

A Survey Study Of Supplier Selection Issues In Construction Supply Chain

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ABSTRACT

It is undeniable fact that construction industry is a very important product of Gross Domestic Product (GDP) of our country. It is almost 11% of the GDP of our country. It is the second most employment providing sector after agriculture. In spite of its importance, construction industry has not made necessary managerial advancements in formation of Supply Chain to augment productivity and responsiveness in the Industry. In this research, we have made an attempt to explore and understand the nature of supply chain in Indian construction Industry with special attention to supplier selection issues.

As we all know that construction industry is an unorganised sector where a lot of individual parties in Construction Supply Chain come together to complete one project. Sometimes many Supply Chain players in the construction industry come together for only one project and on completion of the project they go their separate ways. In such a scenario it is difficult to form and understand the nature and necessity of formation of supply chain fit for use for the given project. In construction industry all the SC players involved look to safe guard their own profits and want their needs to be attended first. With such divided interests and lack of coordination between the participating members it is difficult to complete the project with minimum time and cost variance.

Many studies have taken place to improve the coordination between the various SC players of the project. Earlier researchers have already put forth their view of upstream integration in the Construction Supply Chain to reduce cost and time overrun. We argue that the key role of downstream integration has paucity in earlier research work. We believe that the suppliers and subcontractors are the key players in downstream of construction supply chain, because they are the players who actually get the work done at the construction site. We think that if suppliers and subcontractors are integrated at an early stage of a project then reduction in time and cost variation is possible. This means that inputs from suppliers and subcontractors are taken during design stage itself, then the project

schedule prepared will be more precise as the subcontractors and suppliers will be present to tell the times and the buffer that they would require to complete a certain activity; at same time they can tell us about the cost related to the activity based on the material, man-power and equipment required.

One other advantage of integrating the suppliers and subcontractors is that they know about the work to be carried out before hand and can arrange for the same in terms of material, man-power and equipments leading to reduction in time for starting an activity and at the same time reducing the cost and time wasted in making last minute arrangements.

In this paper 'A survey study of supplier selection issue in construction supply chain', we have tried to find out the factors on which suppliers are selected in construction industry in today's scenario. We think that the supplier selection is a prerequisite for integrating them in the supply chain. A client would prefer to select a supplier who is trusted and who can be capable to maintain good quality and consistent supply of materials throughout the life of the project and also the supplier should be open for long term relationship. In our study we collected the primary data relevant to our study through questionnaire. On the basis of the responses that were collected Relative Importance Index (RII) for each option for all the questions were calculated. Based on the RII values we have concluded about the various factors that play an important role in selection of suppliers in construction industry.

In this regard, we endeavour this study to integrate the suppliers/subcontractors in formation of supply chain. We argue that for the downstream integration in construction supply chain, integration of suppliers/subcontractors is the crucial link. Thus, this study has undertaken the research on supplier selection as the prerequisite for downstream integration in construction supply chain. The result of the questionnaire survey has resulted into a list of factors that will ensure integration in downstream, keeping in mind supplier selection issue.

Keywords - Supplier Selection, Downstream Integration, Construction Supply Chain Management.

I. INTRODUCTION

Facing with the new challenges, today's construction companies are striving to become better organized, increase capital base, acquire high tech equipment and material to compete with the foreign companies which are more experienced. Many companies are making the beeline for ISO: 9000 certificate. Many organizations are trying to implement Business Process Re-engineering (BPR), Total Quality Management (TQM), and Information Technology (IT). Some of the organization had even tried to implement the Enterprise level business process (ERP) software and Construction Supply Chain Management (CSCM).

Construction supply chain management (CSCM) is an emerging area to be studied. Though it is substantially different from Manufacturing supply chain, it is being inspired by it. In manufacturing supply chain management, emphasis is more on modelling volume production, whereas in CSCM is concerned with the coordination of discrete quantities of material (and associated speciality engineering services) delivered to specific construction projects. The organization and sourcing of material is becoming increasingly complex across the global construction industry. So, CSCM in terms of supplier selection is very important in today's world.

Supplier selection is the vital decision in construction supply chain. The supply chain of construction industry is primarily fragmented and needs through integration in the downstream. The extent of integration in downstream depends on the supplier selection practices of the supply chain. This study put forwards the argument that the supplier selection is the pre requisite for downstream integration in construction supply chain.

II. CONSTRUCTION SUPPLY CHAIN

Construction is a multi-organization process, which involves client/owner, designer, contractor, supplier, consultant, etc. It also is a multi-stage process, which includes conceptual, design, construction, maintenance, replacement, and decommission. From this perspective, CSC can be defined as flowing:

CSC consists of all the construction business processes, from the demands by the client, conceptual, design and construction to maintenance, replacement and eventual decommission of building, and organizations, which are involved in the construction process, such as client/owner, designer, general contractor (GC), subcontractor, supplier, consultant, etc. CSC is not a chain of

construction businesses with business-to-business relationships but a network of multiple organizations and relationships, which includes the flow of information the flow of materials, services or products, and the flow funds between client, designer, contractor and supplier.

III. SUPPLIER SELECTION IN CONSTRUCTION SUPPLY CHAIN

For many organizations effective supplier evaluation and purchasing processes are of vital importance. As the pace of market globalization quickens, the number of potential suppliers and the number of factors to consider when selecting suppliers increases. In this paper we present the critical success factors (CSFs) for supplier selection. Increased competition and globalization of markets facilitated by Internet-based technologies have combined to dramatically change the ranking of factors while introducing new criteria to the supplier selection process.

Based on the results of this study, we conclude that supplier selection criteria will continue to change based on an expanded definition of excellence to include traditional aspects of performance (quality, delivery, price, service) in addition to non-traditional, evolving ones (just-in-time communication, process improvement, supply chain management).

IV. SUPPLIER SCORING AND ASSESSMENT

When scoring and assessing suppliers, the following factors other than quoted price must be considered:

- Replenishment of lead time
- On time performance
- Supply flexibility
- Delivery frequency/minimum lot size
- Supply quality
- Inbound transportation cost
- Pricing terms
- Information coordination capability
- Design collaboration capability
- Exchange rates, taxes and duties
- Supplier viability

V. SUPPLIER EVALUATION SYSTEM

The three general types of supplier evaluation systems used today are:

- Categorical method,
- Cost-Ration method,
- Linear averaging method.

The guiding factor in deciding which system is best is:

- Ease of implementation &
- Overall reliability of system.

VI. RESEARCH METHODOLOGY

The methodology is qualitative, which explores the "insider's view" of the process, and provides independent analysis of suppliers and subcontractors selection process in construction projects. The objective is to gain access to the participant's experiential insights on supplier selection process.

The data presented in this research is primarily qualitative. The principal objective is to use the participant's experiences to find the criteria on which they select the suppliers. Specific research questions were developed for use in conducting the qualitative analysis through survey. These questions were designed to address the measures used to seek the basis on which suppliers are selected for construction projects.

The questionnaire was compiled on the basis of the following factors:

- **Selection procedure** for vendors
- **Selection criteria** considered for the selection of sub-contractor and suppliers
- **Phase in which involvement** of the suppliers and sub-contractors would significantly influence the project effectiveness
- Impact of **technical expertise** on project work
- **Testing capability** of the supplier
- **Relationship** with the supplier
- Method to encourage subcontractor towards **waste elimination process**
- Supplier's **geographical reach**
- How **resourceful** the supplier is
- **Transparency and openness** of supplier
- Expectations from suppliers to ensure **quality and timely work**
- Extent to which the **client briefing** affected decision regarding supplier and sub-contractor selection
- **Attitude of client** towards supplier selection
- **Minimum skill requirement** of subcontractors to execute the work
- Method which would ensure **proper coordination** on project work
- Cooperation of suppliers in situations to cope up with **frequent design changes**
- Impact on **material availability** due to frequent design changes
- **The incentives** provided by the client for on time delivery of the project
- Methods of preventing **complacency** on part of suppliers and sub-contractors
- Impact due to **early participation** of supplier and subcontractors in projects

VII. ANALYSIS OF RESULTS

After preparing the questionnaire, responses to the questions were collected by sending the questionnaire through e-mail. The respondents

were working professionals with engineering background. To analyze the responses given by the respondents and to get the criteria on which suppliers are selected in construction industry. Relative Importance Index method was used.

Relative Importance Index (RII) is the process where weight is given to each type of response as per the judgment of the user. In this case;

- Strongly Disagree = 1
- Disagree = 2
- Undecided = 3
- Agree = 4
- Strongly Agree = 5

Once the weights are decided then the total numbers of responses for each option of each question are found out.

Then RII for each option is calculated using the equation;

$$RII = (W_1 * n_1 + W_2 * n_2 + \dots) / A * N$$

Where W = Weight of the option as decided by user,
n = Number of responses under each option,
A = Highest weight given and
N = Total number of respondents.

The option with the highest RII for a question is the preferred option for that question

VIII. CONCLUSION

This study was carried out to find the criterion that governs the selection of suppliers and subcontractors in the construction industry.

Based on the review of literature on formation of supply chain in construction industry, we found that construction industry is too fragmented and too adversarial to adopt supply chain management practices. We believe that a Supply chain initiative in Construction industry is the way forward to reduce delays and cost and time overrun.

In this regard, we endeavour this study to integrate the suppliers/subcontractors in formation of supply chain. We argue that for the downstream integration in construction supply chain, integration of suppliers/subcontractors is the crucial link. Thus, this study has undertaken the research on supplier selection as the pre-requisite for downstream integration in construction supply chain.

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