

**PROCUREMENT STRATEGIES TO ENHANCE SUSTAINABLE CONSTRUCTION
ADOPTION IN HOUSING PROJECT DELIVERY IN ABUJA**

BY

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FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA**

NOVEMBER, 2022

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**THESIS SUBMITTED TO THE POST GRADUATE SCHOOL, FEDERAL
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ABSTRACT

While there is the need to address the various issues influencing sustainable housing delivery, contract procurement strategies adopted for a project execution influences its delivery in quite a number of ways. Wrong conceptualization by the project team often lead to untimely and poor quality delivery, increased cost and worst of all, project abandonment, with its associated environmental, economic and social effects and thereby leaves the involved stakeholders unsatisfied after possession of the housing have been concluded by prospective home-owner. Hence this study aimed to establish efficient contract procurement strategies for the delivery of government housing projects with a view to enhance adoption of sustainability in low and middle income housing provision. To achieve this aim, quantitative research approach was employed and descriptive statistical tools was used to analyse the data gathered from construction professionals who are stakeholders in housing provisions in Abuja, Nigeria. From the results of analysis, the study concludes that procurements strategies that enhance adoption of sustainable construction practices in housing development are Project Management and Design & Build procurement strategies. The drivers for selection of procurement method were grouped under three headings; Project, Design and Management related drivers. Thus the study concludes that five project related drivers (availability of construction resources (MS value 4.817), project innovation (MS 4.437), project cost (MS 4.437), project scope (MS 4.225) and project complexities (MS 4.177)) influences clients and project team choice of procurement method. While, for design related drivers, construction materials specification, design team experience, construction method and revision, change order by clients and design error were the design related drivers. Also, for management related drivers; project monitoring and evaluation, risk management, efficient management strategy and decision-making process were the most influential drivers. The study concludes on influence of project key parameters of cost, time and quality showed that, project management, Management contracting, design and build and PPP variants are the most responsive procurement methods that ensure housing project delivery at affordable cost are the most efficient procurement methods that ensure timely delivery of housing project were; project management, design and build, management contracting and PPP variants. On the quality of housing project; project management, management contracting, design and build, and PPP variants are the most efficient procurement methods that enhance delivery of quality housing project. On the benefits of the identified procurement strategy in relation to use of construction materials, labour and plant revealed the most beneficial procurement strategy that ensure effective, efficient and waste free construction works are; Management Contracting, PPP variants, Project management and Design and Build method. These procurements method were most beneficial to prudent management of construction materials. This study also showed that management contracting Design and Build, Project management, and direct labour procurements methods as the most beneficial methods that ensure efficient human resources usage and assures best productivity.

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CHAPTER ONE

1.0

INTRODUCTION

1.1 Background to the Study

The majority of customers and suppliers in the construction industry accept the assumption that it shows that a project is successful when a mark is placed on it. To begin, a project is considered successful if it is completed on time, within budget, and to a high standard of quality, and gives the client with a high level of satisfaction (Love *et al.*, 1998). Moreover, choosing the right procurement method is critical to achieving customer happiness and project success. According to Masterman (2003), ineffective procurement systems result in claims for cost and time overruns, as well as project conflicts. Traditional technique, design and build method, labour alone method, direct labour method, project management method, management contracting method, build-operate-transfer (BOT) method, and design-build-operate-transfer (DBOT) method, among others, are the procurement systems of concern.

In contract procurement strategies, clients obtain or acquire construction products by using organized methods or processes and procedures (AbdulRashid *et al.*, 2006). The implementation of new procurement systems during the 1980s and 1990s provided a number of advantageous features, like increased selection and flexibility, for project procurement methods (Seeley, 1986). Clients should bear in mind the complexities of their projects when choosing procurement methods. There are alternative procurement systems that construction industry companies around the world have adopted. The various procurement strategies have varying ways of allocating responsibilities, the order in which activities are carried out, process and procedure, and the overall organisational approach.

In construction, service delivery takes place when more than one company or individual carries out design and production outside of the project site. With the exception of the fashion

industry, designs, models, production, quality assurance, marketing, and so on are usually handled within the same organization and location though they are executed by experts from various departments (Sanvido, *et al.*, 1992). With this method of delivery, projects are managed according to an approach that is typically used in construction, where the client engages an architect, as well as construction workers, to manage the design and specification of their project. Miller (2013) explained that traditional methods of public sector project procurement were most commonly and widely used until inadequacy began to become apparent around the 1960s. When the project is awarded to an independent general contractor under a dispersed bid contract, the client will choose who they want to work with. For the designer, payment is tied to the number of services delivered, whereas for the contractor, payment is a standard component of construction costs. Additionally, Ashworth (2006) claims that as large, continual volumes of project, design, and build services are required, organizations may prefer public sector design expertise over consulting designers, as project managers and construction managers frequently take on those design, build, and project management roles. When design and construction are treated as separate entities in the traditional procurement method, integrating design and construction becomes extremely important.

Therefore, contract procurement systems that use varying contract templates influence successful project delivery because they are connected to risk allocation, project activities, process and procedure, and project administration. To make an effective procurement system, a thorough procurement system must be set up to satisfy clients and stakeholders' needs, taking into consideration affordability (cost – time schedule), design complexity, and other considerations.

1.2 Statement of the Research Problem

Even though there are various issues to consider when delivering sustainable housing, project procurement approaches adopted for the actual delivery of the project have a number of influences. Erroneous conceptualization on the part of the project team frequently leads to delays in completion, additional cost, and most significantly, project abandonment, which causes environmental, economic, and social impacts in addition to stakeholders' unmet expectations.

Mathonsi and Thwala (2012) highlighted the relevance of the architects, quantity surveyors, engineers and builders in an effort to promote best value-for- money for construction clients through advising the adoption of a procurement strategy that best addresses project objectives. However, the construction industry has yet to reach a consensus on the most effective strategy for contract procurement for housing projects.

As a developing country, Nigeria faces quite a number of socio-economic challenges, which influence the Abuja construction industry (Oshungade, 2015); hence, construction project objectives are rarely met, particularly due to these socio-economic challenges, as clients tend to get accustomed to, and stick with, a 'traditional' procurement approach that frequently fails to address the requirements and sensitivities specific to a particular project type (Mbanjwa, 2004). In other words, there is a definite need to establish a certain project requirement for an effective procurement method that best addresses the demand of such project (Oyegoke, 2011). However, the concern is how the different contract procurement strategies influence housing delivery and how each method enhances the sustainability of the same, given that the method, process, procedure and organisation vary according to the systems. The procurement systems being employed for construction projects must be analysed critically and intensively, with clear differentiation identified between the traditional and non-traditional approaches and variations as such, for clients to have a more astute

understanding for selecting an effective procurement approach that suits each specific project need (Skitmore & Marsden, 1988).

The different contract procurement strategies present different methods, processes and procedures of project construction for clients. These different strategies also prescribe the variation of the organisational structure of the project teams in terms of role, responsibility and authority. This research assesses contract procurement strategies, the attributes and the impact (both beneficial and detrimental) of each system on the delivery of sustainable housing.

1.3 Aim and Objectives

1.3.1 Aim

The aim of this research is to establish efficient contract procurement strategies for the delivery of public housing projects with a view to enhance the delivery of sustainable housing.

1.3.2 Objectives

The research objectives are:

1. To identify and examine the efficiency of contract procurement strategies used for housing projects;
11. To examine the factors that influences the selection of suitable procurement method for housing projects;
111. To examine the effect of contract procurement methods on the delivery of sustainable housing in terms of cost, time and quality;
- 1V. To examine the benefits of procurement method used on housing projects resources (materials, manpower and machinery);

- V. To establish the procurement strategies that is effective for the delivery of sustainable housing.

1.4 Research Question

- 1. How efficient are the contract procurement strategies used for housing projects?
- 11. What are the factors that influence the selection of a suitable procurement method for housing projects?
- 111. What are the effect of the contract procurement methods in the delivery of a sustainable housing in terms of cost, time and quality?
- 1V. What are the benefits associated with each procurement method on housing projects resources (material, labour and plants)?
- V. Which procurement strategy is effective for the delivery of a sustainable housing?

1.5 Significance of the Study

Construction projects have a high rate of abandonment while many finished ones have overruns in both time and cost (Love *et al.*, 1998). The short-term and long-term impacts of these measures in terms of the provision of sustainable housing are significant. However, several thousand new housing projects have been built, as well as a significant number in development. However, the issue is not at an end yet (Kumaraswamy & Dissanayaka, 1998).

Procurement methods for construction have a direct impact on housing delivery; a sustainable housing is created. Due to the recent flaws in the traditional procurement system, a number of alternative procurement methods have emerged. Due to this, the focus of this research is on non-traditional procurement methods, especially in the construction industry, where alternative procurement methods are gaining in popularity and popularity. One reason why construction projects are so distinct is that each one is unique, which means the activities

involved in the construction process must be integrated and coordinated before and during construction (Kumaraswamy & Dissanayaka 1998). This study has considerable importance because it explores a number of different procurement strategies that construction firms in the construction industry have used to deliver housing, and it assesses the impact of each strategy on delivery of a sustainable housing, while considering the costs, time, and quality, so as to determine the most effective option.

Following the completion of this study, the outcomes will benefit developers who plan to build housing and other stakeholders, in making decisions about procurement methods. Additional understanding of the advantages and disadvantages of the chosen method would be obtained.

CHAPTER TWO

2.0

LITERATURE REVIEW

2.1 Overview of Construction Industry and Project Procurement

Construction industry refers to the diverse groups that contribute to the value of the fixed assets in the built environment. Many industries are unique, and construction is no exception. This, however, can be attributed to the fact that technological, budgetary, and development processes are becoming more volatile. When it comes to building and civil infrastructure projects, the activities and interactions that lead to a finished project occur over the life of the facility, with the changing participants and processes. All of this takes place in a dynamic environment with constantly changing surroundings. According to Sanvido, *et al.*, (1992), the construction industry differs from most other industries, in that it makes prototypes but also reproduces them. In other words, because of its influence on building maintenance and construction, this important industry is sometimes regarded as the leader of all other industries. Non-specific construction industry groups work together to build, maintain, and alter a variety of structures and civil engineering projects (Andawei, 2015). From residential and non-residential buildings to heavy construction, a wide range of public and private facilities are produced. In many ways, the physical facilities are extremely important because they play a critical and prominent role in the development process. There are a number of distinct characteristics associated with construction products, including their custom-built nature, immobility, high initial expense, complexity, and continually changing technology (De-Wilde *et al.*, 1973).

Furthermore, Myers (2013) notes that the construction industry is an economic investment and has a noteworthy impact on the economy. Many studies have confirmed this. While, some argue that the significance of its role is difficult to establish. To others, the construction

industry may be used to regulate the economy, while others feel construction can have no effect on the economy (Myers, 2013). In terms of construction projects, construction work includes the planning, design, construction, alteration, maintenance, repair, and eventual demolition of buildings of all kinds. Residential, commercial, industrial, institutional, religion, and recreational buildings are construction projects where people are employed, worship, reside, or relax (Ofori, 1990). They try to control the natural environment in order to provide facilities such as roads, dams, and airports (Seeley, 1986). While it comes to heavy engineering projects, projects like bridges, tunnels, and petrochemical plants, to cite just a few, fall into that category. (Ogunsemi *et al.*, 2003): Sources outside the industry initiate the majority of construction activity. Construction begins after the client has decided on the facility's necessity and has decided to purchase it. This construction industry is best thought of as a service industry offering various services. Client involvement throughout the contract procurement process leads to the best services and performance (Akram, *et al.*, 2012).

The construction procurement method that (Akram, *et al.*, 2012) highlights is an organized approach to identifying, selecting, and contracting for new building and facility projects, as well as all related site work. The ability to perform the specific function required by the client's clients is expected when a project is completed on time, on budget, and with high quality (Akram, *et al.*, 2012). The Smith and Love (2001) hypothesis posits that procurement methods have remained relatively stagnant over the last two decades; however, significant increases in construction costs and overruns are still present, and thus to reduce these, procurement methods such as partnering and alliancing are suggested (Love *et al.*, 1998).

As clients demand more time, money, quality, and risk, various procurement methods have emerged to meet the demand (Cook, 2008). There are distinct characteristics, advantages, and constraints to each contract procurement system, and there is rarely any one ideal system for all types of clients and projects. Since contract procurement systems come in so many

different varieties, selecting one for any type of project is challenging because of the numerous choices and available professional advice (Ashworth, 2006). The author went on to explain that expertise that serves mainly as a design service most of the time sees the project in opposing viewpoints, prejudice, vested interest, and prior experience as reasons for change. It has resulted in a rise in the demand for a method of selecting an appropriate procurement approach for housing projects, which necessitates that clients focus on developing an appropriate methodology because the adoption of an unsuitable methodology may lead to project failure (Chua *et al.*, 1999). The search for cost-effective and speedy housing delivery brought about the use of a number of diverse contract procurement strategies. These innovations were aimed at meeting the changing client demands by updating the traditional delivery method (Sharif & Morledge, 1994). The process and procedure of providing affordable housing has not only been transformed, but the management and organisational techniques as well (AbdulRashid *et al.*, 2006).

In the construction industry, there are multiple contract procurement systems in use today. They come in traditional and many variations, such as design and construct, management contracting, construction management, project management, direct labour, and labour only. The proliferation of disparate procurement systems additionally necessitates more systematic methods of selection.

2.2 Contract Procurement Strategies for Housing Projects

Home building is so important because the environmental, social, and economic value of housing cannot be under-valued especially special-designed housing which benefits the immediate environment greatly contributes to building communities, improves social well-being, and has a large impact on future living standards (Sutton). Investing in well-planned and managed housing projects contributes significantly to helping to bolster the economy, preserve the environment, and promote social well-being by expanding the overall housing

capacity needed to meet the growing demand for services (Casey & Bamford, 2014). A sound procurement strategy will allow clients to identify the delivery model and procurement method that best suits the project at hand. Customers can expect to achieve the best value for money if risks are managed and contractual disputes, cost overruns, and delay are all avoided by using an appropriate procurement method.

In the construction industry, procurement has become a complex affair, according to Hughes *et al.*, (2006), because this takes into consideration a wide variety of ways of obtaining construction products, it refers not only to what is bought, but also to diverse procurement methods. One must first conduct a survey of the contract procurement methods in place before developing a general understanding of the different methods. In the construction industry, contracting practices are varied and complex because it is difficult to describe all of the possible arrangements (Akram *et al.*, 2012). Contracts are essential to a procurement system, and they're crucial to working with other organizations to collaborate on a project. According to Davis *et al.* (2008), a contract is an agreement between two parties where one party agrees to provide goods or services to another party and commits to fulfilling this obligation within a specified time period and for an agreed-upon price. The authors concluded by stating that the definitions of 'Client' and 'Contractor' must be specified as "A party in need of a service" and "The party that delivers the service."

Procurement comes from the word procure, which is derived from the French term, "procurer," which means "to obtain by effort or care." Organized methods or processes and procedures to obtain or acquire construction products have been referred to as contract procurement strategies (AbdulRashid, *et al.*, 2006). The best way to acquire the project's objectives and at a good price is to consider risk and constraint, leading to decisions about how to fund the project and who gets to own the assets. To procure the optimum balance of risk, control, and funding, a contract procurement strategy is used (Thomson & Jackson,

2007). Masterman (2003) believes that constructing projects for specific clients necessitates using contract procurement as the organizational structure. A key element in effective project delivery is a well-designed contract procurement strategy, which is typically developed during the “evaluation” or “definition” stages of a project (Casey & Bamford, 2014).

In summary, a project's overall success depends on a strategy for procuring essential works and/or services that ensures project timelines are not delayed or worse, severely lacking. Very crucial from a project management perspective is devising a contract procurement strategy. Starting as early as possible in the project lifecycle, which is an element of the project's ‘evaluation’ and ‘definition’ phases, is key to successful procurement strategy development (Casey & Bamford, 2014). A typical project management framework shown in Figure 2.1.

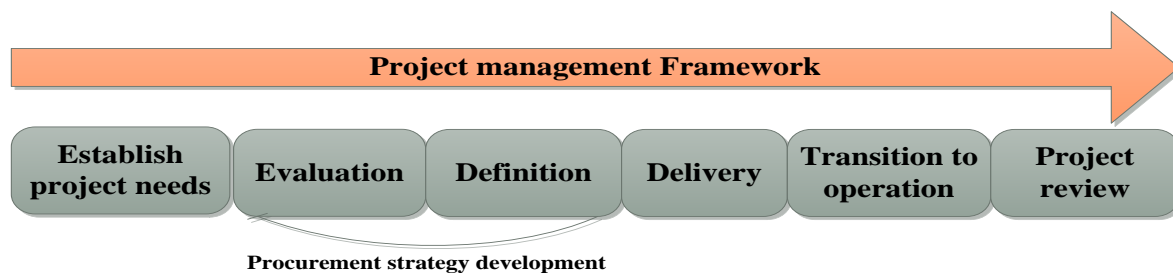


Figure 2.1: Procurement strategy development. (Adapted from Casey & Bamford, 2014)

2.2.1 Contract procurement strategies effectiveness on housing projects

It is important to identify the main features, effectiveness, and identifying characteristics of different contract procurement approaches before creating a general picture of how procurement strategies differ. In delivering housing projects, various strategies are employed to fulfil contracts agreement, some of which are summarised as follows by (Ashworth, 2006):

- i. Traditional procurement method
- ii. Design and Build procurement method
- iii. Management contracting procurement method
- iv. Construction management procurement method

- v. Project management procurement method
- vi. Direct labour procurement method
- vii. Labour only procurement method
- viii. Public-Private-Partnership (BOT, DBOT, DBFO, ROT, BOOT, LROT, *et cetera*) procurement method.

2.2.2 Traditional Procurement method

Traditional method of contract procurement is the most common, well established and recognized model of project delivery (Ashworth, 2006). RICS (2003) data shows that over half of construction projects, namely, 43%, use the traditional method of procurement. In this contractual arrangement, a single main contractor oversees all construction works to ensure that the design and other project documentation is followed as well as the contracting process. Sub-contractors are then hired to implement various elements of the work.

A specific characteristic of this procurement category is the division of project design and construction responsibilities. Even where there are alternative ways to approach the system's basic structure, these two key elements remain separate entities. A major procurement category has only one type of procurement system: the conventional method and various ways of it, such as negotiation, two-stage selective tendering, continuity contracts, serial contracts, and cost reimbursable contracts (Masterman, 2003). It is normal practice for a contract to be awarded to the contractor who best fulfils the requirements of the tender, but, if negotiations necessitate the prior appointment of a contractor, that person will be found through negotiation on the basis of partial or notional information. Smaller projects, such as small or middle-sized construction projects, are served by this delivery model, which provides an early on-site start and lowers the risk of financial loss (Cooke & Williams, 2013). They go on to say that traditional procurement approaches include the following characteristics:

- i. Appointment of contractor is by competitive tendering.
- ii. Designs are completely prepared ahead of time prior to the commencement of tendering process and actual construction.
- iii. The contractor has no design responsibility whatsoever; hence, the client has total control over the design.
- iv. Due to the separation of the design and construction process, the project duration tends to be lengthy.
- v. The client appoints professional consultants for contract administration, advice on aspects of design, progress and stage payment that must be made by the client.

The structure of the traditional procurement method is shown in Figure 2.2:

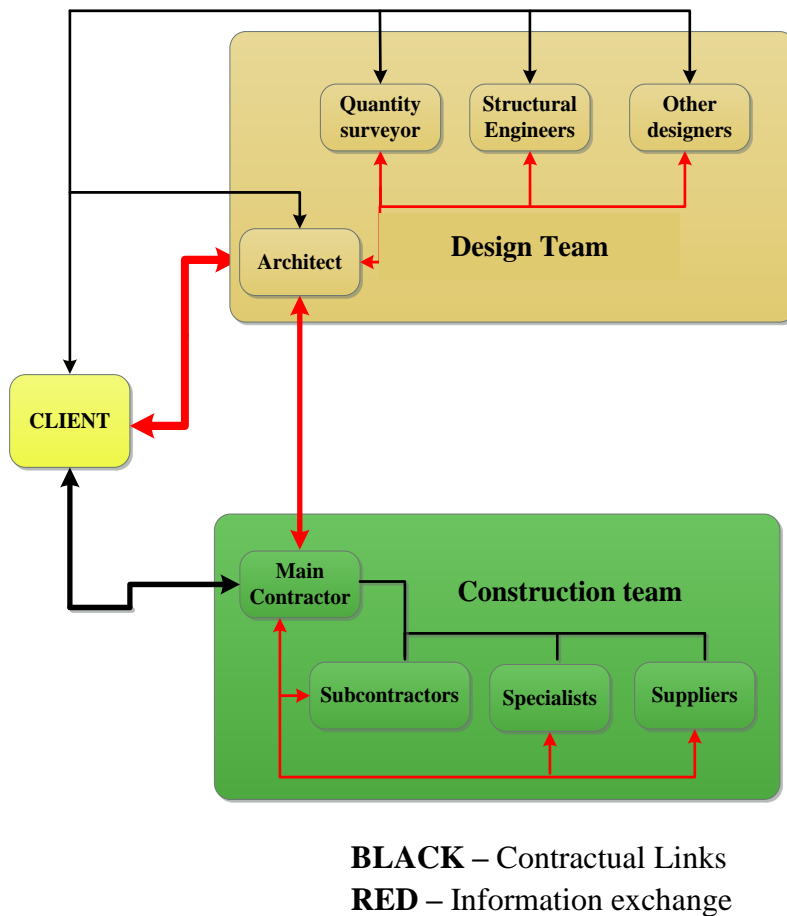


Figure 2.2: Traditional Procurement method Adapted from (Cooke & Williams, 2013).

2.2.3 Design and Build Procurement Method (Integrated)

Contract procurement using this method is commonly employed in large and medium-sized projects that were implemented in the 1980s (Gordon, 1994). Design and build refers to the process of procuring where the main contractor is selected to design and construct the project (Clamp *et al.*, 2007). The purchase decision process includes all the strategies and techniques for managing design and construction where these two distinct components are brought together by a contracting entity and assumed by that entity (Masterman, 2003). This category consists of the main “design and build” procurement system as well as variants of that method. The primary variations are the ‘package deal,’ which means to develop and construct, and the turnkey, which means to have everything finished (Masterman, 2003).

Additionally, a multitude of variations, including 'build-operate-transfer', 'design-build-finance operate', and so on, have recently appeared. They are of equal importance; the difference is in who bears the workload. Time is required by the client's consultants to prepare an adequate set of requirements, and time is required to compare and evaluate the schemes from competing tenderers (Kumaraswamy & Dissanayaka, 1998). Turner (1997) summarised the key points to consider when selecting design and build procurement method as follows:

- i. The point of responsibility in all design and build contracts is a single individual. This customer, as a result, only works with one organisation.
- ii. When extensive lines of the scheme are satisfactory, it may be acceptable to have the client have no control over the design's layout, because the detail is less important.
- iii. Design and construction work can proceed in parallel; hence, the project duration is shortened. However, it is mainly the contractor who benefits from this operational flexibility.
- iv. The entire project is solely the responsibility of the contractor, who is bound to complete the project within the allocated time. The contractor bears responsibility for ensuring a timely flow of necessary communication of information.
- v. Also, designers and cost estimators working together helps ensure that the contract goes smoothly, economically, and quickly.

The Design and Build procurement structure is shown in Figure 2.3:

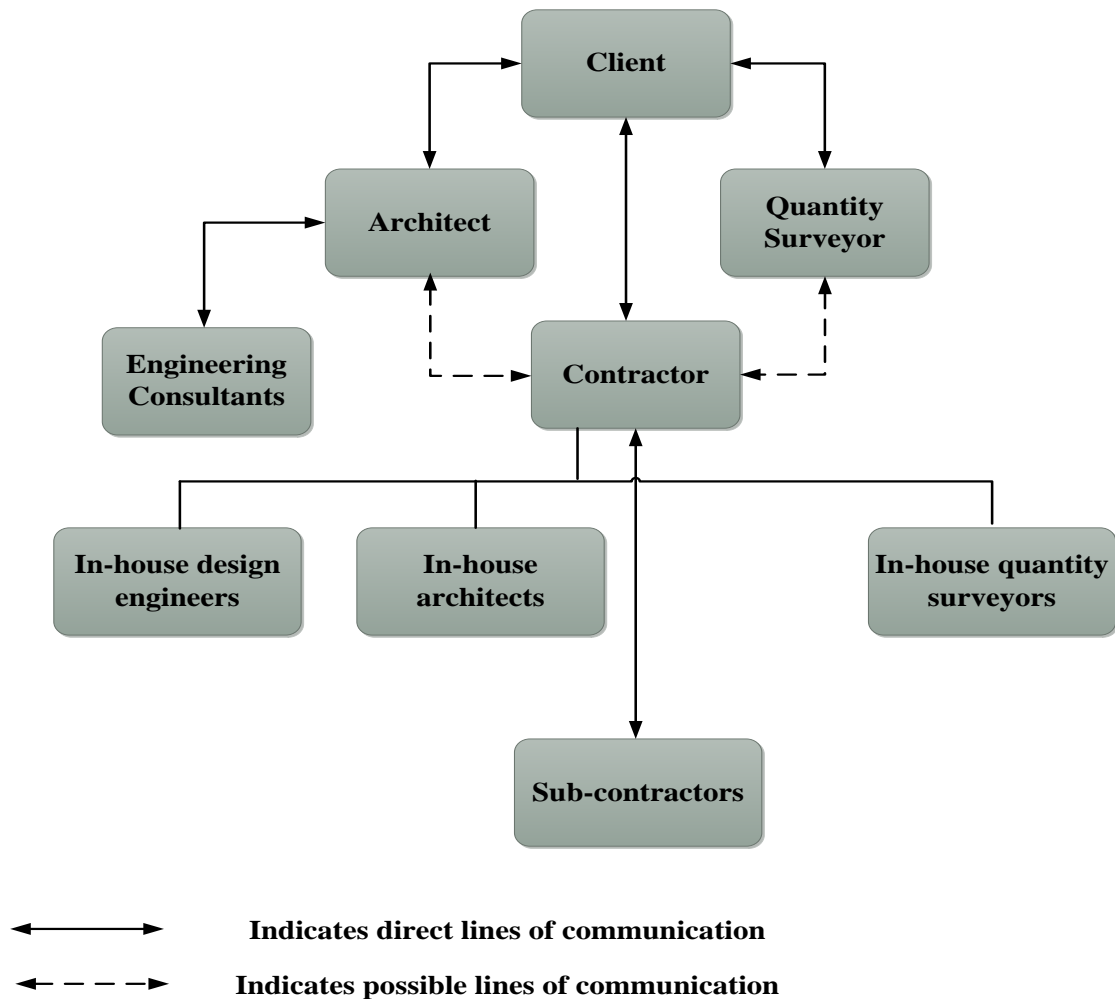


Figure 2.3: Design and Build procurement method (Adapted from Turner, 1997).

2.2.4 Management contracting method

This contracting method for procurement was established in the 1970s in the UK with the goal of completing large construction projects for a low cost in a shorter amount of time. This development coupled with the trend for construction companies to sub-let all of the work caused the project to require only project management and coordination input, along with a strong client-contractor relationship (Hughes *et al.*, 2006). The client appoints an independent design team, with design and project management responsibilities, who reports to the designer. Conversely, the client appoints the development manager as the ‘management

contractor,' which allows the development manager to oversee design and production coordination, signing contracts, and leading the works' delivery on behalf of the client (Casey & Bamford, 2014). Site facilities such as offices, storage, and mess huts, power supplies, and other services, common construction machinery, welfare, and essential personnel are normally supplied and maintained by the management contractor as part of the management contractor's service (Casey & Bamford, 2014). Each member of the design team, including the management contractor, has contractual links to the client, with the same stipulations that apply to the management contractor and to each of the works sub-contractors.

Using management contracting, a construction project has only one point of contact during the duration of the project (Ogunsanmi, 2016). In response to traditional systems' inherent limitations, these management approaches were developed for increasingly complex projects. Only sub-contractors selected and appointed in consultation with the client and his professional advisers do construction work in the management system. The various varieties include construction management, design and manage, and management contracting. Management contracting methodology of contract procurement results in an early start to construction work on-site, shortening project completion time, and facilitates the design change of the project because drawings and other details can be adjusted and finalized as work progresses and the management contractor takes on the project. subcontractors work with the management contractor, who may be the architect, quantity surveyor, or project manager, on approved terms; they then oversee the construction work (Akram *et al.*, 2012). For major or significant construction projects where there is some uncertainty regarding project requirements, contract-based procurement is best-suited. Design and construction, however, tends to be shorter (CWMF, 2008). Management contracting procurement structure is shown in Figure 2.4:

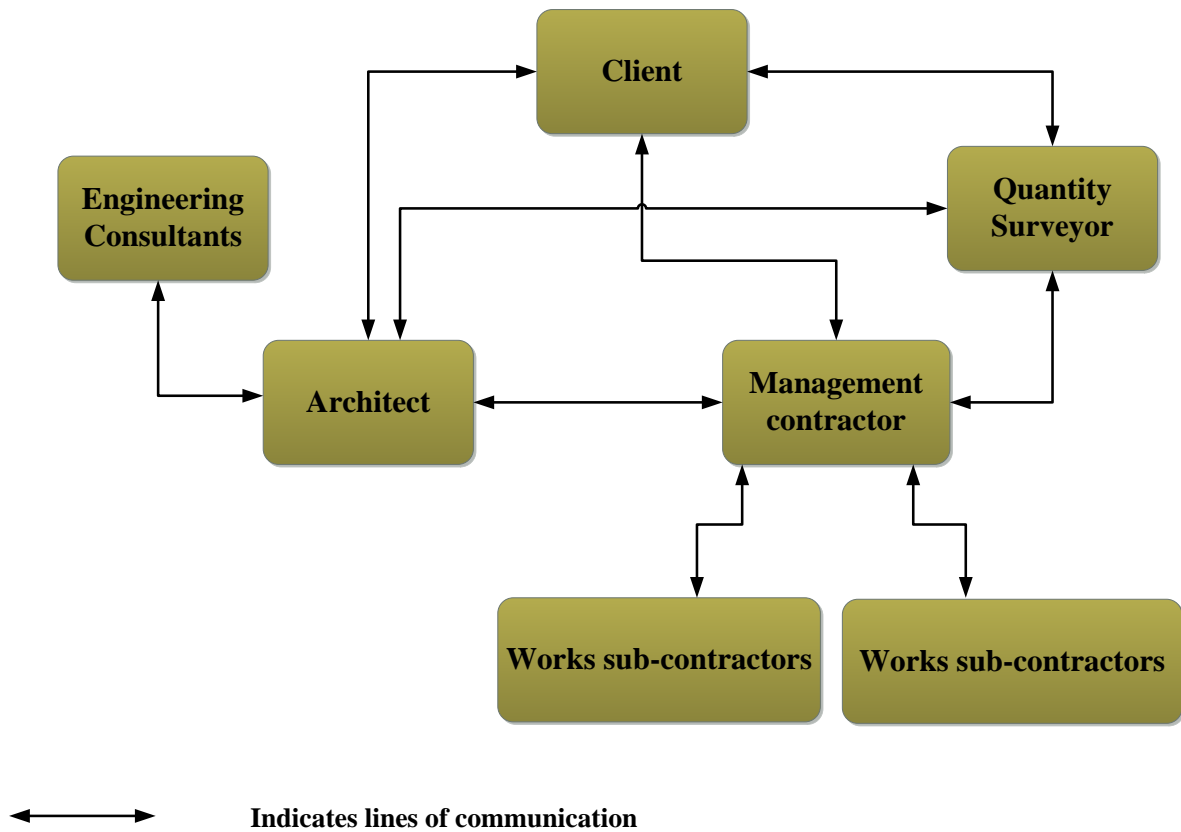


Figure 2.4: Management contracting procurement method (Adapted from Casey & Bamford 2014).

2.2.5 Construction management procurement method.

In the sense that it is a management consultant service to the client, provided on a fee basis, construction management procurement method is similar to management contracting in the same way that it is a management consultant service to the client. The design and construction services are provided by other organizations (Rowlinson & McDermott, 1999). Direct contractual links are used, and thus the construction manager plays a role more like a consultant than a contractor. Since the construction manager is responsible for managing construction on-site, as well as ensuring that construction projects are carried out in the most efficient manner, he also assumes the burden of executing those projects (Akram, *et al.*, 2012). The construction manager has the following responsibilities, according to Masterman (2003):

- i. Cooperation and consultation with the other members of the client's professional team.
- ii. Preparation and updating of a comprehensive construction programme.
- iii. Materials and component flows are prepared, and advanced ordering is arranged.
- iv. Determining the specific site services and facilities that must be provided, as well as their location.
- v. In consultation with other members of the client's professional team, the project is broken down into relevant trade packages.
- vi. List of subcontractors whom you should recommend to be considered for trade packages.
- vii. Obtaining tenders from sub-contractors and suppliers.
- viii. Evaluation and recommendation of tenders to client's team.
- ix. Coordination of works sub-contracted to trade contractors in ensuring that works are executed in accordance to the master programme.
- x. Establishment of all necessary on-site personnel management with the responsibility to supervise and manage the project.
- xi. Deals with all necessary variations that arises during the course of project execution, providing the design team with an estimate of the likely cost to be incurred and subsequent issuance of instructions to trade contractors.
- xii. Preparation of all necessary documentations regarding the final account receives applications for periodic payments from trade contractors and submits to the Quantity Surveyor.

Under construction management procurement method, contractual links exist between:

- i. The client and the construction manager.
- ii. The client and each of the trade contractors.

- iii. The client and each member of his professional advisers (Architect, Quantity Surveyors and Engineering consultants).

As a result, the construction manager takes on a consultant role, whose role is to ensure that the project is being carried out correctly, coordinating communications with design consultants to meet objectives approved by the client (Masterman, 2003). In addition to being paid an approved fee, the construction manager is entitled to receive a fee for covering the costs of staff and overheads. This type of contract is frequently used when designing in parallel with construction (Akram *et al.*, 2012).

Construction management procurement structure is shown below in Figure 2.5:

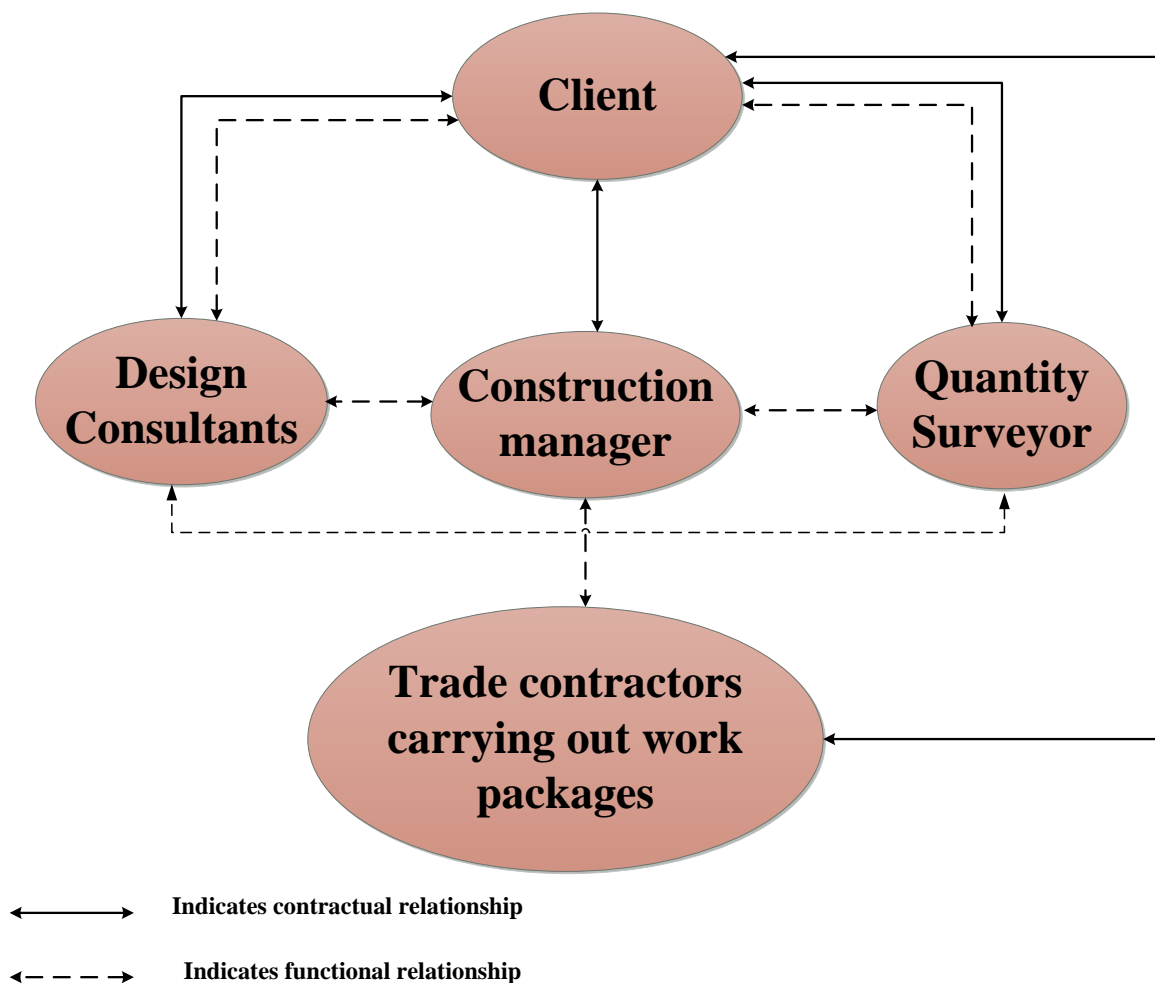


Figure 2.5: Construction Management Procurement method (Adapted from Masterman, 2003).

2.2.6 Project Management procurement method.

The phrase "project management as defined is application of knowledge, skills, tools, and techniques to project activities to meet project requirements." In order to meet client needs and to produce a financially and functionally viable project, it is necessary to plan, control, and coordinate the project from inception to completion, and to do so in order to obtain the desired project time, estimated cost, and standards of quality. As asserted by Ashworth (2006), project management is typically a service provided by a client's in-house consultants, not a service provider. Also, the client makes the project manager and the design consultants the key decision makers, and he or she then hires the contractor.

To ensure the client is engaged in the design and construction phases of the project, they are required to be involved throughout the design and construction process. Project managers have to ensure that design, tender, and construction processes are coordinated. Design, tender, and construction functions overlap, construction work is divided into several smaller work packages, and tenders are awarded for each package. Construction work begins as soon as design information is available and design drawing package programming allows for a rolling tender (Ramus, *et al.*, 2006). When work elements have been awarded, the construction costs will only be known at that point. A structure of project management procurement is demonstrated as shown Figure 2.6.

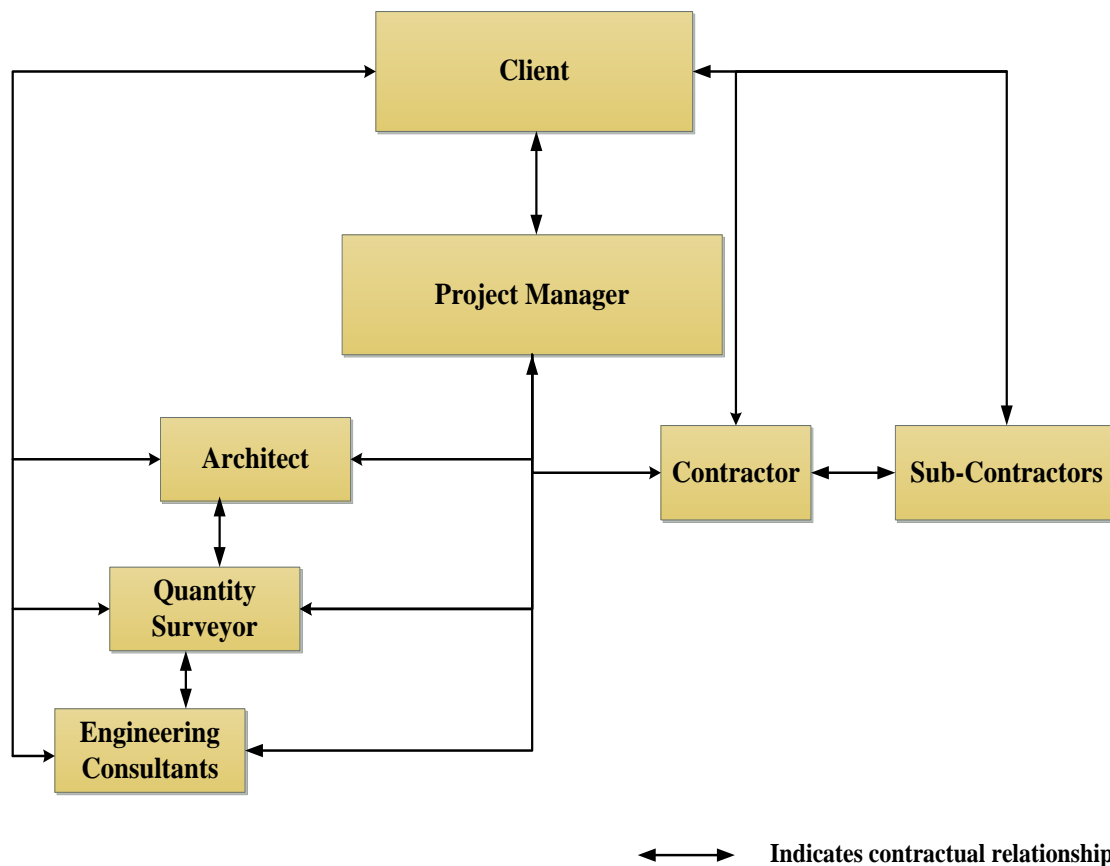


Figure 2.6: Project management procurement method (Adapted from Ashworth, 2006).

2.2.7 Direct labour procurement method.

The primary direct labour procurement method defined as a system where the workers of an organization are responsible for executing a construction project instead of contracting out for it." Using an in-house or outsourcing source to procure all necessary resources, a client employs, organizes, and mobilizes these resources to carry out a construction project. The resource employed in this process is paid directly by the client. Using a direct labour procurement method, clients will be responsible for sourcing materials and also for finding and supervising the labour for project execution. Thus, the main contractor is not involved in project execution. For small-scale projects and routine maintenance, the most common direct labour procurement method is used (Kadiri & Odusami, 2003). In Figure 2.7, we see the structure of direct labour procurement.

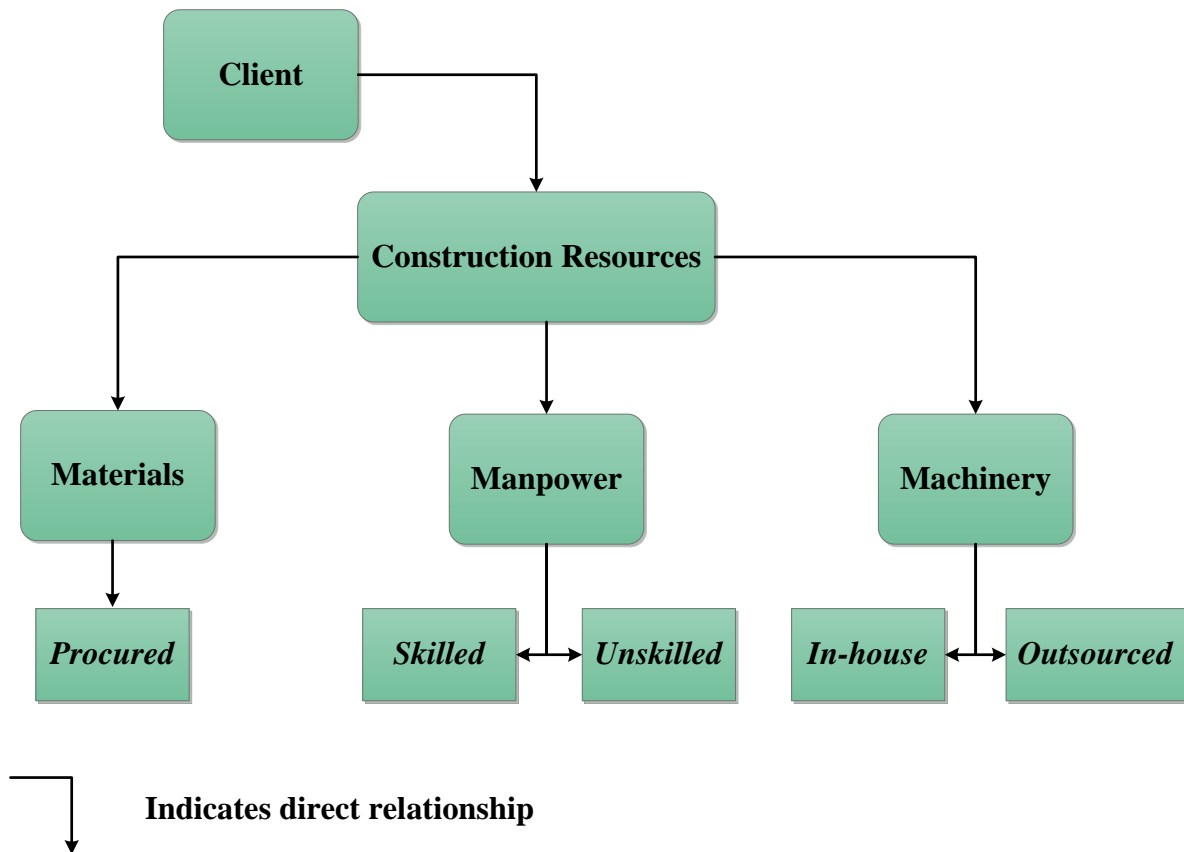


Figure 2.7: Direct labour procurement method (Adapted from Adenuga, 2013).

2.2.8 Labour only procurement method.

The “labour only” aspects of construction works can be contracted out to the client (Kadiri & Odusami, 2003). All the construction materials and resources needed for the project are the responsibility of the project's client (Olabode, 2013). The adoption of the labour only procurement method by a client will result in a significant amount of time and energy being wasted in order to meet project objectives. a difficulty with implementing the labour-only procurement method is that a labour-only contractor faces difficulties in coordinating the client's construction resources, making it difficult for labour-only procurement to be implemented. Labour only procurement structure is shown in Figure 2.8:

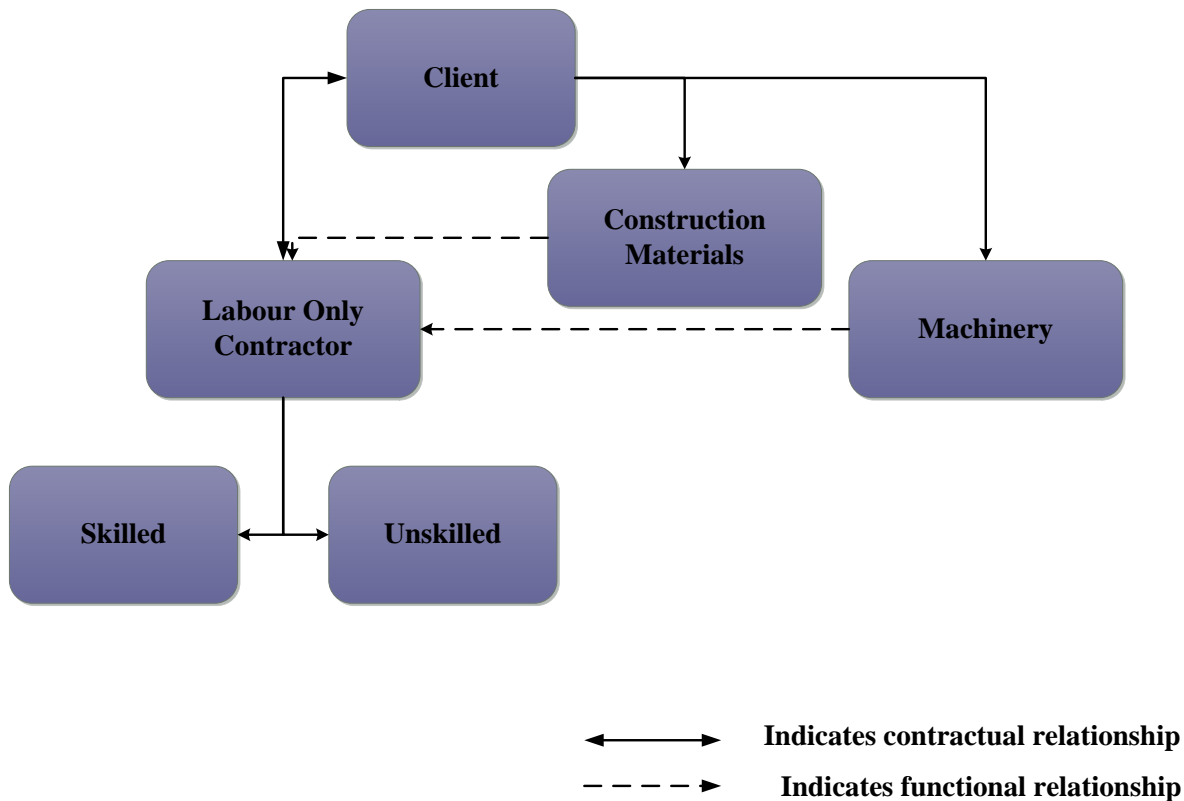


Figure 2.8: Labour only procurement method (Adapted from Ogunsanmi, *et al.*, 2003).

2.2.9 Public-private partnership procurement method (PPP).

When a private and public sector collaborate to produce public value in an effective, efficient, and cost-effective manner, this is known as a public-private partnership approach of contract procurement (Akram *et al.*, 2012; Casey & Bamfort, 2014). These trends are apparent, but in recent years, many public-sector construction projects have begun to fund themselves in new ways (Hughes, *et al.*, 2006). A method of granting concession contracts in which a private sector entity agrees to take complete responsibility for the total supply of a service within a specific geographic area, including operating, maintaining, collecting, managing, constructing, and rehabilitating the project (Casey & Bamford, 2014). According to Hughes *et al.*, (2006), employing PPP in procurement to supply a public service while attaining the best value is an appropriate technique. Although the private sector provides construction sites, the assets are publicly held during the concession period and the public sector is accountable for defining construction price and quality criteria (Casey & Bamford, 2014).

PPP entails adopting a long-term performance-based contract and/or concession to acquire proper control over construction project risks, which is accomplished through the employment of a Special Purpose Company (SPC/SPV) (Akram *et al.*, 2012). Concessionary periods often span 25 to 30 years. The private sector is allowed to repay its investment while also making a profit during this time. Figure 2.9 depicts the PPP structure.

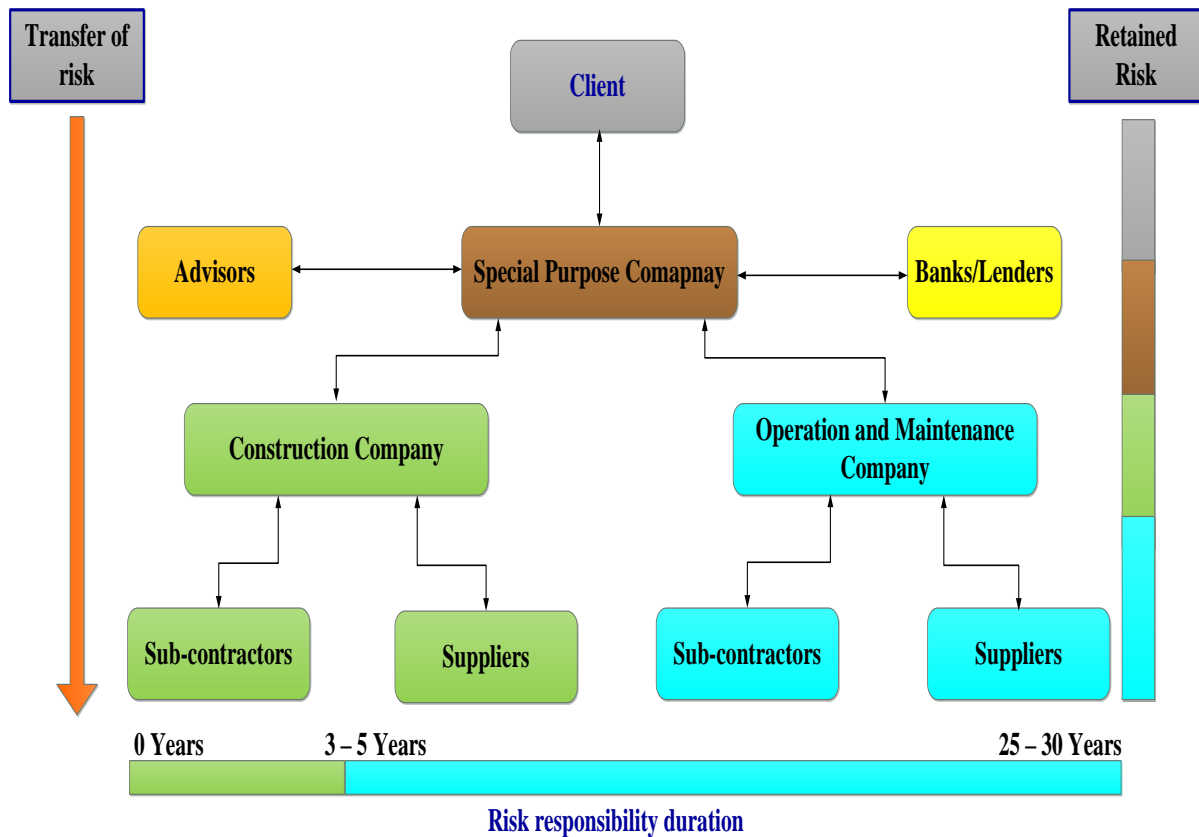


Figure 2.9 Public –private partnership procurement method (Adapted from Miller, 2013).

There are several different types of PPP delivery models that define who is responsible for what and how much risk each individual carries. According to Akram *et al.*, (2012), Gounden (2000) and Miller (2013), the most widely utilized variants in a typical public-private partnership framework are:

- i. **Build-Develop-Operate (BDO):** The private entity buys the facility from the public institution, refurbishes and upgrades it with its own resources, and then operates it

under a concession contract that spells out the conditions of the deal. Although the payment may increase during the concession term due to the length of the agreement, the private firm may still have a sufficient internal rate of return on investment because the rate of increase is often impacted by both internal and external factors (Miller, 2013).

- ii. **Build-Lease-Operate-Transfer (BLOT):** A BLOT agreement creates a private company that develops, finances, constructs, and operates a facility. For the duration of the lease, the private entity leases to the government and charges users fees. At the end of the lease period, the facility's ownership and operational responsibilities are transferred to the government for an agreed-upon fee. The BLOT approach provides a favourable overall risk/reward scenario for the project company, as it allows it to keep legal control of the property while avoiding operational risk (Gounden, 2000).
- iii. **Build-Own-Operate (BOO):** With a BOO project, a private organization finances, constructs, owns, and manages a facility or service for an indeterminate length of time. The facility's remaining value will be made available to the private enterprise. This method is employed when the facility's physical location coincides with the concession term. The amount of money required is significant, and the payback period is long (Casey & Bamford, 2014).
- iv. **Build-Own-Operate-Transfer (BOOT):** Private entities can use BOOTs to get funding, design, build, and run facilities for a set length of time. The facilities then become public property. While the private organization retains authority during the concession term, they try to maximize their return on investment and maintain the facilities. BOOT structures are ideal for projects such as developing motorways, roads, public transportation, trains, and power plants, and infrastructure projects are important for both social and economic reasons. The BOOT (Business Opportunities Through

Overseas Trade) scheme fosters private investment, injects new foreign capital into the economy, facilitates the transfer of know-how, reduces project completion time and cost, and relieves the government's infrastructure obligation (Akram *et al.*, 2012).

- v. **Build-Operate-Transfer (BOT):** A concession arrangement in which a private corporation manages an infrastructure project that is developed, financed, and completed by a public-sector institution, with ownership transferring to the public sector at the conclusion of the concession period. While the private sector is responsible for funding the infrastructure project, it is also the owner of the facility and has the right to all project income. As a result, they are allowed to claim ownership of the facility. However, the project's feasibility is determined by its efficiency in relation to public funding. The majority of BOT initiatives are used to develop single facilities rather than entire networks. They may, however, be employed for renovation work in exceptional circumstances (Akram *et al.*, 2012).
- vi. **Buy-Build-Operate (BBO):** The public sector can transfer assets or facilities to the private sector under this delivery model. Assets and facilities will be transferred, improved, and maintained by the private firm for a certain amount of time in order to complete the transaction (Casey & Bamford, 2014).
- vii. **Contract-Add-Operate (CAO):** The private party finances the extension of an existing infrastructure facility (that is currently in use by the public) and operates the new facility for a specified period of time. A transfer agreement may or may not be included in the additional facility completed by a private firm (Hughes *et al.*, 2006).
- viii. **Design-Build-Maintain (DBM):** This approach is similar to Design and Build, but instead of a private firm owning and maintaining the facility, the public sector is in charge of ownership and operation after specific performance benchmarks are fulfilled. This methodology encourages designers to create a life cycle responsibility for the

facility's performance, which encourages them to create better projects (kumarraswamy & Dissanayaka, 1998).

- ix. **Design-Build-Finance-Operate (DBFO):** DBFO is identical to BOOT, except there is no transfer of facility ownership. The private entity finances, constructs, and builds a new facility for the public entity under a long-term lease agreement, and then manages the facility for the period of the lease. For the length of construction, the private entity is responsible for all financial commitments (Li *et al.*, 2005).
- x. **Design-Build-Run (DBO):** Private companies are allowed to design, build, and operate public facilities, but the facilities are legally owned by the general public. Operationally Integrated Design-Build Partnership to decrease the risk to the private sector, all project components are purchased from a single private firm under a single contract, with the finance secured by the public body, which bears the risk on behalf of the private sector. DBO is a performance-based procurement strategy that encourages competition and innovation, lowering costs for ratepayers (Li *et al.*, 2005).
- xi. **Design-Construct-Finance-Manage (DCMF):** A public entity awards a private business the contract to design, construct, finance, and manage a facility based on the public entity's specifications. The cash flow of the project is financed by the rent the facility gets from the government. This delivery approach could be considered as a method to avoid contributing to the national debt by operating on credit (Gounden, 2009).
- xii. **Develop-Operate-Transfer (DOT):** A strategy in which outside attractive conditions, such as favourable development sites, are inserted into an agreement for a private firm to develop adjacent properties, granting them the right to collect rent from those buildings (Hughes *et al.*, 2006).

- Xiii. Lease-Renovate-Manage-Transfer (LROT):** This approach transforms an existing asset into a new type of asset on a lease-like basis, allowing a private party to renovate and operate a facility for a specified length of time. Following that, the asset is passed over to the government for a predetermined return (Li *et al.*, 2005).
- Xiv. Rehabilitate-Operate-Transfer (ROT):** This model uses the existing building as the foundation, with a public entity granting a privately owned business authority to rehabilitate, operate, and maintain a facility for a period of time as an authority, then handing over all property rights to the public entity once the work is completed (Li *et al.*, 2005).

2.4 Factors that Influence Selection of Contract Procurement Strategy.

There is no single procurement approach that is suitable for all project requirements, which can lead to waste in projects. as said previously by (Davis, *et al.*, 2008). It is necessary to understand the numerous aspects that influence the selection of a contract procurement strategy in order to thoroughly explore the procedures involved in contract procurement strategy selection (Thomson & Jackson, 2007). Choosing a procurement strategy entails determining a way to provide total objectivity and openness to clients and stakeholders when selecting a procurement technique, so that people advising the process can defend the procurement strategy and method they are suggesting (Turner, 1997).

Project cognition improves during the several periods depicted in Figure 2.10. It's vital to choose a procurement strategy or strategies that best satisfy project criteria, such as the type of building needed, the delivery timetable, and the available cash (CWMF, 2008). In the selection process, it is critical to understand project objectives and limits, which is why procurement techniques and how they fit project needs should be extensively studied prior to selection. A four-step strategy for procurement method selection was discovered, according to Casey and Bamford (2014). Important judgments should be made deliberately and

documented for future reference following each step of the selection process, according to the theory.

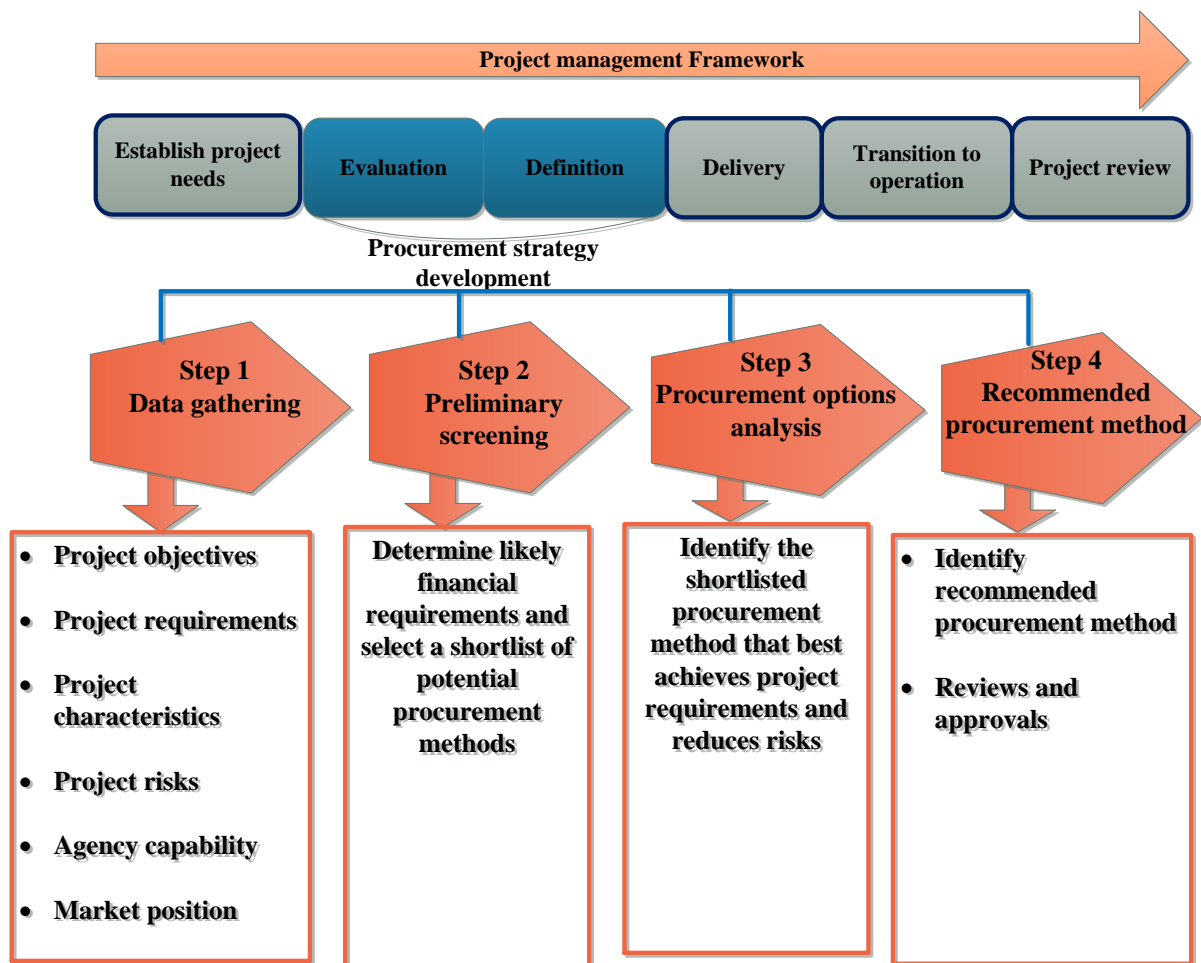


Figure 2.10: Procurement method selection process (Adapted from Casey and Bamford, 2014).

Step 1 - Data Gathering: This step requires the gathering and documentation of project briefs in order to correctly outline the project in respect to upcoming procurement methods. Data collection is essential for projects in their early stages, as this is when project briefs and specifications are most important for accurately characterizing the project and customer requirements (Casey & Bamford, 2014).

Step 2 - Preliminary Screening: This stage addresses the alignment with step one as well as the evaluation of potential procurement techniques (CWMF, 2008).

Step 3 – Procurement Options Analysis: Possible procurement possibilities, risk minimization, and the shortlisting of a winning solution are all assessed in this step.

Step 4 - Recommended Procurement Method: Clients can determine the best procurement method for the project, taking into account the project's needs and risk profile (Thomas & Jackson, 2007). According to studies by, a variety of factors influence procurement strategy selection (Thomas & Jackson, 2007; Skitmore & Marsden, 1988; Ashworth, 2006; and Ogunsanmi, 2016);

- i. The project key objectives and constraints.
- ii. The risks that could arise during the execution of the project and how best the risks could be managed (seen and unforeseen).
- iii. The level of complexity of the project.

2.4.1 Project key objectives and constraints.

- i. As a prerequisite to selecting a procurement strategy, the major objectives of any project are normally specified during the project definition phase (from the perspective of project management) (CWMPF, 2008). According to Davis *et al.*, (2008), a project's main goals should include the following:
 - ii. The project's scope of work.
 - iii. Project cost, which should include both long-term and ongoing costs.
 - iv. Project time - this should include effective project planning and phasing to demonstrate project milestones and target dates, as well as a sufficient provision for the contract term.
 - v. Project quality — design requirements that must be met in order for the project to be considered successful.
 - vi. Longevity – taking into account social, economic, and environmental considerations.

- vii. Project innovation - rather than setting prescriptive specifications, this should be encouraged based on the performance of previous similar projects.
- viii. The requirements and expectations of the parties who were involved.
- ix. The impact of the government's goals being improved.

Constraints are features of a project that have an impact on the project's main goals in some way (Skitmore & Marsden, 1988). Every construction project has its own set of constraints, which may include the following:

- i. Site conditions – physical constraints
- ii. Program restrictions - a master program should be created so that the project's important milestones can be evaluated for achievability.
- iii. There are time limits.
- iv. Budgetary restrictions.
- v. Materials, labour, and machinery are all available construction resources.
- vi. Project participants' skills, competency, and ability to deliver the project's expected outcomes.
- vii. The state of the market
- viii. Policy of the government.

The key objectives and constraints of a construction project are usually inter-alia, hence, there is a need for concurrent considerations as the key objectives and constraints of a project influence the planned outcome of a project and facilitate the selection of a suitable procurement strategy (Davis *et al.*, 2008).

2.4.2 Project risks.

Risks are events or occurrences that may occur during the execution of a construction project, both anticipated and unanticipated, and which usually have an impact on the project's delivery outcome (CWMF, 2008). Risks that may arise during the course of a project's

execution should be assigned to the best party capable of dealing with them. Inappropriate risk allocation can lead to project cost overruns and increase the likelihood of contractual disputes. As a result, both parties should consider and determine the best way to deal with the identified risks before choosing a procurement strategy (Skitmore & Marsden, 1988).

2.4.3 Level of Project Complexity.

According to Davis, *et al.*, (2008); and CWMF (2008), the following are the factors that determine the complexity of a project:

- i. Project size.
- ii. Project scope.
- iii. Project duration.
- iv. Involved number of stakeholders.
- v. The extent of technology to be incorporated into the project.
- vi. Client's knowledge of construction works.
- vii. Market conditions.

Procurement strategies are tailored to meet specific project requirements; as a result, it is critical that a client selects the suitable procurement system as well as the relevant construction specialists, as using the incorrect procurement system would result in poor project outcomes.

2.5 Influence of Contract Procurement Strategies on the Delivery of Sustainable Housing.

Based on the important project factors of cost (affordability), time, and quality, the impact of contract procurement strategies on the delivery of sustainable housing is investigated.

2.5.1 Traditional Procurement Method

Cost: Traditional contract procurement, according to AbdulRashid *et al.*, (2006), offers clients with cost certainty early in the project; it also provides clients with a steady pricing

because the design and complete working drawings of the project have been fully established and fleshed out prior to tendering. AbdulRashid *et al.*, (2006) went on to say that the traditional procurement technique reduces design and construction ambiguity, which could lead to contractors artificially inflating construction costs.

Time: Due to the linear or sequential pattern of activities, traditional procurement methods have the slowest delivery approach (Olabode, 2013). AbdulRashid *et al.*, (2006) on the other hand, argue that the traditional procurement strategy is preferable to the other alternative strategies in that it provides accountability and better design and construction control by the client, i.e., there is ample time for the client and the project team to examine and evaluate the design prior to construction.

Quality: According to Ogunsanmi *et al.*, (2003), the conventional procurement process provides a high degree of quality since it allows the customer to pool the best design and management skills from professional consultants and the contractor.

2.5.2 Design and build procurement method

Cost: Although construction costs are established at the tender stage and subject to design revisions, the cost of construction using the design and build procurement approach is generally higher than the cost of construction using the traditional procurement method, (Masterman, 2002). According to AbdulRashid *et al.*,(2006), the lack of design and specification information during the tender process has caused contractors to inflate the construction total to account for all uncertainties that may develop during the project's execution unless the client requests adjustments.

Time: Because the design and construction phases are linked, the design and build procurement approach is commonly referred to as the "build-it-fast" project delivery system, (Griffith & Watson, 2004). The design and build method allows the design and building

processes to operate concurrently, significantly lowering the overall construction time (AbdulRashid *et al.*, 2006).

Quality: The contractor can use his knowledge and experience to establish a more efficient design and construction control program, allowing him to be more imaginative in improving the construction process and procedures, resulting in a higher quality standard (Turner, 1997).

2.5.3 Management contracting procurement method

Cost: The cost of executing construction projects with the management contracting method tends to be lower than with other procurement systems, because the cost of the project is actually the total of prices quoted by the work contractors (Ramus, *et al.* 2006).

Time: The management contracting procurement method provides for the early start of construction work while also increasing constructability because the management contractor has the necessary knowledge, experience, and competency to effectively oversee the project's design and construction (Masterman, 2002). According to Turner (1997), the management contracting procurement method allows for effective and efficient coordination of construction works, as well as construction resources such as materials, manpower, and machinery, resulting in a significantly shorter construction period than other procurement methods.

Quality: The management contractor is more concerned with the standard and quality of work performed by various work contractors because the management contractor's ability to select durable materials ensures efficient project quality and, as a result, delivers higher project quality (Ramus *et al.*, 2006).

2.5.4 Construction / Project Management Procurement Method

Cost: According to Ramus *et al.*, (2006), there are typically no fixed costs at the start of a project except a cost plan prepared by the Quantity Surveyor, and the cost plan may increase or decrease in the anticipated trajectory during the project execution phase, necessitating close cost monitoring to avoid cost overruns.

Time: Construction work can begin as soon as design information is available, taking into account project time (Masterman, 2003).

Quality: Construction / project management procurement methods allow design changes to be made later in the program, which improves work quality if the changes do not influence what, has already been built (Ramus *et al.*, 2006).

2.5.5 Direct Labour / Labour only Procurement Method

Cost: According to Olabode (2013), direct labour and labour-only procurement is a cost-cutting strategy because the client purchases all essential construction supplies from start to finish and pays all labour used, and there is typically no contractual obligation..

Time: Tendering and negotiation process is not necessary as the procedure for carrying out construction works is majorly simplified, thus, reduces construction period substantially (Adenuga, 2013).

Quality: According to Iyagba and Idoro (1995); Kadiri and Odusami (2003), direct client labour reduces client communication problems, fosters effective working relationships, and controls quality.

2.5.6 Public-Private Partnership

Cost: As a result of the design and construction teams' close collaboration, more innovative and less expensive designs are produced, and the total expenses of construction experts' services such as supervision, reviews, and contract management activities can be reduced (Baily *et al.*, 2014; Edwards *et al.*, 2005). Private partners benefit from economies of scale,

innovative technology, flexible procurements, and more flexible compensation, lowering overhead, facility maintenance, and operating costs (Li *et al.*, 2005b).

Time: The PPP model allows public and private parties the ability to pick strategic techniques in providing assets and services, which results in shortening project development time (Hall, 1998).

Quality: With greater operational efficiency and creative thinking, the PPP model can give better quality standards for projects (Baily *et al.*, 2014; Li *et al.*, 2005a).

2.6 Benefits and Pitfalls of Contracting for Goods and Services on Real Estate

Projects (Materials, Manpower and Machinery)

2.6.1 Traditional procurement strategy

Benefits: The following are the benefits of traditional procurement strategy according to (Olabode, 2013; Ogunsanmi, *et al.*, 2003; Ramus, *et al.*, 1989).

- i. The employer determines the design team's overall strategy.
- ii. To help control design costs, the contractor is not required to take on major design management risk. In other words, he is only asked to build, thus there is little or no premium paid.
- iii. The duty lies with one person, and the client has a direct interaction with the contractor because of the necessity of the project to support the function of many people, machinery, and material resources.
- iv. Traditionally, the construction sector has adopted the tried and tested traditional procurement technique, thus with respect to machinery and material acquisition, pricing is ensured.
- v. To make changes to the contract is not difficult, and these adjustments have no substantial impact on the materials, people, and machinery used in construction.

Shortfalls: The following are the shortfalls of traditional procurement strategy according to Davis *et al.*, (2008); Adenuga, (2013); and Akram, *et al.*, (2012)

- i. Under the prevailing design specifications, the design consultants are rarely hired through a competitive bidding, and thus the specifications become conservative and the equipment and materials costs grow.
- ii. Defects in design (which is the responsibility of the client) and/or supplies and labour shortages (which is the responsibility of the client) frequently lead to litigation (for which the contractor is responsible).
- iii. Design is finalized before the construction contract is let, which could mean that changes to the design could be difficult and time-consuming for the customer to implement.
- iv. Most projects, especially large-scale ones, last longer because of the sequential technique and the fact that building cannot begin until the design is finished.

2.6.2 Design and build procurement strategy

Benefits: design and build procurement technique is beneficial to customers in the following ways (Gordon, 1994; Clamp, *et al.*, 2007; Kumaraswamy & Dissanayaka, 1998; and Turner, 1997).

- i. One potential cause of late completion of projects is the overlap of design and construction operations, which may cause reductions in project time and better constructability.
- ii. When used with a savings option split, a guaranteed maximum price (GMP) for building supplies, labour, and machinery stimulates thinking and shortens the time required to get materials, people, and equipment.
- iii. Because the client's financial commitment is in place from the onset, it is therefore ensured that prices are fixed prior to construction begins.
- iv. Each client has a single point of responsibility, which reduces the demand to engage several contractors, as well as material, people, and machinery.

- v. It's important for the design and construction team to communicate clearly and openly to encourage cooperation while executing the contract and addressing site concerns quickly.

Shortfalls: the under-listed are design and construct procurement strategy inadequacies according to Hughes *et al.*, (2006); Ramus *et al.*, (1989), Robinson (1987), Turner (1997) and Akram *et al.*, (2012).

- i. Potential complications for the client could arise from their modifications to project scope and construction resources, which could be costly.
- ii. Construction companies' organisations are smaller, therefore it is rare that the contractor is an expert on design; thus, the resulting building may be less visually pleasing.
- iii. If the customer does not engage independent counsel, he will not know if he is getting value for money on the project and related construction resources, therefore increasing the overall cost of the project.

2.6.3 Management contracting procurement strategy

Benefits: The following are the benefits of management contracting procurement strategy identified by Ashworth (2006); Hughes *et al.*, (2006) and Davis *et al.*, (2008).

- i. The client engaged only one entity that better coordinates designers and construction contractors, by allowing them to use construction resources and machinery more effectively.
- ii. Overall, there is considerable time-saving potential on the project duration due to the overlapping of design and construction stages.
- iii. Competitive pricing for job packages is possible.
- iv. Quality can only be regulated by the design team; roles, risks, and duties of all parties are well defined.

- v. Design adjustments are adaptable, because of the flexibility afforded by management contracting strategy.
- vi. A degree of price certainty is possible due to the preliminary machinery and administration fee, which can be defined.

Shortfalls: The following are the shortfalls of management contracting procurement strategy identified by CWMF (2008); Hughes *et al.*, (2006) and Davis *et al.*, (2008).

- i. As the management contractor is given little responsibility for package contractor default, bankruptcy, or termination, this procurement technique presents a low risk strategy for them.
- ii. on construction resources, guaranteed maximum price (GMP) can be accomplished, but management contracting procurement is still a prime cost-based strategy.
- iii. As is usually the case, the initial cost plan is frequently altered upwards, and this might result in a considerable cost increase.
- iv. closed communication and strict information management is essential since the client will offer a well-written outline to the design team in order for the design to be done..

2.6.4 Construction / Project Management Procurement Strategy

Benefits: The benefits of construction / project management procurement strategy stated by Ashworth (2006); Walker (2015) and Masterman (2003) are as follows;

- i. The design and construction teams do not come into conflict during the project.
- ii. The project is also structured to maintain its precise design in conjunction with construction, thus shortening the project's timeline.

- iii. To each trade contractor is granted a degree of privacy to make it easier for the client to appeal if delays arise.
- iv. As a result, the client holds the contracting and tendering arrangements.
- v. The job is able to be packaged to suit the trade contractors, and interactions between building supplies, personnel, and machinery are all possible on-site.
- vi. Trade contractors that perform poorly will be identified and dealt with by the client.
- vii. Conventionally, project managers are typically concerned with project design, construction timeline, and constructability.

Shortfalls: The shortfalls of construction / project management procurement stated by (Rawlinson, 1999; Walker, 2015; and Masterman, 2003) are;

- i. The start of the project usually has a fixed cost except for a cost plan established by the Quantity Surveyor, which means that the cost of the project could rise or fall as tenders come in during construction.
- ii. In terms of risk, the customer carries the greatest responsibility for the results of the design, especially for lateness or incompleteness and uncoordinated design.
- iii. till the final of the works contract is signed, the client's financial commitment is uncertain.
- iv. instead of dealing with only one main contractor, the client now has a significantly larger pool of contractors to choose from.

2.6.5 Direct Labour / Labour only Procurement Strategy

Benefits: The following are the benefits of direct labour / labour only procurement strategy highlighted by (Adenuga, 2013; and Kadiri & Odusami, 2003).

- i. The project regulations, conditions, and effective use of construction resources are decided by the client.
- ii. Work hours are set and precise.
- iii. The quality control is kept very attentive.
- iv. the labour hired serves as a source of good input, understanding the needs of the client.

Shortfalls: The following are the shortfalls of direct labour / labour only procurement strategy highlighted by (Adenuga *et al.*, 2013).

- i. it is time consuming and extremely stressful.
- ii. it serves as a minefield for the inexperienced.
- iii. materials, manpower and machinery must be provided by the client.
- iv. control of productivity by the client is difficult.

2.6.6 Public-Private Partnership Procurement Strategy

Benefits: The following are the benefits of public-private procurement strategy highlighted by (Li *et al.*, 2005).

- i. It expedites project development, therefore, saves time in delivering the project.
- ii. The PPP provides the local economy with a boost through the distribution of cutting-edge technologies to local firms.
- iii. PPP promotes integrated government solution capacity by enabling creative and innovative methods.

- iv. The PPP initiative deals with the challenge of public sector budget restraint by cutting public money locked up in capital expenditure.

Shortfalls: The following are the shortfalls of public-private procurement highlighted by (Li *et al.*, 2005).

- i. Additionally, when using contract transactions, the project's accountability is significantly reduced.
- ii. Participation is restricted to the point where it costs significantly more to participate. Possible project expenses could increase if government objectives and evaluation criteria are unclear.
- iii. When it comes to liability, the private sector bears the biggest risk.

2.7 Summary of Chapter Two

The literature analysis in this chapter examines the contract procurement options available to businesses. Based on an extensive literature review, popular contract procurement procedures on housing projects were discovered. This chapter is an introduction to the effectiveness of contract procurement strategies used for housing projects, as well as the selection of a procurement strategy, which is largely dependent on the project needs and objectives. To ensure that a client gets the best value for money, it is recommended that they implement an appropriate procurement strategy that addresses project needs to reach their aim.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Research Design

To date, there have been many research projects undertaken on evaluating and establishing contract procurement strategies for home construction projects, which is why most of the research focuses on helping customers achieve the greatest value for their money (Ashworth, 2006). The topic of importance, relevant for Architects, Quantity Surveyors, Engineers, and Construction Teams, has been pointed out by Mathonsi and Thwala (2012), who asserted that all of these groups should embrace a procurement strategy that prioritizes project objectives and offers more value for money. While this hasn't been achieved in the construction business, a comparative examination of the examined contract procurement technique is still needed to see which one works best (Mathonsi & Thwala, 2012). In order to discover and establish the contract procurement strategies to increase housing sustainability, the research used quantitative methodologies. To promote the success of the investigation, the research design was used precisely. Most importantly, as the study's main goal is to assess various contract procurement strategies used by construction firms to supply building projects, and in order to help construction firms increase sustainability, the study's stakeholders' level of satisfaction in regards to price, time, and quality is taken into consideration.

In order to analyse how different contract procurement procedures affect the success of their outcomes, construction experts (consultants, contractors, architects, quantity surveyors, builders, and engineers) were surveyed and their data was gathered quantitatively. The quantitative approach was implemented to determine the effectiveness of project sustainability enhancement, and analyse the effects of procurement strategy on construction

sector stakeholders' levels of satisfaction in regard to overall project costs, time, and quality. A structured questionnaire survey (quantitative method) was used to collect the research data.

3.2 Population and Sample Size

The population consists of all members of a specific class or group. From which a sample is selected. Bryman (2015) describes a population as a collection of people, items, or animals that are either being considered for a research study or have already been studied. In other words, "population" does not specifically refer to a group of people who are being considered for the study, but rather encompasses various and different aspects that change and vary. The demographic of this study is; construction industry workers including construction workers, construction managers, quantity surveyors, engineers, and engineers in the Abuja sector. The study was designed to gather information on a large population, and hence a sampling technique was utilized to pick respondents. A flicking sample is an example of the smallest illustration of a population.

Members of the research sample, identified as outlined above, have a hand in the influence of construction elements on the contract procurement strategy, making them a perfectly adequate representative of construction players in Abuja.

3.3 Sampling Technique

To obtain elements of a population for study, researchers have to collect samples. While further justification has been provided for the need to gather random samples to arrive at generalized findings of a community, Pietersen and Maree (2007) emphasized that sampling is a process of picking from a population randomly to derive findings for the complete population. Sampling requires a certain sampling design, sample size, and sample frame (Leedy & Ormrod, 2010). They went on to say that, while a sample frame is a group of

people selected using the sampling approach, it must be composed of people who are likely to be selected.

Construction workers have been observed to work on a very hectic schedule, which is why they were selected by using "simple random sample and convenience sampling technique." Simple random sampling, as defined by Pietersen and Maree (2007) and referenced by Biggam (2015), is defined as a subset of individuals (a sample) from a broader group (a population) for data gathering and generalization of results. It was suggested by the authors that simple random sampling is an unbiased methodology. The ease and speed of administering questionnaires to construction experts in Abuja facilitated the use of the simple random sample technique, resulting in generalization of findings.

To verify the data collected through surveys, construction site supervisors were interviewed. To find out which contract procurement technique works best for housing projects delivery to improve housing sustainability, the interviews were performed. The term "convenience sampling" was defined in the course text as a technique that is employed in an exploratory research to draw ideas and insights that are available at the researcher's fingertips. Convenience sampling is the simple and inexpensive way to validate research data (Pietersen & Maree, 2007).

3.4 Data Collection Techniques

Research methods comprise utilizing several data sources to collect relevant information for a research project (Struwig, 2001). There is a direct relationship between the data collection strategy used in a research project and the sample frame, the target population, the study focus, and the available resources for data gathering (Leedy & Ormrod, 2010). Secondary and main data that are accumulated in a research study is noteworthy (Struwig, 2001). In this

research, questionnaires survey was employed with information gathered through literature reviews.

3.4.1 Primary Data Collection

Primary data are the most recent information that was gathered for the study project (Leedy, & Ormrod, 2010). To conduct a survey, the researcher must interview people in the population. That's why it's important to design the questions in a clear and comprehensible manner to collect the relevant information from respondents (Kumar & Phrommathed, 2005). In order to conduct this study, quantitative close-ended questionnaires were administered to survey respondents who were construction professionals.

3.5 Questionnaire Design

The most important part of a survey research is questionnaires. For quantitative research, questionnaires are crucial for data collecting (Kumar & Phrommathed, 2005). By ensuring a correlation between the study aim, the research questions, and the research objectives, the researcher is able to assure the validity and reliability of the research questions in a questionnaire design. The study questionnaire was close-ended questions. Five-point Likert scales were used in the close-ended questions, making it difficult for survey respondents to provide responses outside of the allowed numbers. The questionnaire was constructed based on findings from literature reviews and objectives of the study, which were evaluated to identify correlations.

The questionnaire for the study is constructed to target various objectives of the study, each component targeting a distinct goal. The first part of the survey questionnaire asks about survey respondents' personal background. This paper discusses the aims of the research, as well as sub-sections that investigate one objective: to find out if respondents think contract procurement procedures utilized for housing projects are effective. It is intended that the

selection of an appropriate procurement technique for housing projects should be based on a number of different elements in order to fulfil the second objective. In addition to meeting objective three, the contracting strategies assessment surveys all project stakeholders' satisfaction, including that of construction stakeholders, and evaluates each construction method in relation to contracting strategies, therefore addressing the third goal of the questionnaire.

Objective four is addressed in the last questionnaire portion where the questions include the benefits and shortcomings of the various procurement approaches used on housing projects, labour and machinery, all with the goal of making a recommendation. Hand-delivered questionnaires represented the majority of the surveys. This is due to the depth of experience that the construction professionals have on the various aspects that go into successful construction projects.

3.6 Data Analysis for the Study

Testing, tabulating, categorizing, and review of results are all part of data analysis in order to Quantifiable data acquired from respondents fulfil the purposes of a study (Yin, 2003). The goal of the core is to assure the trustworthiness of quantitative research findings. Data was collected quantitatively and graphed as frequency tables, bar charts, and pie charts to illustrate it.

3.6.1 Descriptive statistics

Descriptive statistics is the process of explaining or summarizing quantitative data that was acquired in a study in a way that makes it clear and Intelligible (tables, chats, et cetera). The basic descriptive statistics shows an overall and easy view of a vast amount of data by employing descriptive statistical methods to give a basic overall view of the data. In a study by Henn *et al.*, (2009), the three measures of central tendency they studied were the mean, the

median, and the mode. Respondents' average scores and respective percentages of respondents are provided for each study variable. The quantitative data acquired in the survey is evaluated with the use of mean, percentage, and standard deviation.

CHAPTER FOUR

4.0. RESULTS AND DISCUSSION

4.1 Questionnaire Distribution and Response Rate

The study questionnaire was distributed to 180 professionals who are have undertaken housing projects in Abuja, through hand delivery and email contacts. However, a total of 92 responses were retrieved after several follow ups via phone calls and personal visit to the respondents offices, this represents 51% response rate. Moreso, out of the 92 responses retrieved, only 71 responses were found suitable for analysis and this numbers represent 39% of the total number of the questionnaire distributed as shown in Table 4.1. The table below shows the response rate of questionnaire distributed.

Table 4.1: Questionnaire distribution and responses

Questionnaire distribution mode	Number dispatched	Questionnaire returned	Valid response	Response Rate	Valid response rate
Hand delivery / Email	180	92	71	51%	39%

Source: Researcher's analysis (2020).

4.2 Respondents Demographic Information

The results in Table 4.2 showed that, approximately 41%, 38% and 21% of the respondent's firm type are quantity surveying firm, sub-contracting and project management firm's respectively. Analysis on respondents gender reveals that approximately 89%, 11% male and female respectively. Age of respondents shows 41%, 38% and 21% are between the age range of 46 - 50 years, 51 - 55 years and 41 - 45 years.

On educational background, 41% are bachelor (BSc/BTech) degree holder, 38% are HND holder and 21% have master degree (MSc). While 58% of respondents have above 10 years and 42% have 5 – 10 years working experience. Results of position in the firm shows 42% are project officers, 38% are managers and 20% are deputy managers. Years of respondents

been in their current position shows that 62% of the respondents have been in their current position for less than 10 years, while 38% have between 10 to 20 years.

In all of the foregoing, it could be inferred from the results that, the respondents are qualified, competent, and very well experienced to pass judgement on the subject of the study and that the opinion expressed by these respondents can be relied upon.

Table 4.2: Results of respondents' demographic information

		Frequency	Percent	Valid Percent	Cumulative Percent
Firm Type	Project Management	15	21.1	21.1	21.1
	Quantity Surveying	29	40.8	40.8	62.0
	Sub-contracting	27	38.0	38.0	100.0
	Total	71	100.0	100.0	
Gender	Male	63	88.7	88.7	88.7
	Female	8	11.3	11.3	100.0
	Total	71	100.0	100.0	
Age	41 - 45 years	15	21.1	21.1	21.1
	46 - 50 years	29	40.8	40.8	62.0
	51 - 55 years	27	38.0	38.0	100.0
	Total	71	100.0	100.0	
Educational Qualification	HND	27	38.0	38.0	38.0
	BSc/BTech	29	40.8	40.8	78.9
	Master Degree	15	21.1	21.1	100.0
	Total	71	100.0	100.0	
Years of Working Experience	5 - 10 years	30	42.3	42.3	42.3
	Above 10 years	41	57.7	57.7	100.0
	Total	71	100.0	100.0	
Position in the Firm	Manager	27	38.0	38.0	38.0
	Deputy Manager	14	19.7	19.7	57.7
	Project officers	30	42.3	42.3	100.0
	Total	71	100.0	100.0	
Years in current Position	0 - 10 years	44	62.0	62.0	62.0
	10 - 20 years	27	38.0	38.0	100.0
	Total	71	100.0	100.0	

Source: Researcher's analysis (2020).

4.3. Contract Procurement Strategies used for Housing Projects

4.3.1. Awareness on the use of sustainable procurement strategies

As the quests to achieve the main objective of the study continue, the results of analysis on the level awareness of the identified procurements methods, which have been found to be a

promoter of sustainable construction adoption revealed that, the respondents are much aware of the identified procurements methods.

The results thus showed that, Direct labour method have mean score of 5.000 (ranked 1st), labour only and project management procurement methods have mean score of 4.803 and ranked 2nd and 3rd respectively. Also design and build method was ranked 4th with mean score value of 4.606. generally, the results displayed high mean score value for all the procurements methods with the least haven mean score value of 3.028 and ranked 7th.

Table 4.3: Level of awareness on use of identified procurement methods

	N	Minimum	Maximum	Mean	Mean Ranking
Direct Labour Method	71	5.00	5.00	5.0000	1
Labour only method	71	4.00	5.00	4.8028	2
Project Management	71	4.00	5.00	4.8028	3
Design and Build method	71	1.00	5.00	4.6056	4
Traditional Method	71	1.00	5.00	4.5634	5
Management contracting	71	4.00	5.00	4.2113	6
PPP variants	71	2.00	4.00	3.0282	7

Source: Researcher's analysis (2020).

4.3.2. Frequency of usage of procurement strategies

The results of analysis in Table 4.4 showed that, Project Management and Design & Build were the most sought after procurement strategies for housing projects in the study area. These procurement strategies have mean score value of 4.028 and they were ranked 1st and 2nd. Management Contracting and Traditional procurement strategies ranked 3rd and 4th with both haven mean score value of 4.00, while Direct Labour strategy ranked 5th (MS 3.366).

Table 4.4: Results on usage of procurement strategies for housing projects

	N	Minimum	Maximum	Mean	Mean Ranking
Project Management	71	2.00	5.00	4.0282	1
Design and Build method	71	3.00	5.00	4.0282	2
Management contracting	71	3.00	5.00	4.0000	3
Traditional Method	71	3.00	5.00	4.0000	4
Direct Labour Method	71	2.00	5.00	3.3662	5
PPP variants	71	1.00	4.00	2.6338	6
Labour only method	71	1.00	5.00	2.3662	7

Source: Researcher's analysis (2020).

4.4 Drivers for Selection of Procurement Method for Housing Project Delivery

The drivers for selection of procurement method were grouped under three headings; Project, Design and Management related drivers. Thus the results showed in Table 4.5 revealed that five project related drivers have mean score value above 4.00. These drivers are; availability of construction resources (Mean score 4.817), project innovation (MS 4.437), project cost (MS 4.437), project scope (MS4.225) and project complexities (MS 4.177). Other variables have MS value ranged between 3.986 to 3.802 are; stakeholders needs and expectation, project risk and sustainability concern. These variables thus ranked 6th, 7th and 8th respectively.

For design related drivers, construction materials specification, design team experience, construction method and revision, change order by clients and design error have MS value of 4.605 (ranked 1st), 4.423 (ranked 2nd), 4.211 (ranked 3rd), 3.817 (ranked 4th) and 3.606 (ranked 5th) respectively. Management related drivers revealed that, project monitoring and evaluation ranked 1st (MS value = 4.423), risk management ranked 2nd (MS = 4.394),

efficient management strategy and decision making process ranked 3rd and 4th (both haven MS of 4.028).

Table 4.5: Drivers for Selection of Procurement Strategies

	N	Minimum	Maximum	Mean	Mean Ranking
Project Related Drivers					
Availability of construction resources	71	4.00	5.00	4.8169	1
Project innovation	71	3.00	5.00	4.4366	2
Project cost	71	3.00	5.00	4.4366	3
Project scope	71	3.00	5.00	4.2254	4
Project complexities	71	4.00	5.00	4.1972	5
Stakeholders needs and expectation	71	3.00	5.00	3.9859	6
Project risks	71	3.00	5.00	3.8310	7
Sustainability concerns	71	2.00	5.00	3.8028	8
Project time	71	3.00	3.00	3.0000	9
Government policy	71	1.00	4.00	2.1690	10
Design Related Drivers					
Construction materials specification	71	4.00	5.00	4.6056	1
Design Team experience	71	4.00	5.00	4.4225	2
Construction methods	71	4.00	5.00	4.2113	3
Revision and change order by client	71	2.00	5.00	3.8169	4
Design errors	71	3.00	4.00	3.6056	5
Poor coordination among the design team	71	2.00	5.00	2.9437	6
Misinterpretation of client brief	71	2.00	3.00	2.3944	7
Management Related Drivers					
Project Monitoring and Evaluation effectiveness	71	3.00	5.00	4.4225	1
Risk management	71	4.00	5.00	4.3944	2

Efficient Cost, Time and Quality	71	3.00	5.00	4.0282	3
Management strategy Decision making process	71	3.00	5.00	4.0282	4
Expertise of the Project Management Team	71	3.00	4.00	3.3944	5

Source: Researcher's analysis (2020).

4.5 Effects of Procurement Strategy on Project Key Parameters

4.5.1 Procurement methods in relation to final construction cost

Table 4.6 displayed the results of descriptive analysis on effects of procurement methods on final construction cost. The respondents ranked the responsiveness of the identified procurement method on final project cost. The results showed that; project management (MS; 4.437 ranked 1st), Management contracting (MS; 4.409 ranked 2nd), design and build (MS; 4.211, ranked 3rd) and PPP variants ranked 4th with MS value of 3.239 are the most responsive procurement methods that ensure housing project delivery at affordable cost.

Table 4.6: Effects of procurement methods on final project cost

	N	Minimum	Maximum	Mean	Ranked
Project Management	71	3.00	5.00	4.4366	1
Management contracting	71	4.00	5.00	4.4085	2
Design and Build method	71	3.00	5.00	4.2113	3
PPP variants	71	1.00	4.00	3.2394	4
Direct Labour Method	71	1.00	4.00	2.1549	5
Labour only method	71	1.00	4.00	1.9577	6
Traditional Method	71	1.00	3.00	1.6056	7

Source: Researcher's analysis (2020).

4.5.2 Procurement methods in relation to time

Table 4.7 displayed the results of descriptive analysis on effects of procurement methods on timely completion of housing project. The respondents ranked the responsiveness of the identified procurement method on time and the results showed; project management with MS value of 4.620 (ranked 1st), design and build with MS value of 4.423 (ranked 2nd), Management contracting (MS = 4.409 ranked 3rd) and PPP variants ranked 4th with MS value of 4.014 are the most efficient procurement methods that ensure timely delivery of housing project. Griffith and Watson (2004) collaborated the results of this study by referring to, design and build procurement method as a ‘build-it-fast’ project delivery system, since the design and construction phases are integrated. The PPP variants procurements models enhance project time because it accelerates project development by avoiding unnecessary delays in project delivery (Hall, 1998).

Table 4.7: Effects of procurement methods on project duration

	N	Minimum	Maximum	Mean	Rank
Project Management	71	4.00	5.00	4.6197	1
Design and Build method	71	3.00	5.00	4.4225	2
Management contracting	71	4.00	5.00	4.4085	3
PPP variants	71	3.00	5.00	4.0141	4
Traditional Method	71	2.00	3.00	2.3944	5
Direct Labour Method	71	1.00	5.00	2.1408	6
Labour only method	71	1.00	3.00	1.7746	7

Source: Researcher’s analysis (2020).

4.5.3 Procurement methods in relation to quality

Table 4.8 displayed the results of descriptive analysis on effects of procurement methods on quality of housing project. The respondents ranked the responsiveness of the identified procurement method to quality and the results showed; project management with MS value of 4.437 (ranked 1st), Management contracting (MS = 4.437 ranked 2nd), design and build with MS value of 4.437 (ranked 3rd), and PPP variants ranked 4th with MS value of 4.042 are the most efficient procurement methods that enhance delivery of quality housing project. A study conducted by AbdulRashid *et al.* (2006) showed that the design and build method allowed design and construction processes to run parallel, thereby reducing the overall construction period considerably.

Table 4.8: Effects of procurement methods on Quality

	N	Minimum	Maximum	Mean	Rank
Project Management	71	3.00	5.00	4.4366	1
Management contracting	71	3.00	5.00	4.4366	2
Design and Build method	71	3.00	5.00	4.4366	3
PPP variants	71	2.00	5.00	4.0423	4
Traditional Method	71	3.00	4.00	3.2113	5
Direct Labour Method	71	2.00	5.00	2.9577	6
Labour only method	71	2.00	3.00	2.1972	7

Source: Researcher's analysis (2020).

4.6 Benefit of Procurement Strategy on Project Construction Resources

This section presents the results of analysis on benefits of the identified procurement strategy in relation to use of construction materials, labour and plant, these results are showed in Table 4.9.

In table 4.9, the most beneficial procurement strategy that ensure effective, efficient waste free construction works is Management Contracting (MS = 4.394), PPP variants and Project management and Design and Build method with MS of 3.986, 3.831 and 3.169 respectively. These procurements method were ranked 1st, 2nd, 3rd, and 4th most beneficial to prudent management of construction materials. However, Adenuga (2013) opined that labour only procurement approach offers huge financial savings on construction materials usage and on the final project cost as a whole. Though, Oladiran *et al.*, (2007) argued that the labour based approach is time consuming and extremely stressful and it is been used mostly by inexperienced project team. Design and build and the traditional contract procurement strategy are perceived as approaches of benefit with respect to construction materials. The assertions of these researchers are thus not in agreement with the results of this study.

The results also showed, Management contracting Design and Build, Project management, and direct labour procurements methods as the most beneficial methods that ensure efficient human resources usage and assures best productivity. These procurement methods exhibited a very high MS value of 4.437, 4.409, 3.831 and 3.563 respectively. Thus, these results were in agreement with the postulations of Akram *et al.*, (2012); Ashworth (2006) that the separation of design and construction often times lead to contractual disputes on defects in design (for which the client is responsible) and on construction manpower (for which the contractor is responsible). The management based contract procurement approach (construction management) is also identified as an approach of benefit to construction manpower.

Table 4.9: Benefits in relation to material usage

	N	Minimum	Maximum	Mean	Rank
Materials usage					
Management contracting	71	4.00	5.00	4.3944	1
PPP variants	71	3.00	5.00	3.9859	2
Project Management	71	3.00	5.00	3.8310	3
Design and Build method	71	2.00	5.00	3.1690	4
Direct Labour Method	71	2.00	3.00	2.5915	5
Traditional Method	71	1.00	5.00	2.4789	6
Labour only method	71	2.00	3.00	2.4085	7
Labour and Workmen					
Management contracting	71	3.00	5.00	4.4366	1
Design and Build method	71	4.00	5.00	4.4085	2
Project Management	71	3.00	5.00	3.8310	3
Direct Labour Method	71	3.00	5.00	3.5634	4
Labour only method	71	3.00	5.00	3.3662	5
PPP variants	71	1.00	4.00	2.6197	6
Traditional Method	71	1.00	4.00	2.4085	7
Plant usage					
Design and Build method	71	4.00	5.00	4.7887	1
Management contracting	71	4.00	5.00	4.1972	2
Project Management	71	3.00	4.00	3.8028	3
PPP variants	71	3.00	4.00	3.4085	4
Labour only method	71	1.00	4.00	2.9718	5
Direct Labour Method	71	2.00	4.00	2.6056	6
Traditional Method	71	1.00	3.00	2.5775	7

Source: Researcher's analysis (2020).

The results of descriptive analysis on usage of construction plants in Table 4.9 showed that Design and Build Method, Management contracting, Project Management and PPP Variants (MS value of 4.789, 4.197, 3.803 and 3.409 respectively. these procurement methods were ranked first, second, third and fourth in order of their mean score value. The results of this study confirm the position of Ogunsanmi (2016) that construction tools and machinery related factors are substantial challenges to construction project performance.

4.7 Summary of Findings

From the results of analysis conducted on the data, the study inferred as follows;

The construction professionals sampled for the study have very high level of awareness on the identified procurements strategies that enhances adoption of sustainable construction. These methods were; direct labour method, labour only, project management and design and build method. The also inferred that, Project Management and Design & Build procurement strategies were the most sought after for housing projects.

The drivers for selection of procurement method were grouped under three headings; Project, Design and Management related drivers. Thus the results showed that five project related drivers which are; availability of construction resources, project innovation, project cost, project scope and project complexities been the mostly ranked variables. But, for design related drivers, construction materials specification, design team experience, construction method and revision, change order by clients and design error were the design related drivers. As for management related drivers; project monitoring and evaluation, risk management, efficient management strategy and decision-making process were the most influential drivers.

The study inference on effects of procurement methods as regards project key parameters of cost, time and quality showed that, project management, Management contracting, design and build and PPP variants are the most responsive procurement methods that ensure housing

project delivery at affordable cost. On effects of procurement methods on timely completion of housing project showed; project management, design and build, management contracting and PPP variants are the most efficient procurement methods that ensure timely delivery of housing project. On the effects of procurement methods on quality of housing project; project management, management contracting, design and build, and PPP variants are the most efficient procurement methods that enhance delivery of quality housing project.

The results of analysis on benefits of the identified procurement strategy in relation to use of construction materials, labour and plant revealed the most beneficial procurement strategy that ensure effective, efficient and waste free construction works are; Management Contracting, PPP variants, Project management and Design and Build method. These procurements method were most beneficial to prudent management of construction materials. This study also showed, Management contracting Design and Build, Project management, and direct labour procurements methods as the most beneficial methods that ensure efficient human resources usage and assures best productivity.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Based on the information gathered from extant literature and the results of analysis conducted on the data which were sourced from qualified, competent and well experienced professionals in the construction industry, the study concludes as follow;

To identify and examine the efficiency of contract procurement strategies used for housing projects; the procurements strategies that enhance adoption of sustainable construction practices in housing development are Project Management and Design & Build procurement strategies.

The drivers for selection of procurement method were grouped under three headings; Project, Design and Management related drivers. Thus the study concludes that five project related drivers (availability of construction resources, project innovation, project cost, project scope and project complexities) influences clients and project team choice of procurement method. While, for design related drivers, construction materials specification, design team experience, construction method and revision, change order by clients and design error were the design related drivers. Also, for management related drivers; project monitoring and evaluation, risk management, efficient management strategy and decision-making process were the most influential drivers.

The study concludes on influence of project key parameters of cost, time and quality showed that, project management, Management contracting, design and build and PPP variants are the most responsive procurement methods that ensure housing project delivery at affordable cost are the most efficient procurement methods that ensure timely delivery of housing project were; project management, design and build, management contracting and PPP

variants. On the quality of housing project; project management, management contracting, design and build, and PPP variants are the most efficient procurement methods that enhance delivery of quality housing project.

On the benefits of the identified procurement strategy in relation to use of construction materials, labour and plant revealed the most beneficial procurement strategy that ensure effective, efficient and waste free construction works are; Management Contracting, PPP variants, Project management and Design and Build method. These procurements method were most beneficial to prudent management of construction materials. This study also showed, Management contracting Design and Build, Project management, and direct labour procurements methods as the most beneficial methods that ensure efficient human resources usage and assures best productivity.

5.2 Recommendations

A supply of housing that is durable, obtained at the lowest possible cost, and made available as quickly as possible is referred to as sustainable housing. So, to improve sustainable housing delivery, more people involved in construction, better project management, use of up-to-date construction material, use of a well-integrated workforce, and clearer communication and feedback must be employed. Project delivery in terms of time and cost overruns will be ineffective if projects are not successfully integrated with these elements.

Adoption of a contract procurement system that best meets project objectives must be implemented if an in-depth awareness of customers' needs and expectations for particular construction project objectives is expected. Clients should expect to get the most value for their money by selecting an appropriate contract procurement technique.

5.3 Suggestion for Further Study

As it is difficult to conduct research that will solve all existing problems bedeviling housing provisions, thus this study suggests the further research in the following areas;

1. Critical evaluation of housing financing systems that support each of the procurements methods.

11. This study should be replicated in other state of Nigeria to develop a procurement policy framework for the country.

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APPENDIX 1

QUESTIONNAIRE FOR THE SURVEY

OPERATIONAL PROCUREMENT STRATEGIES TO ENHANCE SUSTAINABLE HOUSING PROJECT DELIVERY IN ABUJA

Dear Sir/Madam,

PARTICIPATION IN A QUESTIONNAIRE SURVEY

I hereby solicit your assistance and support to participate in a research survey that examines the effectiveness of contract procurement strategies for project delivery, towards enhancement of housing sustainability in Nigeria. I humbly request your participation in this study to achieve the desired success as this study is primarily undertaken for **academic purposes** by Master of Technology degree student from the department of Quantity Surveying at Federal University of Technology, Minna, Niger State, Nigeria.

Kindly endeavour to answer all the question and be assured that every piece of information provided for this study will be kept with utmost **confidentiality** and will only be used for research purposes.

Kindly complete the survey and return to:

Thaddeus Ibrahim,

Federal University of Technology, Minna,

Department of Quantity Surveying,

School of Environmental Technology.

E-mail: thadavid2008@yahoo.com

Mobile: 08032469039.

Thanks for your cooperation, understanding and assistance.

CONTRACT PROCUREMENT STRATEGIES QUESTIONNAIRE

SECTION A: BIOGRAPHICAL INFORMATION OF RESPONDENTS

Kindly answer all questions, as you are implored to tick (x) in the **CORRECT** box.

1. Kindly specify which of the following categories your firm belong:

Contracting firm	
Architectural firm	
Project management firm	
Quantity surveying consulting firm	
Sub-contracting firm	
Others (please specify)	

2. Kindly specify your gender:

Male	
Female	

3. Please indicate your age group:

Below 30	31-35	36-40	41-45	46-50	51-55	56-60	Above 60

4. Please indicate the highest formal qualification you obtained:

SSCE Certificate	
National Diploma (ND)	
Higher National Diploma (HND)	
Bachelor Degree (Bsc/BTech)	
Master degree (MSc/MTech)	
PhD	

5. Kindly specify your year of work experience in the construction industry; (0-5years)
(5-10years) (Above10years)
6. Kindly indicate your present position in your firm.....
7. 7. How long have you been working in this position? (0-10year) (10-20years)
(Above20years)

SECTION B: EFFICIENCY OF CONTRACT PROCUREMENT STRATEGIES USED FOR HOUSING PROJECTS

B1. The following are the variants of contract procurement strategies; rank them according to your level of awareness, using the following: **5- Highly aware, 4- Slightly aware, 3- Aware, 2- Barely aware, 1- Not aware.**

	Highly aware (5)	Slightly aware (4)	Aware (3)	Barely aware (2)	Not aware (1)
Traditional method					
Design and build method					
Management contracting method					
Construction management method					
Project management method					
Direct labour method					
Labour only method					
P.P.P variants					

B.2 How often do you use the following methods to deliver a housing project? **5- Highly used, 4- Sometimes used, 3- Rarely used, 2- Used, 1- Not used.**

	Highly used (5)	Sometimes used (4)	Rarely used (3)	Used (2)	Not used (1)
Traditional method					
Design and build method					
Management contracting method					
Construction management method					
Project management method					

Direct labour method					
Labour only method					
P.P.P variants					

SECTION C: DRIVERS FOR THE SELECTION OF A PROCUREMENT METHOD FOR HOUSING PROJECT DELIVERY

C1 Kindly use the scale below to tick “as appropriate”, the rate at which the under-listed factors influence the selection of a procurement method; **5- Strongly agree, 4-Agree, 3- Neither agree nor disagree, 2- Disagree, 1- Strongly disagree.**

INFLUENTIAL FACTORS	Strongly agree (5)	Agree (4)	Neither agree nor disagree (3)	Disagree (2)	Strongly disagree (1)
PROJECT RELATED DRIVERS					
Project scope					
Project cost					
Project time					
Project complexities					
Sustainability concerns					
Project innovation					
Stakeholders’ needs and expectation					
Government policy					
Availability of construction resources					
Project risks					
DESIGN RELATED DRIVERS					
Design Team experience					
Design error					
Revision and change order by client					

Misinterpretation of client brief					
Poor coordination among the design team					
Construction materials specification					
Construction methods					
MANAGEMENT RELATED DRIVERS					
Decision making process					
Efficient Cost, Time and Quality Management Strategy					
Risk management					
Expertise of the Project Management Team					
Project Monitoring and Evaluation effectiveness					

SECTION D: CONTRACT PROCUREMENT STRATEGIES' EFFECTS ON KEY PROJECT PARAMETERS – COST, TIME AND QUALITY

D1 Kindly rank your level of satisfaction of the procurement methods in relation to project cost (final construction cost). **5- Highly satisfactory, 4- Slightly satisfactory, 3- Satisfactory, 2- Less satisfactory, 1- Not satisfactory**

	Highly satisfactory (5)	Slightly satisfactory (4)	Satisfactory (3)	Less satisfactory (2)	Not satisfactory (1)
Traditional method					
Design and build method					
Management contracting method					

Construction management method					
Project management method					
Direct labour method					
Labour only method					
P.P.P variants					

D2. Kindly rank your level of satisfaction of the procurement methods in relation to project completion time. **5- Highly satisfactory, 4- Slightly satisfactory, 3- Satisfactory, 2- Less satisfactory, 1- Not satisfactory**

	Highly satisfactory (5)	Slightly satisfactory (4)	Satisfactory (3)	Less satisfactory (2)	Not satisfactory (1)
Traditional method					
Design and build method					
Management contracting method					
Construction management method					
Project management method					
Direct labour method					
Labour only method					
P.P.P variants					

D3 Kindly rank your level of satisfaction of the procurement methods in relation to project quality. **5- Highly satisfactory, 4- Slightly satisfactory, 3- Satisfactory, 2- Less satisfactory, 1- Not satisfactory**

	Highly satisfactory (5)	Slightly satisfactory (4)	Satisfactory (3)	Less satisfactory (2)	Not satisfactory (1)
Traditional method					
Design and build method					
Management contracting method					
Construction management method					
Project management method					
Direct labour method					
Labour only method					
P.P.P variants					

SECTION E: BENEFITS OF THE PROCUREMENT METHODS USED ON HOUSING PROJECT RESOURCES (MATERIALS, LABOUR AND PLANTS)

E1. Kindly rate the extent at which each procurement method is beneficial to construction project materials; **5- Highly beneficial, 4- Slightly beneficial, 3- Beneficial, 2- Less beneficial, 1- Not beneficial**

	Highly beneficial (5)	Slightly beneficial (4)	Beneficial (3)	Less beneficial (2)	Not beneficial (1)
Traditional method					
Design and build method					
Management contracting method					
Construction management method					
Project management method					

Direct labour method					
Labour only method					
P.P.P variants					

E2. Kindly rate the extent at which each procurement method is beneficial to construction project labour; **5- Highly beneficial, 4- Slightly beneficial, 3- Beneficial, 2- Less beneficial, 1- Not beneficial**

	Highly beneficial (5)	Slightly beneficial (4)	Beneficial (3)	Less beneficial (2)	Not beneficial (1)
Traditional method					
Design and build method					
Management contracting method					
Construction management method					
Project management method					
Direct labour method					
Labour only method					
P.P.P variants					

E.3 Kindly rate the extent at which each procurement method is beneficial to construction project plants; **5- Highly beneficial, 4- Slightly beneficial, 3- Beneficial, 2- Less beneficial, 1- Not beneficial**

	Highly beneficial (5)	Slightly beneficial (4)	Beneficial (3)	Less beneficial (2)	Not beneficial (1)
Traditional method					
Design and build method					
Management contracting method					
Construction management method					
Project management method					
Direct labour method					
Labour only method					
P.P.P variants					

Thanks for the time spent