysis

Presently, there are several tools exist in the project management market for analyzing project activities. The selection of the tools however depends on the nature of the project, the complexity of the project and the level of activities involved in the project. According to Souza et al, Esteca, Santos, Valêncio, and Honda (2011) and Contessoto, Sant’Ana, Souza, Valêncio, Zafalon, Amorim, Esteca, (2016), the most bwidely used tools of project activities analysis are Microsoft Project 2016 - Ms (MSProject, 2016), NetProject 2016 - Net (NetProject, 2016), ProjectLibre 2016 – Lib (ProjectLibre, 2016) and Project Planner - Pla (ProjectPlanner, 2016). The criteria adopted in tool selection are always in line with scope management processes presented in PMBoK guide.

Table 2.2 Hypothetical Project scope analysis tools

Tool \ Process	Lib (%)	Pla (%)	Ms (%)	Net (%)	SAPM (%)
Plan scope	Δ	Δ	Δ	Δ	Δ
Collect requirements	Δ	Δ	Δ	Δ	Δ
Define Scope	μ	μ	μ	μ	μ
Create WBS	√	√	√	√	√
Validate scope	f	f	f	f	f
Control Scope	∞	∞	∞	∞	∞

Evidence based literature on design error costs in construction and mechanical projects reveal that the extent of the rework that may arise as a result of design error, however, is dependent upon when it is identified in a project’s life cycle. Farrington (2017) revealed that design errors occurring in nine case study projects accounted for 19.7% of the total number of deviations that arose. Farrington (2017) also revealed that design changes/errors accounted for 79.1% of the total cost of quality deviations that arose in projects. Similarly, Robinson-Fayek *et al.* (2003) found the engineering and review processes for an engineering project contributed to 68% of rework costs with 78% of this total

attributable to design errors. Barber *et al.* (2000) found that design errors accounted for 50% of quality failure costs in civil engineer projects. The cost of design errors has been reported to be lower in building projects with Love and Li (2000) revealing that they accounted for 14% of rework costs. Cusack (2012) has revealed that design errors contained within contract documentation alone can contribute to a 5% increase in a project's contract value.

Theoretical Framework

2.2.2 Management by Objectives Theory

Management by objectives theory Management by Objective (MBO) was developed by Drucker (1954) which states that managers should avoid "the activity trap" that is, getting so involved in the day-to-day activities that they forget to adhere to principles regarding the sustenance of the reason why the organization was established. One of the focal points of Management by Objective was that instead of just a few top managers taking the center stage on all organizational matters, all managers of sub-units should participate in the strategic planning process. This will help greatly in the implementation of the organizational plan. The theory also states that managers should implement a range of performance systems which are designed to help the organization to function well.

As earlier mentioned, resources in an organization could be financial, human or material. These resources are exhaustible and should therefore be used judiciously. However, for the utility to be achieved, the objectives of the organization must be clear so that there could be a clear linkage between objectives and resources. Tertiary education in Nigeria has its role in a sustainable economy. However, the resources to meet this objective are scarce. This is where Management by Objectives becomes important in the achievement of such goals. It is important to state that tertiary institutions ought to constantly focus on their objectives and ensure that all is done to achieve the needed goals.

In the face of scarcity of resources in any organization, the relevance of this theory in this study cannot be overemphasized. The relevance of this theory to this work is that it is appropriate for organizations to draw out plans that will ensure that monies that are meant for the revitalization of project, provision of instructional materials, staff training and retraining, facilitation of projects and so on are specifically targeted towards addressing the planned objectives.

Therefore, have to work with clearly defined objectives such that it will be difficult for them to lose focus. In the same vein, all the contactors in any level must constantly move in line with the laid down objective(s). Any deviation from the above may cause the firm to begin to major in the minor and minor in the major.

Empirical Review

Several empirical evidences have been put forward by various scholars on the issues of project scope and design management. Indeed, requirements, inadequate involvement of all relevant parties of a project, inadequate communication between those involved, and insufficient time allocated are among the top factors responsible for both design and scope management problems in project management.

In a study by Yu, Shen, Kelly, & Hunter (2007) in which they developed and validated a theoretical framework for construction project briefing, the results indicate that stakeholder management is one of the 13 variables that were found to have significant impact on the briefing process. Understanding different stakeholders' involvement during early stage of the project helps in reflecting their opinions

and interest on the project objectives before detailed design stage commences. However, stakeholders' importance to the project should be assessed in order to identify their relative involvement and contribution to the project.

The study of Aaltonen, Jaakko, & Tuomas (2008) revealed the importance of understanding stakeholders' needs and requirements to ensure project success. Their research combined stakeholder salience framework with stakeholder influence to identify stakeholders' behaviors, which influence the outcome of global projects. The research applied Mitchell et al.'s (2017) stakeholder classification, which depends on stakeholder power, legitimacy and urgency. The research proposed that external stakeholder influence strategies that can enable managers to better understand and manage stakeholders' behavior. However, the research did not show how these classifications and understandings could facilitate and help control, manage and quantify stakeholder salience in the project.

Chinyio & Akintoye (2008) conducted qualitative research to investigate the practice of companies in the context of UK construction projects. The research was used to identify themes that demonstrated effective stakeholder management practice. It concluded that a comprehensive approach of engaging stakeholders is still required in construction. In addition, the stakeholders' expectations must be respected and reflected in the project, while varying their engagement according to their saliency. Chinyio and Akintoye's research was conducted in the UK context. However, their recommendations and suggestions are useful and can be quantified and replicated for use in construction industry elsewhere. A quantitative approach would also be helpful.

Extant project management literature shows that in construction projects, people care not only about the outcome of decisions, but also about the procedures used to make those decisions (Aibinu *et al.*, 2011). People feel more fairly treated if they are given the opportunity to participate in making decision relating to their concerns. Even if their input has little or no influence in the decision made, people still value the opportunity to express their views (Lind et al., 2000). According to procedural justice theorists, people do not only evaluate decision-making by the outcome it produces but by other criteria such as the fairness of the process used to arrive at the decision (Thibaut & Walker, 2015). Procedural fairness (justice) is the perception about fairness of a process used to make decisions and could have profound effect on peoples' attitudinal and behavioral reactions towards the process and the decision arising from it (Lind & Tyler 2008).

METHODOLOGY

This study employed a survey of five private sector projects and three public sector projects purposively selected in Enugu, Port-Harcourt and Awka. It is designed to use a mixture of descriptive and quantitative approaches to assess the effect of scope and design factors on project outcome. A purposive sample of the key employees of the construction firms responsible for the selected projects is taken. Tables and charts are used in the analysis. The hypothesis testing is done using the non-parametric statistical tools of Relative Importance Index and the Spearman's Rank Correlation Index. The findings are summarized and reported accordingly. The sources of data for this study consist of the responses from the sample population as highlighted in the research design above which formed the basis of the analysis and findings of the research. The population of this study is the staff members of the selected construction companies for this study. However, for the unique purpose of this study,

the final sample shall be selected on the bases of both the purposive criterion and simple random sampling criterion: all employees in strategic positions relative to the subject of our study shall be purposively selected into the sample. Thus all Heads of core functional units, project supervisors shall be selected into the final sample while all the key members of the contracting firms shall be included in the final sample. From the survey data, the population of the selected construction firms is presented in table 3.1

Table 1: Constitution of the Study Population.

S/N	Project	Contractor	Staff No.
1	CBN Enugu Branch	Akiota Works Ltd	104
2	Faculty of Pharmaceutical Sciences, NnamdiAzikiwe University, Awka	J. QuarissonNig Ltd	74
3	New Social Science Lecture Theater, Awka	Structs Engineering Ltd	86
4	Market Square Plaza, Enugu	Con Engineering Ltd	75
5	St. James Hostels, Choba, P.H	Metroharmon Engineering Ltd	68
6	R.B. Ogazi Hostels, Enugu	W. Ibe Engineering Ltd	72
7	The Psalms Hotel & Suites Enugu	Veetek Engineering Ltd	81
8	Access Bank Regional Office, Awka	Njomas Engineering Ltd	70
	Total		630

Source: field survey, 2023

To determine the sample size, the researcher employed the use of Taro Yamene (1967) finite population sample size determination formula. The choice of this formula was informed by two major factors: first, the formula enjoys wide application among scholars in management and social sciences which points to the reliability of its outcome (see Onwe, 2004). Second, the formula is simple and straight forward to use. It is given by the following formula:

$$n = \frac{N}{1 + N(e)^2}$$

where

n = Sample Size

N = Population size

e = limit of tolerable error (usually 5% (0.05))

$$n = \frac{630}{1 + 630(0.05)^2}$$

$$n = \frac{630}{1 + 630(0.0025)}$$

$$= 630 / 2.575$$

$$\mathbf{n = 245}$$

Therefore our nominal sample size is 245. The researcher also adopted the Kumar's (1967) formula in determining the sample size due to each of the contractors as shown below:

$$\mathbf{K = nS/N}$$

Where:

K = Sample size from each sub-constituent group/organization

n = Total Sample size

S = Total no of respondents from the substantive sub-constituent group

N = Total numbers of respondents in the sample frame

For this study, n = 245, N = 630

i. Akiota Works Ltd

$$N_h = \frac{245 \times 104}{630} = 40$$

ii. J. Quarisson Nig. Ltd

$$N_h = \frac{245 \times 74}{630} = 29$$

iii. Structs Engineering Ltd

$$N_h = \frac{245 \times 86}{630} = 34$$

iv Con Engineering Ltd

$$N_h = \frac{245 \times 75}{630} = 29$$

v. Metroharmon Engineering Ltd

$$N_h = \frac{245 \times 68}{630} = 26$$

vi W. Ibe Engineering Ltd

$$N_h = \frac{245 \times 72}{630} = 28$$

vii. Veetek Engineering Ltd

$$N_h = \frac{245 \times 81}{630} = 32$$

viii Njomas Engineering Nig. Ltd

$$N_h = \frac{245 \times 70}{630} = 27$$

Given the unique nature of this study, the researcher adopted a mix of purposive and simple random sampling techniques. Purposively, the researcher selected heads of units, foremen, and strategic project managers into the sample. Thereafter, using a simple random selection system akin to a lucky dip, the researcher wrote “Yes” or “No” on small plain papers folded them and put them in a draw bowl. The number of papers containing “Yes” equaled the no of individuals needed to complete the sample size to 245 after subtracting the No selected purposively. Based on the calculations using SPSS, the researcher arrived at a value of 0.9593. Acceptable values for Cronbach alpha is above 0.7. It means the research data is valid for further analysis. Two basic methods were adopted for the data analysis. One method consisted in the use of percentage frequencies and ratios. The second method involved the use of the Non-parametric statistical approach of the Chi-Square tool which has been widely used in social science, management and engineering studies in the determination of extent of

impact and effect of exogenous factors on dependent factors. The X^2 (chi-square) non-parametric statistic is given by:

$$X^2 = \frac{\sum fo - \sum fe}{fe}$$

Where

fo = observed frequency

fe = expected frequency

Decision Rule: = if X^2 calculated is $\geq X^2$ table reading, then reject H_0 and Accept H_A .

DATA PRESENTATION AND ANALYSIS

Table 2 Questionnaire administration and returns

S/N	Project	Contractor	Sample taken	Copies of Questionnaire Returned	%
1	CBN Enugu Branch	Akiota Works Ltd	40	30	75
2	Faculty of Pharmaceutical Sciences, NnamdiAzikiwe University, Awka	J. QuarissonNig Ltd	29	20	69
3	New Social Science Lecture Theater	Structs Engineering Ltd	34	20	59
4	Market Square Plaza, Enugu	Con Engineering Ltd	29	18	62
5	St. James Hostels, Choba, P.H	Metroharmon Engineering Ltd	26	18	69
6	R.B. Ogazi Hostels, Enugu	W. Ibe Engineering Ltd	28	16	57
7	The Psalms Hotel & Suites Enugu	Veetek Engineering Ltd	32	20	63
8	Access Bank Regional Office, Awka	Njomas Engineering Ltd	27	18	67
	TOTAL		250	160	64

Source: field survey, 2023.

From table 2 above, it could be seen that the return rate was only moderate at an overall of 64% of the total questionnaires issued. Thus our final sample size for this study is 160.

Analysis of Research Questions

Here, we analyze the research questions of the study. The section is considered very critical for the objectives of the study to be realized. It looks at the core reasons for the study and separately examines the constituent independent variables of the study to find the pattern of relationship they maintain with the dependent variable of the study.

Table 3 Analysis of Responses to Questions on Research Question 1

	PROPOSITIONS	RESPONSES	NUMBER	%
1.	The project SOW described the expectations of the project in detail.	TA	58	36.2
		A	36	22.5
		N	-	-
		D	28	17.5
		TD	38	23.8
		Total	160	100
2.	The SOW specified the deliverables clearly	TA	80	50
		A	38	23.8
		N	-	-
		D	20	12.5
		TD	22	13.7
		Total	160	100
3.	The project SOW specified the inclusions and the exclusions	TA	80	50
		A	20	12.5
		N	-	-
		D	60	37.5
		TD	-	-
		Total	160	100
4.	The project SOW stated the due completion date/period	TA	122	76.2
		A	8	5
		N	-	-
		D	30	18.8
		TD	-	-
		Total	160	100
5	The SOW was precise in stating the performance obligations	TA	96	60
		A	28	17.5
		N	-	-

		D	14	8.8
		TD	22	13.7
		Total	160	100

Table 4 Analysis of Responses to Questions on Research Question 1 (Contd.)

	PROPOSITIONS	RESPONSES	NUMBER	%
6	The focus of the SOW was on the performance objectives, expected output, requirements and milestones	TA	44	27.5
		A	62	38.8
		N	6	3.7
		D	18	11.2
		TD	30	18.8
		TOTAL	160	100
7	It clearly described the objectives and expectations of the project	TA	60	37.5
		A	60	37.5
		N	-	-
		D	40	25
		TD	-	-
		TOTAL	160	100
8	The SOW also gave full technical information and specifications	TA	80	50
		A	20	12.5
		N	-	-
		D	60	37.5
		TD	-	-
		TOTAL	160	100
9	The SOW avoided the use of vague and ambiguous words.	TA	60	37.5
		A	32	20
		N	-	-
		D	68	42.5
		TD	-	-
		TOTAL	160	100
10	The overall content of the SOW made it effective.	TA	60	37.5

	A	36	22.5
	N	-	-
	D	40	25
	TD	24	15
	TOTAL	160	100

Source: Field Survey 2023

Table 3 reveals that on question 1, 58.7% of the respondents agreed to the proposition while 41.3% disagreed. On question 2, 73.8% agreed to the proposition against the minority of 26.2% who disagreed. On question 3, 62.5% of the respondents agreed to the proposition while 37.5% expressed disagreement. Again, on question 4, 81.2% of respondents were in agreement to the question. However, 18.8% people thought otherwise. 77.5% answered in affirmation to question 5 while 22.5% disagreed to the proposition.

On the proposition 6, 66.3% of the respondents expressed agreement to the proposition against the 33.7% of the sample which disagreed to it while on question 7, 75% of the respondents agreed to the proposition that it takes fair rewards and good environment to beat turnover intentions but 25% of the sample expressed disagreement to it. On question 8, 62.5% of the respondents showed support to the proposition against 37.5% of them who disagreed to the question. 57.5% of the responses agreed to proposition 9 but 42.5% disagreed to it. Finally, 60% of the respondents supported proposition 10 while 40% did not.

Table 4 Analysis of Responses to Questions on Research Question 2

	PROPOSITIONS	RESPONSES	NUMBER	%
21	The project was completed on time	TA	54	33.75
		A	38	23.75
		N	-	-
		D	40	25
		TD	28	17.5
		Total	160	100
22	The project was completed within the allocated budget	TA	66	41.25
		A	30	18.75
		N	-	-
		D	38	23.75
		TD	26	16.25
		Total	160	100
23	The project meets the quality requirements	TA	48	30
		A	54	33.75
		N	-	-
		D	32	20

		TD	26	16.25
		Total	160	100
24	The project achieved its strategic objectives	TA	50	31.25
		A	45	28.125
		N	-	-
		D	40	25
		TD	25	15.625
		Total	160	100
25	The project was completed in line with its original schedule	TA	50	31.25
		A	50	31.25
		N	10	6.2
		D	25	15.65
		TD	25	15.65
		Total	160	100

Table 5 Analysis of Responses to Questions on Research Question 2 (Contd.)

	PROPOSITIONS	RESPONSES	NUMBER	%
26	No additional budget was required to complete the project	TA	48	30
		A	38	23.75
		N	-	-
		D	40	25
		TD	34	21.25
		Total	160	100
27	Project meets its scope and was completed according to its SOW	TA	52	32.5
		A	44	27.5
		N	-	-
		TD	28	17.5
		TD	36	22.5
		Total	160	100
28	Project contributed to the organizations strategic development plan	TA	44	27.5
		A	62	38.8
		N	6	3.7

		D	18	11.2
		TD	30	18.8
		TOTAL	160	100
29	Its implementation minimized use of resources and wastages but still met quality prescription	TA	52	32.5
		A	44	27.5
		N	-	-
		TD	32	20
		TD	32	20
		Total	160	100
30	Overall, the project implementation was successful	TA	32	20
		A	48	30
		N	6	3.75
		D	40	25
		TD	34	21.25
		TA	32	20

Source: Field Survey 2023

We could see from table 4.3 above that question 11, 57.5% of the responses were in agreement to the question while 42.5% expressed disagreement. On question 12, 60% of the respondents expressed agreement to the proposition while 40% of them remained in disagreement to it. 63.75% of the people showed agreement to proposition 13. However, 36.25% of the respondents disagreed to this. Again, on proposition 14, 59.375% expressed agreement as against the 40.625% of the sample that expressed their disagreement to the question. 60% of the responses favoured proposition 15 while 40% of them were in disagreement. 53.75% of the respondents agreed to proposition 26 but 46.25% of the responses disagreed to this.

On question 17, 62.5% of the respondents agreed to the proposition against the 31.3% of them who disagreed. However, 6.2% of the respondents were neutral. On question 18, 66.3% of the responses were in favour of the proposition against 30% that stood in opposition. However, 3.7% of the respondents were neutral. Another 60% of the respondents supported question 19 against 40% of them that disagreed to it. Finally, on question 20, 50% of the responses were in support of the proposition against 41.25% that disagreed. 3.75% remained neutral.

Table 6 Analysis of Responses to Questions on Research Question 3

	PROPOSITIONS	RESPONSES	NUMBER	%
11.	The project was completed on time	TA	50	31.2
		A	40	25
		N	-	-
		D	36	22.5
		TD	34	21.3
		Total	160	100
12.	The project was completed within the allocated budget	TA	60	37.5
		A	22	13.8
		N	-	-
		D	40	25
		TD	38	23.7
		Total	160	100
13.	The project meets the quality requirements	TA	30	18.8
		A	40	25
		N	5	3.1
		D	60	37.5
		TD	25	15.6
		Total	160	100
14.	The project achieved its strategic objectives	TA	50	31.2
		A	-	-
		N	-	-
		D	110	68.8
		TD	-	-
		Total	160	100
15	The project was completed in line with its original schedule	TA	35	23
		A	40	25
		N	10	6.2
		D	50	31.2
		TD	25	15.6
		Total	160	100

Table 7 Analysis of Responses to Questions on Research Question 2 (Contd.)

	PROPOSITIONS	RESPONSES	NUMBER	%
16	No additional budget was required to complete the project	TA	32	20
		A	48	30
		N	6	3.75
		D	40	25
		TD	34	21.25
		Total	160	100
17	Project meets its scope and was completed according to its SOW	TA	52	32.5
		A	44	27.5
		N	-	-
		TD	32	20
		TD	32	20
		Total	160	100
18	Project contributed to the organizations strategic development plan	TA	60	37.5
		A	32	20
		N	-	-
		D	50	31.25
		TD	18	11.25
		TOTAL	160	100
19	Its implementation minimized use of resources and wastages but still met quality prescription	TA	58	36.25
		A	32	20
		N	-	-
		D	44	27.5
		TD	26	16.25
		TOTAL	160	100
20	Overall, the project implementation was successful	TA	42	26.25
		A	54	33.75
		N	-	-
		D	44	27.5
		TD	20	12.5

	TOTAL	160	100
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Source: Field Survey 2023

From Table 7 above, we find that 56.2% of the respondents agree question 21 as against the 43.8% which disagreed to it. On question 22, 51.3% responded in agreement while 48.7% opposed the proposition. Furthermore, on question 23, 43.8% responded in support of the proposition while 53.1% of them opposed it. However, 3.1% of the respondents were neutral.

Again, on proposition 24, 31.2% of the respondents agreed to the question against 68.8% of the sample that did not see it that way. On question 25, 10 people representing 6.2% of the sample population were neutral. 48% were in agreement while 46.8% were in disagreement. 50% of the respondents agreed to proposition 26. However, 46.25% of them expressed opposition to this while 3.75% of them were neutral. On question 27, 60% of the respondents expressed agreement for the question against 40% which were in opposition. On proposition 28, 57.5% of the responses were in support of the proposition against 42.5% of them that showed disagreement.

56.25% of responses recorded on question 29 stood for the proposition but 43.75% answered in disagreement to the question. Finally, 60% of the respondents on question 30 expressed their agreement against 40% which were in opposition.

Test of Hypotheses

H₀₁: Project scope planning has no significant effect on Project outcome

H₀₁: Project scope planning has significant effect on Project outcome

Table 8 Summary of Responses for H₀₁

PROPOSITIONS CAPTURING HO₁	AGREE	DISAGREE	TOTAL
Proposition 1	94	66	160
Proposition 2	118	42	160
Proposition 3	100	60	160
Proposition 4	122	30	152
Proposition 5	124	36	160
Proposition 6	106	48	154
Proposition 7	120	40	160
Proposition 8	100	60	160
Proposition 9	92	68	160
Proposition 10	96	64	160
Total	1072	514	1586

Table 9 Calculation of cell values for Ho₁

S/N	Calculation for Agreements		Calculation for Disagreements	for
1	$\frac{1072 \times 160}{1586}$	108	$\frac{514 \times 160}{1586}$	52
2	$\frac{1072 \times 160}{1586}$	108	$\frac{514 \times 160}{1586}$	52
3	$\frac{1072 \times 160}{1586}$	108	$\frac{514 \times 160}{1586}$	52
4	$\frac{1072 \times 152}{1586}$	103	$\frac{514 \times 152}{1586}$	49
5	$\frac{1072 \times 160}{1586}$	108	$\frac{514 \times 160}{1586}$	52
6	$\frac{1072 \times 154}{1586}$	104	$\frac{514 \times 154}{1586}$	50
7	$\frac{1072 \times 160}{1586}$	108	$\frac{514 \times 160}{1586}$	52
8	$\frac{1072 \times 160}{1586}$	108	$\frac{514 \times 160}{1586}$	52
9	$\frac{1072 \times 160}{1586}$	108	$\frac{514 \times 160}{1586}$	52
10	$\frac{1072 \times 160}{1586}$	108	$\frac{514 \times 160}{1586}$	52

Table 10 Contingence for Ho₁

	Observed F (O)	Expected F (E)	O-E	(O-E) ²	$\frac{(O-E)^2}{E}$
1	94	108	-14	196	1.8
2	118	108	10	100	0.9
3	100	108	-8	64	0.6
4	122	103	19	361	3.5

5	124	108	16	256	2.4
6	106	104	2	4	0
7	120	108	12	144	1.3
8	100	108	-8	64	0.6
9	92	108	-16	256	2.4
10	96	108	-12	144	1.3
11	66	52	14	196	3.8
12	42	52	-10	100	1.9
13	60	52	8	64	1.2
14	30	49	-19	361	7.4
15	36	52	-16	256	4.9
16	48	50	-2	4	0.1
17	40	52	-12	144	2.8
18	60	52	8	64	1.2
19	68	52	16	256	4.9
20	64	52	12	144	2.8
X² Calculated					45.8

Source: Field Survey 2023

Decision Rule: If Chi-Square (X^2) calculated at 95% level of significance is $\geq X^2$ tabulated, reject H_0 (that is, accept H_1) and conclude that the variable in question has significant impact on the phenomenon studied. Accept H_0 and conclude otherwise if the reverse is the case.

Note: for this test, the 95% critical level under normal distribution is 11.92. This is the maximum tolerable limit of error for the study. Therefore empirical results higher than this will lead us to reject the null hypothesis and vice versa if the reverse is the case.

Conclusion: Since our empirical X^2 calculated at 95% critical level is 45.8 which is $> X^2$ tabulated (11.92), we reject H_0 (that is, accept H_1) and conclude that project scope planning has significant effect on Project outcome.

H_{02} : Implementation of scope of the structural design has no significant effect on the final project outcome.

H_{02} : Implementation of scope of the structural design has significant effect on the final project outcome.

Table 11 Summary of Responses for H_{02}

	PROPOSITIONS CAPTURING H_{01}	AGREE	DISAGREE	TOTAL
	Proposition 21	92	68	160
	Proposition 22	96	64	160
	Proposition 23	102	58	160
	Proposition 24	95	65	160
	Proposition 25	100	50	150
	Proposition 26	86	74	160

	Proposition 27	96	64	160
	Proposition 28	106	48	154
	Proposition 29	96	64	160
	Proposition 30	80	74	154
	Total	949	629	1578

Table 12 Calculation of cell values for Ho₂

S/N	Calculation for Agreement		Calculation for Disagreement	
21	$\frac{949 \times 160}{1578}$	96	$\frac{629 \times 160}{1578}$	64
22	$\frac{949 \times 160}{1578}$	96	$\frac{629 \times 160}{1578}$	64
23	$\frac{949 \times 160}{1578}$	96	$\frac{629 \times 160}{1578}$	64
24	$\frac{949 \times 160}{1578}$	96	$\frac{629 \times 160}{1578}$	64
25	$\frac{949 \times 150}{1578}$	90	$\frac{629 \times 150}{1578}$	60
26	$\frac{949 \times 160}{1578}$	96	$\frac{629 \times 160}{1578}$	64
27	$\frac{949 \times 160}{1578}$	96	$\frac{629 \times 160}{1578}$	64
28	$\frac{949 \times 154}{1578}$	93	$\frac{629 \times 154}{1578}$	61
29	$\frac{949 \times 160}{1578}$	96	$\frac{629 \times 160}{1578}$	64
30	$\frac{949 \times 154}{1578}$	93	$\frac{629 \times 154}{1578}$	61

Table 13 Contingence for H₀₂

Observed F (O)	Expected F (E)	O-E	(O-E) ²	$\frac{(O-E)^2}{E}$	
1	92	96	-4	16	0.2
2	96	96	0	0	0
3	102	96	6	36	0.4
4	95	96	-1	1	0
5	100	90	10	100	1.1
6	86	96	-10	100	1.0
7	96	96	0	0	0
8	106	93	13	169	1.8
9	96	96	0	0	0
10	80	93	-13	169	1.8
11	68	64	4	16	0.3
12	64	64	0	0	0
13	58	64	-6	36	0.6
14	65	64	1	1	0
15	50	60	-10	100	1.7
16	74	64	10	100	1.6
17	64	64	0	0	0
18	48	61	-13	169	2.8
19	64	64	0	0	0
20	74	61	13	169	2.8
X² Calculated				16.1	

Source: Field Survey 2023

Conclusion: Since our empirical X² calculated at 95% critical level is 16.1 which is > X²tabulated (11.92), we reject H₀ (that is, accept H₂) and conclude that implementation of the structural designs has significant effects on the final project outcome.

H₀₃: Project scope implementation has no significant effect on final project outcome.

H₀₃: Project scope implementation has significant effect on final project outcome.

Table 14 Summary of Responses for H₀₃

PROPOSITIONS HO1	CAPTURING	AGREE	DISAGREE	TOTAL
Proposition 11		90	70	160
Proposition 12		82	78	160
Proposition 13		70	85	155
Proposition 14		50	110	160
Proposition 15		75	75	150
Proposition 16		80	74	154

	Proposition 17	96	64	160
	Proposition 18	92	68	160
	Proposition 19	90	70	160
	Proposition 20	96	64	160
	Total	821	758	1579

Table 15 Calculation of cell values for Ho₃

S/N	Calculation for Agreement		Calculation for Disagreement	
11	$\frac{821 \times 160}{1579}$	83	$\frac{758 \times 160}{1579}$	77
12	$\frac{821 \times 160}{1579}$	83	$\frac{758 \times 160}{1579}$	77
13	$\frac{821 \times 155}{1579}$	81	$\frac{758 \times 155}{1579}$	74
14	$\frac{821 \times 160}{1579}$	83	$\frac{758 \times 160}{1579}$	77
15	$\frac{821 \times 150}{1579}$	78	$\frac{758 \times 150}{1579}$	72
16	$\frac{821 \times 154}{1579}$	80	$\frac{758 \times 154}{1579}$	74
17	$\frac{821 \times 160}{1579}$	83	$\frac{758 \times 160}{1579}$	77
18	$\frac{821 \times 160}{1579}$	83	$\frac{758 \times 160}{1579}$	77
19	$\frac{821 \times 160}{1579}$	83	$\frac{758 \times 160}{1579}$	77
20	$\frac{821 \times 160}{1579}$	83	$\frac{758 \times 160}{1579}$	77

Table 16 Contingence for Ho₃

Observed F (O)	Expected F (E)	O-E	(O-E) ²	$\frac{(O-E)^2}{E}$	
1	90	83	7	49	0.6
2	82	83	-1	1	0
3	70	81	-11	121	1.5
4	50	83	-33	1089	13.1
5	75	78	-3	9	0.1
6	80	80	0	0	0
7	96	83	13	169	2.0
8	92	83	9	81	1
9	90	83	7	49	0.6
10	96	83	13	169	2.0
11	70	77	-7	49	0.6
12	78	77	1	1	0
13	85	74	11	121	1.6
14	110	77	33	1089	14.1
15	75	72	3	9	0.1
16	74	74	0	0	0
17	64	77	-13	169	2.2
18	68	77	-9	81	1.1
19	70	77	-7	49	0.6
20	64	77	-13	169	2.2
X² Calculated				43.4	

Source: Field Survey 2023

Conclusion: Since our empirical X² calculated at 95% critical level is 43.4 which is > X²tabulated (11.92), we reject Ho (that is, accept H₃) and conclude that scope implementation has significant effect on final project outcome.

Summary of Findings

Using the Chi-square non-parametric statistic, the result of the hypotheses testing turned up with the following findings:

- i) The X² test outcome on effect of scope planning on project outcome turned up significant at the 5% critical level with a value of 45.8 against the theoretical benchmark of 11.92 indicating that scope planning is significant to successful project outcome.
- ii) The index measuring the relationship between scope implementation and successful project outcome reached a value of 43.4 which is greater than the theoretical statistic value of 11.92 indicating that scope implementation is significantly linked to successful project outcome.
- iii) Finally, the measure of the influence of Design scope implementation on successful project outcome reached a value of 16.1 which is also greater than the theoretical statistic 11.92 showing that design implementation significantly influences project outcome.

Conclusion

Based on the above findings, this study concludes that project scoping and design implementation can significantly determine the quality of project outcome. With proper scope planning and execution, the project budget in terms of time and cost are maintained. Proper design implementation also helps to ensure compliance with time and cost budget line

Recommendations

Following from the findings made in this study, the study recommends as follows:

- i) Project stakeholders, especially, the contractors are strongly urged to plan the scope of their projects in accordance with the tasks progression sequence as well as cost and time implications so that budget timelines may not be overrun. This also helps to throw up issues needing correction and further attention on time without significantly impacting the overall project timelines and cost budget.
- ii) In implementing the scope, the contractor should liaise closely with other stakeholders in the project. For instance, the consultant and the job issuer would be very vital factors to be regularly communicated to ensure minimum errors and proper outcomes.
- iii) The design implementation should be executed in close consultation with the architect. Gray areas should be discussed in details to ensure proper assimilation of facts.

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