

Review on Risk Assessment of Supply Chain Management in Construction Projects

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Abstract - Construction plays a key role in economic development of a country. It is vital for growth on account of industrialization, urbanization, and infrastructure development. Construction sector is very diverse and unorganized in nature. Also most of the construction companies are small and medium scale enterprises. Efficient and sustainable supply chain management (SCM) is pivotal for the delivery of a successful project. However, the application of SCM in construction industry is still evolving. Purpose of present study is to examine the current practices of SCM used in the construction industry and identifying the risk factors of SCM in Construction projects. To fulfill these objectives literature review approach was adopted in which various research articles were involved. The construction industries lack in implementing Supply Chain Management (SCM) concept and develop models that support the decision-making and planning. This study will ensure the effective implementation of Supply Chain Management in Construction Industry.

Key Words: Supply Chain Management, Construction Industry, SCM in Construction Industry.

1. INTRODUCTION

Construction plays a key role in economic development of a country. A construction project supply chain may contain hundreds of firms, contractors; subcontractors; material and equipment suppliers; engineering and design firms; and consulting firms etc. It remains highly fragmented and involves many small and medium size suppliers and subcontractors. Also construction projects need a high level of coordination among various stakeholders, who have conflicting interests during the life of the project and involve various short and long-term business to business relations.

Procurement of each material and service involves risks at various nodes of the procurement channel. Risk management decisions in construction supply chains and can be used for various different projects would bring enormous savings to construction firms.

The construction industries lack in implementing Supply Chain Management (SCM) concept and develop models that support the decision-making and planning. This study gives

idea about improvement in implementation of SCM in Construction industry effectively.

1.1 Concept of Supply Chain Management

SCM is a concept that started in the manufacturing industry. It is seen as a demanding innovation that is built on previous changes such as Total Quality Management (TQM) and Just-in-time (JIT). The supply chain is “the network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate customer.” Similarly, a supply chain has been conceptualized as “a system whose constituent parts include materials supplies, production facilities, distribution services and customers linked via the feed forward flow of materials and the feedback flow of information”.

In the construction sector, the supply chain presents a growing economic burden associated with poor performance and a poor quality of the final product, which leads to a low customer satisfaction and a decline in productivity and efficiency, while competition in this sector increases. This is due to the constant delays in the work site because of late deliveries, lack of integrated management and lack of collaboration between the various stakeholders involved in the project, leading to the need for a thorough analysis of these Supply chain in the industry.

Therefore, there has been an increasing interest in SCM applied in the construction industry, with the objective to understand and characterize failures and to propose solutions in order to improve the coordination of the many subcontractors and suppliers of the construction industry supply chain.

Hence, the implementation of SCM in the construction industry aims to, reduce the storage of raw materials and equipment, perform more advantageous purchases and streamline transportation, eliminate waste and add value to the final product, i.e., making the supply chain more efficient and effective. When deadlines are reliable, when service exists in case of an emergency, order placement is easy and there is a quality after-sales service, value is added to the final product, which only happens if there is a good relationship and trust between contractors, suppliers and subcontractors.

2. Methodology

Literature Review is Methodology adopted for carried out this study on Supply Chain Management in Construction Industry. For this literatures were studied which are available in Journals. From this risk factors were identified on SCM in Construction Industry.

2. 1 Literature Review

“Supply Chain Management: Effective Tool in Construction Industry” By Mulla Aneesa. I, Dr. A.K. Gupta, Prof. D. B. Desai

In this article Supply Chain Management (SCM) has been considered as a very useful tool for the management of the construction industry. This study gives the important principles and characteristics of SCM for a construction industry. Supply Chain Management is recognized as a leading process improvement, cost saving and revenue enhancing business strategy. SCM is suggested as a promising means for improving construction performance the main idea being that supply chain processes should be integrated in order to provide better customer value. However, the implementation of SCM practices might pose a number of challenges; SCM is considered to be especially problematic in relation to the construction industry.

“Supply Chain Management: A Review of Implementation Risks in the Construction Industry” By Davide Aloini, Riccardo Dulmin, Valeria Mininno and Simone Ponticelli

The research described in this paper analyzes the development of supply chain management (SCM) introduction in the construction industry, investigating the risk factors affecting the implementation of SCM principles. This study identifies a lack of construction supply chain risk management (CSCRM) literature which is mainly conceptual and descriptive and focused especially on the risk assessment phase. A total of 13 common risk factors are identified in literature and critically analyzed considering eight key perspectives. These stress the attention on the project planning phase and confirm the main contractor as the main promoter for the SCM practice.

“Supply chain knowledge management: A literature review” By Marianna Marra, William Ho, John S. Edwards

This paper aims to contribute to the debate on the role of knowledge management in supply chain management by reviewing the published literature. This review identifies various theoretical and methodological characteristics of the way in which knowledge management applications are proposed in the supply chain context. In this paper the results of a structured review of knowledge management literature in supply chain management are presented.

“Dynamic Control of Construction Supply Chain to Improve Labour Performance” By

Sungkon Moon, Payam R. Zekavat and Leonhard E. Bernold

The goal of this research is to present a proactive concept of quality control that is holistic in nature, defining quality as a function of process waste generated along the construction supply chain. To verify the proposed method, the field testing in this paper discusses the prefabricated rebar supply system of an actual construction site in Kensington, New South Wales, Australia. One of the critical tasks in the construction industry is to accomplish the required levels of quality. In considering the quality as a managerial target, former methodologies stipulated that the ultimate goal should be focused on final quality. However, with the advent of total quality management, the dynamic approach began to grab the attention of the research field. The high quality of rebar supply ensured by the master-bundle concept enabled the steel fixers to increase their productive time from 31.5 to 77.4%. As expected, this radical change was accompanied by a drastic reduction of process waste from 45.5 to 6.2%. The realization of these substantial performance improvements will rest on the industry's ability to adopt mutually supportive relationships and agile communication channels across the supply chain.

“A Study on Supply Chain Frame Work in Construction Industry” By V. Charles Durai, Dr. K. Sentamilselvan

This paper made an attempt to know the significant relationship between the respondents' demographic variables and their attitude regarding supply chain management supply chain frame work in Construction Industry. 100 samples were selected randomly from Chennai, Tamil-Nadu. Based on the objectives certain hypotheses were formulated. Statistical tools such as one-way analysis of variance (ANOVA) and Correlation method was used to analyse the data. Questionnaire and interview method was used to collect the necessary data.

The study made an attempt to identify the factors and respondent's attitude regarding the supply chain frame work in construction industry. Result concluded that respondents significantly differ in their attitude and also some factors such as firm level, project level, investment cost and Modern communication system are influenced.

3. Factors Identification

According to the methodology followed in this study literature survey and discussion were conducted in the SCM field focusing on the material supply for construction projects. For this various journals and research papers are referred from the articles published by world-wide journals: ASCE, Science Direct (Elsevier), Springer, etc.

After selecting the research papers, they were reviewed in order to identify relevant risk factors. Total of 9 risk factors are identified which will affect the SCM in material supply for construction project. These factors are mentioned below:

1. Awareness about SCM Benefits
2. Training and Instruction about SCM in an organization
3. Communication between participants
4. Number of Suppliers (Specific for material)
5. Selection of suppliers
6. SCM relationship with the supplier
 - a. Simplify the ordering process
 - b. Cost benefits
 - c. Simplify the construction process
 - d. Better quality service
7. Internal organizational functions
 - a. Transport of Material
 - b. Inventory
 - c. Storage of material
 - d. Purchasing of material
8. IT system for SCM
9. Conflict resolution procedure

These are the relevant critical factors, according to which further study will be done. Effect of these factors on SCM in construction project will be studied based on the questionnaire survey.

4. Questionnaire Preparation

Questionnaire is certainly the best known of the research instruments used for gathering information from people. Its purpose is to collect the required data from the respondents. Questionnaire will be administrated by phone call, mail or personal interview.

While designing the questionnaire, steps were followed as mentioned below:

1. Decide the information required:
The first step is to decide what are the things required to know from the respondent
2. Choose the methods of reaching your target respondents:
Following are the methods of reaching the target respondents:
 - a. Personal Interview
 - b. Mail
 - c. Phone Call
3. Decide the question content
4. Develop the question wording:

It provides the respondent with an easy method of indicating his answer- he does not have to think about how to articulate his answer. Responses can be easily classified, making

analysis very straight forward. It permits the respondent to specify the answer categories most suitable for their purpose.

5. Ordering the questions:
Following is the order to be followed:
 - a. Opening questions.
 - b. Question flow
 - c. Question variety
 - d. Closing Question

6. Check the length of questionnaire:

In general, it is best for a questionnaire to be as short as possible. A long questionnaire leads to a long interview and this is open to the dangers of boredom on the part of respondent.

7. Pre-test the questionnaire:

Test the questionnaire on a small sample of your subject first this is possible at least it on colleagues or friends. The aim here to detect any flaws in question and correct these prior to main survey.

8. Develop the final survey form:

It means designed questionnaire will be administered among the selected sample respondents to the study.

Based upon the 9 critical factors identified from the literature survey as mentioned questionnaire were prepared. By following above steps questionnaire were designed as mentioned below:

“Risk Assessment of Supply Chain Management in Construction Project”

Questionnaire Survey for the Study of M-Tech Dissertation

Surveyor’s Name: Rishikesh Sanjay Aher

Qualification: M-Tech in Construction Management (SY)

Institute: Government College of Engineering, Karad

“Questionnaire”

Part A: General Information

Name of Company: _____

Type of Project: _____

Expected Completion Duration of Project: _____

Approximate Budget of Project (if comfortable to share): _____

Name of Respondent: _____

Educational Qualification: _____

Designation of Respondent in an Organization: _____

Work experience: 1 to 5 6 to 10 11 to 15 More than 15

Gender: Male Female

Part B:

1. Your opinion about implementation of SCM in construction projects:

it can help to save cost

it can help to save time

Fig -1: Questionnaire Form

it can help to raise the quality of construction

it can improve the customer's satisfaction

no idea about it (not sure)

2. Is SCM related to your business and do you think that your organization has system in place to manage the project in an efficient way?

Yes

No

Not sure

3. Current SCM practice used in your construction projects

4. What do you think about importance of arranging training and instruction program about SCM in construction projects?

Less important

Important

More important

Very important

Not sure

5. Is there any training and instruction program were arranged by your organization about implementation of SCM?

Yes

No

Not sure

Fig -2: Questionnaire Form

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5. CONCLUSION

According to the study, various risk factors were identified from literature review and questionnaire also prepared for implementation of Supply Chain Management in Construction Industry. There is wide scope to study further on the implementation of SCM in Construction Industry. Questionnaire based Survey should be adopted for the further study.

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