

# Assessment of the Use of Subcontracting Options for Construction Project Delivery

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## Abstract

In most developing countries around the world, construction projects are carried out on a daily basis, using diverse means of contracting. One of such means is the process of subcontracting which is gaining popularity as a result of specialization among construction participants. This research therefore assessed the use of various subcontracting options for construction project delivery. Using a survey design, 43 registered construction firms were sampled. Data gathered were analyzed using percentage, frequency and mean item score. Findings showed that nominated and domestic subcontracting options are the mostly used subcontracting options. Planned construction time, time taken to implement variation order and time taken to rectify defects are the major time related factors capable of causing poor project delivery, while contractor's expected profit, contractor's cash flow and the cost of materials and equipment are the major cost related factors capable of causing poor project delivery if not properly evaluated by the parties involved. The study further recommends that the level of awareness and usage of the other subcontracting options which are not widely known and used presently can be improved through seminars, meetings, conferences organized by construction professional's supervisory bodies and relative agencies for construction stakeholders. Also effective monitoring and coordination of the activities of subcontractors by the main contractor is necessary so that the outline programme of works can be achieved on time and within budget.

**Keywords:** Cost, Nigeria, Project delivery, Subcontracting, Time

## 1. Introduction

Construction projects are carried out on a daily basis in most developing countries. This is because the construction industry plays an important role in national development and in achieving societal goals (Navon, 2005). Yik, Lai, Chan and Yiu (2006), stated that construction project is a function of many variables such as time, cost and quality, and it is complex in terms of conception and execution. According to Munns (1996), traditionally, construction project involves three groups of people who are brought together for a temporary period in which they are expected to work together towards a mutual goal. These are the client, the consultants and the construction contractors (Salami and Mustapha, 2015). Contractors are responsible for converting the plan of the client into final reality and according to Usman, Inuwa, Iro, and Dantong (2012) the contractor is one of the key players in the delivery of construction projects. Ugochukwu and Onyekwena (2014) submitted that firms, companies or organizations that execute construction works are referred to as 'contractors'. They offer their skills and services and accept the challenge of executing the works in exchange for financial reward.

According to Abdullahi (2014) construction projects are awarded to a main contractor which in some cases sublet their work out to specialize outside firm to carry out specific project activities. These sublet works are in most cases outside the scope and technical expertise of the main contractor. Yik *et al.*, (2006) stated that since technology is increasing day-by-day, modern elements are incorporated into building which sometimes may be difficult for the main contractor to execute. Blay-Armah and Ross (2013) also opined that it is uneconomical for a main contractor to keep tradesmen whose work are not always required on a daily basis as staffs of their organizations. This is reasonable because keeping them as staffs will amount to paying them even when they are not needed. This situation thus lead to subletting of these part of the works to tradesmen and specialist. This process of subletting work is termed subcontracting. Ohnuma, Pereira and Cardoso (2000) emphasized that subcontracting is when a person/firm is appointed by the client or main-contractor enters into an agreement with the main contractor in order to perform part of main contractor's work.

According to Gould (2011) and CIDB (2013), fluctuating demand sometimes make main contractors to use subcontracting options in order to share or transfer their financial risk, burden and workload as a result of uncertainty in construction business. Most construction companies undertook projects in order to stay afloat of insolvency and bankruptcy where they sublet the majority of the work to another firm/company, by sharing the overhead and profit of the project. While this practice might be advantageous to the contractor, it might prove dangerous for the client as the credibility of the subcontractors may not be sure, thus leading to a less satisfactory project.

Gunderson and Rick (2013) emphasized that, subcontracting is an excellent means for a main contractor to exercise cost control while sharing part of the risk to other people in order to concentrate the effort and resources of main contractor on other activities. Sharing of risk makes the insurance, supervision and

management cost of that work to be taken care by the subcontractor which reduces worries of main contractor. Base on this knowing, this paper assessed the use of subcontracting options for construction project delivery in Nigeria, with a view of providing more effective project delivery through the diverse subcontracting options available.

## 2. Literature Review

### 2.1 Nature of Subcontracting in Construction Projects

Subcontracting is used on nearly every construction project. Hinze and Tracey (1994) ascertained that on many projects, it is common for 80% to 90% of the work to be performed by subcontractors. The general contractor oversees the work performed by subcontractors on the project. The general contractor is perceived as providing guidance and coordination for the subcontractor. Wong and Cheah (2004) opined that subcontracting is a situation where the firm offering the subcontract requests another independent enterprise to undertake the production or carryout the processing of a material, component, part or subassembly for it according to specifications or plans provided by the firm offering the subcontract.

Blay-Armah and Ross (2013) explained that subcontracting entails a myriad of different forms and processes, making it extremely difficult to give it a precise definition. According to Ng and Price (2010), the role of contractor has gradually transformed from a constructor to a manager of subcontractors due to rapid development in construction projects in terms of complexity and size. These construction projects most especially civil engineering projects are not too labour intensive and involve fewer trades which result in low turnout of subcontract works compare to building projects.

### 2.2 Subcontracting Options

#### 2.2.1 Domestic Subcontracting

A main contractor appoints and employs a firm or person to undertake specific part of the main contractor's work. The person or firm employed under this means is known as domestic subcontractor. A domestic subcontractor according to Reid (2004) is one in whose selection and appointment; the employer traditionally plays no part other than simply giving consent when required under the terms of the main contract. Abdullahi (2014) corroborated that the appointment of the subcontractor is treated as something entirely beneficial to main contractor - a purely, domestic matter. Reid (2004) explained domestic subcontracting in its usefulness to main contractor; as reduction in the workload and risk of the construction project, supervisory role for domestic subcontractor, checking and evaluating subcontractor performance.

#### 2.2.2 Nominated Subcontracting

Mbachu (2008) opined that nominated subcontracting is a way by which client or client's representative select another person to undertake part of the main contractor's work and the person employed under this means is called nominated subcontractor. CIDB (2013) affirmed that the basic characteristic, of nominated subcontracting is the power to choose by client, which makes instructions to come from the client representative to the main contractor to enter into contract with the nominated and approved subcontractor. Gunderson and Rick (2012) identified factors involve in selection of nominated subcontractor by client as track records; technical know-how; financial capability; quality; reliability and pricing.

Hughes, Gray and Murdoch (1994) states that the emergence of nominated subcontracting is feature of subcontracting peculiar to construction is the practice of "nomination" which has evolved to cope with three major issues which are the need to modify the main contractors' control over specialists; the incorporation of role of the design team; the needs of clients to have a say. The primary motivation behind nomination was the need to harness the skills of specialists before the main contractor was appointed. It is one of the strongest arguments for nomination and has helped to spur the growth of nominated subcontracting Specialists favored nomination because it protected them from unbridled market forces by enabling them to compete on some basis other than cost. It also enabled them to develop strong and stable business relationships with regular clients of the industry and with certain consultants.

Vilasini, Neitzert, Rotimi and Windapo (2012) explained that main contractor provides necessary support services to the nominated subcontractor in order to aid his/her work. These necessary supports as identified by Abdullahi (2014) includes, provision of access road, provision of electricity, store houses, conveniences, scaffolding and hoisting facilities, water, etc. in doing this, the main contractor gets his reward in form of attendance and profit. CIDB (2013) explained nominated subcontractor as a specialist that execute or undertake mostly special nature of work which falls outside the scope of main contractor e.g. mechanical, electrical, plumbing, roofing works.

#### 2.2.3 Labour-only Subcontracting

The use of labour subcontracting and non-standard forms of employment has become common practices in many developed countries as well as developing countries (ILO, 2001). These result not from underdevelopment of industry but cost-cut pressure driven of intensified competitions. More and more enterprises have attempted to

offload cost and risk onto subcontractors

Hughes *et al.*, (1994) ascertained that the sudden surge of labour-only subcontracting in United Kingdom was at 1996 when government introduced selective employment tax (SET) designed to tax firms on their payroll which brought firms and contractors to sought alternatives by employing labour directly which in turn leads to a consequent growth in subletting of labour. Abdullahi (2014) explained that labour-only subcontracting occurs when a firm or person is been employed to supply labourers to perform part of main contractor's work. Main-contractor provides materials, plants and equipment needed to execute the job. CIDB (2013) defined a labour only subcontractor as a person who provides labour to main contractors for the performance of certain work in the construction industry. The main contractor supplies material and pays wages to the labourers. This is done to reduce the financial burden on the subcontractor.

#### 2.2.4 Trade/Specialty Subcontracting

Hinze and Tracy (1994) define a specialty contractor as a subcontractor who is hired to perform specific tasks on a project. Specialization of some firms has led to a state whereby contractor performs less than fifty percent of the work with his own forces. Thus, specialty or trade subcontracting is when a particular tradesman or specialized services contractor is called to perform part of the main contractor's work. Building trades and services such as plumbing, electrical, tiling, painting, bricklaying, soil testing, lift installation, ceiling installation; window sill, etc. are done mostly by specialist or tradesmen. Gunderson and Rick (2013) emphasizes that in construction, specialty items are usually more effectively performed by subcontract. Trade and specialty subcontractors make their own arrangement regarding materials sometimes and are more responsible for their oversight.

#### 2.3 Factors influencing the Performance of subcontracting options

Project performance or success means different thing to different people. While some consider time cost and quality as measures for project success, others believe the concept of project success is far wider encompassing areas like client's satisfaction, client changes, stakeholder's satisfaction, health and safety and the likes (Chan, 2001; Cheung, Suen and Cheung, 2004). This study employed the use of time and cost yardstick for project success.

Several factors having been identified to affect cost and time performance of subcontracted projects. Some are; weather condition, material, equipment's or labor shortage, price fluctuations, and inclination to completion of project in shorter time to catch the acceleration award or to dispatch the equipment to other projects (Frimpong, Oluwoye and Crawford, 2003). Some other identified factors includes: Contractor's cash flow on the project, Contractor's expected profit, cost of material and equipment, Contractor's overhead percentage, cost of insurance cost, Cost of variation orders, Material wastage, Fluctuations cost, Safety cost, cost of rework, Planned time for construction, Time needed to implement variation order, Average delay in regular payment, Time needed to rectify defects, Time taken for material arrival, Rework time and Time consumed by accidents on site (Akintoye, 2000; Enshassi, Choudry, Mayer and Shoman, 2008; Love, 2002; Palaneeswaran, 2006).

### 3. Research Methodology

This study set out to assess the use of subcontracting options on construction project delivery in Nigeria. A survey research design was employed and the target populations comprises construction companies and consultancy firms which engage in building and civil projects in Lagos state. Data from the Nigeria's Federation of Construction Industry (FOCI) shows that there are 43 registered construction firms in Lagos state. This formed the total sample frame of this research.

A well-structured questionnaire was designed into two sections with Section 'A' containing personal data of the respondents and section 'B' which assessed the objectives of the research work i.e. the awareness and usage of subcontracting options, and cost and time performance indicators of subcontracting. A total of 43 questionnaires were administered to personnel of the identified construction companies and a total of 38 were retrieved and found fit for analysis.

Data gathered were analyzed using percentage, frequency and Mean Item Score (MIS). Reliability test carried out to test the reliability of the research instrument gave a Cronbach's  $\alpha$  value of 0.830 and 0.843 for both the cost and time performance of the various variants of subcontracting options identified from literature. This shows that the instrument is reliable since the degree of reliability of an instrument is more perfect as the value tends towards 1.0 (Moser and Kalton, 1999).

### 4. Findings and Discussions

#### 4.1 General Information

Respondents profile showed that Engineers formed the bulk of the respondents with about 34% while Architects and Quantity surveyors were 26% each. The least represented professionals were Builders with about 13%. Most

of the contracting firm sampled dwell majorly on building construction (63%) while about 32% are based strictly on civil engineering projects. Only about 5% handle both building and civil engineering construction. About 24% of the respondents have below 5 years of working experience in their respective construction firms while about 86% have above 6 years working experience which implies that result gotten from the respondents can be relied upon as answers were given based on experience. This years of experience also in turn affect the number of construction projects which the respondents have been involved in, as about 47% have been involved in between 1 to 10 construction projects while about 53% have been involved in more than 11 construction projects since they joined the construction firm.

Based on this general information, it can be assumed that the respondents are capable to provide sufficient response that will address the objectives of this research.

#### 4.2 Awareness and Usage of the Various Subcontracting Options

Result in Table 1 shows that the respondents are more aware of nominated subcontracting option followed by domestic and labour-only subcontracting. Trade or specialty subcontracting is the least among the options but with a MIS above average of 2.5. This implies that all the subcontracting options identified are not new to these contracting firms, they only have varying degree of knowledge in them.

In terms of usage, result in Table 1 also shows that the nominated subcontracting option is the most widely used options of subcontracting followed by domestic subcontracting and labour-only subcontracting. Trade or specialty subcontracting is the least among the options but with a MIS above average of 2.5. A cursory look at Table 1 shows that the level of awareness of these subcontracting options affects the level of usage of same.

Table 1. Awareness and Usage of the Various Subcontracting Options

Subcontracting Options	Awareness		Usage	
	MIS	Ranking	MIS	Ranking
Nominated subcontracting	3.76	1	3.97	1
Domestic subcontracting	3.61	2	3.55	2
Labour-only subcontracting	3.24	3	3.18	3
Trade or specialty subcontracting	3.03	4	3.05	4

#### 4.3 Time related factors affecting performance of subcontracting options

Table 2 shows the effect of some time performance indicators of subcontracting options on construction project. These time performance indicators were each measured and ranked on the various identified subcontracting options. For nominated subcontracting the most important time related factors that could affect the timely delivery of construction projects when it used are planned time for construction and the time needed to implement variation orders. For domestic subcontracting, time needed to implement variation order and time needed to rectify defects are the two most significant factors that could affect the timely delivery of construction projects executed using this option. For Labour-only subcontracting option, planned time for construction and the time needed to rectify defects are the two most the two most significant factors that could affect the timely delivery of construction projects executed using this option. For trade/specialty subcontracting planned time for construction and time needed to implement variation order the two most significant factors that could affect the timely delivery of construction projects executed using this option

Table 2. Time related factors affecting performance of subcontracting options

Factors	Nominated		Domestic		Labour only		Specialty	
	MIS	Rank	MIS	Rank	MIS	Rank	MIS	Rank
Planned time for construction	3.66	1	3.26	3	3.50	1	3.24	1
Time needed to implement variation order	3.39	2	3.32	1	3.00	5	3.08	2
Average delay in regular payment	3.34	3	3.00	4	3.26	3	2.97	5
Time needed to rectify defects	3.24	4	3.32	1	3.45	2	3.00	3
Time taken for material arrival	3.13	5	2.79	5	3.08	4	3.00	3
Rework time	2.89	6	2.74	7	2.76	7	2.63	7
Time consumed by accidents	2.76	7	2.76	6	2.87	6	2.66	6

#### 4.4 Cost related factors affecting performance of subcontracting options

Result in Table 3 shows the effect cost performance indicators of subcontracting options on construction project. These cost performance indicators are each measured and ranked on the various identified subcontracting options. For nominated subcontracting option, the most significant factor which have highest effect on nominated subcontracting are contractor cash-flow on the project, contractor's profit and cost of material and

equipment. For domestic subcontracting option the most rated of the cost performance factors are the contractor's profit, the cost of material and equipment and contractor's cash flow on the project. For labour-only subcontracting option, contractor's profit, contractor's cash flow on the project and labour and over-time were the most rated of the cost performance factors that could affect the cost delivery of a construction project using this option. Lastly, for trade/specialty subcontracting option, the most rated cost performance factors are Overhead percentage, contractor cash-flow on the project and contractor's profit.

Thus it can be concluded that contractor's profit, contractor's cash flow on the project and the cost of acquiring materials and equipment to carry out the project is a major factor that could affect effective cost delivery of construction project using any of the identified subcontracting options. This is understandable as contractors are generally in to make profit. This keeps them in business. In similar vein, any hiccup in the cash flow of a contractor will ultimately lead to lack of payment of the subcontractor, thereby leading to poor cost performance of same.

Also a cursory look shows that fluctuation cost will have little effect on the cost delivery of construction project using any of the identified subcontracting options. This is understandable as most subcontractor tend to bear the cost in most cases when fluctuation occurs on a project since getting any additional money from a main contractor is more or less impossible.

Table 3. Cost factors affecting performance of subcontracting options on construction projects

Factors	Nominated		Domestic		Labour only		Specialty	
	MIS	Rank	MIS	Rank	MIS	Rank	MIS	Rank
Contractor cash flow on the project	3.71	1	3.24	3	3.29	2	3.37	2
Contractor profit	3.53	2	3.32	1	3.32	1	3.32	3
Material and equipment cost	3.47	3	3.26	2	3.13	5	3.13	4
Overhead percentage	3.37	4	3.13	5	3.21	4	3.45	1
Insurance cost	3.32	5	2.66	10	2.58	10	2.79	7
Cost of variation orders	3.24	6	2.87	8	2.84	7	2.66	8
Material wastage	3.13	7	3.11	6	2.82	8	2.63	9
Labour and overtime cost	2.97	8	3.21	4	3.24	3	3.11	5
Fluctuations cost	2.95	9	2.53	11	2.50	11	2.58	11
Safety cost	2.89	10	2.74	9	2.79	9	2.61	10
Rework cost	2.82	11	2.97	7	2.87	6	2.84	6

#### 4.5 Discussion of Findings

##### 4.5.1 Awareness and Usage

Most times construction stakeholders practice the act of subcontracting but are not conscious of the name they are called. Nominated subcontracting is one of the subcontracting options that construction stakeholders recognize and use most as observed from the findings of this research. This corroborates Hughes *et al.* (1994) statement that the emergence of nominated subcontracting has a feature of subcontracting peculiar to construction known as the practice of "nomination" which has evolved to cope with three major issues which are the need to modify the main contractors' control over specialists; the incorporation of role of the design team; the needs of clients to have a say. It therefore implies that the nominated subcontracting is often used on construction projects because of the increase desire by the client to have a voice on the construction project; the need to give them the opportunity to choose and appoint, and the need to modify the control of contractor over specialists (Hughes *et al.*, 1994).

Reid (2004) explained domestic subcontracting in its usefulness to main contractor: as reduction in the workload and risk of the construction project; assuming supervisory role for domestic subcontractor; checking and evaluating subcontractor performance. From the research findings, domestic subcontracting follows nominated subcontracting in terms of awareness and level of usage and this can arguably be because it is purely based on the main contractor's relationship with the subcontractor. This affirms Abdullahi (2014) submission that the appointment of the subcontractor is treated as something entirely beneficial to main contractor - a purely, domestic matter. Ng and Luu (2008) opined that monitoring, evaluation and performance of subcontractor can be best done through the experience and knowledge of the subcontractor. Thus, as a result of the relationship that exist in most cases between the main contractor and the domestic subcontractor, there is a total control of the domestic subcontractor through the power of selection and appointment, thereby making monitoring and evaluation of the subcontractor by the main contractor easier.

##### 4.5.2 Factors influencing the time and cots performance of subcontracting options

The effect of planned construction time on nominated subcontracting was the most effective among the time factors that affect the performance of subcontracting options on construction projects due to the client usual lateness in nominating subcontractor for works that cannot be performed by contractor which most times makes the work of nominated subcontractor to cause delay. The process of nomination involves client and consultant

which are identified at the commencement of the project. This process can lead to delay due to longevity in the process which consists determining of scope of works to be for nominated subcontract; tenders for nominated works; selection and approvals of the nominated (Fugar and Agyakwah-Baah, 2010)

Findings of this research shows that one of the major factor that can affect the effective cost delivery of a project is the expected profit of the contractor. This further corroborates Ugochukwu and Onyekwena (2014) assertion that contractors offer their skills and services and accept the challenge of executing works in exchange for financial reward. This implies that the level of profit expected by the contractor is bound to affect the cost performance of the construction project as this will be his target from the onset of the construction.

## 5. Conclusion and Recommendation

This research work set out to assess the use of subcontracting options in construction project delivery in Nigeria. Using a survey method whereby construction firms in Lagos state were sampled, the research has been able to ascertain the level of awareness and usage of the various subcontracting options identified from literature. Also using time and cost criteria for determining project performance, the research was able to identify the time and cost related factors that could affect the performance of each of the identified subcontracting options.

From the research it is evident that the nominated and domestic subcontracting options are the mostly used subcontracting options while the planned construction time, time to implement variation order and time taken to rectify defects are the major time related factors capable of causing poor project delivery if not properly evaluated by all parties involved. In similar vein, contractor's expected profit, contractor's cash flow and the cost of materials and equipment are the major cost related factors capable of causing poor project delivery under any of the subcontracting options.

The study further recommends that the level of awareness and usage of the other subcontracting options which are not widely known and used presently can be improved through seminars, meetings, conferences organized by construction professional's supervisory bodies and relative agencies for construction stakeholders to enlighten and widen the scope of the professionals to the current trends in construction subcontracting. Also effective monitoring and coordination of the activities of subcontractors by the main contractor is necessary so that the outline programme of works can be achieved on time without delay and within budget.

The study was limited to the awareness, usage and factors that can affect the performance of the various subcontracting options in construction project delivery in Nigeria. Further study can be carried out in assessing the factors affecting the choice of selection of a subcontracting option. Also a comparative assessment of the construction work carried out using any of the variants of the subcontracting option can be done.

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