

Effect of Supply Chain Management on Operational Performance: A case of Construction Industry

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Abstract: The lack of implementation of SCM in construction companies is one of the major cause that these companies does not gain Operational Performance in this competitive world. SCM is calculated on various variables. The main aim of this study is to find the effect of Partnering Members as one of the major variable related to SCM over Operational Performance. Initially the questionnaire was checked for validity and reliability. Then with the use of SEM in smartPLS, correlation and regression was evaluated and was reported as the SCM is having a strong and positive relation with operational Performance. Further research is advised as this study was having some limitation.

Abbreviations used: -

SCM – Supply Chain Management

SEM – Structural Equation Modelling

SCI – Supply Chain Integration

1. INTRODUCTION

The increasingly disruptive world has constantly evolved and impacted the way the companies does their current businesses. To maintain their successful run, companies depends upon the development of innovative supply chain tactics that would help the firm to enhance, and make profits while implementing continuous improvement. SCM is associated with the goods and services that starts from the phase of raw material to the final phase of finished goods. It is not only this movement but it includes the processes that are required while transforming the raw goods and services into finished goods and also includes the process required for the distribution of these finished materials to the end users. These SCM activities are used nowadays in the companies to maintain their competitive edge over the other companies in the same line of business, in return gaining advantage by these companies, their operational performance can be enhanced (Kristal et al, 2010).

Managers has to integrate their supply chains. They have to certify that the functions of the companies and activities that are involved are functioning congenially together. SCM works majorly to club the suppliers of the company with the distributors and finally with the customer of the company into one unified process (Lee & Kwon, 2007). For an effective and efficient management in the company, it must coordinate all the

activities of the SCM, keeping the cost to the company to the minimum and maintain the quality of the products as required (Corsten & Kumar, 2005).

A vast research is available on the current topic and it has been indicated in the literature that the majority of the organizations do not have effective management of their supply chain in perspective to develop their Operational Performance. Even though huge abundance of these kinds of research are available on SCM, still concept of SCM is at the beginning stage in constructions industries in India. So there can be a lot of work that could be conducted for effective creation, formulation and designing the supply chain framework for the intention of evaluation and calculation of the impact of SCM on the construction companies.

2. LITERATURE REVIEW

There is vast literature available on the Supply Chain Management. Review of Literature is conducted into two parts, namely SCM and Partnering Members & SCM and Operational performance.

2.1 Supply Chain Management and Partnering Members

In this section of the research paper, those research papers were reviewed and interpreted which were working on the partnering supply chain members of the SCM.

R. Spekman et al. (1998), argued on the partnerships in the supply chain members by taking into account the automobile industry of the United States. Researched used exploratory regression analysis and found buyers view cost saving aspect of the SCM as the most important factor for the enhancement of revenue. They also found that supply chains should focus more on collaborating with their suppliers. Finally they found that the trust and commitment in the supply chain members lead to customer satisfaction. Researchers suggested that the collaboration and coordination are two different criteria and to work over these aspects companies require different levels of commitment and trust.

S. Fawcett et al (2008), purposed this study for enhancing the knowledge of the academicians and practitioners on the quantitative and qualitative analysis of the barriers, benefits, and bridges fir the successful implementation of collaboration in strategic supply chains. They used triangulation method which consisted literature review, cross-functional mail survey, and 51 in-depth case analysis. Data was collected from senior managers of purchasing, manufacturing, and logistics departments. Their sample included 14 retailers, 13 finished goods assemblers, 12 first-tier suppliers, 3 lower-tier suppliers, and 9 service providers. Researchers found Customer satisfaction and service was perceived to be more enduring in comparison to cost savings.

They further found that the technology, information, and measurement systems was the major barriers for the successful implementation of collaboration in supply chain. Finally they commented that the culture, trust, aversion to change, and willingness to collaborate as issues in the implementation of the collaboration. The only limitation they had while conducting this research was that the response rate was very low, i.e., 23.5%.

Simatupang, T. M., & Sridharan, R. (2005), purposed and instrument that was to be used for the measurement of the extent of collaboration considering suppliers and retailers. They purposed that collaboration incorporated information sharing, incentive alignment and the synchronization of the decisions. Data was collected from the small number of companies from New Zealand. Researchers found that the proposed collaboration index which they prepared for the collection of the data was reliable and valid. And they also found that the collaboration was positively related to operational performance.

Simatupang, T. M., & Sridharan, R. (2005), proposed a framework integrating supply chain collaboration that is based on the reciprocal approach. Which works on interaction phenomena on the different features for collaborating performance of supply chain. Researchers composed five features, namely, collaborative performance system, information sharing, decision synchronization, incentive alignment, and integrated supply chain processes. They found that partnering with the supply chain members is essential for the enhancement of the performance of the company. Further research was purposed for diagnosing and improving supply chain collaboration.

Walker et al (2002), found there was a significant differences between project partnering and project alliancing in the process of selection, as management structure of the companies were undertaking the projects and also the nature of risks and rewards incentives. Researchers clarified the nature of project coalition and how linked member organizations were selected. Further they differentiated between the two different approaches in partnering, firstly, partners may gain rewards at the expenditure of other partners. Secondly, in associating each alliance member, positions their profit margin and the reward structure at risk. Therefore in alliancing, the whole alliance entities either benefited together or not all. Finally researchers explained changes the motivation and dynamics of relationship between alliance members.

2.2 Supply Chain Management and Operational performance

In this section of the research paper, those research papers were reviewed and interpreted which were working on the Operational performance the companies were attaining by the use of proper implementation of SCM.

Kannan, V. R., & Tan, K. C. (2005), found that there were various approaches that had been proposed for the improvement of operations performance. And particularly they found just in time, SCM, and quality management, had received substantial attention. While these three strategies were sometimes viewed and

implemented as independent and distinct, and they also could be implemented as three spikes of an integrated operations strategy. Researchers empirically examined the extent to which just in time, SCM, and quality management were correlated, and how they impacted business performance. Results demonstrated that at both strategic and operational levels, associations existed between just in time, TQM, and SCM in the organizations as their operations strategy part. Results also indicated that commitment to quality maintained and understanding of supply chain dynamics had maximum effect on performance.

Vachon, S., & Klassen, R. D. (2008), worked on the collaborative SCM for the attainment of performance in the company. They surveyed North American manufacturers, and examined the impact of collaborative supply chain practices on manufacturing performance. As per researchers, collaborative supply chain practices were defined the interactions between organizations and the supply chain members, including environmental goal setting, environmental planning, reduce pollution or environmental impacts. These practices can be directed both towards suppliers and towards customers. Researchers empirically assessed the objectives and perceptual measures of manufacturing performance by using sample of package printing industry. Researchers found SCM practices were broadest with suppliers. And in contrast, collaboration with customers granted mixed outcomes. Further they found that the upstream practices were closely associated with process-based performance, while downstream collaboration was linked with product-based performance.

Fabbe-Costes, N., & Jahre, M. (2008), analyzed papers studying the inter-link between SCI and performance, related to logistics and SCM. Researcher reviewed 38 papers published in nine important journals of logistics, supply chain and operations management during the period of 2000-2006. Multidimensional framework was used by the researchers and they structured results. They found that SCI does not always improved performance. They also found that the more SCI the better the performance. They further defined that the use empirical research was still needed to get to the bottom of the analysis. Results encouraged researchers and practitioners for becoming more cautious concerned to SCI and its impact on performance and to have conscious and differentiated view of SCI.

Martínez Sánchez, A., & Pérez Pérez, M. (2005), explored the relationship between the supply chain flexibility and firm performance using the sample of automotive suppliers. Researchers surveyed sample of 126 Spanish automotive suppliers in the month of September and October 2003. They gathered data through mailed survey to purchasing managers by using a structured questionnaire. They used Spearman correlation coefficients and analyzed the relationship between the supply chain flexibility dimensions, and firm performance dimensions, and also between supply chain flexibility dimensions and environmental uncertainty dimensions. They further used a multivariate analysis and studied the determinants of supply chain flexibility. Researchers found a positive association between performance in flexibility capabilities and firm performance, and also flexibility dimensions are not equally important for firm performance. Further results

showed that companies enhanced aggregated flexibility capabilities and were positively related to firm performance than basic flexibility capabilities. Finally, results indicated that flexibility capabilities were enhanced in supply chains with higher environmental uncertainty, technological complexity, and mutual understanding, but with lower interdependence among the agents involved in the supply chain.

3. RESEARCH OBJECTIVES AND HYPOTHESIS

Most of the researchers already have worked on SCM and they found many crucial details that are beneficial for other researchers. However it can be said that few studies are available that have researched on the construction companies relating to SCM. Therefore research question prepared for the study is, “What is the impact of SCM on the Operational performance of the construction companies?”

And objective of the study is illustrated as: -

Objective 1: To calculate the Impact of Supply Chain Management on Operational performance of the construction companies

Further for working on the study, hypothesis is framed that is based on the review of literature. Hypothesis that is based on the precise survey done on the existing researches is given below: -

H1: Proper implementation of SCM enhances Operational performance of the construction company.

4. RESEARCH METHODOLOGY

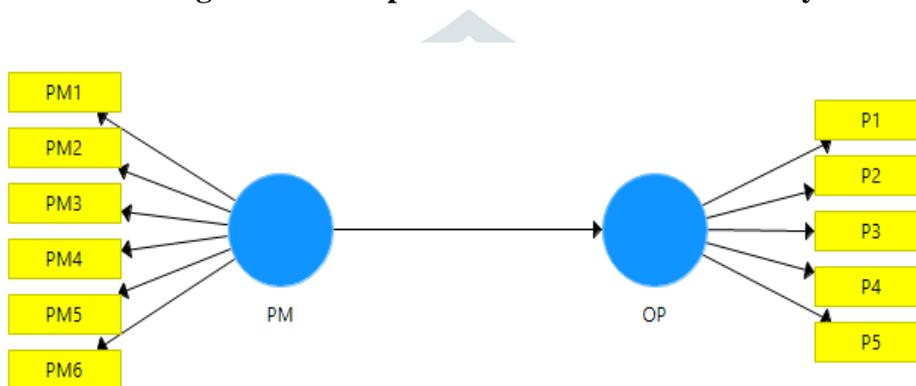
This study on SCM, takes into account one of the major variable which has been determined on the basis of review of literature and also by the through discussion with experienced people of construction companies, i.e, Partnering Members. Partnering Members means that the members of the supply chain like, suppliers, distributors, customers, etc, should be linked with the company to have an efficient and effective output in the company. For the purpose of the study, structured questionnaire as a research instrument is designed which is having two parts. First part of the questionnaire includes the basic description of the respondents and the second part includes the questions asked on Partnering Members and Operational performance. Six items are designed for Partnering Members and five items are designed for Operational performance on the basis of the items that were used in the previous studies.

The data collection is done only from the civil engineers. And also the data is collected taking into account that these engineers are working on any of the civil construction projects that is in the city of Mohali and Chandigarh, India. Mohali and Chandigarh is selected on the basis of the amount of investment that is being

put in construction in the current year. Simple random sampling is used to select the respondents for collection of the data.

Finally a conceptual framework is designed where “PM” represents Partnering Members and “OP” represents Operational performance. PM1 to PM6 are the items included in Partnering Members and P1 to P5 are the items that are included in the Operational performance and then finally SEM is applied. Using smartPLS, discriminate validity is checked first and then statistical tools, i.e, correlation and regression is applied using smartPLS to evaluate the association and depended of Partnering Members on Operational performance.

Figure 1: Conceptual Framework for the Study



5. RESULTS AND DISCUSSIONS

Researcher visited different construction sites in Mohali and Chandigarh, simple random sampling techniques is used for the collection of data by using structure questionnaire. Finally data has being collected from 113 civil engineers that are enrolled on the payrolls of the company for working in construction projects within Mohali and Chandigarh.

As explained above, the framework designed for the study is first tested for reliability and validity by using smartPLS. Below is the analysis depicted of the same: -

Table 5.1: Cronbach’s Alpha, Composite Reliability and Average Variance Extracted

	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
OP	0.945	0.958	0.819
PM	0.917	0.936	0.71

Where PM stands for Partnering Members and OP stands for Operational Performance

As per table 5.1, it can be depicted as Cronbach's Alpha value for Operational performance and Partnering Members is 0.945 and 0.917 respectively, which is greater than 0.7. This means that the data collected using the questionnaire is reliable for the study. Even Composite Reliability is 0.958 for Operational performance and is 0.936 for Partnering Members, which also are greater than 0.7, means that the questionnaire is reliable.

Average Variance Extracted is also inferred in the table and it reported as 0.819 for Operational performance and 0.710 for Partnering Members, which is greater than 0.5. This means the questionnaire is also convergent valid.

Further Discriminate Validity is evaluated. For this purpose, calculation of the square root of the Average Variance Extracted is calculated and put at the diagonal and then checked that all the remaining values both in horizontal and vertical lines are below this square root value. This method is used as Fornel and Larcker (1971) criteria. It is calculated and depicted below in table 5.2.

Table 5.2: Discriminate Validity

	OP	PM
OP	0.905	
PM	0.78	0.843

Where PM stands for Partnering Members and OP stands for Operational Performance

As per the table above, it can be concluded that the questionnaire is discriminate valid and hence the data collected on the questionnaire is valid and reliable for the study.

Further test of association (correlation) and dependence (regression) is applied and is reported one by one.

H1: Proper implementation of SCM enhances Operational performance of the construction company.

For the calculation of the above hypothesis, first correlation is used. In smartPLS correlation value is reported as path coefficient. The results are reported below: -

Table 5.3: Correlation between Partnering Members and Operational performance

	OP	PM
PM		0.78
OP		
Where PM stands for Partnering Members and OP stands for Operational Performance		

From the above table, it can be inferred that the correlation coefficient value $r=0.78$. This means that the Partnering Members is having a strong ($r>0.7$) positive association with Operational performance.

Further test is applied for calculation of the dependence on the Partnering Members with Operational performance, regression is applied and is reported below: -

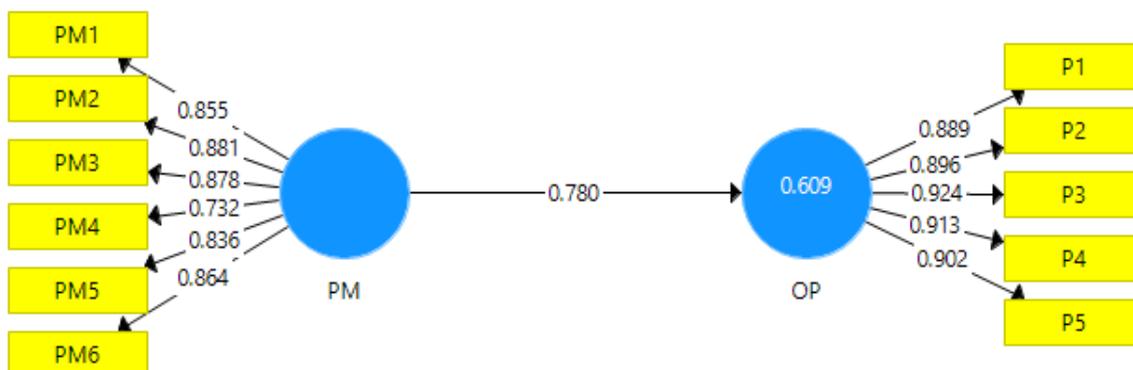
Table 5.4: Regression between Partnering Members and Operational performance

	R Square	R Square Adjusted
OP	0.609	0.605
Where OP stands for Operational Performance		

From the table above, it can be inferred that the value of adjusted R square is 0.605. Therefore it can be concluded that Partnering Members explains 60.5% relation with Operational performance.

It is depicted below, the final evaluated model of the study where “PM” represents Partnering Members and “OP” represents Operational performance. PM1 to PM6 are the items included in Partnering Members and OP1 to OP5 are the items included in the Operational performance.

Figure 2: Final evaluated model



Hence it can be inferred that the H1 is fully supported. And also the Objective 1 is fully supported.

6. CONCLUSION

In the conducted research, following conclusion can be inferred: -

- For the proper implementation of the SCM, there is a need of proper training programs, as the implementation of these practices is at the early stages in construction companies.
- If construction companies implement SCM in an effective and efficient way, they can achieve better competitive edge over the other competitors in the industry.
- Hypothesis testing done on Partnering Members and Operational performance shows that the relation is strong and positive and Partnering Members also explains 60.5% of the impact on Operational performance

7. LIMITATIONS AND FUTURE RESEARCH

Studies conducted in similar to this study and other studies also have limitation in their research. For conducting this study there were some limitations as well. Below are the limitation of this study: -

- The area of the study was limited to Mohali and Chandigarh only, so for further studies the area of the study can be increased to have more accurate results.
- Respondent that were selected in the study were only civil engineers, so for further studies along with civil engineers, other engineers and managers could be taken into account, so that the inclusion of all the dimensions of the company could be considered.
- The industry picked for the study was on construction industry, so the results are limited to construction industry only. So in future, respondents could be selected from more all the other sectors as well, for the better attainment of the results.
- Only one major variable of SCM was taken into consideration in this study, so for further studies more variables could be taken into account, so that the all-round effect of SCM could be calculated.

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