Benefits of Strategic Supplier Integration in Manufacturing Industry

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Abstract

Traditionally, research into antecedents, characteristics and outcomes of supplier integration has mainly focused on integrating suppliers into new product development. What is urgently needed is more comprehensive analysis of supplier integration activities. This research, which is based on responses from 100 industrial firms as well as supplementary interviews with purchasing executives, develops the notion of the phase differentiated approach toward supplier integration. It further provides insights into supplier integration. It further provides the insights into supplier integration in the development phase and supplier integration in the industrialization phase with respect managerial approaches, and the benefits sought by the buyer and supplier. Additionally results of an industry level analysis examine how various industries approach supplier integration.

Key Words: Supply Chain Management, Supplier Integration, Competitive Advantage.

1. Introduction

The importance of supplier management has grown enormously in recent years, driving by factors such as the trend toward focusing on core competencies, the demand for outside sources of innovation and efforts to make management more lean an agile. Superior suppliers bases and relationships assists firms throughout the development of new products, services and process, and contribute to long term quality improvement, delivery performance, and cost reductions. The above factors reinforce the criticality of continued research attention on supplier relationships and the nature of the supplier base.

2. Literature Review

Managing suppliers is an essential issue for today’s industrial firms as a means for achieving sustainable competitive advantage. Supplier Management encompasses “planning, implementing, developing and monitoring company relationship with current and potential suppliers (wagner 2000) or “organizing the optional flow of high quality value of money materials or components to manufacturing companies form a suitable set of innovative suppliers” (Goffin, szwejczewski, supplier management activities into three categories management of the supplier base (e.g the selection of the supplier and the reduction of the supplier base) supplier development (i.e. long term efforts of a firm to upgrade its suppliers capabilities or performance) and supplier integration.
Supplier integration is a pivotal supplier management activity and can be defined as the combination of internal resources of the buying firm with the resources and capabilities of selected key suppliers through the meshing of intercompany business process to achieve a competitive advantage. Some scholars have criticized the tendency to focus on supplier integration activities in new product development, neglecting integration activities in new product development, neglecting integration activities in the other situation. Such as a process development and improvement (McGinnis and Mele Vallopra 1998; McGinnis and Mele Vallopra 1999) or collaborative value analysis (Hartley 2000).

3. Need for Study

The current research proposes a phase differentiated approach toward supplier integration. Analyzing activities with respect to suppliers integration in various phases sheds lights on how firm seek to utilize their suppliers capabilities in order to attain sustainable competitive advantages.

In the next section of the article, sampling procedures and validation methods of the empirical research are briefly described in the subsequent sections, the foremost statistical analyses are presented and the results discussed. Section five describes the degree to which firms integrate their suppliers in selected consecutive stages. The results of a factor analysis will show in section six that distinct phases are of major concern for companies in their supplier integration strategies. The impact of moderation issues such as firm size and firm disposition toward supplier integration will be investigated in section seven and eight. The final two sections sum up with conclusions as well as recommendation for further research.

4. Research Methodology

4.a) Quantitative Inquiry

Quantitative data were collected as part of a major empirical study investigating supplier management practices in multiple firms. To assess the broader research questions a four page questionnaire was designed and reviewed by academicians and practitioners for readability, clarity and comprehensiveness of the measurement instrument. Minor changes were suggested
and incorporated in the final questionnaire. In addition a pilot test was conducted. Questionnaire items requested general information about the responding business unit and its suppliers (e.g. the company’s industry type of manufacturing annual sales purchasing volume, number of suppliers) the business units uses of supplier management practices and questions on supplier integration.

The main mail survey was administered to large industrial firms in Bangalore, which can be classified as North Bangalore, South Bangalore, East Bangalore, West Bangalore and Central Bangalore. Top level purchasing decision makers were selected as informants. They were the most highly ranked purchasing executives, department heads, or purchasing managers. Respondents were asked to answer for their business unit.

4.b) Qualitative Inquiry

Phenomena in today’s business, such as the collaboration between firms and their suppliers, are inherently complex and multifaceted. If researchers can combine modes of inquiry (i.e. quantitative survey research and qualitative data), additional data richness can capture and explain business phenomena more comprehensively.

Given the intent to better relate and interpret the findings of quantitative analyses, the research design further involved interviews with several firms subsequent to the qualitative inquiry matches the research objectives of the article. In addition the literature shows ample precedent for qualitative research and verifies its applicability in inter firm buyer seller relations, supply chain management (SCM) logistics and purchasing research (Ellarm 1996).

The data gathered in these interviews helped to better understand findings from the quantitative inquiry, thus providing a critical perspective from which to view the research

5. Intensity of Supplier Integration

The starting point for all further analysis was the intensity of the firms’ supplier integration efforts in below mentioned predefined stages. When analyzing the intensity of supplier integration in each stage, industrial firms on average integrate suppliers only marginally in the very early stage of strategic product planning (mean= 1.08 with 0.00 representing “not at all” and 4.00 representing “very intensive”) and in the late stage of customer service (1.30). the most intensive integration of suppliers takes place during design specification (1.64) pilot production (1.70) and production (1.69) During the stages product concept (1.37) and manufacturing engineering (1.47), suppliers are slightly integrated (Table I) A series of ( 7/2) = 21paried samples t-tests confirms that the majority of the mean differences are significant with the exception of the six pairs S2/S4, S2/S7, S3/S5, S3/S6, S4/S7, and S5/S6, all differences were significant (t>2.159;p>0.05)
Table I  Intensity of Supplier Integration

<table>
<thead>
<tr>
<th>Stage</th>
<th>Mean</th>
<th>St. Dev.</th>
<th>N</th>
<th>Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1 Strategic Product Planning</td>
<td>1.08</td>
<td>1.02</td>
<td>165</td>
<td>S1 S2 S3 S4 S5 S6</td>
</tr>
<tr>
<td>S2 Product Concept</td>
<td>1.37</td>
<td>1.01</td>
<td>167</td>
<td>0.64</td>
</tr>
<tr>
<td>S3 Design Specifications</td>
<td>1.64</td>
<td>1.21</td>
<td>168</td>
<td>0.35 0.65</td>
</tr>
<tr>
<td>S4 Manufacturing Engineering</td>
<td>1.47</td>
<td>1.17</td>
<td>164</td>
<td>0.38 0.6 0.64</td>
</tr>
<tr>
<td>S5 Pilot Production</td>
<td>1.7</td>
<td>1.26</td>
<td>164</td>
<td>0.37 0.52 0.54 0.68</td>
</tr>
<tr>
<td>S6 Production</td>
<td>1.69</td>
<td>1.23</td>
<td>169</td>
<td>0.22 0.41 0.39 0.62 0.62</td>
</tr>
<tr>
<td>S7 Customer Service</td>
<td>1.3</td>
<td>1.14</td>
<td>166</td>
<td>0.26 0.39 0.32 0.45 0.38 0.54</td>
</tr>
</tbody>
</table>

Answers were coded: 0.00 = “not at all”; 4.00 = “very intensive”
All correlations are significant at the 0.01 level (2-tailed)

Summarizing these findings, one can argue that first of all manufactures are generally very hesitant with respect to integrating suppliers. None of the means are close to the scale average of 2.00. Some executives indicated that in general, supplier integration demands a foundation on which these strategies and process can be coordinated and that many companies have not yet fully developed these platforms.

6. Composite Supplier Integration Phases

Given the exploratory nature of this research, facto analysis was performed to indentify whether on large number of possible integration stages could be reduced to a simpler structure with a small number of phase relevant for supplier integration.

Principal component analysis was used with a limiting eigen value of 1.0 for varimax rotation. Table II shows the two factors identified. The communalities i.e. the degree of variance explained are (except for the variable S7) larger than 0.600. The two factors extracted have eigen values greater than 2.0 and explain more than 70 percent of the variance. All factors loadings are above the threshold for “high” loadings of 0.5 and all variables load noticeably on only one factor.

In essence, customers were asked how they work with suppliers along different stages. The stages were considered the value added chain. The analysis resulted in two distinct factors because supplier integration in the development phase and industrialization phase is the result of distinct philosophies, approaches and responsibilities with regard to supplier integration. The
first phase is dominated by the literature of innovation management, marketing and purchasing, while SCM and operations management are most prominent in the second phase.

Table II  Factor Matrix for Supplier Integration Phases

<table>
<thead>
<tr>
<th>Stages</th>
<th>Factor Loadings</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Development Phase</td>
<td>Industrialization Phase</td>
<td></td>
</tr>
<tr>
<td>S1 Strategic Product Planning</td>
<td>0.861</td>
<td>0.039</td>
<td></td>
</tr>
<tr>
<td>S2 Product Concept</td>
<td>0.839</td>
<td>0.345</td>
<td></td>
</tr>
<tr>
<td>S3 Design Specifications</td>
<td>0.636</td>
<td>0.45</td>
<td></td>
</tr>
<tr>
<td>S4 Manufacturing Engineering</td>
<td>0.484</td>
<td>0.717</td>
<td></td>
</tr>
<tr>
<td>S5 Pilot Production</td>
<td>0.411</td>
<td>0.709</td>
<td></td>
</tr>
<tr>
<td>S6 Production</td>
<td>0.113</td>
<td>0.881</td>
<td></td>
</tr>
<tr>
<td>S7 Customer Service</td>
<td>0.125</td>
<td>0.719</td>
<td></td>
</tr>
</tbody>
</table>

Eigen Values (after rotation)       2.633  2.282
Variance Explained                  70.22%

Rotation converged in three iterations
Extraction method: principal component analysis
Rotation method: varimax with Kaiser normalization

7.a Supplier Integration in the Development Phase
Activities in the product development phase include all procedures that guide the strategic planning, conceptualization, design and engineering of new products. Firm increasingly extend these activities and integrate internal company resources with the critical resource of suppliers.

Previous studies have shown that companies should consider several issues when actually integrating suppliers in the development places. They must adapt their process, organizations and behavior in order to take full advantage of supplier integration in new product development (Ragatz, Handfield and Scannell 1997’ Wynstra, van weele, and Weggermann 2001).

7.b Benefits of Supplier Integration in the Development Phase.
Firms have recognized that the ability to extend product development activities across organizational boundaries can provide competitive advantage for the buying firm as well as the supplier.
Scholars have identified numerous benefits arising from the involvement of suppliers in the development process rather than working independently when it comes to time-to-market of new products, product quality and development cost. Supplier integration in the development phase can also help firms share risks, conserve resources, gain new competencies and move faster into new markets. Accordingly, firms continue to integrate suppliers earlier in their product development projects and to a greater extent.

8.a Supplier Integration in the Industrialization Phase

The cutoff - stages up to S3 load on the factor "development phase" and stages from S4 to S7 on the factor "industrialization phase"-seems plausible. Industrialization begins with manufacturing engineering and pilot production, followed by full-scale production and customer service. With the beginning of manufacturing engineering, responsibilities are traditionally handed over from marketing and R&D to manufacturing and operations. At this point, product architecture, layout, and product features have typically been frozen (design freeze). Hence, when companies set up manufacturing processes, the production supplier is fixed.

The overall goal of supply chain design is to increase customer satisfaction, but the particular goal in the industrialization phase - as compared to the development phase - shifts from superior product design combined with short development time (differentiation strategy) or low product cost (cost leadership strategy) to fast, agile and cost efficient product manufacturing and reliable delivery and after sales service through shared operational linkages.

Likewise, several managers interviewed pointed out their companies' approach toward suppliers shifts from comprehensive project oriented activities to transactions oriented improvements in exchange goods and services procured.

8.b Benefits of Supplier Integration in the Industrialization Phase.

Manufacturing companies implementing supply chain strategies and programs and enhancing personal and electronic communication aim for one or several of the potential benefits of supplier integration in the industrialization phase. The potential results are better and more stable quality, improved logistics, lower stock levels, and lower costs. Moreover, customer requirements such as reliability, delivery times and flexibility, order fill rate, order status information, spare part availability, etc, will reach a higher level and customer satisfaction will increase (Christopher 1998; McGinnis and Mele Vallopra 1998; McGinnis and Mele Vallopra 1999), making the focal company more competitive in the long run (Christopher 1998). Supplier
integration in the industrialization phase, e.g., through JIT delivery systems, goes along with more frequent deliveries and results in substantially higher turnover rates and lower stock levels. Overall, reduced costs are practically the combined result of the aforementioned benefits. Therefore, it is advantageous for suppliers to assume an increasing prominent role in their customers' business processes.

9. Implications for Purchasing Professionals

From the preceding analyses of the intensity of supplier integration, the composite supplier integration phases and the firm characteristics, as well as the discussion of these analyses, several broad implications for purchasing managers can be concluded.

Manufacturing firms are still quite cautious in their supplier integration efforts. Given that they integrate suppliers, they tend to vary the intensity of supplier integration to a certain degree. If supplier integration efforts are to be successful, firms must invest enormous amounts of resources and management capacities. Setting up intercompany communication and information systems, co-locating supplier personnel, sharing technology, or investing in physical assets are only a few examples. As any firm's resources are inevitably limited, the firm can integrate only a small number of carefully selected suppliers. Otherwise, the potential benefits may not justify the effort.

10. Conclusions

There is ample evidence in the literature that professional supplier management and full utilization of supplier relationships are an important source of competitor advantage. Supplier integration is widely considered as one important building block of companies' supplier management practices.

This article has empirically analyzed the current status of supplier integration on firm level and industry level based on the responses of 100 highly ranked purchasing executives from a wide range of firms. The results indicate that industrial firms still do not integrate suppliers very intensely in internal processes, vary the intensity of supplier integration over time, distinguish between supplier integration in the development phase and supplier integration in the industrialization and manage these activities differently. In order to realize the benefits of supplier integration, it is proposed that firms should look after at supplier integration more systematically and in a wider context.

Limitations of the study

As this research on supplier integration was part of a larger research undertaking on supplier management, the research scope had to be focused. Apparently, the study has various limitations.
that suggest several avenues for future research. First, the study was confined to the buying firms perspective. Future studies might take a dyadic or even a network perspective and apply more elaborate research designs. Related to the first limitation, the buyer-supplier relationship was not explicitly addressed in the quantitative study. Third, the study was intentionally limited to larger firms. In future research, small and medium size firms should be included to explain differences in supplier integration based on firm sizes.

References


