

Procurement Method Selection for Housing Projects Using ANN

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Abstract: A structure project is one strategy for passing on a response for the particular business needs of clients, paying little mind to whether for theory, expansion or improved adequacy. Right when another structure plan is picked, rather than renting, leasing or getting existing area, there is regularly the prerequisite for a bespoke course of action that hopes to meet explicit goals. Recognizing objective and sorting out them can be a difficult work termed as the assortment of accomplices regularly that may be incorporated within the client affiliation. On account of the procurement in the construction development venture the things that impact the technique resemble kind of the undertaking, sort of the acquisition necessity, climatic conditions, other affecting powers like political, social, natural, and so on subsequently it is very important to consider out everything before choosing the acquirement methodology. Work done in the proposal considers the determination of the procurement technique based on the diverse affecting variables and past information too for which ANN is being utilized for the choice procedure. ANN is the most appropriate shrewd framework for the determination of procedure that really chips away at the past information, the ANN framework have a few states which are info, yield and concealed states. Info and yield states/layers are single in the system and concealed layer or state might be single or various based on prerequisite of the framework or the field considered.

Index Terms— Procurement, Procurement techniques, Procurement systems, ANN (Artificial Neural Network), Building structure, Construction Project.

I. INTRODUCTION

The procurement systems of building structure ventures have not transformed altogether over the most recent 25 years, however time and cost overwhelms are as yet common all through the business (Smith and Love, 2001) [1]. In a reaction to lessen the occurrence of time and costs invades, the debate that may regularly emerge, and the probability of venture achievement, elective types of procurement technique, for example, banding together and aliening have been supported (Love et al. 1998). Not all types of acquisition strategy, be that as it may, are fitting for specific undertaking types, as customer goals and needs constantly vary (Skitmore and Marsden, 1988; Love et al. 1997) [2].

Plenty of procurement techniques have been created to manage the need to effectively convey building construction projects (e.g., RICS 1996). An procurement methodology plots the key methods by which the goals of the undertaking projects are to be accomplished (NSW, 2005). NEDO (1985) recognized seven stages to effective structure acquirement:

1. Choosing an– house undertaking project official
2. Engagement of an essential counsel
3. Concern in choosing the customer's prerequisites
4. Timing the task reasonably
5. Choosing the acquirement way
6. Selecting the associations to work for the customer
7. Designating a site or working for redesigning

When the essential system for a project venture has been set up, at that point the accompanying variables ought to be viewed as while assessing the most suitable procurement technique:

➤ Exterior factors

Thought ought to be given to the potential effect of financial, business, innovative, political, social and lawful elements which impact the customer and their business, and the project group amid undertaking project's lifecycle.

➤ Customer assets

A customer's learning, the experience of the association with obtaining building ventures and nature inside which it works will impact the acquisition technique.

➤ Project Features

The size, multifaceted nature, area and uniqueness of the undertaking ought to be considered as this will impact time, cost and risk.

➤ **Capability to compose changes–**

Preferably the requirements of the customer ought to be distinguished in the beginning times of the project venture. This isn't constantly conceivable. Transformation in innovation may result in changes being acquainted with a project venture. Transformation in extension perpetually result in increment expenses and time, particularly they happen amid the development.

➤ **Cost issues**

In the event that value sureness is required, at that point configuration must be finished before development begins and configuration changes dodged.

➤ **Timing**

Requirement of majority project ventures is that to be performed inside a particular time period.

II. PROCUREMENT SYSTEMS

Acquirement frameworks or procurement can be delegated:

- Traditional (isolated);
- Design and Develop (coordinated);
- Management (bundled);

➤ **Traditional Procurement**

During the application of traditional methodology, the business acknowledges that plan work will commonly isolate from development, experts are selected for structure and cost control, and the contractual worker is in charge of completing the works. This obligation stretches out to all workmanship and materials, and incorporates all work by subcontractors and providers.

➤ **Design and Construct Procurement**

By means of design and construct procurement a contractual worker acknowledges duty regarding a few or the majority of the plan. There ought to be express reference to this in the agreement, and the degree of plan obligation ought to dependably be set out as plainly as could be expected under the circumstances.

➤ **Management Procurement**

A few variations of management procurement shape present, which incorporate; the executives contracting, development the board and plan and oversee. There are some inconspicuous contrasts between these obtainment strategies. On account of the management getting, the temporary worker has direct legally binding connections with every one of the works contractual workers and is in charge of all construction development work.

III. OBJECTIVES

- To observe the effectiveness of contract procurement strategies utilized for housing projects;
- To recognize factors that impact the determination of an appropriate procurement method for housing projects;
- To suggest a methodology for the determination of the procurement strategy,
- To examine the chose procurement technique for thought about conditions and project.

IV. PROBLEM STATEMENT

While there is a need to address the various issues influencing procurement selection, this particular study addresses the selection criteria and suitability of contract procurement systems for housing projects. Mathonsi and Thwala (2012:3583) highlighted the relevance of the architects, quantity surveyors, engineers and builders in an effort to promote best value-for- money for construction clients through advising the adoption of a procurement strategy that best addresses project objectives. However, the construction industry has yet to reach a consensus on the most effective strategy for contract procurement for housing projects.

In majority of the cases for the selection of the procurement strategies the input from the client side on the basis of certain parameters is not properly defined which actually makes it un-desirable. In the work the parameters like complete project description from client considering many parameters is done like relation between the working parties, current problems and future trends, environmental factors, political factors, etc. The analysis of the parameters is being done using the well evaluated and validated technique which actually works on the past data and considers the matching at the best, which is being termed as ANN (Artificial Neural Network).

V. LITERATURE REVIEW

According to Hughes et al. (2006) [3], affirmed that singular amount contracts may be less reasonable where speed is fundamental, or where the idea of the works isn't very much characterized. In any case, a singular amount contract does not distribute all the task hazard to the contractual worker as it's anything but a fixed cost, nor an ensured most extreme value; the agreement whole on a single amount contract is liable to change and instruments for changing the agreement total incorporate the accompanying, as attested by Love (1998)[4]:

- dissimilarity;
- temporary sums;
- fluctuations;
- expense to nominated sub-contractors or nominated suppliers;
- statutory fees; and
- Expense relating to the opening-up and testing of works.

They further depicted that an estimation contract as a 're-estimation' or a 'deliberate and esteemed' contract. Estimation contracts are gone into when the structure of works can be depicted in reasonable detail yet the real contract aggregate can't be resolved (Designing Buildings, 2017). The agreement aggregate is then determined on culmination of the development venture, in view of 're-estimation' of the genuine development work executed and offered rates (Hughes et al., 2006). Estimation contracts license a solid start of development chip away at site, before structure and working illustrations are finished up, and changes to be made to the works are moderately simple (Designing structures, 2017). In any case, Love (1998) keeps up that related dangers are unavoidable to the customer as the expense of construction development works is unsure.

A cost repayment contract, likewise alluded to as a 'cost-in addition to agreement', is an authoritative plan where the contractual worker is repaid the all out genuine expenses brought about in executing construction development works 'in addition to' an extra charge (Love et al., 1998). A cost repayment contract is utilized where the nature or extent of the work to be executed can't be satisfactorily characterized at the beginning, and the dangers related with the works are high (Designing Buildings, 2017). Therefore, the expenses for which the contractual worker is qualified for be repaid must be unmistakably expressed in the agreement.

VI. RESEARCH METHODOLOGY

The phases which are to be pursued for the determination of the acquisition system, for which it is required to quickly characterize the ANN, are following:

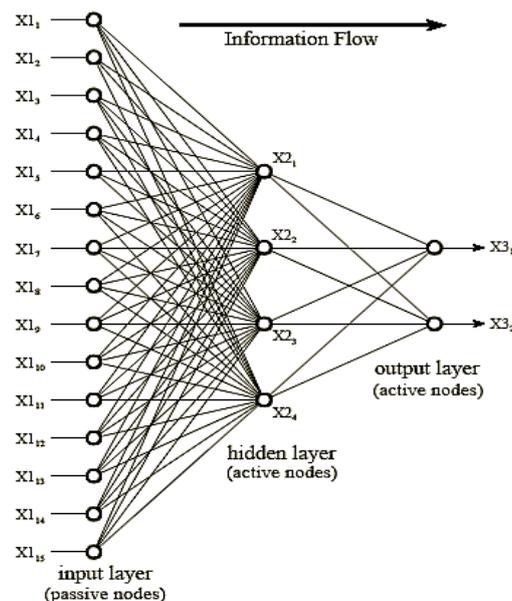


Figure 1: Working architecture of the ANN technique.

- ⇒ **Phase 1: Authentication of requirement-** Accomplish a fruitful arrangement relies on confirming the requirement for an undertaking. This procedure ought to radiate from the customer's incentive or business case for the undertaking and ought to include all partners including the individuals who will go for broke related with the venture and the individuals will's identity legitimately associated with utilizing the finished facility. The procedure should set up and organize the targets to be met by the task and the budgetary and physical program parameters.
- ⇒ **Phase 2: Assessing the selections-** Building another office probably won't be best way to meet the customer's incentive. Leasing, renting, purchasing a current office or broadening or modifying existing premises could give elective and potentially less expensive arrangements. Every choice must be surveyed and assessed at a beginning time in venture advancement. In the wake of affirming the need and surveying all alternatives, an increasingly definite case for the venture ought to be created. This will include thinking about profit for capital venture, the imaginable advantages to operational productivity or salary stream.

⇒ **Phase 3: Procurement Strategy Selection-** Choosing a task group is critical work. Colleagues ought to be chosen on the nature of their notoriety, their reputation for comparable ventures, their ability to take the necessary steps and the extent of their charges. The customer must feel good with the manner in which the experts selected will dealt with the ideal technique. Once more, the customer could hope to wellsprings of autonomous exhortation to aid the choice procedure, especially when it comes to assessing delicate bundles.

The choice of the obtainment procurement methodology exceptionally relies upon the accompanying parameters like total task depiction from customer considering numerous parameters is done like connection between the working gatherings, current issues and future patterns, ecological components, political elements, and so forth. The investigation of the parameters is being finished utilizing the all around assessed and approved strategy which really takes a shot at the past information and thinks about the coordinating at the best, which is being named as ANN (Artificial Neural Network).

⇒ **Stage 4: Project Delivery-** On the point where the task group has been chosen the venture can advance through creating introductory structure work to getting ready illustrations and reports to represent the undertaking, accomplishing arranging assent, characterizing gauges to be met and apportioning duties. Amid this period the customer (or venture support or task administrator) ought to be:

- Make sure that purchase of land is finished on schedule, if fundamental
- Make sure the plan procedure is steady with the deliberate brief
- Make sure an interior basic leadership framework is set up to evade configuration delays
- Maintain the more extensive customer association educated set up a fitting financing structure to guarantee instalments can be made.

VII. RESULTS AND ANALYSIS

For the analysis of the work descriptive study is being used where the parameters and factors for analysis are considered and evaluated with the proposed methodology and traditional methodology. In the total work the design and construction phase of the construction project is being considered and also the work talks a lot about the performance and quality as the consideration is all about the housing project.

Table 1: Analysis based of dependent parameters.

Procurement Strategy related parameters	Traditional Method	Proposed methodology
Design	Contractor and owner	Design and construction considered by same party
Construction	Contractor	After proper design by designing party
Time	No proper evaluation	On time evaluation on the basis of certain external factors
Cost	No pre-close up	Properly evaluated at the time od design
Certainty of time	medium	High
Certainty of cost	medium	High
Price competition	High	Medium
Flexibility	medium	High
Quality	medium	High
Responsibility	medium	High
Risk	medium	Low
Contractor selection	By owner	Automated technique

As per the evaluation and the data represented above in the table the parameters like cost, time, design, construction, flexibility, responsibility, risk, quality, etc are considered with some descriptive output on the basis of technique selected. In the case of the proposed methodology the design phase, construction phase and contractor selection is being done by the pre-defined techniques. As for the selection of the procurement strategy ANN is being used which actually works over the past data and pre-defined inputs and processing and reduces the chances like cost, time overrun.

Table 2: Analysis of time based factors in proposed methodology.

Parameters that affects time	Traditional method	Proposed methodology
Economic	Not defined	Pre-consideration
Commercial	Not defined	Pre-consideration
Technological	Not defined	Pre-consideration
Political	Not defined	Pre-consideration
Social	Partially	Pre-consideration
Legal Factors	Partially	Pre-consideration

During the study in table 4.2 based on factors that actually affects the time overrun for any of the project, majorly talking about the construction projects. On the basis of evaluation made the proposed methodology considers the factors like legal, technical, social, political, etc for the successful completion of the project on time.

Table 3: Quality consideration related analysis.

Quality related factors	Traditional method	Proposed methodology
Capacity for temporary worker to include an assess plan improvement.	Average	High
Adaptable to suit modify instructions	Low	High
Single point duty regarding design and development	Low	High
Capacity to manage/react to location circumstances	Low	High

Table 4: Cost related evaluation.

Cost related factors	Traditional method	Proposed methodology
Fixing the total amount of the project before making the any bonds.	Medium	High
Shifting of amount related problems	Low	High
Focused offering in current market situations	Low	High

Table 5: Evaluation depends on satisfaction level.

Performance and expectation matching factors	Traditional method	Proposed methodology
Stakeholders' satisfaction	Average	High
Project related factors	Medium	High
Client related factors	Low	High
Project management related factors	Low	High
Construction material related factors	Medium	High
Construction machinery related factors	Low	High
Construction manpower related factors	Medium	High
Cost satisfaction	Medium	High
Time satisfaction	Medium	High
Quality satisfaction	Medium	High

On the basis of above data presented in different tables it is being evaluated that the proposed methodology that actually works for the automated process of selection of the procurement strategy works efficiently as compared to other techniques or the traditional methodology. In the proposed methodology the factors that affect time, cost, quality and stakeholder satisfaction and well-handled and also proves that the things are in the process of well considering the risk management, and other management related issues.

VIII. CONCLUSION

It has proposed, choice of appropriate procurement method is the beginning step to achieve goals in construction related projects. Mainly, three most three critical parameter of project performers are Cost, time and quality.

- More effective in monitoring and control to accurate implementation and to progress the work.
- Who are related to the construction industry, they may be from public or private sector must be well known about the different procurement system, hence it will support to get good results.
- Client's authentic needs, necessities, destinations and project objectives should be properly suggested to the project group, keeping in mind the end goal is to make proper procurement strategy.
- An apparent, common system has to built up at an early phase of the project which will decide extensively what has be done, how it has be done, by whom it must be done, where it have to be done and when it must be properly finished.

Improved utilize and equivalence of data innovation is probably going to be the key, all together for development industry to have the capacity to meet the administrative, specialized and social difficulties. Improving the procurement strategy in building administration will get more advantages to deal with workforce, proprietor of the building, and the clients who are identified with support industry.

Findings reveal that traditional and design and build contract procurement strategies are cost, time and quality effective and satisfactory. The findings indicate that the traditional contract procurement system is a contractual approach that meets involved construction stakeholder satisfaction to a significant extent. Construction project objectives, such as project scope, project cost, time and quality, and project constraints such as time constraints, cost constraints, site conditions, market conditions, and government policy constraints, are the major project-related factors influencing the selection of a reasonable contract procurement strategy.

Essentially, the study posits that the careful selection and adoption of a contract procurement method that clearly defines a particular construction project objective and best addresses a project need should be adopted for clients to receive the best value-for-money on their projects, as well as to also enhance sustainable housing delivery in the construction market.

IX. REFERENCES

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