

An Investigation of the Relationship between Cost of Capital and the Delivery Period of Public Turnkey Building Projects in Nigeria

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Abstract

Turnkey projects attract enormous funds and time. Greater portion of the funds involved is borrowed at an agreed cost (cost of capital) often expressed as a percentage of the capital over an agreed fixed time often referred to as delivery period. The delivery period (time) is of essence as any delay in the form of extension would delay the release of the objectives of the project among others. The study investigated the relationship between Cost of Capital and the delivery period of public turnkey building projects in Nigeria. The data for the analysis were sourced from various respondents including professionals and participants in the built-environment in five study clusters of Abuja, Jos, Makurdi, Lokoja, and Ilorin of North Central Zone of Nigeria. The non-parametric descriptive and inferential statistics were used in the analyses of the data. The Kruskal-Wallis test technique was used to test the null hypothesis: there is no significant relationship between cost of capital and the delivery period (time). The study revealed that delivery period exert pressure on the cost of capital of public turnkey building project. It was further found that factors of variations, fluctuation, force majeure unfriendly environment et cetera affect the delivery period of a project. Recommendations such as policy devoid of somersault, employment of independent built-environment professionals, and relevant legal framework to turnkey project, entrenchment of peace and rule of law were proffered

Keywords: *Construction industry, Turnkey, Public Project, Cost of Capital, Delivery Period.*

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Background of the Study

In recent times, government seems to have developed the policy of involving private sector in the procurement of public goods and services. This policy shift submits Bloomfield (2006), is driven by a culmination of factors, and centres on the ideology that partnerships between the public and private sectors offer greater efficiency and deliver better value for money relative to traditional methods of public procurement.

Contributing, Treasury (1995) explained the new policy along the lines of two main benefits: the traditional public procurement was characterized by high cost and time overruns. Consequently, it was felt that public private partnership would offer accelerated completion and more effective operation of the assets.

Secondly, the private sector was considered to be inherently more efficient than their public sector counterparts. Thus, it was felt that the private sector would not only appease budgetary pressures but would also deliver better value for money.

On the other hand, Ball and Maginn (2006) advocates that the reduced financial capacity of government to deliver infrastructure necessitated the exploration of alternative form of governance whereby the provision of essential goods and services such as turnkey projects are maintained. Conceptually, turnkey according to Septel (2006), seeks to continuously involve the private sectors in the financing design, construction; operation, maintenance and in some cases ownership of major infrastructure facilities.

As a characteristic, turnkey is complex and attracts enormous funds and time. The resources of funds and time among others are normally estimated and accommodated in the feasibility report which eventually forms part of the agreement. During the execution of the contract, certain variables such as vitiations, fluctuations and force majeure effect positive or negative tilt on the time often referred to as delivery period. The enormity of funds often required to finance turnkey projects attracts borrowing of capital which must be repaid at a cost. The extra money paid for borrowing the capital is often referred to as cost of capital.

According to Samuelson and Nordhans (2001), the return (cost of capital) represent the price or rate of interest that a consumer pays to suppliers for the use of the funds for a period of time and it is usually expressed as a percentage. Fundamentally, time is measured in hours, days, weeks, months or years. The longer the time, the higher the returns expected to be realized as cost of capital. Turnkey arrangement arrears to guarantee uninterrupted cash inflows, unairtaining deligency in construction activities culminating to timely delivery of the project. Resultantly, This work shall attempt to investigate how cost of capital relate with timely project delivery.

Aim

The aim of this study is to investigate the relationship between cost of capital and delivery period of public turnkey building projects towards achieving effectiveness.

Objectives of the Study

- i) To determine the relationship between cost of capital and the delivery period of public turnkey building projects Nigeria.
- ii) To proffer solutions that would enhance effective delivery of public turnkey building projects.

Research Question

The research question is stated as: To what extent does the cost of capital determine the delivery period of public turnkey building projects in Nigeria.

Hypothesis

The study tested the null hypothesis:

There is no significant relationship between the cost of capital and the delivery period of public turnkey building projects in Nigeria.

Significance of the Study

According to Davis (2003), the cost and time overruns in public building projects execution have contributed to and led to the failure in the realization of various public turnkey building projects.

The built-environment shall benefit immensely as a result of the resolution of the identified problems by this study.

Construction Industry

The construction industry comprises the building and civil engineering sectors and even the process plant industry. Characteristically, the products of the sectors are unique, complex and time consuming. As a matter of fact, no two processes are ever alike rather, each structure is tailored to suit its environment, arranged to perform its own particular tasks and references.

Furthermore, Cooke and Williams (2009), posits that the building industry has a diverse range of suppliers as well as contractors, including manufacturers of materials and components, suppliers of quarry products and ready-mixed concrete, builders' merchants and plant hire firms. Some of the industry's suppliers are larger than the largest contractors working in the industry and they also have considerable influence on the way the industry operates. One of the biggest problems in construction is the extent to which the industry has distinct designs from production to a greater extent than in other industries. This particular feature of the industry is still common despite the deficiencies of traditional procurement and the benefits offered by newer and more flexible approaches.

The industry is highly fragmented project-based and the leadership in construction comes from clients and not from contractors and specialists who carry out the work. This appears to be in line with the submission of Cox (2008), who stated that the clients and their professional advisers dictate the procurement methods used in the industry and it is the contractors who have to react to the latest flavour of the month in the context of the

organization and the management of the project. There is however one common feature and that is the project based nature of the industry. Their whole focus is on the project; the time, cost, quality, resources, problems and solutions are all geared to the project.

Hillebrandt (2000) on the other hand, states that the various activities in the building projects encourage investment in capital projects which generate wages for those who produce it, which in turn generate consumer spending among wage earners and so operate profit for manufacturers of consumer goods, and so on, right through the macro-economy. The realization of these objectives appears to be distorted by paucity of funds.

According to World Bank (2006), stated that the burden of infrastructure (including building) provisions is higher for developing countries because of a greater need for new investments, a much smaller resource base and greater difficulty in sourcing capital. For over a decade now, public spending on the building industry was broadly on a downward trend, partly as a result of high expectations from private sector involvement in building industry and partly from a shift in focus to social issues and poverty reduction, thereby creating a widening investment gap.

Turnkey

Turnkey especially in the public sector, revolves on the developed techniques of the fixed term concession often referred to as Public Private Partnership (PPPs). According to Septel (2006), the techniques are continuously being developed to draw the public and private sectors together with a view to sharing the risks and rewards associated with such activities. Thus, turnkey as a technique of the (PPPs), seeks to involve the private sector in the financing, design, construction, operation, maintenance and in some cases ownership of major infrastructure facilities.

Turnkey, as a concept is derived from the situation of an employer wanting to have little involvement in the construction of a project to the extent that he simply wants to turn the key and to begin the use of a completed project. The traditional procurement system for building projects seeks to ensure that the Design Team – Architects, Engineers and Quantity Surveyors are distinct from contractors to the extent of design ability and build ability respectively.

However, when the contractor by definition and responsibility is charged with design and also build the project, it is no more traditional but is associated with “Alternative Procurement Methods”. Turnkey is one of these alternative procurement methods and seeks to charge the contractor to design and construct the project with little or no contribution from the client or his representatives, especially the Design Team.

Turnkey in relation to the building industry involve, the firm to procure land, project financing, designs, constructs, managing the project towards satisfying the contractual arrangements and other conditions of the contract. According to CEM (1990), building projects are better procured through turnkey in the following situation:

- i) Clients who want a straight forward, reasonable quality project at a reasonable price and completely quickly.
- ii) When the size of a project tends to be more complex and specialized, and requires single point responsibility, flexibility, contractors expertis, certainty of cost, low levels of risks, control and improved communications.

In his contribution, Clough (2008), posited that turnkey contracts are increasingly in use by owners largely due to economics of cost and time that can be realized by welding the two functions of design and construction. Generally, most complex and specialized projects that produce public goods and services, attract enormous funds, associated relative risks whose procurement and delivery appear to be optimally actualized through turnkey contract.

Public Project

Public projects refer to any infrastructural work procured and financed partly or wholly with public funds including key players being held accountable. In addition Morledge etal (2006) submit that certain conditions must be fulfilled:

1. The way in which projects and services are procured must be seen to be awarded fairly and without discriminations. Thus, the award processes must be both transparent and accountable;
2. Tax payers, especially, in a democracy have the right to be shown how their money is being spent in accordance with the approved published policies, standing orders, financial regulations etc and that adequate safeguards are in place to prevent the misappropriation of funds;
3. Maximizing value for money to the extent of ensuring optimum combination of price and quality for each procured project or service.

The key players of public project management or supervision are mainly the public sector comprises anybody established for the specific purpose of meeting needs in the general interest and not having an individual or commercial character, which has legal personality and is financed by most part of the state or its subject to management supervision to the later.

Public consultants are mainly the professionals in the built environment such as Engineers, Architects, Quantity Surveyors, Project Managers et cetera.

Statutorily, the public projects are imposed with obligations to the extent of involving employees and consultants in a significantly higher level of responsibility, transparency and accountability than is conventional the case in the informal sector. failure to comply with the later of the law, may render individuals and/or the clients body as a whole liable to actions at civil law and/or to possible criminal persecution.

Cost of Capital

The capital (funds) required for executing turnkey projects is not only scarce as a resource but is fundamentally obtained at a cost. This is explained as the provider of the fund demands compensation for using his funds and to a reasonable extent for the risks involved.

According to Onwusonye (2011), the worth of the compensation is the outcome of negotiation between the borrower and the provider of the funds and is usually expressed as a percentage. The agreed compensation (a percentage of the borrowed fund as agreed) is often referred to as cost of capital. The borrower is therefore, required to pay the full amount of funds borrowed and the cost of the borrowed fund (capital). Providers of funds usually demand a higher percentage on their funds from projects they consider to attract higher risks.

The cost of capital, involves a negotiation between the borrower of funds and provider of funds. This revolves on the resolve of the financier to part with his funds if only he is convinced that the negotiated percentage (which will dictate the expected return on capital borrowed) is not less than the prevailing market lending rates. The interest of the borrower of funds affects his decision to borrow to the extent that the result of the projected cash flows of the proposed project discounted at the agreed cost of capital (negotiated percentage), remains critical. The borrower will accept the fund if the outcome is a positive difference between the discounted projected cash inflows and projected cash outflows. The negative difference is usually rejected.

Delivery Period

Delivery period in construction represents the date of commencement through and up to the date of final completion of all work items contractually covered in a project and often referred to as time or contract period. Time, according to Webster's (2003), is the portion of duration allotted to some specific purpose. In the construction industry, Onwusonye (2005), time is usually measured based on calendar or statutorily approved working hours, days, weeks, months or years and represents the portion of duration allotted for the actualization of a specific product such as building, roads, etcetera.

Projects, according to Onwusonye (2005), entails series of activities, which among others consume time individually. The time needed to realize a given activity varies and revolves on the complexity, technology, location, and uninterrupted flow of funds to the activity, among others.

He further states that while some activities follow one another in constructive order, others are simply independent and can be carried out simultaneously. Each of these cases has its own time requirement. For instance, a given construction project attracts several mutually dependent and interrelated operations whose combination comprises a cobweb of different time and sequential relationships.

An operation (often referred to as activity) is a single discrete step in the total project concept. The number of operations which a given project can be divided into is a function of the nature, the extent to which the client will be involved in any or a combination of the operations, at times the source of funding, the expertise/experience of the consultants and even the contractual arrangements. This is explained by the fact that as a client may sponsor a project through equity instead of borrowed, or an arrangement whereby payments are effected in phases to different specialist contractors: Pile works, Block work/Concrete works, Roof, etc.

Time, when associated with turnkey projects may exceed its allocation in the actualization of the products and this affects managing the generated cash flows as earlier planned until the agreed period for handing over to the owners. In this regard, time is of essence to financiers (lenders) who are expected to wait for a period of time to enable them recover funds invested and the agreed cost of capital. The longer they wait, the more returns they expect from their investment.

The value of money appreciates over time and this concept remains a pre-requisite towards the operation of project finance and its cost of capital component (<http://booksgoogle.com/books>).

Furthermore, as turnkey projects are usually large and are implemented over long period of time, financiers (lenders) invoke the principles associated with money appreciating in value over time. The factors that give credence to this principle are articulated by Willie (2008) as:

- (a) The risk of default
- (b) Inflation
- (c) The time the money could be put to productive use (i.e. the opportunity cost of money).

As a result, borrowed fund attracts costs in the form of rates of interest. The longer the time for repayment of borrowed fund, the higher cost of capital received.

The issue of extension of time and/or exceeding the contract period often becomes inevitable. Murdoc and Hughes (2008), stated that when a turnkey project experiences a combination of variation(s), fluctuations and Force Majeure the contract period (delivery period) is affected leading to time overrun and/or cost overrun.

Methodology of the Study

Method of Data Collection

Primary sources of data were employed in this study.

The primary data were sourced from various respondents who are professionals and participants in the built-environment such as Architects, project managers, clients, quantity surveyors, construction managers, engineers, estate managers, developers at the various construction sites for public turnkey projects located in five study clusters of Abuja, Jos, Makurdi, Lokoja and Ilorin representing the North Central Zone of Nigeria.

The data gathering processes involved in-depth interviews of the respondents through the use of a structured questionnaire. The questionnaires are constructed in such a manner as to reflect the objective of the study. The questionnaire is designed along a five point rating scale viz Strongly agree (SA), Agree (A), Not sure (N), Disagree (D) and Strongly disagree (SD). This corresponds to the Likert rating scale. The questionnaire was made to possess the qualities of clarity, definitiveness of answers and objectivity of the responses.

Method of Data Analyses

The data generated by the study were analyzed using the non-parametric descriptive and inferential statistics. These include the mean, frequencies percentages and pie charts. The Kruskal-Wallis test technique was found relevant and used in testing hypothesis of the study.

Data Presentation, Analyses

Interpretation and Discussion of Findings

The responses of the various respondents are as summarized below.

Table 4.1: Relationship between Cost of Capital and the delivery period of Public Turnkey Building Projects in Nigeria

SN	Option	Mean	Decision
1	When I base my project time measurement on the calendar, it normally increases my cost of capital on turnkey projects	4.08≈4	Agree
2	Contingency factors such as rain, force, majeure, etc affect the determination of project time.	4.15≈4	Agree
3	My completion time of project is normally obtained by the experience from similar projects	4.06≈4	Agree
4	My completion time of project is normally influenced by information from project team and artisans	3.80≈4	Agree
5	My completion time of project is normally influenced by forecasting	2.17≈2	Disagree
6	My completion time of project is normally influenced by urgency of the job	3.97≈4	Agree
7	My completion time of project is normally influenced by availability of labour and materials	2.73≈3	Undecided
8	Acceptance of warrantees, guarantees and other liabilities normally affect the completion time for turnkey projects	3.42≈3	Undecided
9	Total project time normally influence the cost of capital for building projects.	4.08≈4	Agree
	Grand Mean	3.61 ≈4	Agree

Source: Field Survey

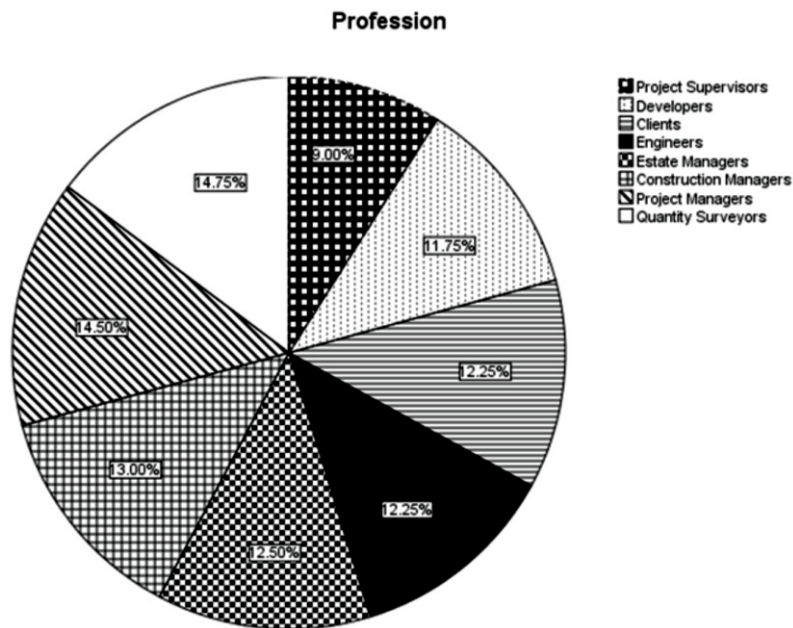


Figure 4.1: Respondents by Profession

Eight (8) different groups of public turnkey project participants were involved. According to the analyses. Figure 4.1 showed that 9% were Architects; 14.5% were project managers; 12.2% were clients; 14.8% were quantity surveyors; 13% were construction managers; 12.2% were engineers; 12.5% were estate managers; and 11.8% were developers. In this regard, the percentage distribution of the respondents by profession indicates that the sample is evenly spread.

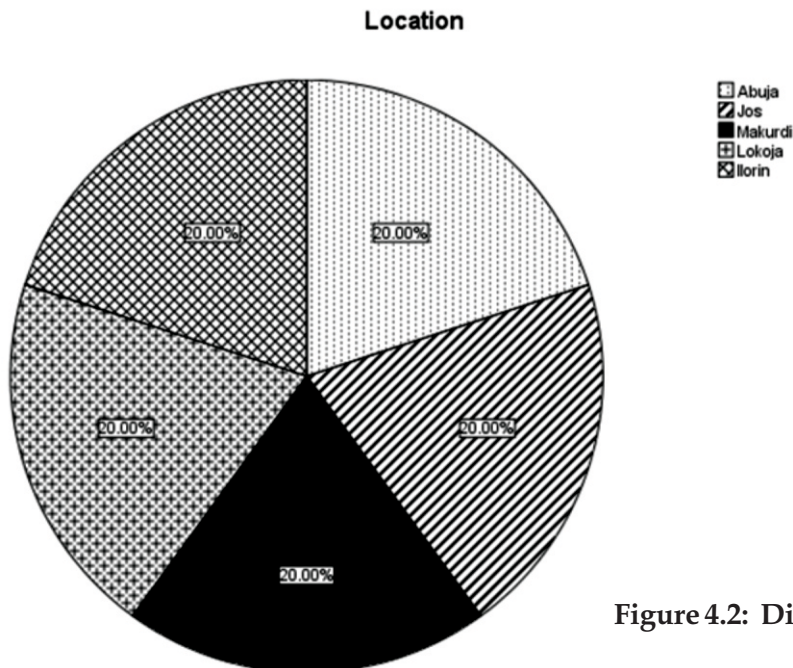


Figure 4.2: Distribution by Location

The locational distribution of the respondent's shows even spread. The respondents were distributed on equal of 20% across Abuja, Jos, Markudi, Lokoja and Ilorin. Also, all the respondents that participated in the study were involved in public turnkey building projects.

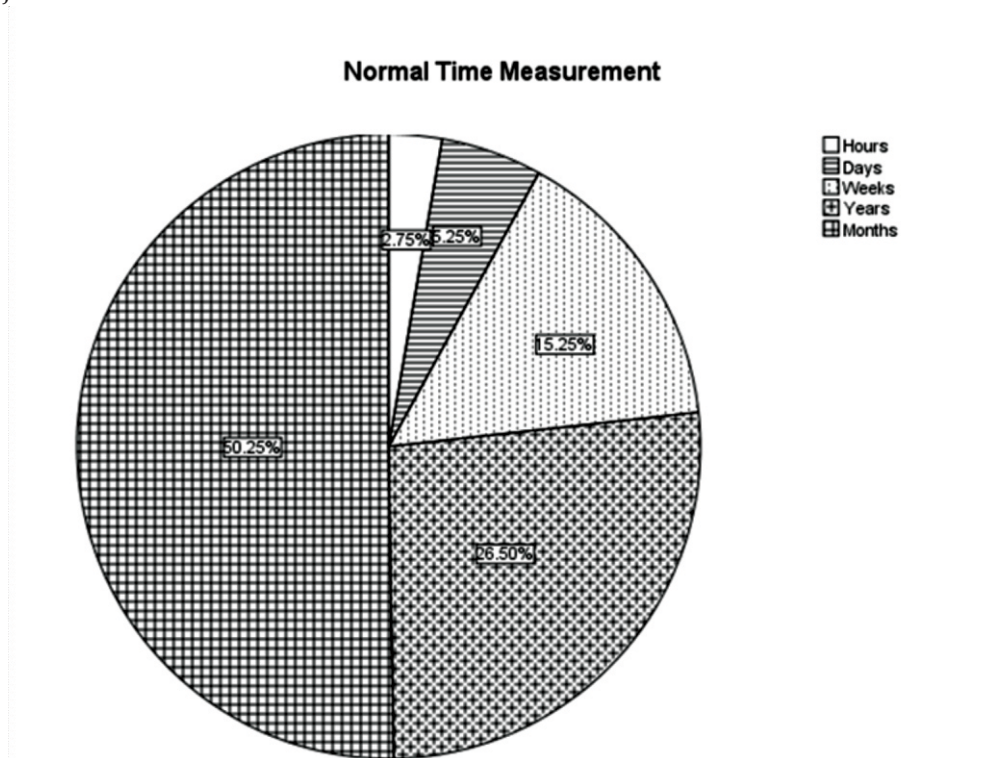


Figure 4.3: Normal Time Measurement

Figure 4.3 above shows that 11 (2.75%) respondents says that normal time measurement for turnkey projects was on hourly bases; 21 (5.25%) said that turnkey was measured on daily bases and 61 (15.25%) said it was on weekly bases. Meanwhile, 201 (50.25%) respondents measured turnkey project on normal monthly bases while 106 (26.50%) respondents measured in year. The pie chart indicates that most of the turnkey project participants measure normal project time on monthly bases while the second large group of respondents said it was measured in years.

Nonetheless, turnkey projects can equally be measured on calendar periods.

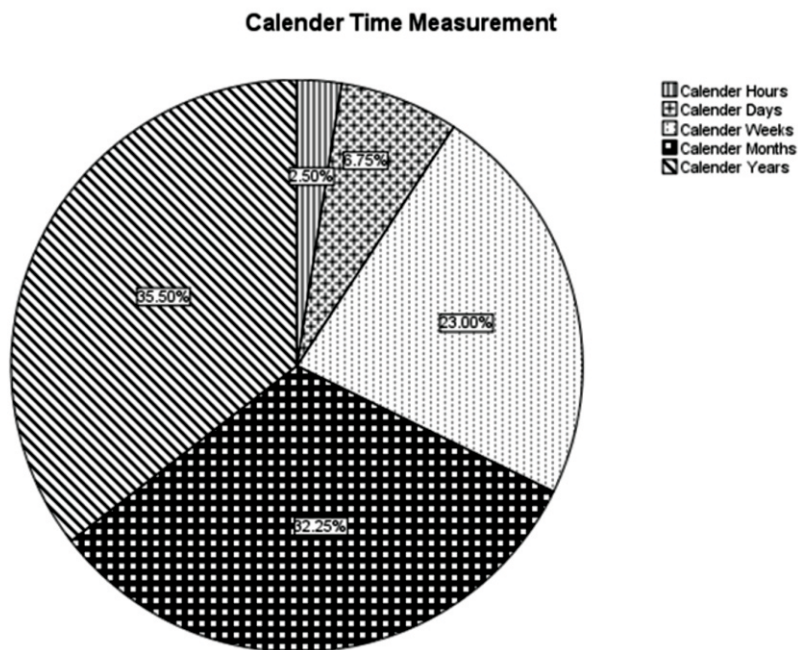


Figure 4.4: Calendar Time Measurement

From figure 4.4, the number of respondents that said the calendar measure of turnkey projects were based on hours were 11 (2.50%), while 27 (6.75%) and 92 (23.00%) said it was in days and weeks, respectively. Meanwhile 129 (32.25%) and 142 (35.50%) respondents said that calendar measurements for turnkey projects were based on months and years respectively.

This indicates that greater number of respondents use calendar periods for turnkey projects measured mostly in months and years, as the case may be.

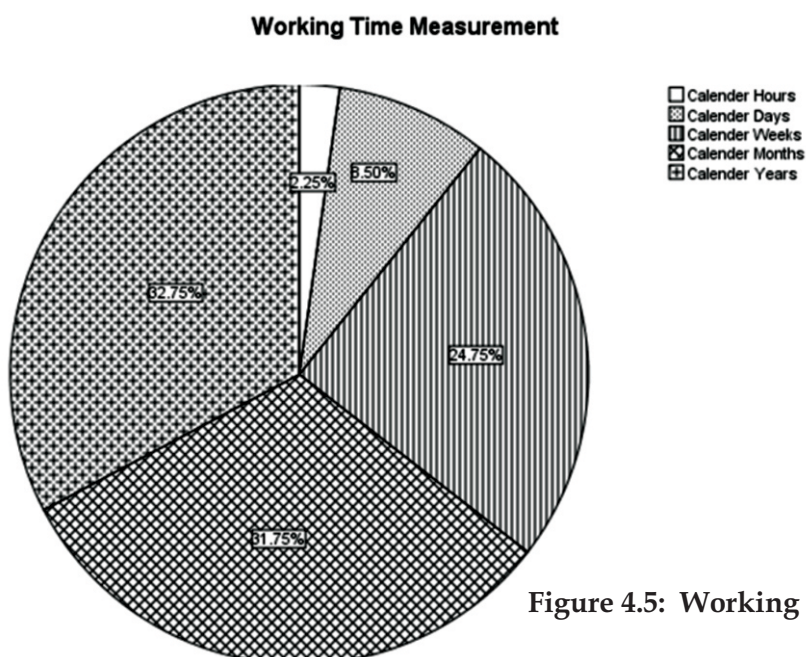


Figure 4.5: Working Time Measurement

Working Time Measurement in figure 4.5, has shown that 9 (2.25%) respondents measured working time in hours, 34 (3.50%) measured in days, 99 (24.75%) in weeks. While 127 (31.75%) of the respondents measured working time in months, 131 (32.75%) respondents measured in years. It follows that working years are the most used in working time measurement followed by working months.

From the analysis on time measurement of turnkey projects, months and years are the most widely used methods. This may be as a result of the length of period required to complete turnkey projects.

Data Analyses

Assumptions

In the test of the hypothesis, the following assumptions were put in place.

- i. Project time measurement based on the calendar months normally increases the Cost of Capital in turnkey projects
- ii. Contingency factors such as season, majeure etc affect the determination of project time.
- iii. Completion time of project is normally influenced by the experience obtained from similar projects
- iv. Completion time of project is normally also influenced by information from project team and artisans
- v. Completion time of project is normally influenced by urgency of the job and
- vi. Finally, total project time normally influences the Cost of Capital for public turkey building projects.

On the other hand, the completion time of project is not normally influenced by the issue of forecasting.

Test of Hypothesis

Ho: There is no significant relationship between the cost of capital and the delivery period of public turnkey building projects in Nigeria.

The test was affected according to the categories of profession and location to see if there is significance.

The study could not ascertain the actual effect of Cost of Capital on completion period of public turnkey building projects especially as regards to:

- (i) Availability of labour and materials
- (ii) Acceptance of warrantees, guarantees and other liabilities

Table 4.2: Grouping Variables according to Profession

Test Statistics^{a,b}

	Question 18
Chi-Square	7.099
Df	7
Asymp. Sig.	.419

- a. Kruskal and Wallis Test
- a. b. Grouping Variable: Profession

Source: SPSS Programme

Since the Asymptotic significance of the Chi-Square is greater than 5% level, the study rejects the null hypothesis and then concludes that there is a significant relationship between the cost of capital and the delivery period of public turnkey building projects in Nigeria.

Table 4.3: Grouping Variables according to Location

Test Statistics^{a,b}

	Question 18
Chi-Square	5.699
Df	4
Asymp. Sig.	.223

- a. Kruskal and Wallis Test
- b. Grouping Variable: Location

Source: SPSS Programme

Since the Asymptotic significance of the Chi-Square is greater than 5% level, we reject the null hypothesis and then conclude that there is a significant relationship between the cost of capital and the delivery period of public turnkey building projects in Nigeria. Therefore, the test of hypothesis is statistically significant by profession and by location.

Discussions of Findings

The study found that;

There is a significant relationship between cost of capital and delivery period of public turnkey building projects in Nigeria.

In this regard, the study revealed that delivery period exert pressure on the cost of capital of public turnkey building projects.

This result appears to give credence to the submission of Murdoch and Hughes (2008) which states that when a turnkey project experiences a combination of variation(s), fluctuations and force Majeure, the contract time (delivery period) and/or initial contract sum is affected leading to time overrun (delivery period) and/or cost overrun (final contract sum).

Furthermore, the cost of capital is fixed as a percentage of the final contract sum. Hence, when as a result of the factors of variation(s) ,fluctuation and force majeure the delivery period (contract time) is extended, the related costs that are associated with such extension will tilt the contract sum upwards and this will also increase the amount representing cost of capital to be paid by the borrower.

Conclusions

It was found that the cost of capital is significantly affected by the delivery period of public turnkey building projects. The study thus concludes that when delivery period (contract period) is extended, the cost of capital will exert more pressure. The study thus concludes that in a public turnkey building project of long delivery period and/or extended delivery period, the cost of capital exert high pressure resulting to a higher amount representing cost of capital.

Recommendations

This study hereby recommends that the:

1. Sponsors of public turnkey building projects should ensure that the feasibility reports including designs are explicit enough to minimize possible positive variations resulting to extension of contract time(delivery period), which tilts positively the contract sum and by implication increases the amount representing the cost of capital.
2. Policy makers and government should ensure policy consistency. The frequent cases of policy summersaults which lead to time overrun and cost overrun should be minimized.
3. Government should ensure that relevant and experienced independent built-environment professionals are commissioned at the brief/objectives development stage so as to eliminate avoidable time wastes activities usually associated with egghead professionals.
4. Developing countries such as Nigeria often adopt existing laws not specifically designed for turnkey projects procurement. A well articulated legal framework, with relevance to turnkey projects procurement, should be put in place. This is to avoid doubts and the usual waste of time in the resolution culminating to extension of the delivery period.
5. Most regions of Nigeria are associated with unrest, abduction and unfriendly environment for turnkey project development. This factors among others lead to long delivery period. Hence, the need for government to ensure peace, poverty eradication stability and rule of law remains critical for construction activities to be contractually timely procured.

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