COLLABORATION IN SUPPLY CHAIN MANAGEMENT:

CHALLENGES AND OPPORTUNITIES

By

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The thesis entitled 'Collaboration in Supply Chain Management: Challenges and Opportunities' being submitted by KS Bhoon to the Indian Institute of Technology, Delhi for the award of the degree of Doctor of Philosophy (Ph.D.), is a record of bona fide research work carried out by him. He has worked under my supervision and has fulfilled the requirements for the submission of this thesis, which has attained the standard required for a Ph.D. degree of the institute. The results presented in this thesis have not been submitted elsewhere for the award of any degree or diploma.

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K.S. Bhoon
COLLABORATION IN SUPPLY CHAIN MANAGEMENT:
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Abstract

Most of the best practices in supply chain management are generally confined to the internal supply chain of a company with some outside support from vendors. However, supply chains have implications far beyond the boundaries of a single company. For cross-supply chain processes to become efficient and effective, there is a need for formal collaborative arrangements with supply chain partners. In collaborations, metrics regarding acceptable performance are required to be defined differently. Since partners are now collectively responsible for revenue growth, costs, asset utilization and service levels, benefits need to be defined in a "win-win" context, where rewards are equitably shared and costs fairly distributed. There are two main issues here; one, is the collaborative strategy really win-win and two, how will the benefits be shared.

Two broad approaches to current research on supply chain collaboration are evident from literature. More researchers focus on qualitative issues like formation of collaboration, collaboration enablers, impediments, benefits, implementation issues, etc. While some research on quantitative analysis of collaboration exists, its domain appears to covers the inventory aggregation issues at system level, in the vertical supply chain configuration. The scope of such research invariably encompasses the study of three flows within the supply chain: goods, information and finances. Supply chain strategies like postponement through product or process red-design are invariably conceptualized and framed in the context of internal supply chain of a company. These rarely cover collaboration. People competencies, by and large, remain at the periphery of research on collaboration in supply chain management. Keeping this visualization of current research, the focus of this research has been to
extend the research on quantitative analysis of collaboration, especially in horizontal configuration and study of postponement through collaboration. While analyzing these issues, a need is felt to study development of people competencies in the extended supply chain through collaboration.

For the purpose of quantitative analysis of horizontal and vertical collaboration, a network of two supply chains has been modeled on a demonstration simulator, specially written for this purpose in Visual Basic, to experiment different collaborative scenarios.

Postponement through collaboration has been formulated as a concept in the context of collaboration between manufacturers and their suppliers. The concept has been analyzed quantitatively and demonstrated with the help of a case study in manufacturing industry. Similarly, building competencies of the people to harness their potential for supply chain effectiveness has also been analyzed with the help of a case study.

This study has concluded that collaboration is a win-win situation for a network of supply chains except when it operates under specifically unfavourable parameters. Although, Full Collaboration (FC) appears to be better than Partial Collaboration (PC) in most cases, there appear to be certain scenarios in which Partial Collaboration may become more beneficial. Thus, it is perceived from the simulation results in this study that collaboration can be a profitable arrangement for a network of supply chains. However, there can be some counter-productive scenarios for the collaborating supply chains or their respective nodes. Hence, simulation studies may be important to ensure benefits of collaboration. It also appears that collaboration benefits a supply chain facing higher volatility in demand. The dynamics of interacting variables in supply chains is such that one is not too sure if it is going to be a 'win-win' for all stakeholders. However, in a fine-tuned web enabled supply chain; collaboration could reduce inventory levels in the system. Since individual members of the collaboration may sometimes be
negatively impacted, benefits need to be apportioned equitably, on mutually agreeable terms.

Horizontal collaboration offers significant opportunity in the form of reduced working capital coupled with increased service levels. These are contradictory objectives in stochastic demand situation (i.e. higher service levels usually require more safety stocks, hence more inventory). If these supply chains operate under defined rules of forecasts, demand planning, supply management and manufacturing, net cash flows are inherent in the collaborative model. Hence, it is important to study such implications before going in for collaboration.

In the case of manufacturing enterprises, many assemblies and subassemblies are outsourced from vendors. In such cases any early postponement is possible only with the participation of suppliers. There is thus a need to expand the scope of postponement to include any delayed differentiation in the whole supply chain and not just a postponement strategy within the internal supply chain. This study defines the concept of postponement through collaboration and validates it with the help of a case study in the automotive sector, bringing out quantitative benefit of postponement through collaboration, despite additional cost incurred on process redesign.

There are few companies in India whose executive’s knowledge and competencies match the demands of current supply chains. This is further aggravated by the fact that education levels among the supply chain partners are bound to differ extensively, with the dominant company tending to have appreciably enhanced employee education, awareness and skill levels. Collaborative e-learning to extend the scope of supply chain training through the entire supply chain covering suppliers, distributors and customers has been proposed in this thesis.
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