

The Impact of Supply Chain Management Practice on Construction Project Performance in the Central Gujarat

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Abstract— Construction industry faces a lot of inherent uncertainties and issues. Construction companies know that it is important to improve the decision-making process in supply chain process. However, they do not know how to improve the decision making in supply chain process in relation to the needs of the organization. One reason is that a lot of companies do not have knowledge of factors and performance measure, which can support decisions in this area. To improve the decision making in supply chain process, first, it is important to know the factors (Parameters) affecting the decision making in construction supply chain process. Application of supply chain management philosophy to the construction industry has been widely investigated in recent years as effective and efficient management measure and strategy to improve the performance of construction. Supply chain management (SCM) can be considered as the coordination of distributed decision making of organization on material flow and information flow. Supplier selection is one of the important factors in Supply Chain Management. This research contains a review of various decisions making in construction supply chain management, generally used methods and factors for supplier selection by other industries.

This paper has been planned to deal with identification of factors affecting SCM, then carrying out the quantitative analysis using a questionnaire survey among engineers, contractors and suppliers by using the Relative Importance Index (RII) Method. All factors affecting SCM have been ranked using RII Method using the response acquired from stakeholders. Ranking has been carried out for each stakeholder group and also as an overall response from stakeholders.

Keywords— Supply Chain Management, Delays, Risk, Parameter, Performance Measures, Alternatives, Survey, Relative Important Index (RII).

I. INTRODUCTION

Construction business is the second largest financial activity in India. Construction industry in India can be separated into primary three market fragments: Real Estate, Industrial and Infrastructure. There is a huge venture stream into the infrastructural improvement in India. Looking at the strong future prospects and universal construction activity in the country, it is necessary to ruminates the strategies to enlarge the productivity in construction activity which seems to lag far behind in comparison to other service and manufacturing industries. Construction companies experienced a decrease in productivity and an increase in costs. Owners of these firms thought that these increase in cost were due to economic and inflation problems. Further research explained that was also attributable to poor management. In the lack of construction companies' beginning for better quality and higher productivity, the construction business has seen commoditization; where contracts are allowed along the premise of least offer. This thusly causes chop down the net revenues and industry members have been unwilling to making speculations for efficiency improvement. Current firm-particular value decrease doesn't present any reasonable favorable position in the overall marketplace. With the expanding worldwide rivalry, Indian firms need to take all the stakeholders of the building supply chain who impact the efficiency of the work of labor. This is conceivable just through more noteworthy coordination among the different members. Firms request to follow a supply chain approach to deal with worldwide standards. Rising incomes of the construction industry and strong future prospects would urge construction firms to make ventures to achieve higher efficiency.

The issue of deferrals, cost over-runs and quality non-conformance is firmly associated with the Supply Chain Management (SCM) and I consider that applying Supply Chain Management standards, Use of various strategies and store network coordination can get a noteworthy increment the profitability in construction tasks.

II. OBJECTIVES

Following are the main objectives of supply chain management:

- To identify the factors affecting the supply chain management in construction industry.
- To recognize and analyse the current traditions and challenges in the supply chain management process.
- To determine engineers, contractors and suppliers perceptions towards the relative importance of the key indicators of SCM in construction industry for the Central Gujarat region of India.
- To identify the major factors of SCM in construction industry for the Central Gujarat region.

III. RESEARCH METHODOLOGY

The data collected to determine the major factors which affect supply chain management of the project was done through a survey by explorative questionnaire to the respondents involved in daily activities of construction firms in various cities and part in the Central Gujarat region of India. The questionnaire was planned and designed so that respondents can give the rank to their answers based on their opinions. The analysis of these data was done by a ranking method named relative importance index (RII) method.

IV. DATA COLLECTION

The target population included buildings construction firms, civil engineering and material supplier of central Gujarat region of India. The stakeholders like engineers, contractors and suppliers of various cities of central Gujarat were targeted for survey. The details of different stakeholders and its numbers were gathered from internet. These details were considered as size of population to decide sample size of study.

Total 120 questionnaires were distributed to different respondents in Ahmedabad, Anand and Vadodara District. Total 92 respondents provided their response for this research work. The analysis done by relative important index (RII).

A. Relative Importance Index Technique

It is used determine the relative importance of the factor affecting SCM in construction. The similar method is going to implemented in this study within different groups (i.e. engineer, contractor and supplier). The five-point scale which ranged from 1 (Unimportant) to 5 (Very important) is adopted and converted to relative importance indices (RII) for each different factor as follows:

$$(RII) = \frac{\sum W}{A \times N} \dots\dots\dots(1)$$

Where, W is the weighting given to each factor by the respondents (ranging from 1 to 5), N is the total number of respondents and A is the highest weight. Higher the value of RII, more important was the important value of SCM.

V. RESULTS

There are mainly five questionnaire group which is based on:

- Important factors of organization supply chain collaboration
- Successful supply chain relationship with clients
- Barrier of supply chain integration
- Benefit of supply chain management
- Improved or implemented factors to manage supply chain better

Based on ranking, most to least important factors of organization supply chain collaboration is derived by RII is describe in table 1 and Fig.1. And important factors of successful supply chain relationship with clients is derived by RII is describe in table 2 and Fig. 2:

TABLE1
 Critical Factors of Organization Supply Chain Collaboration by RII Method

Rank	Factor	RII
1	Improved quality assurance	0.94
2	Increased profitability	0.94
3	Benefits to the client	0.92
4	Achievement of company goals and objectives	0.91
5	Overall supply chain reduction	0.91
6	Improved customer service	0.91
7	Cost reductions within your organization	0.90
8	Benefits to your supplier	0.90
9	Increased market competitiveness	0.88
10	Reducing bureaucracy/ paperwork	0.88

TABLE2
 Critical Factors of Successful Supply Chain Relationship with Clients by RII Method

Rank	Factor	RII
1	Creating standardization of processes	0.87
2	Simplify the whole construction process	0.85
3	Top management support	0.82
4	Manpower development	0.81
5	Reliability of supply	0.80
6	Simplify bid process	0.79
7	Closer links between demand/ supply	0.75
8	Trust	0.73
9	Mutual interest	0.69
Rank	Factor	RII
10	Free flow of information	0.68
11	More frequent meetings	0.65

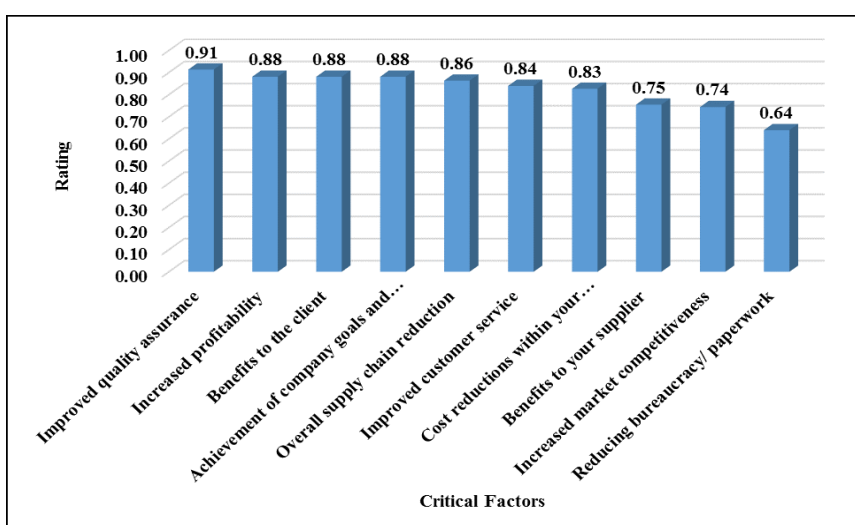


Fig. 1 Critical Factors of Organization Supply Chain Collaboration by RII Method

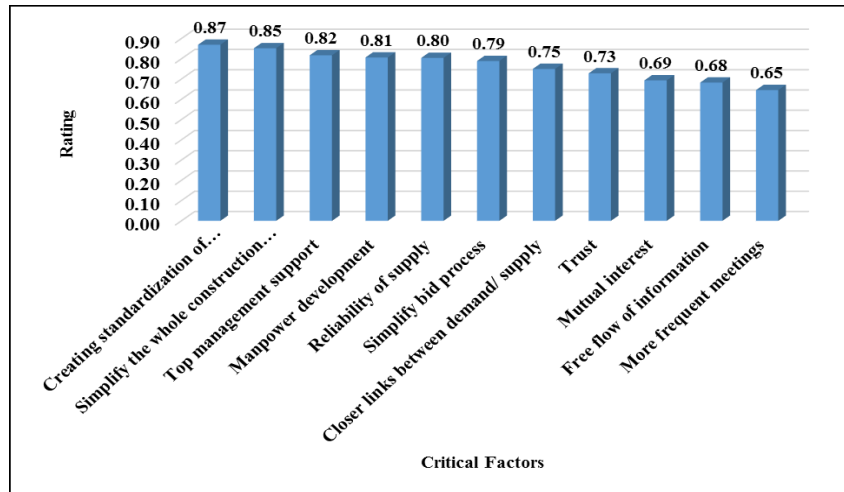


Fig. 2 Critical Factors of Successful Supply Chain Relationship with Clients by RII Method

Based on ranking, most to least important barrier of supply chain integration is derived by RII is describe in table 3 and Fig. 3:

TABLE3
 Critical Factors of Important Barrier of Supply Chain Integration by RII Method

Rank	Factor	RII
1	Late and incorrect payments	0.76
2	Inaccurate data, engineering drawings not fitting the use	0.75
3	Problematic completion due to quality problems	0.75
4	Deliveries not in conformance with planning, wrong and defective deliveries, long storage period, awkward packing, large shipments	0.72
5	Difficulties in finding out client's desires, changes of client's requirements, long procedures to discuss changes	0.72
6	Threat for substitute products	0.72
7	Design/engineering interface-incorrect documents, design changes, extended wait for architect's approval or design changes	0.71
8	Bidding process	0.69
9	Inaccurate data, information needs not met, adversarial bargaining and other changes	0.68
10	Subcontracted work not delivered according to main design, contract and planning,	0.68
11	Unresolved quality problems, delayed occupation due to late completion	0.66
12	Retention	0.65

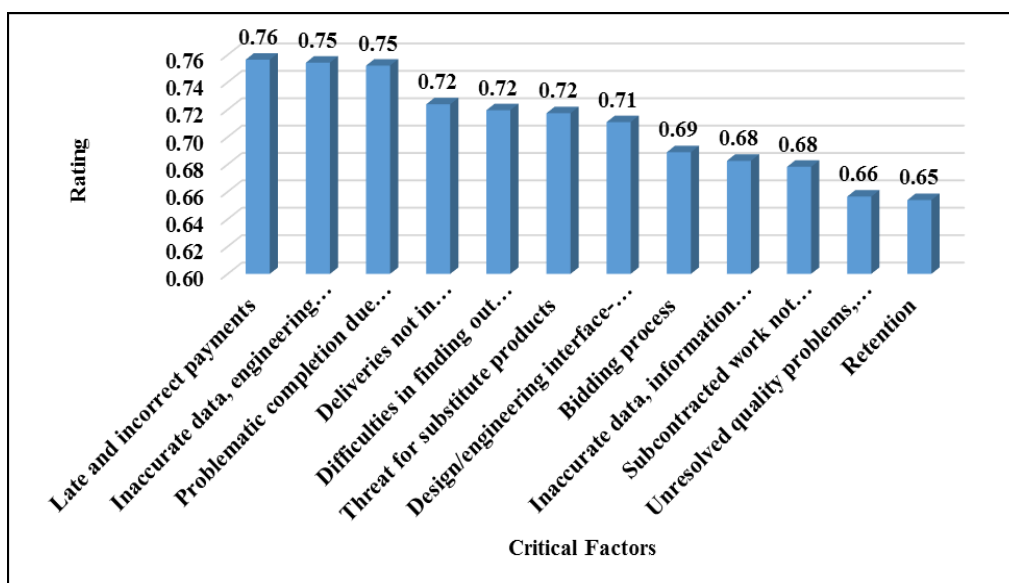


Fig. 3 Critical Factors of Important Barrier of Supply Chain Integration by RII Method

Based on ranking, most to least beneficial factors of supply chain management is derived by RII is describe in table 4 and Fig 4:

TABLE4
 Critical Beneficial Factors of Supply Chain Management by RII Method

Rank	Factor	RII
1	Cost saving	0.89
2	Better quality and quantity of information	0.87
3	Increased coordination with supplier	0.87
4	Increased coordination with client/ contractor	0.85
5	Increased sales	0.85
6	More accurate costing	0.81
7	Financial management	0.81
8	Better operational efficiency	0.80
9	Reduced inventory level	0.78
10	Resource planning	0.77
11	Reduced lead-time in production	0.77
12	Forecasting	0.71
13	Flexibility	0.65

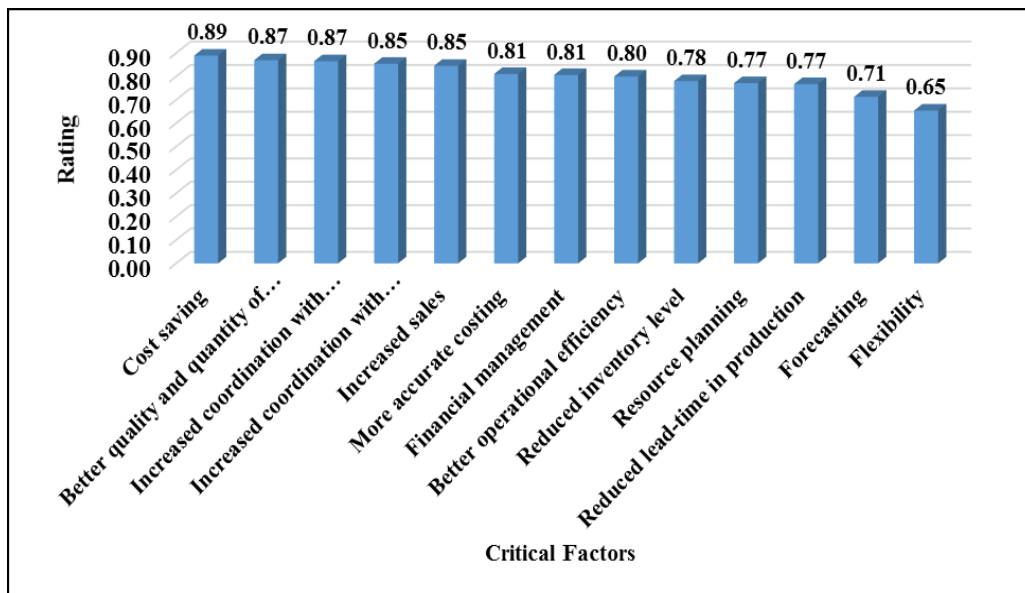


Fig. 4 Critical Beneficial Factors of Supply Chain Management by RII Method

Based on ranking, most to least improved or implemented factors to manage supply chain better is derived by RII is describe in table 5 and chart 5:

TABLE5
 Improved or Implemented Factors to Manage Supply Chain Better by RII Method

Rank	Factor	RII
1	Creating standardization of processes	0.87
2	Simplify the whole construction process	0.85
3	Top management support	0.82
4	Manpower development	0.81
5	Reliability of supply	0.80
6	Simplify bid process	0.79
7	Closer links between demand/ supply	0.75
8	Trust	0.73
9	Mutual interest	0.69
10	Free flow of information	0.68
11	More frequent meetings	0.65

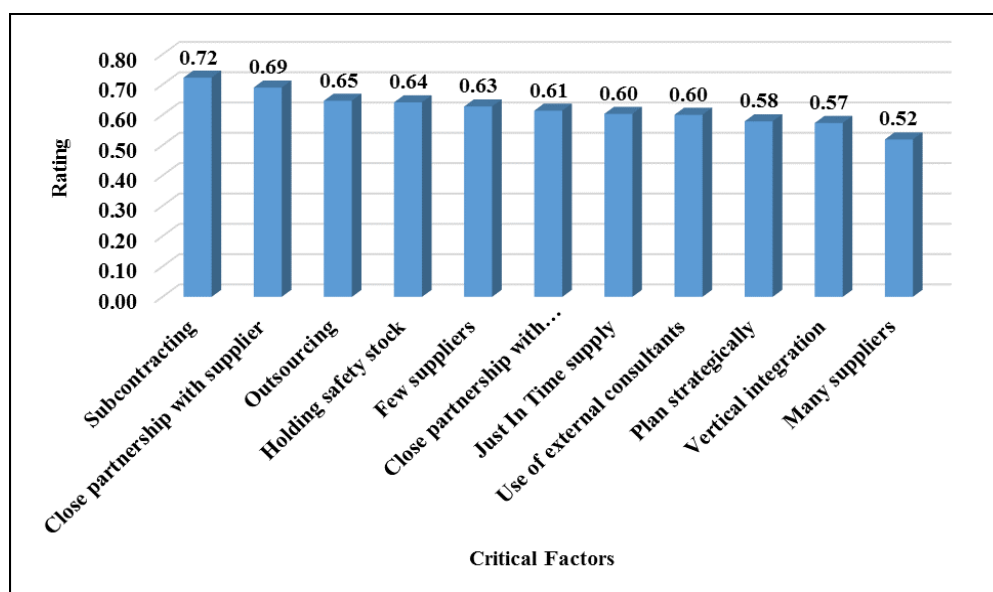


Fig. 5 Improved or Implemented Factors to Manage Supply Chain Better by RII Method

VI. CONCLUSION

This research is intended to identify the factors affecting supply chain management in construction industry. This study investigates all possible factors through a structured questionnaire distributed in three cities of Gujarat: Ahmedabad, Anand and Vadodara. The survey results are subjected to analysis, and the ranking of factors is calculated using the Relative Important Index (RII) Method.

The results from calculations of RII Method from different stakeholders' point of view indicate that the most important factors affecting SCM in construction firms are:

1. These are the following major factors to the organization supply chain collaboration: Improved quality assurance, increased profitability and benefits to the client.
2. These are the following major factors that affect the development of a successful supply chain relationship with clients: Creating standardization of processes, simplify the whole construction process and top management support.
3. These are the following major factors those are a barrier to supply chain integration: Late and incorrect payments, Inaccuracy of data, engineering drawings not fitting the use and Problematic completion due to quality problems.
4. These are the major factors that benefit to using Supply chain management: Cost saving, better quality and quantity of information and increased coordination with supplier.
5. These are the major factors that benefit to using Supply chain management: Subcontracting, Close partnership with supplier and Outsourcing.

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