

Effect of Supply Chain Integration on Operational Performance in Manufacturing Industries

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Abstract— This paper presents the study of Supply Chain integration and its effect on operational performance in manufacturing industries. The study conduct by literature review followed by questionnaire survey. The survey explored the extent level of integration with supplier, customer and internal integration. The study also examines the factors on which supplier, customer, and internal integration depend. The study reveals that the level of integration with the supplier are the most important indicators, followed by internal integration (within the company), and finally level of integration with customers. In addition, empirical results indicated that there are strong inter-relationships and interactions among the three components of Supply chain integration and between them and operational performance. Finally, the results showed that the respondents believe that there is a strong relationship between SCI and OP.

Keywords: Supply Chain Integration, Supply Chain Operational Performance, Manufacturing Industries

I. INTRODUCTION

For smooth flow of resources in a supply chain, one is needed for the improvement of cross-functional teams as organizations with process-oriented structure. According to Trent and Monczka (1994), such teams help to improve supply chain effectiveness. They eliminate functional and departmental boundaries and overcome the difficulties in specialization. According to Fawcett (1995), this cross-functional teams can distribute the knowledge of all activities by which we can add value, in short, value-adding activity. These activities are such that no one has complete control over the process. Such teams contribute to the construction of modern supply chains by encouraging the integration of organizations with suppliers and customers. Supplier partnerships and strategic affiliation refer to the mutual and more exclusive relationships between organizations and their upper suppliers and lower customers. Today many companies have taken strong steps to break down both inter and intracompany obstacles to form partnerships, with the objective of decreasing uncertainty and increasing control of supply and distribution channels. Such relationships are framed to increase the financial and operational performance of each channel member through the reduction in cost and inventories and increased sharing of information (Maloni and Benton, 1997). Rather than concerning themselves only with price, manufacturers are looking to suppliers to work cooperatively in providing improved service, technological innovation, and product design. This development has produced a significant impact by expanding the scope of SCM through greater integration of suppliers with organizations.

It was shown that there is a well-built relationship between supply chain integration and performance. Some

researchers claimed that there is a strong relationship between supplier, internal and customer integration and also organizational performance, other researchers comments the existence of the relationship between upstream and downstream interactions and operational performance, another group of researchers defines the certainty of the relationship between supplier, internal, and customer integration with the overall organizational performance. The process of collaboration within supply chain players that manage inter and intra-organization activities to achieve effective and efficient flow of products, services, and information to provide a maximum value to the customer in right place at the suitable price and high

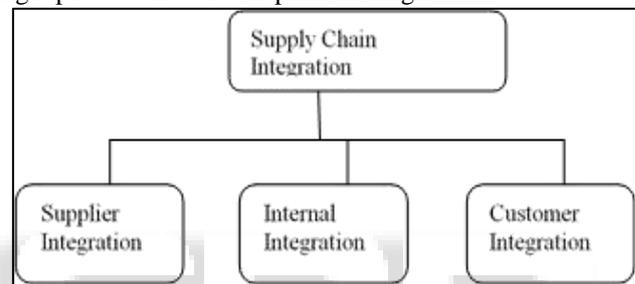


Fig. 1: Supply Chain Integration

Scannell, et. al. (2000) concluded that supply chain challenges were positively associated with measures of transportation and delivery speed. Salvador, et. al. (2001); Frohlich and Westbrook (2001); and Vickery, et. al. (2003) found a positive and direct relationship between information communication technology and supply chain integration. Chen and Paulraj, (2004) said that: internal integration of different departments within a firm should act as the integrated process. Kulp, et. al. (2004); Gimenez and Ventura, (2005); and Fynes, et. al. (2005) showed the importance of downstream integration. Bagchi, et. al. (2005) stated that supply chain integration shows some effects on operational performance, and the integration influences cost and efficiency.

II. LITERATURE REVIEW

The main belief between researchers is that supply chain integration has both strategic and operational significance and facilitate firms to become more and more competitive (Lambert et al., 1998; Frohlich and Westbrook, 2001, Pagell, 2004; Fabbe-Costes and Jahre, 2008; Van der Vaart and Van Donk, 2008; Yeung et al., 2009). Many studies have found that integration across the supply chain has a positive impact on the performance of firms whilst others have proved that integration has a positive impact on supply chain performance (Narasimhan and Kim, 2002; Lee et al., 2007) and operational performance (Frohlich and Westbrook, 2001; Chen et al., 2007; Flynn et al., 2010). Lee (2000) viewed the main benefits of the integrated supply chain in terms of cost reduction, but also an increased value for the focal firm, its

shareholders and the supply chain members. Yeung et al. (2009) assumed that "the rationale behind supply chain integration is to combine partners' resources and perspectives into a firm's value propositions, thus allowing all firms in a supply chain to excel in performance".

supply chain integration comprises individual investment in the relationship and uniform procedures between a group of firms, supply chain integration is hard to replicate by competitors (Chen et al., 2009a; Koufteros et al., 2010) When a buyer and supplier work closely in a synchronized way, this leads to acquiring transaction-specific know-how (Grant, 1996; Schoenherr and Swink, 2012; Blome et al., 2014).

A. Relationship between Supply Chain Integration and Operational Performance

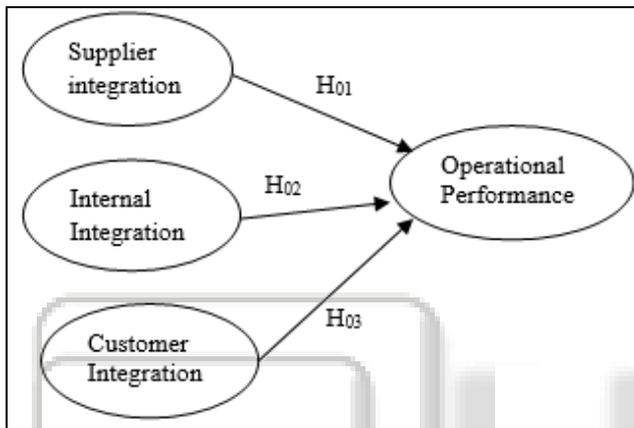


Fig. 2: Structure of Hypothesis

Nevertheless, the validity of integration was questioned by some authors (Cousins and Menguc, 2006; Flynn et al., 2010; Danse, 2011; Danese and Romano, 2011). The empirical findings from Flynn et al. (2010) indicated that external supplier integration did not improve operational performance. However, their study did not focus on a specific industry and was limited to studying supply chain in the cultural context of China. Bask and Juga (2001) discussed that complete integration is not essentially the best solution in all cases instead of limited integration, as it might be helpful in some areas. Danese and Romano (2011) analyzed the impact of customer integration on efficiency and the moderating role of supplier integration. This study suggested that customer integration improves efficiency, it is not essential. However, supplier integration moderates the relationship between customer integration and efficiency.

Some researchers claimed that there is a strong relationship between supplier, internal and customer integration and also organizational performance, other researchers comments the existence of the relationship between upstream and downstream interactions and operational performance, another group of researchers defines the certainty of the relationship between supplier, internal, and customer integration with the overall organizational performance.

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Bagchi, et. al. (2005) stated that supply chain integration shows some effects on operational performance, and the integration influences cost and efficiency. Swink, et. al. (2007) and Flynn, et. al. (2010) indicated that external integration pointed out the importance of cooperation and collaboration with suppliers and customers.

III. RESEARCH METHODOLOGY

The questionnaire was developed in order to achieve objective. Data collected through survey and interviews of employees of manufacturing industries. Some part of data collected through Google forms and some data are collected by hardcopies thereby surveys.

A. Questionnaire Design

The questionnaire consist of four section and all sections have a separately self-rating five point Likert scale (1-very poor, 2-poor, 3-neutral/fair, 4- good, 5-very good) to evaluate the respondent's level of agreement and disagreement with statements relating to variable. These statements are related to supply chain integration- supplier integration, internal integration and customer integration. Beside these variables the questionnaire included city, type of industry, type of products and no. of employee. The questionnaire consist of four section, each section collects specific type of information.

B. Data Collection

The constructs incorporated into this theoretical model are defined and described with a focus on manufacturing firms. Considering this data was collected through two ways, Primary and secondary data:

1) Secondary Data:

Data was collected from different sources such as journals, working papers, researches, thesis, articles and worldwide Web and Manufacturing organizations.

2) Primary Data:

Data was collected by the extensive survey by questionnaire. Surveys were conducted via Google forms and direct filling up the hard copies of the questionnaire in.

The data was collected from 92 qualified samples of various manufacturing firms. Eligibility for participation in the questionnaire survey was based on an employee being a technical professional and working as a manager in the supply chain and production activities. A total of 300 questionnaires were distributed; 102 responses were received, in which 92 responses were usable after deleting and sorting the missing values and reliability. This is given a 30% response rate.

C. Hypothesis

In this era, the supplier and customer are the very important factor to gain competitive advantages. Online order taking, order processing speed, responding quickly are the major factors to consider. To obtain better operational performance with respect to supply chain integration (Supplier, Customer,

and Internal) there has to be some hypothesis to be developed as shown in figure 1.

- H₀₁:- Supplier integration shows the positive effect on operational performance.
- H₀₂:- Internal Integration shows the positive effect on operational performance.
- H₀₃:- Customer integration shows the positive effect on operational performance.
- H₀₄:- Supply chain integration shows the positive effect on operational performance.

D. Data Analysis

Descriptive statistics was used to analyze empirical data. Internal consistency of variables of supply chain integration and its operational performance were tested by using SPSS 25.0 (data analysis software). In order to present and collate information from the respondents, data were tabulated, mean and standard deviation calculated. First of all in the reliability test, Cronbach's alpha coefficient, which ranges from 0 to 1 based on the average interior correlation, was employed. The reliability testing of the variables gives the value of Cronbach's alpha is .81 which is greater than 0.6, which indicates the good consistency of information.

Cronbach's alpha value $\geq .70$ and therefore it is reliable.

Regression analysis is used to obtain a linear relationship between supply chain integration and operational performance. The linear Regression feature of SPSS used to make regression analysis finding the regression, It is seen that the high integration level of the supplier on operational performance ($\beta=.670$, $p=0.000$). Findings show that high impact of level of integration within the company on operational performance ($\beta=.620$, $p=0.000$). And also the high impact of customer integration on operational performance ($\beta=.562$, $p=0.000$) in a positive way. This information shows that the hypothesis shows the positive effect. Supplier integration takes the first rank with operational performance then internal integration at second and last one is customer integration. There is a strong relationship between SCI and operational performance.

S. no.	Factor	No. of variables	Cronbach's Alpha	No. of Cases
1	Level of Integration with Supplier	5	.757	92
2	Level of Integration within Company	4	.825	92
3	Level of Integration with Customer	5	.800	92
4	Operational Performance	7	.876	92

Table 1: Reliability Test Analysis

IV. RESULTS AND DISCUSSION

The current study shows that there is a significant importance of the supply chain integration among manufacturing industries. The researcher refers this result to the awareness of the managers, supervisors, and other employees who work

in manufacturing industries about the importance of supply chain integration and its effect on the overall operational performance. All independent variables have a high degree of integration (supplier, internal, and customers). The researchers believe that the first and high level of integration is concern to the customer integration which is actually the most important variable among supply chain integration because customer satisfaction is the ultimate goal that all organizations seek to achieve, internal integration(Within the company) is the second level of integration as it is the key element between supplier integration and customer integration, and it is impossible to achieve either supplier integration or customer integration without internal integration. Finally, supplier integration is ranked in the third level and that's may refer to the respondents believe about the high importance of customer and internal integration because of the difficulties in satisfying customer needs and requirements and to change the employee behaviors and attitudes toward new culture. The study showed that there are strong inter-relationships and interactions among the three components of SCI and between them and OP. in conclusion, the results showed that the respondents believed that there is a strong relationship between SCI and OP.

Data analysis shows that the internal integration was having the highest effect on OP, followed by supplier integration and finally customer integration. These results are going with a line with the most of previous studies, such as Wong, et. al. (2011) described a model which shows that there is a positive relationship between supply chain integration elements and operational performance elements as well. Jin, et. al. (2012) also showed that the integration positively related to operational performance and firm performance - primarily through its influence on productivity and customer service.

V. CONCLUSION

There is a significant importance of supply chain integration among the manufacturing industries. And there is the high importance of the supply chain integration variables in the Manufacturing industries field. Results indicate that Manufacturing industries are well organized since the supply chain department are available at each organization. The study shows that supplier integration has an impact on the operational performance of Manufacturing Organizations. These results concur with the two studies: Peterson (2005) showed that the supplier involvement has a positive impact in new product development and made significant improvements in financial returns as well, and Saeed et. al. (2005) showed that the external integration enhanced the manufacturing firms' process efficiency.

There is a high importance of the operational performance variable in Manufacturing Organizations and the overall result indicates that there is a significant importance of the operational performance dimensions among manufacturing industries.

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