

RISK MANAGEMENT EFFECTIVENESS IN HOUSING PROJECTS: A COMPARATIVE EVALUATION IN SELECTED PROCUREMENT METHODS IN AKWA IBOM STATE

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ABSTRACT

Purpose: The knowledge and understanding of risk management is critical in achieving project objectives in terms of time, cost, quality and safety. The study aimed at providing insight into how procurement methods could influence the effectiveness of risk management practices of housing projects in Akwa Ibom State. The objectives of the study were to evaluate the effectiveness of risk management methods of traditional, direct labour, and labour only procurement methods with a view to enhancing construction projects delivery in Akwa Ibom state and Nigeria in general.

Design/methodology/approach: A cross-sectional survey approach was used for the study. Ninety-nine (99) questionnaires were retrieved from purposively selected contractors operating in the study area. Data collected were analysed using mean item score and Kruskal Wallis was used to test the hypotheses.

Findings: The results indicate that Consulting with experts, past experience and brainstorming were the most moderate effective risk identification techniques employed by the respondents across the three procurement methods while risk analysis was rarely done. Risk response techniques shows 93.75% moderate effectiveness, with avoidance/prevention, transfer and mitigation were mostly employed, while risk retention was never used. Risk assessment was ineffective, while risk monitoring was of moderate effectiveness. Furthermore, the findings of the study revealed that there is no significant variation in the level of effectiveness of risk management methods among risk identification, response, monitoring among the delivery systems, but a significant variation in risk assessment. The study concluded that there is a general lack of knowledge of structured risk management practice by the respondents in housing projects.

Research limitations/implications: The limitations include the use of only perception of contractors purposively selected from companies in Akwa Ibom state and only selected procurement methods. The contribution to knowledge is that this study has established the current level of effectiveness of risk management in some procurement methods in the study area.

Practical implications: It is recommended that there is need for advanced formal and informal training in the characteristics and fundamentals of various procurement methods for adequate

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assessment of their inherent risks in the study area. There should be an iterative and systematic risk management approach that consider the specific risk factors and their assessment in the procurement practices.

Originality/value: The study revealed the effectiveness level of sub processes of risk management among risk identification, assessment, response and monitoring, as well as the variation among the procurement methods.

Keywords: Contractors; comparative evaluation; housing project; procurement methods; risk management.

1. INTRODUCTION

Man's major desire has been that of comfortable housing system to serve as shelter, this need occupies a unique place in the life of human beings (Alabi, 2018). Housing being one of the most basic needs of mankind after food is a very important consumer item that affects welfare, health and productivity of individuals and households and consequently, the economic growth of a country (Babalola, Ibem, Olotuah and Fulani, 2016).

According to the National Bureau of Statistics (NBS, 2015), the Nigerian construction industry which has the development of residential and commercial real estate and their maintenance as one of its functions, needs to accommodate social and demographic changes that happen overtime, such as migration and urbanization, demands for better living conditions. The growth of the industry over the years as a result of demands for real estate and housing, the provision of infrastructure to support an increasing population size and the need to open up communities to foster inter-state and inter-regional trade and movement has also opened up the market for construction and services within the industry (NBS, 2015).

It was reported that the Nigerian construction Industry is one active sector of the Nigerian economy which takes the largest part of government spending on capital projects and it's the major source of economic growth and development of the country (Waziri and Bala 2014).The provision of infrastructure is mostly undertaken and financed by the government through either the conventional traditional method or other procurement methods in Nigerian construction industry (Iboh, Adindu and Oyoh, 2013).Procurement method which is the management of the total process involved in construction project delivery, are of several types used in the construction industry, they range from the traditional system to the several variations of 'fast track' systems such as Design and Build, Management Contracting, Build operate and transfer, and so on (Babatunde, Opawole and Ujaddughe, 2010; Kadiri and Ogukola, 2014).Ogunsami (2012)reported that the client's choice for a procurement method is dictated primarily by the inherent risk and other derivable prospects in the method. Chattered Institute of Building (CIOB, 2010) stated that the selection of an absolute optimal procurement method is difficult, because even the most experienced client or contractor does not know all the potential benefits or risk for each method. Procurement is, therefore a succession of calculated risk. Hence, taking effective risk management techniques to manage the procurement risk associated with construction activities is very important for the successful delivery of a project.

According to Sanda, Anigbogu, Nuhu and Olumide (2020), risk refers to any factor, event or influence that threatens the successful completion of a project, although the influence could be negative or positive. Risk Management helps the key project

participants – clients, contractor or developer, consultant, and suppliers to meet their commitments and minimize negative impacts on construction project performance in relation to cost, time and quality objectives (Odimabo and Oduoza, 2013). The construction industry has become so complex, that the nature of the structured risk management systems can be the difference between failure and success of a project (CIOB, 2010; Agerbern and Ågren, 2012).

The procurement system selected determines the control and power the various parties may exercise and the risk to which they are exposed to. It is in line with the problems associated with the difficulty of managing the risks inherent in projects delivered with different procurement methods that informs the present comparison of the risk management among traditional, labour only and direct labour procurement methods in housing projects in Akwa Ibom State. Studies like Akobi (2012); Ogunsami (2012); Babatunde, Opawole and Ujaddughe (2010); Ojo, Adeyemi and Fagbenle, (2006); Aladeniyi (2013), have established the prevalence of the use of these three procurement systems in housing projects delivery in the country hence the reason for choosing them for the study. Akwa Ibom State is one of the 36 states of the Federal Republic of Nigeria, with Uyo as the state capital. Since her creation in 1987, the provision of decent housing for its citizens has been a major socio-economic problem of great concern to the successive government. As observed by James, Akpan, Essien and Ekpo (2012), the state is currently undergoing major infrastructure and economic renaissance. This is evident in the construction of more infrastructures, for instance: Ibom Tropicana Entertainment Centre, the Uyo International Olympic Stadium and many urban roads, rural-urban migration intensifies, which makes the population of the urban area to become so dense that the existing houses are not enough to accommodate the growing population (Udoh, 2014). The governments, organisations and private individuals have made concerted efforts at meeting the needs of the growing population through provision of affordable houses but the achievement of this objective is still far away from reality. The focus of this study is therefore to compare the effectiveness of risk management in selected procurement methods adopted in housing projects with a view of enhancing effective housing delivery in the study area.

This study is aimed at providing an insight into how the effectiveness of risk management can be influenced by selected procurement methods used in housing projects delivery with a view to enhancing project delivery in Akwa Ibom State. The first objective is to determine the level of effectiveness of risk management practice applied in traditional procurement method in housing project in Akwa Ibom State. The second is to evaluate the level of effectiveness of risk management practice employed in direct labour procurement method, while the third is to determine the level of effectiveness of risk management practice applied in labour only procurement method in housing projects in Akwa Ibom State.

The study will help in advancing the knowledge and importance of procurement methods and risk management in enhancing project delivery in the study area. The evaluation of the effectiveness of risk management method in traditional, direct labour and labour only procurement method will provide the stakeholders of housing projects in the study area with the knowledge of selecting and prioritizing different risk management methods inherent in the various procurement methods for sustainable project performance. The study in general will help the client to appreciate the importance of risk management in housing projects thereby allocating funds for the exercise; it will also assist the consultants and contractors to have a knowledge base on

the processes of risk management; proceeding to analysis after identification, responding and monitoring risk appropriately to achieve project objectives.

1.1 Hypotheses of the Study

Four hypotheses were postulated for the study;

The first states that there is no significant variation in the effectiveness of the risk identification methods among the procurement systems.

The second states that there is no significant variation in the effectiveness of the risk monitoring methods among the procurement systems.

The third states that there is no significant variation in the effectiveness of the risk assessment methods among the procurement systems.

While, the fourth states that there is no significant variation in the effectiveness of the risk response methods among the procurement systems

2. REVIEW OF RELATED LITERATURE

Literature were reviewed in related areas covering, risk management and its processes, risk identification, risk assessment, risk response, risk monitoring and selected procurement methods.

2.1 Risk Management

Risk management is seen as integrated process aimed at addressing events that would have adverse effect on project objectives if they occur (Sanda, Anigbogu, Nuhu and Olumide, 2020). Risk management research has grown considerably in the construction industry given that construction projects are exposed to risk at the time of their coming into existence and are perceived to have more inherent risk due to the involvement of many contracting parties such as owners, contractors and designers, among others (Serpellaa, Ferradaa, Howarda and Rubio, 2014). Risks are associated with every project and should be identified in order to avoid negative impacts on the overall performance. Many problems which are faced in later phases of the project result from unmanaged risks from the earlier stage (Ropel and Gajewska, 2011). Banaitiene and Banaitis (2012) has it that risk management in the construction project management context is a comprehensive and systematic way of identifying, analysing and responding to risks to achieve the project objectives.

In this study, risk management is considered as the whole activities geared towards spotting risky situations, along with developing the strategies to reduce the probability of occurrence and impacts of risks (Pereraa, Rameezdeen, Chilesheb and Hosseini, 2014), with various management process.

2.2 Risk Management Process

The risk management process involves the systematic application of management policies, processes and procedures to the tasks of establishing the context, identifying, analysing, assessing, treating, monitoring and communicating risks (Ozcan, 2008; Ropel and Gajewska 2011). Identification and analysis of project risks are required for effective

risk management. One of the most important steps in Project Risk Management is the identification of the various risks. After identification of these risks, the focus changes to the risk analysis and assessment, and then to selection of mitigation methods that will minimise, transfer, avoid, and control the risks (Ozcan, 2008). Klemetti (2006) believed that risk management process should be implemented at the early project phases, when there is still a possibility for fundamental changes. The project should be carefully analysed as to which kind of methods to use at which project phases, and a process needs to be customised according to all project characteristics.

2.2.1 Risk Identification

It is quite obvious that if we are unaware of the risks, it is difficult to manage them, though this view is limited to the event-type scope of risk management (Klemetti, 2006). According to Agerberg and Agren (2012), the risk identification process should be a set of on-going activities during the whole lifetime of a project. As a construction project makes progress, it will be harder to make changes as these will be associated with high costs. Therefore, it will be crucial to identify project risks in an early stage while it still can be governed. Risks and other threats can be hard to eliminate, but when they have been identified, it is easier to take actions and have control over them. If the causes of the risks have been identified and allocated before any problems occur, the risk management will be more effective (Ropel and Gajewska 2011).

2.2.2 Risk Assessment

Risk assessment is the second stage in the Risk Management Process where collected data about the potential risk are analysed. It can be described as short listing risks with the highest impact on the project, out of all threats mentioned in the identification phase (Ropel and Gajewska, 2011). Many risks can be quantified by measuring their impacts on the project objectives (Ozcan, 2008). An understanding of the possible effects on project objectives is needed: since most projects have only a limited amount of resources to use for risk management, concentration on only the major risks is essential. Reliable estimates of likelihoods and consequences are needed for prioritisation (Klemetti, 2006). Risk analysis involves the integration of information from numerous sources through quantitative and/or qualitative modelling, while preserving the uncertainty and the complex relationships between the elements of information (Ozcan, 2008). Ropel and Gajewska (2011) penned that in the analysis of the identified risk, two categories of methods – qualitative and quantitative – have been developed. The qualitative methods are most applicable when risks can be placed somewhere on a descriptive scale from high to low level. The quantitative methods are used to determine the probability and impact of the risks identified based on numeric estimations.

2.2.3 Quantitative methods

Quantitative methods need a lot of work for the analysis to be performed. The effort should be weighed against the benefits and outcomes from the chosen method, for example smaller projects may sometimes require only identification and taking action on the identified risks, while larger projects require more in depth analysis. The quantitative methods estimate the impact of a risk in a project, Project Management Institute (PMI, 2004). They are more suitable for medium and large projects due to the number of required resources (Ropel and Gajewska, 2011).

Scenario technique - Monte Carlo simulation- This method is based on statistics which are used in a simulation to assess the risks. The simulation is used for forecasting, estimations and risk analysis by generating different scenarios.

Modelling technique - Sensitivity analysis - The purpose of a sensitivity analysis is to establish the risk events which have the greatest impact or value.

Diagramming technique - Decision tree analyses are commonly used when certain risks have an exceptionally high impact on the two main project objectives: time and cost

2.2.4 Qualitative methods

Qualitative methods for risk assessment are based on descriptive scales, and are used for describing the likelihood and impact of a risk. These relatively simple techniques apply when quick assessment is required in small and medium size projects, (Cooper, Grey, Raymond and Walker, 2005). (PMI) (2004) identifies four qualitative methods for risk assessment;

- i. Risk probability and impact assessment: In this method the likelihood of a specific risk to occur is evaluated. Furthermore, risk impact on a project's objectives is assessed regarding its positive effects for opportunities, as well as negative effects which result from threats.
- ii. Probability/impact risk rating matrix: these is concerned with assessing risks in relation to other risks, since these relations may cause minor risks to become more relevant to the risk management process if they are significant sources for other risks.
- iii. Risk Categorisation: This is a way of systematizing project threats according to their sources, in order to identify areas of the project that are most exposed to those risks. Tools which can be used in this method are work break down structure (WBS) or risk breakdown structure (RBS), and their role is to develop effective risk response.
- iv. Risk Urgency Assessment: Is to prioritize risks according to how quick response they require.

2.2.5 Risk Response

This third step of the Risk Management Process indicates what action should be taken towards the identified risks and threats. The response strategy and approach chosen depend on the kind of risks concerned (Ropel and Gajewska, 2011). Other requirements are that the risk needs to have a supervisor to monitor the development of the response, which will be agreed by the actors involved in this risk management process (PMI, 2004). The strategies for risk response include;

- i. Avoidance/Prevention: If the risk is classified as bringing negative consequences to the whole project, it is of importance to review the project's aim. In other words, if the risk has significant impact on the project, the best solution is to avoid it by changing the scope of the project or, worst scenario, cancel it. There are many potential risks that a project can be exposed to, and which can impact its success (Ropel and Gajewska, 2011). This is why risk management is required in the early stages of a project instead of dealing with the damage after the occurrence of the risk (PMI, 2004). The avoidance means that by looking at alternatives in the project, many risks can be eliminated. If major changes are required in the project in order to avoid risks. Cooper, Grey, Raymond and Walker (2005), list some activities that can help to avoid potential risk. These includes: More detailed

- planning, Alternative approaches, Protection and safety systems, Operation reviews, Regular inspections, Training and skills enhancement, permits to work, Procedural changes, Preventive maintenance.
- ii. Reduction/Mitigation: Mitigation seeks ways to reduce the probability and/or impact of risk (Klemetti 2006). Kajsa (2006) also affirms that risk reduction is about decreasing the probability, the consequences or a combination thereof for a risk to breakout. This could be done in several ways, of which sharing with other parties or taking some action where the probabilities or consequences become reduced is common. Mitigation strategies can, according to Cooper, Grey, Raymond, and Walker (2005), include: Contingency planning, Quality assurance, Separation or relocation of activities and resources, Contract terms and conditions, Crisis management and disaster recovery plans
 - iii. Transfer: Risk is transferred from the client to the contractor through the agreements in the contract, or from the contractor to the sub-contractor (Kajsa, 2006). Ropel and Gajewska (2011), states that the risk should be transferred to those who knows how to manage it. The actors that the risks can be transferred to are, for example, the client, contractor, subcontractor or designer depending on the risk's character. As a result, this could lead to higher costs and additional work, usually called risk premium. It must be recognized that the risk is not eliminated; it is only transferred to the party that is best able to manage it (PMI, 2004).
 - iv. Retention: When a risk cannot be transferred or avoided, the best solution is to retain the risk. The reasons for retaining the risk could be that the estimated probability, consequence or the combination of the two is low and at an acceptable level (Kajsa, 2006). In this case the risk must be controlled, in order to minimise the impact of its occurrence. Retention can also be an option when other solutions are uneconomical (Ropel and Gajewska, 2011).

2.2.6 Monitoring and Control

This is a method of creating a risk register where all risks and their management can be allocated in order to facilitate future projects (PMI, 2004). The continuous supervision over the Risk Management Process helps to discover new risks, keep track of identified risks and eliminate past risks from the risk assessment in the project (Ropel and Gajewska, 2011).

Tools and techniques used to monitor and control risk includes; Risk reassessment-identification of new potential risks: This is a constantly repeated process throughout the whole project. Monitoring of the overall project status – are there any changes in the project that can effect and cause new possible risks? Status meetings: discussions with risk's owner, share experience and helping managing the risks, and Risk register updates (PMI, 2004).

2.3 Procurement Methods

Three procurement methods have been selected for assessment in this study. These are the traditional, labour only and direct labour procurement methods. This is because many studies as earlier identified have established the prevalence of the use of these three procurement systems in housing projects delivery in the country hence adopting them in this study.

2.3.1 Traditional Method of Procurement

The traditional method of project procurement is a system whereby the client commissions an architect to take a brief, produce design and construction information, and invite tenders and administer the project during the construction period and settle the final account (Akobi, 2012). In the traditional approach, the employer accepts that design work will generally separate from construction, consultants are appointed for design and cost control, and the contractor is responsible for carrying out the works. This responsibility extends to all workmanship and materials, and includes all work by subcontractors and suppliers. The contractor is usually appointed by competitive tendering on complete information, but may if necessary be appointed earlier by negotiation on the basis of partial or notional information (Davis, Love and Baccarini, 2008). Traditional procurement has been in use in Nigeria for a long time and has dominated the construction scene for which majority of the projects in the country were procured. Studies of Ogunsanmi (2013), Ogunsamni (2012), Ojo, Adeyemi and Fagbenle, (2006), Babatunde, Opawole and Ujadduge (2010) all documented the dominance of the Traditional method in housing constructions in Nigeria. However, Ogunsanmi (2013) explains that this situation is brought about because clients can easily understand the operations of the method as well as their financial commitments towards their projects long before the design documentation are made. In the views of Ogunsamni (2012), the traditional procurement method is not a suitable method for fast tracking projects because of its sequential nature that projects are designed before being constructed.

2.3.2 Labour Only Procurement Method

The downturn in the Nigeria economy from 1985 to 1999 had created recession in the construction industry that makes clients and consultants to think of cheaper ways of achieving constructions; this led to modifications of existing project execution systems in favour of labour-only system (Aladeniyi, 2013). Labour-only procurement is a method of acquiring new units of housing in which the client selects an Architect and other consultants, or no consultants at all are used, but a main contractor or sub-contractor is employed on "Labour-only" basis. Labour-only procurement system is adopted by clients who seek to have control of their building process and desires to save cost (Akinkunmi, Aghimien and Awodele, 2018).

The client purchases all the necessary building materials for the use of the building contractor to execute the project to completion (Ogunsamni, 2012). As stated by Ogunsanmi (2013), this method is now believed to offer cheaper, better and produce quality projects than Traditional method. Babatunde, Opawole and Ujaddughe (2010) asserts that in the Nigerian construction industry Labour-only procurement has recently been accepted by stakeholders for use in their various construction projects as many private individual projects of different constructions types ranging from residential, religious, social and other specialized buildings had been procured through the use of Labour-only method. As opined by Akobi (2012), this method has now been developed to suit the present economic condition of the country. The downturn in the economy he claimed, with the resultant lean economic resources has forced employers/promoters to expand the scope of its usage to include construction of new projects, primarily as a means of saving cost and yet realizing their set objectives.

The benefits of using labour-only according to Ogunsamni (2012), includes; It takes shorter time to achieve the design preparation processes as well as the building time, It is also used by clients for better control of their building process as well as strategy for saving money on project. It is versed with minor alteration/modification works involving repairs,

maintenance and refurbishments. The disadvantage of the use of this method by clients as observed by (Akobi, 2012) includes: liability to poor standard of workmanship, likelihood of offering poor working conditions for its labour force and possibility of leading to conflicts, as contractors are always not satisfied with the materials purchased by the clients.

2.3.3 Direct Labour Procurement

Adenuga (2013) defined it as a process by which a project is executed by the workers of an organisation instead of the project being contracted out. It can simply be described as a 'do it yourself' approach to project procurement. Akobi (2012) asserts that direct labour method of project procurement is a system of project execution where technical civil servants are allowed to be involved fully in the physical execution of government projects. This method of project implementation is not new in the country as it has been used for executing minor jobs like filling of pot holes of road, repair of broken down machinery and so on. The new things about the method now are the emphasis and the call for direct labour method implementation in both state and federal governments' capital projects, such as buildings, consultancy services, roads and others major capital projects which has always been done by traditional system.

Aladeniyi (2013), observed that direct labour method is very pronounced in government or public sector projects and that the option has greater economy over contract methods. The author also describes direct labour as a method whereby a developer plans and organizes the project delivery process, carries out the design, the planning and procurement of resources and the construction of a project using client-employed supervisory staff and labour. They regard the method as an in-house arrangement because client's staffs as different from contractor's staff carry out the project delivery process and activities. They also observe that the arrangement may involve both design and construction otherwise regarded as in-house design and construction or a mixed system involving in-house design and contract construction or contract design and in-house construction. The direct labour delivery system is particularly used where: smaller projects are involved and 'in-house' resources have the required capacity, direct control with extra flexibility is required where the work cannot be accurately defined for a contract; uncertain and complex interface works between contracts are involved, where it is inappropriate to use another contract, the required speed of implementation and coordination with other dependent activities prohibits using a single contract or other work packages, there is a potential for the rapid development of technology or other change in a work/trade/special equipment area that must be addressed independently of other concurrent work, more time is required for design and to confirmed details, requiring some work areas to be addressed earlier and separately; and the work in a trade/equipment/other area is an experiment or a trial for new processes or technologies.

Akobi (2012) posited that increasing attention concern with the direct labour method by government and all personnel from all work of life is also new to the implementation of this method in Nigeria. The use of direct labour on government project at federal state and local government level is now well established nationwide. For reasons of cost, time, quality and training, it is being used increasingly. In fact, the situation has now led to renewed calls for the elimination of traditional system at all level of government (Akobi, 2012). The core benefits of using this method are; Generation of employment, Promotion of professional competency, Elimination of middlemen and cost saving, while the disadvantages of the direct labour are: lack of contractual obligation which oftentimes lead to projects abandoned due to lack of funds; lack of standard labour, as would have been the

case with established construction firms; and there may be inadequate incentives for workers involved in direct labour procurement.

3. RESEARCH METHODOLOGY

Statistical analysis of the data from the questionnaire was done using statistical package for social sciences (SPSS). The procurement and risk management methods adopted by 99 purposively selected contractors were examined using descriptive statistical tools. The tools that were used for the data analysis were: mean item score and Kruskal Wallis test. Mean item score was used in the data analysis to get the straight-forward totals of the respondents' perception of effectiveness of risk management on the understudied procurement methods. The formula is given as:

$$\text{Mean Score (MS)} = \frac{\sum (f \times s)}{N}$$

where; f = frequency of response to each rating (5 to 1)

s = the score given to each factor by the respondents (ranging from 5 to 1)

N = the total number of responses concerning that factor.

Using the mean scores, the variables are classified as "Effective" (significant) variables that have mean score higher than 4.0, those with 4.0-3.0 mean scores were considered as "moderately effective", while variable with mean score less than 3.0, were considered as "ineffective" as adapted from Ejohwomu, Oshodi, and Onifade (2016). During analysis the variations in the perceptions of the effectiveness of risk management in projects procured with the delivery methods as captured in hypotheses were analysed using Kruskal Wallis test.

4. DATA ANALYSIS, RESULTS AND DISCUSSION OF FINDINGS

The results and findings are presented in this section.

4.1 Respondents Characteristics

The characteristics of the respondents that supplied the data used for the study were analysed for an understanding of the perception of the effectiveness of risk management in the three procurement methods. From the findings 88.9% represents the male while 11.1% represents the female. The highest academic qualification of the respondents are 1% had SSCE, 8% had OND, and 56% had HND OR B.Sc while 35% had M.Sc or PhD, also 14% of the respondents were consultants, 65% were contractors while 21% were clients. The professional affiliation of the respondents, 25% were Architects, 30% Builders, 29% Engineers, 10% Quantity Surveyors and 5% Estate Surveyors. The response on the sub-characteristics of membership status in their professional body, result revealed that corporate members were 21% and graduate members 37% while associate members were 29%. The results also show that 16% of the respondents have been in practice between 1-5yrs, 42% have practiced between 6-10yrs, 12% between 11-15yrs, 8% between 16-20yrs and 21% have been practicing for over 20yrs. The respondents were asked to state the client for the housing project they took part in. The result shows that 29% were public housing projects while 70% were private housing projects. The study also reveals that 54% of the

respondents were from Uyo senatorial district while Ikot Ekpene and Eket senatorial district had 26% and 20% respectively. The respondents were requested to indicate the size of their firm if they are consultants or contractors. The results show that 93% of respondents are working in a small firm (from 0-50 permanent employees) and 7% in a large firm (from 50-250 permanent employees). The results from the type of firm operated by the respondents shows that 82% operate contracting firms while 18% operate consultancy firm. The result gives a good and dependable characteristic of respondents used for the study.

4.2 Effectiveness of Risk Management Process in Traditional Procurement Method

The study achieved the first objective by collecting data on the perception of the internal stakeholders of housing projects in the study area on the level of effectiveness of 14 risk identification methods, 7 risk assessment methods, 16 risk response methods and 4 risk monitoring and control methods identified in the literature as applied in traditional procurement method. The method of analysis was done as described in the method of study and result presented in Table 1.

The result in Table 1 shows that in risk identification the stakeholders perceived that Consulting with experts ranked 1st with a mean score of 3.74, Past experience ranked 2nd with a mean score of 3.66, Brainstorming ranked 3rd with a mean score of 3.52. The result shows 64.3% moderate effectiveness of risk identification. The result of the assessment of risk shows that, Risk urgency assessment ranked 1st with a mean score of 2.92, Risk breakdown structure ranked 2nd with a mean score of 2.75 all showing ineffective performance. The response to risk in traditional procurement method; operation reviews ranked 1st with a mean score of 3.66, regular inspection ranked 2nd with a mean score of 3.60 and risk transfer ranked 3rd with a mean score of 3.56. This criterion shows 93.75% moderate effectiveness. The result of risk monitoring methods as applied in traditional procurement method shows that, Monitoring the overall project status ranked 1st with a mean score of 3.70, Risk reassessment ranked 2nd with a mean score of 3.63 and Risk register updates ranked 3rd with a mean score of 3.42, all of moderate effectiveness. Generally, the findings support the observation by Osipova (2008) that Traditional design-bid-build contracts do not create opportunities for open discussion of project risks and joint risk management, hence, weakness in current procurement practices in Sweden.

Table 1: Effectiveness of risk management in Traditional procurement method

Risk Identification	1	2	3	4	5	Sum	Mean	Rank	Remark
Consulting Experts	3	11	26	27	32	371	3.74	1	ME
Past Experience	4	7	35	25	28	363	3.66	2	ME
Brainstorming	4	7	41	27	20	349	3.52	3	ME
Stakeholder Analysis	3	12	32	38	14	345	3.48	4	ME
Interview	1	13	47	25	13	333	3.36	5	ME
Study Specialist Literature	5	19	42	25	8	309	3.12	6	ME
Checklist	7	23	32	30	7	304	3.07	7	ME
Database	14	18	23	36	8	303	3.06	8	ME
Questionnaire	7	27	29	26	10	302	3.05	9	ME
Delphi Technique	5	39	15	36	4	292	2.94	10	IE
Templates	10	24	37	24	4	285	2.87	11	IE
Risk Breakdown Structure	7	31	31	27	3	285	2.87	12	IE

Research Assumptions	9	29	36	18	7	282	2.84	13	IE
Research Interface	14	32	26	22	5	269	2.71	14	IE
Risk Assessment									
Risk urgency assessment	21	21	22	15	20	289	2.92	1	IE
Risk breakdown structure	18	31	13	32	5	272	2.75	2	IE
Decision Tree analysis	18	33	13	32	3	266	2.69	3	IE
Modelling Technique	16	35	31	12	5	252	2.55	4	IE
Probability & impact assessment	17	39	26	11	6	247	2.49	5	IE
Probability matrix	25	30	32	11	1	230	2.32	6	IE
Monte Carlo Simulation	35	37	18	7	2	201	2.03	7	IE
Risk Response									
Operation reviews	7	7	21	42	22	362	3.66	1	ME
Regular inspection	2	15	25	36	21	356	3.60	2	ME
Risk transfer	2	10	32	41	14	352	3.56	3	ME
Alternative approaches	2	12	30	41	14	350	3.54	4	ME
Crisis management	7	12	22	39	19	348	3.52	5	ME
Permits to work	3	14	39	18	25	345	3.48	6	ME
Retention	1	17	29	45	7	337	3.40	7	ME
Preventive maintenance	2	20	30	32	15	335	3.38	8	ME
Training and skills enhancement	5	11	38	36	9	330	3.33	9	ME
More detailed planning	7	21	30	15	26	329	3.32	10	ME
Contract terms and conditions	3	12	51	19	14	326	3.29	11	ME
Contingency planning	1	28	38	11	21	320	3.23	12	ME
Procedural changes	4	11	48	32	4	318	3.21	13	ME
Quality assurance	2	27	32	25	13	317	3.20	14	ME
Protection and safety systems	8	14	41	28	8	311	3.14	15	ME
Relocation of activities & resources	2	29	42	22	4	294	2.97	16	IE
Risk Monitoring & Control									
Monitoring overall project status	2	10	24	43	20	366	3.70	1	ME
Risk reassessment	4	12	27	30	26	359	3.63	2	ME
Risk register updates	4	14	24	50	7	339	3.42	3	ME
Status meeting	7	8	42	34	8	325	3.28	4	ME

ME-Moderately Effective; IE-Ineffective, RMK- Remarks

4.3 Effectiveness of Risk Management Methods in Direct-Labour Procurement Method

The study achieved the second objective by collecting data on the perception of the internal stakeholders of housing projects as was done in the first objective, for the direct labour procurement method. The result is presented in Table 2.

The result in Table 2 shows that past experience ranked the 1st (MS= 3.60), brainstorming ranked 2nd (MS=3.47), consulting experts ranked 3rd (MS=3.45). The result shows that identifying risk has 57.14% moderate effectiveness. The result suggests that past experience is a major source of managing risk, the risk encountered and managed in previous projects will serve as a benchmark to managing or preventing the risk from future occurrence. Brainstorming is a situation where the stakeholders in the

projects meet to discuss the way out of a potential risk; Experience from previous projects can be used to facilitate such discussions. Moreover, such discourse will be used as a tool to alert other participants about potential risks and by prioritize those risks which had the biggest impact on the project. This corresponds to the findings by Ropel and Gajewska (2011), past experience and discussions were the most commonly used techniques to identify and manage potential risks.

For risk assessment, Risk urgency assessment ranked first (MS= 2.540, decision tree analysis ranked 2nd (MS=2.51) and probability matrix ranked 3rd (MS= 2.49). All mean score less than 3.0 indicated ineffective performance. A critical examination of the risk methods with the least mean scores shows that they are either never or rarely being used by the internal stakeholders of housing projects in the study area, this is similar to the findings by Ropel and Gajewska (2011) that many construction practitioners who execute housing projects are not familiar with these structured methods used to analyse potential risk.

In risk response the results indicate that risk transfer ranked 1st (MS= 3.66), regular inspection ranked 2nd (MS= 3.60) and quality assurance ranked 3rd (MS = 3.56). The result also shows about 93.75% moderate performance. In direct labour procurement, where the client bears most of the risk, transferring the risk to a specialty sub-contractor when the expected loss is higher is a relief to the client. Although, it is generally recognized that risk should be transferred to the party in the best position to deal with the situation. Where a contractor tries to transfer all risks in a project may point towards lack of innovation, leading to low productivity. This corroborates inference by Banaitiene and Banaitis (2012) that risk transference to another project party were risk response techniques frequently used in construction projects.

Table 2: Effectiveness of risk management in Direct Labour Procurement

Risk Identification	1	2	3	4	5	Sum	Mean	Rank	Rmks
Past Experience	4	16	26	23	30	356	3.60	1	ME
Brainstorming	8	8	24	47	12	344	3.47	2	ME
Consulting Experts	9	13	25	28	24	342	3.45	3	ME
Interview	4	17	28	33	17	339	3.42	4	ME
Stakeholder Analysis	4	23	32	28	11	313	3.19	5	ME
Questionnaire	15	16	31	22	14	298	3.04	6	ME
Study Specialist Literature	8	17	47	18	9	300	3.03	7	ME
Database	11	15	45	19	9	297	3.00	8	ME
Delphi Technique	18	19	24	24	14	294	2.97	9	IE
Checklist	12	27	29	25	6	283	2.86	10	IE
Research Assumptions	11	30	29	22	7	281	2.84	11	IE
Risk Breakdown Structure	14	30	32	15	8	270	2.73	12	IE
Research Interface	16	28	30	18	6	264	2.69	13	IE
Templates	16	28	32	19	4	264	2.67	14	IE
Risk Assessment									
Risk urgency assessment	27	21	26	18	6	249	2.54	1	IE
Decision Tree analysis	24	28	21	19	5	244	2.51	2	IE
Probability matrix	29	23	22	19	6	247	2.49	3	IE
Probability & impact assessment	21	33	27	13	5	245	2.47	4	IE
Risk breakdown structure	29	25	26	14	5	238	2.40	5	IE
Modelling Technique	27	25	32	13	2	235	2.37	6	IE
Monte Carlo Simulation	38	30	18	7	6	210	2.12	7	IE

Risk Response										
Transfer	7	7	21	42	22	362	3.66	1	ME	
Regular inspection	2	15	25	36	21	356	3.60	2	ME	
Quality assurance	2	10	32	41	14	352	3.56	3	ME	
Alternative approaches	2	12	30	41	14	350	3.54	4	ME	
Crisis management	7	12	22	39	19	348	3.52	5	ME	
Permits to work	3	14	39	18	25	345	3.48	6	ME	
Retention	1	17	29	45	7	337	3.40	7	ME	
Preventive maintenance	2	20	30	32	15	335	3.38	8	ME	
Operation reviews	5	11	38	36	9	330	3.33	9	ME	
More detailed planning	7	21	30	15	26	329	3.32	10	ME	
Contract terms and conditions	3	12	51	19	14	326	3.29	11	ME	
Contingency planning	1	28	38	11	21	320	3.23	12	ME	
Procedural changes	4	11	48	32	4	318	3.21	13	ME	
Training and skills enhancement	2	27	32	25	13	317	3.20	14	ME	
Protection and safety systems	8	14	41	28	8	311	3.14	15	ME	
Relocation of activities & resources	2	29	42	22	4	294	2.97	16	IE	
Risk Monitoring & Control										
Monitoring overall project status	3	11	33	39	13	345	3.48	1	ME	
Status meeting	2	13	37	36	11	338	3.41	2	ME	
Risk register updates	2	4	54	29	10	338	3.41	3	ME	
Risk reassessment	5	14	43	29	8	318	3.21	4	ME	

ME-Moderately Effective; IE-Ineffective, Rmks- Remarks

In risk monitoring the result shows that monitoring the overall project status ranked 1st with a mean score of 3.48, status meeting ranked 2nd with a mean score of 3.41 and risk register updates ranked 3rd with a mean score of 3.4. The result shows moderate effectiveness of risk monitoring and control and suggests that in status meetings discussions with risks owner and sharing experiences helps monitor the risks.

4.4 Effectiveness of Risk Management Methods in Labour-Only Procurement Method

To evaluate the level of effectiveness of risk management methods applied in Labour Only procurement method, the previous approach was used, with result presented in Table3.

The result in Table 3 shows that past experience ranked the 1st (MS= 3.69), consulting with experts ranked 2nd (MS=3.49) and brainstorming ranked 3rd (MS= 3.19), with about 28.57% moderate effectiveness. This may be attributable to the fact that, the risk encountered within a labour only project may not be identified in the early stages of the project life cycle until it exceeds the capability of the stakeholder to manage. When an expert in risk management is not consulted those risk will not be identified early and managed throughout the life cycle of the project thereby meeting project objectives, this corresponds with the findings by Ropel and Gajewska (2011), that consulting experts in the field of risk management within the project will help in systemising and mapping out the techniques needed in handling these risks.

In risk assessment the result shows that risk urgency assessment ranked first with a mean score of 2.23, risk breakdown structure ranked second with a mean score of 2.16 and probability impact assessment ranked third with a mean score of 2.07. The mean scores less

than 3.0 shows ineffectiveness, suggesting that the respondents are not familiar with risk management techniques, also the degree of sophistication involved in the techniques is unwarranted if compared with project size, hence, their ineffectiveness.

Table 3: Effectiveness of risk management in Labour-only Procurement Method

Risk Identification	1	2	3	4	5	Sum	Mean	Rank	Rmks
Past Experience	2	11	28	33	25	365	3.69	1	ME
Consulting Experts	4	12	34	29	20	346	3.49	2	ME
Brainstorming	2	29	28	28	12	316	3.19	3	ME
Interview	3	17	46	25	8	315	3.18	4	ME
Stakeholder Analysis	13	20	38	17	11	290	2.93	5	IE
Risk Breakdown Structure	11	26	33	24	5	283	2.86	6	IE
Checklist	13	29	31	17	9	277	2.80	7	IE
Questionnaire	24	12	35	17	11	276	2.79	8	IE
Study Specialist Literature	19	27	20	25	8	273	2.76	9	IE
Database	17	25	29	23	5	271	2.74	10	IE
Delphi Technique	22	23	30	18	6	260	2.63	11	IE
Templates	26	26	27	18	2	241	2.43	12	IE
Research Assumptions	28	21	35	11	4	239	2.41	13	IE
Research Interface	30	21	33	10	5	236	2.38	14	IE
Risk Assessment									
Risk urgency assessment	40	33	12	9	4	221	2.23	1	IE
Risk breakdown structure	32	31	25	10	1	214	2.16	2	IE
Probability & impact assessment	42	20	21	14	2	205	2.07	3	IE
Modelling Technique	36	36	16	10	1	201	2.03	4	IE
Probability matrix	44	28	14	12	1	195	1.97	5	IE
Decision Tree analysis	36	40	14	8	1	194	1.96	6	IE
Monte Carlo Simulation	46	36	12	4	1	175	1.77	7	IE
Risk Response									
Transfer	6	7	25	39	22	361	3.64	1	ME
Contingency planning	4	12	28	39	16	348	3.51	2	ME
Regular inspection	2	16	32	29	20	346	3.49	3	ME
Crisis management	4	10	38	34	13	339	3.42	4	ME
Protection and safety systems	6	14	29	37	13	334	3.37	5	ME
Training and skills enhancement	8	17	29	23	22	331	3.34	6	ME
Quality assurance	11	14	30	23	21	326	3.29	7	ME
Relocation of activities & resources	3	17	38	32	9	324	3.27	8	ME
Contract terms and conditions	7	20	26	36	10	319	3.22	9	ME
Preventive maintenance	7	18	33	29	12	318	3.21	10	ME
Alternative approaches	7	16	40	28	8	311	3.14	11	ME
Retention	12	18	23	38	8	309	3.12	12	ME
Procedural changes	6	16	45	25	7	308	3.11	13	ME
More detailed planning	9	28	22	24	16	307	3.10	14	ME
Permits to work	6	23	38	26	6	300	3.03	15	ME
Operation reviews	8	32	22	28	9	295	2.98	16	IE
Risk Monitoring & Control									
Status meeting	5	9	31	28	26	358	3.62	1	ME
Risk register updates	4	13	29	26	27	356	3.60	2	ME
Monitoring overall project status	3	19	30	28	19	338	3.41	3	ME
Risk reassessment	10	5	48	25	11	319	3.22	4	ME

The result of risk response shows that risk transfer ranked 1st (MS=) 3.64, contingency planning ranked 2nd (MS=3.51) and regular inspection ranked 3rd (MS= 3.49), with 93.75% moderate effectiveness. The result suggests that most common contingency plan is to set aside extra money, a contingency fund, to draw on in the event of unforeseen cost overruns. Hence, contingency plans can be looked on as a kind of insurance. The moderate effectiveness may be attributable to the observation by Osipova (2008) that a lack of an iterative approach and absence of systematic risk management in the procurement practices, create a weakness in effectiveness.

The result in risk monitoring shows that status meeting ranked first (MS= 3.62), risk register updates ranked 2nd (MS= 3.60) and monitoring the overall project status ranked 3rd (MS= 3.41), with 100% moderate effectiveness.

4.5 Comparison of Effectiveness of Risk management among Procurement Methods

To further compare respondent's perception of risk management process applied in the different procurement methods, the four hypotheses earlier postulated were tested.

In order to test this hypothesis Kruskal-Wallis test was used at $p \leq 0.05$ to provide confidence of views and generalization of opinions of the three procurement methods, with regards to risk identification, assessment, response and monitoring. The decision rule is that if $p\text{-value} > 0.050$, the hypothesis is accepted, but if $p\text{-value} \leq 0.050$ the hypothesis is rejected. The results are presented in Table 4.

Table 4: Kruskal Wallis test for comparing risk management in procurement methods

Items compared among respondents	No of variables	Traditional Mean Rank	Direct Labour Mean	Labour only Mean rank	H-value	p-value	sig. level	Decision
Risk Identification	14	26.39	22.11	16.00	5.077	0.079	0.050	Accept
Risk Assessment	7	15.29	12.93	4.79	11.051	0.004	0.050	Reject
Risk Response	16	27.03	27.03	19.44	3.142	0.208	0.50	Accept
Risk Monitoring	4	8.25	4.75	6.60	1.911	0.385	0.05	Accept

The result in Table 4 shows that the p-value for risk identification is $0.079 > 0.05$ hence the null hypothesis is accepted, implying that there is no significant variation in the perception of effectiveness of risk identification among the procurement methods. The result indicates that the stakeholder identifies risk the same way among the procurement methods.

In risk assessment the p-value is $0.004 > 0.050$ hence the null hypothesis is rejected, implying that there is a significant variation in the perception of effectiveness of risk assessment among the procurement methods. The result may be attributable to the fact that the stakeholders assesses risk differently in the procurement methods or does not carry out risk assessment at all, owing to their lack of knowledge in risk assessment practice or lack of funds allocated for the risk exercise.

In risk response the p-value is $0.208 > 0.050$ hence the null hypothesis is accepted, implying that there is no significant variation in the perception of effectiveness of risk

response among the procurement methods. The result indicates that the stakeholders respond to risk the same way, probably due to similarity in past experience, consulting experts, brainstorming and interview which mainly comprised risk identification.

In risk monitoring the p-value is $0.385 > 0.05$ hence the null hypothesis is accepted, implying that there is no significant variation in the perception of effectiveness of risk monitoring methods among the procurement methods. The result indicates that the respondents perceive that stakeholders of housing projects in the study area carry out the process of risk monitoring the same way.

5. CONCLUSION AND RECOMMENDATIONS

Risk management has become an important part of the management process for any project. In spite of the general awareness of the risk management process, implementing risk management systematically in the project is still limited in practice. From the results obtained, risk identification is of moderate effectiveness. This may be because, the analysis of the risk to ascertain its likely impact on the project is not performed by the respondents in housing projects. Response techniques of avoidance, transfer and mitigation were carried out but the risk operation review was hardly done. Monitoring was also done. The level of perception of effectiveness of risk management method among the procurement systems was established to be of moderate level in all except risk assessment which is ineffective. The study concludes that risk management has not been very effective in the procurement options probably due to a general lack of knowledge of the likely influence of procurement methods, a lack of an iterative approach and absence of systematic risk management in the procurement practices as noted by Osipova (2008). It shows that there is a no significant variation in the level of effectiveness of risk management methods in identification, response and monitoring among the delivery systems, except in risk assessment which shows significant variation. The study concluded that this might be due to the fact that most procurement methods do not provide opportunity for adequate risk assessment by the stakeholders, or the lack of time/funds in the project reserved for risk management and this may make risks handling difficult at the time of occurrence.

Based on the conclusion of this study, it is recommended that there is need for advanced formal and informal training in the characteristics and fundamentals of various procurement methods for adequate assessment of their inherent risks in the study area. Formal education could be graduate studies in construction project management or informal education and training could take the form of career development programs (like risk management awareness program) organized by academic institutions or professional organizations such as the Nigerian Society of Engineers (NSE), the Nigerian Institute of Building (NIOB) amongst others. There should be an iterative and systematic risk management approach that consider the specific risk assessment in the procurement practices. It is also recommended that the factors affecting the effectiveness of the risk management methods should be evaluated and ample assessment of risk should be encouraged irrespective of the procurement method used.

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