An Overview of Procurement Methods and Techniques for Effective Delivery of Construction Projects

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***Abstract*-Procurement processes in the construction industry are many and the choice of a suitable one depends on the type of construction, volume of work to be done, availability of resources and client experience. Each type of procurement process has its own peculiarity and the choice of the type lies mostly with the client who should be responsible for the success of the project. This paper examines procurement strategies for an effective project delivery with a view to provide solutions to problems encountered in making selection. The Paper has found that traditional method of procurement process is mostly used by the clients irrespective of the type, methods and volume of work to be done.**

***Key Words:* procurement, construction, client, process, project.**

I. INTRODUCTION

A construction project is undertaken by the clients and it can be income or non-income investment. The nature, structure, and mode of approach to the formation, process, assessment, planning and the processes of making it to become real, are dynamic, consisting of many different inter related operations and sometimes sophisticated.The client of an income producing investment would want to know the proceeds [profitability] on the capital they invested, taking into accounts the project lifespan, time, value for money invested and the influence on the economy in relation to existing other opportunities.

A project can be either successful or not, depending on the strategic approach to procurement route, that is, to critically analyses which procurement route can be best suitable for the project, bearing in mind the goals and requirements set aside to achieve the objective i.e. time, cost and quality. Therefore the success or failure of the project are all based on choosing an appropriate procurement strategy for the delivery of the project , because procurement strategy will decide on priority issues, i.e. to procure a building , it is necessary to:

- Understand clients need or wants
- Organize the functional relationship among specialized organizations; that's the stakeholders of the project, their impact either positive or negative.
- Allocate risk to the organization which will handle it with all seriousness, that's events that will prevent the organization from achieving the objective of the project.
- Agree and document the responsibilities of the collaborating organizations, that's parties involved in the project and their relationship.
- Agree on how problems will be solved, that's the way and manner of resolving dispute among the parties involved in the project.

II. PROCURECEMENT STRATEGY OR ROUTE

"Procurement route identify the method of accomplishing the objective of the project, good value for the investment and the benefit to be derived from the investment bearing in mind the risk and constrain which have direct impact to the cash floor for the project. The aim here is to obtain the optimum risk control of financing the project" [Procurement Strategy for Construction Works and Services]. The procurement strategy is the point where the client decide what should be driving the project, decide its objective, decide its structure, decide its scope, decide who is responsible for who, all these are the client primary strategy, and therefore these basically define the project.

"Construction Industry Institute [2003] presents a tool known as 'Project Delivery and Contract Strategy' [PDCS]. The tool pays attention on project selection and delivery.

The most useful elements in contract strategy and delivery of projects are the contractual relationship between the design process, procurement process and construction. The tool proposes a procedure of procurement when client have selected his priorities, it assist the client to pay attention on the factors that should be considered in the procurement selection strategy. [Journal of Construction Engineering and Management, July, 2003. P. 692].

The procurement strategy will look at the following points and evaluate them one after one so as to know the type of relationship.

- Type of client whether he is knowledgeable or non knowledgeable, that is in terms of his experience about the project he is going to undertake.
- The client's objectives, the client should be able to know why he needs the project; does he have the

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financial capability to embark on that kind of project?
- Does he have the time?
- Of what quality does he want the project to be?

All these have to be determined, analyze carefully and addressed before starting. The procurement route will now be decided that is the different arrangement for the organization that are going to come about, this will include the inception briefing, feasibility and viability and the type of decision, the risk involved and how it will be shared among the parties to the contract and method of resolving dispute. Cultural factors will also have to be considered, that is to know the behavior of the locality in terms of working materials, labour and whether the environment support the way people work.

III. FACTORS INFLUENCING PROCUREMENT STRATEGY SELECTION

For client to procure strategy for a project, it is necessary for him to identify the factors which will determine suitable procurement strategy. The factors to be considered are:-

i. The objective of the project
ii. The constraint
iii. Risk for the completion of the contract and the adopted criteria.
iv. The complexity of the project.

Project Objectives: The objective may be related to the following.

- Scope of the project that is the extent to which the client want to deliver the project.
- Time, the duration of the project including any allowance for delays.
- Cost, the budgeted amount for the project
- Quality, of what quality does the client want the project to be.
- Sustainability, this may include environmental aspect in relation to the project.

Constraint: This may be positive or otherwise in relation to the project, that is events which will prevent/improve to achieve the targeted objective, time constraint, cost constraint, quality constraint and constraint in relation to availability of labour resources within the locality.

Risk: These are events both known and unknown that may occur during the progress of the project and which may have a great effect on the project delivery. Risk nature to the project, and its potential effect on project delivery if it occurs, are sometimes identified by the key objectives and constraints of the project. Example if you have a project with a specific completion period, an interruption to the construction programme will have a great risk for achieving the time set aside for the completion of the project.

Therefore it is important to define the key objective and constraint of the project, so that the risk can also be identified.

Complexity of the Project: Project complexity is identified by a number of factors; therefore level of complexity should be taken into consideration before choosing an appropriate procurement strategy. Factors to be considered here are:-

- The size of the contract.
- Time given for the completion of the project.
- The extent of work to be done.
- Method of construction and the machinery required.

Having identified the factors responsible for the procurement strategy selection, it will be understood that the selection of the appropriate procurement strategy will be one, which will be suitable to the project at hand, which will make balance between the objectives and the constraint of the project.

IV. ANALYSIS OF THE PROCUREMENT ROUTES

Here the analysis will be on the most commonly types as follows:-

- Traditional method.
- Design and build method.
- Management contracting method.
- Construction management method.

Traditional Method: This route is common to most of the contractors, they are familiar with it. But the method has failed to address increase in production, control dispute and arguments, due to its adversarial nature which are seen in most traditional procurement paths" [Egan 1998]. "Journal of construction engineering and management April 2002."

Traditional Method has the following characteristic.

- *Complicit* is certain [an adversarial and fragmentative industry]

Time

- Time, it is time consuming
- There is certainty of time because the contractor will determine the time of completion and any delay the contractor will be finalize.

Cost: Cost, there is certainty of cost because design is concluded and it allows the client to choose the lowest tender.

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Quality

- Quality, quality of design is certain, because it is to the satisfaction of the client
- Quality of the contract is also certain since the contractor is given the bills of quantities and the specification and will have to follow what is contained in those documents.
- Changes, variation will have a great impact on cost, because any change either addition, omission or subtraction will have a great effect on the cost.

Risk: Risk, the client takes the risk of design and the contractor will take the risk of construction.

Benefits

- Benefit, very competitive, this will give the client an opportunity to choose from among the tenderers.
- Most clients are familiar with the method because it's very common
- Public accountability is certain.

Weakness

- Weakness, it is slow because of the time taken to prepare design, preparation of bills of quantities and invitation to tender.
- It may result in poor quality because the contractor is involved during design.

Design and Build Method: In this route there is no conflict; it is less adversarial because it is one organization.

The method has the following characteristics:

Time

- There is certainty of time, because it serve time which will be taken to prepare drawings, bills of quantities and tender documents
- Construction can start early since it is one organization.

Cost: It result in high cost because it is one organization for the design and construction

Quality: High quality will be achieved because it is a highly specialize package.

Risk

- There will be risk that quality may be compromise because in the event of trying to meet the time for completion the quality of the project may be compromise.
- The whole risk of the project lies on the contractor.

Benefits

- Less adversarial relationship
- High quality
- Highly specialize package no client interference.
- Approval of material for the contract by the contractor.
- Improve build ability.

Weakness

- The client has little input in the design, because it is difficult for him to prepare brief until he appoints a consultant who will liaise with the contractor during the progress of the contract.
- There is no possibility to make changes.

Management Contracting: In this type of contract the management contractor manages the design process, but is not carrying out the work. When the designs are completed he packages the drawings into parcels of different elements. The management contractor manages the work and the contract until finish. Less adversarial, this type of contract is suitable where there are urgent needs for the project to be completed and the designs are not done. It requires effective and careful planning and control.

Time

- Time is saved since design and construction can overlap.
- There is time certainty.

Cost

- It does not give price certainty.
- It is an expensive route.
- The price is known when the last package is given out.

Quality

- Quality is assured
- Builder ability certainty

Risk: The risk is on the clients shoulder, because the time and cost are not known until the last package is given out.

Benefits

- It is less adversarial relationship.
- It is Time saving
- Cost is saved.
- Flexibility to changes
- Builder ability is improved.
- Quality is improved
- Overlap design and construction.

Weakness

- It does not give price certainty.
- It is an expensive route.

It is used in a complex projects and where cost is not a problem.

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Construction Management: In this type of contract the client enters into agreement with the professional firm [construction management] to oversee the design, planning and construction of a particular project from inception to completion and commissioning.

It is less adversarial because the designers and the consultant are working together.

Time: Time is certain.
Cost: Cost is certain.
Quality: Higher quality will be achieved.
Risk: The risk of the project lies with the client.

Benefits

- The method offer the client good value for money.
- It allows the client to be specific on his design.
- It allows close working relationship between client and the contractor for achieving target objectives.
- It allow for flexibility in making changes to the project.
- It allows the construction manager to participate early in the preconstruction process.
- It allows the client to evaluate the risk associated with the contract.
- It allows flexibility in the tendering process.
- It is a past track approach to construction process.

Weakness

- There is no price certainty.
- The clients have to be specific in his brief.
- It needs close and effective supervision and control.
- The clients need to be knowledgeable or have a background about the construction processes.

V. ADVANCE PROCEREMENT PRACTICES.

There have been growing changes in the way and manners government and their agencies award contract in both developing and developed countries especially in United Kingdom [UK]. Private sector have increasingly been recognized rather than the traditional domain of the public sector, as a result of this phenomena so many forms of private organizations are formed. Popular among them are:-

- Public Private Partnership [PPP].
- Private Finance Initiative [PFI].

These types of contract strategy are adopted by domestic and multinational organization for implementation at different level for tendering or invited offers. N. J. Smith [2008]. Zarco-Jasso [2005] defined PPP as a cooperate agreement between public sector agencies and private sector entities for the management of public sector infrastructure facility. He emphasize that PPP route may provide opportunity to circumvent some of the hardship in owning public facilities including bureaucracy, corruption and inefficiency.[Journal of Built Environment Project and Asset Management Vol.3 NO. 1, 2013. PP 89] Ola et al, [2006] "defined PPP as a cooperate agreement between public sector agencies and private entities for the management of public sector infrastructure facility. He emphasized that PPP routes may provide opportunity to circumvent some of the hardship in owning public facilities including bureaucracy, corruption and inefficiency.

The Private Finance Initiative [PFI] on the other hand was a policy introduced in the United Kingdom [UK] projects, which were privately financed projects. A Private finance have been financing public sector in the pursed of their contracts, this was seen with French Canals financed by private sector in the 18th century and railways in the UK in the 19th century N. J. Smith [2008].

These contracts are typically awarded to construction firms and can last up to 30 years or longer depending on the agreement and terms of the contract

In this type of partnerships, PPP and PFI risk sharing is considered, risk that are hard to control by the party to the contract it is the client that takes those responsibility since if it occur payment have to be made for it. N. J. Smith [2008].

VI. PUBLIC PRIVATE PARTNERSHIP TYPES.

There are many types of PPP procurement contract method in which the promoter will finance, the project, operate, maintains for a given time so that a return on investment is obtained. Some of the types are:-

- *BOT* [Build, Operate, Transfer] under this type the sponsors are given opportunity to use the property for an agreed period then property is handed over to the owner.
- *BLT* [Build, Lease, Transfer] in this type the developer will be given an opportunity to rent the project out in order to regain his capital invested, then transfer the project to the sponsors based on the agreement.
- *BOOST* [Build, Own, Operate, Subsidize, Transfer] the sponsors here are allowed a subsidy to be given to the occupants of the project in order to make it financially stable for the developers.
- *FBOOT* [Finance, Build, Own, Operate, Transfer] here the sponsors are given full right of the facility for an agreed period time, and then the facility is transferred to the actual owner.
- *DBOT* [Design, Build, Operate, Transfer] in this type the developer will make design for the project and will be allowed to operate for a given time after then the ownership of the project will be transferred to the client.

VII. PROCUREMENT SELECTION CRITERIA

Having evaluated the procurement types both traditional and advance and the factors influencing their choice, selection criteria will now be listed. "The National Economic Development Organization [NEDO 1985]

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identified nine generic criteria that public sector agencies could use to select their priorities for projects". [Journal of construction engineering and management ASCE / [March, 2012] pp. 312]

The criteria according to [NEDO] are as follows:-

i. *Time:* Does it require early completion?
ii. *Certainty of Time:* To what degree does the completion is important?
iii. *Certainty of Cost:* does the project require firm price before construction is approved?
iv. *Price Competition:* Does price competition important in selection construction team?
v. *Flexibility:* Does it necessary to have variations after work has begun on-site?
vi. *Complexity:* Does the project require technological advancement in execution?
vii. *Quality:* Does the project need high quality, in terms of materials, workmanship, and design?
viii. *Responsibility:* Does it require distinct responsibility after the briefing stage or direct responsibility to the client from the designers and cost consultant?
ix. *Risk:* Does the transfer of risk for time and cost from the client important?

VIII. CONCLUSION

Having identified the factors responsible for the procurement strategy and selection, and a brief overview of the procurement methods, it will be understood that the selection of the appropriate procurement method will be one, which will be suitable to the project at hand, which will make balance between the objectives and the constraints of the project. This is because individual projects have different characteristics and each procurement method has its own peculiarities in terms of benefits, risks and weaknesses. Therefore selection of an appropriate procurement method is critical to both the client and other stakeholders of the project as it is an important factor which contributes to the overall success of the project and client's satisfaction.

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