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Collaborative Planning Forecasting and Replenishment Initiatives: A State of Art

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Abstract: Collaborative planning, forecasting and replenishment involve the joint determination of forecasting through pooled knowledge and information. CPFR enables trading partners to improve operational efficiency through a systematic process of sharing and utilizing information across firm level boundaries. Usually, the forecasting results are highly variable as we move from the customer to the producer in the supply chain and replenishment is not also tuned with customer demand. As a result demand forecasting and replenishment has become a vital issue for manufacturers, professionals and researchers. This study aims to provide the reader a complete picture of CPFR through a systematic literature review. It presents a state of art on CPFR by systematically arranging main activities in collaborative planning. In addition, a step-by-step approach for understanding CPFR is proposed which consequently explores the domain of CPFR.

Key words: CPFR, bullwhip effect, supply chain processes, information flow management

INTRODUCTION

Today's competitive pressures compel organizations to improve supply chain performance as a means to achieve competitive advantage. These efforts at supply chain improvement initially started with the areas that the firm could control internally such as inventory management, process improvement and quality. These improvement initiatives naturally progressed externally to include collaboration between the firm and its suppliers as well as between the firm and its customers. Successful collaboration has subsequently been difficult to attain due to a failure to differentiate between whom to collaborate with, i.e., a segmentation of customers or suppliers and fundamentally a lack of trust between trading partners (Barratt, 2002; Sabath and Fontanella, 2002). Collaboration between trading partners creates greater benefits (Skjoett-Larsen *et al*., 2003).

This study addresses difficulties (why, what, how) which not only helps to understand the supply chain collaboration but also de-limits research scope of CPFR.

Collaboration initiative, in the context of the supply chain originated in the mid-1990 in the most recognizable form of Collaborative Planning Forecasting and Replenishment (CPFR) (VICS, 1998) is noteworthy. A number of definitions are proposed and the concept is

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discussed from many perspectives. However VICS Association (2002), Fliedner (2003) and Holweg *et al.* (2005) provided excellent review on CPFR literature. These papers define the process, applications, benefits and development of CPFR. They critically examines developments in the theory and practice of CPFR and through such an examination they identified barriers and enablers. Authors found gaps in theory and practice and explored future research areas.

Studies on CPFR propose the next logical development in the future of CPFR. Thron *et al.* (2006) investigated various common supply chain performance measures to show what impact of increasing adoption of collaborative replenishment between manufacturer and several major customers has on each market participant. Holmstrom *et al.* (2002) argues that the benefit of using category management is that the retailer can scale up collaboration with a large no of suppliers without increasing planning resources. For the supplier the benefit is the point of sale forecasts at the time of assortment decision, to support this collaborative forecasting process, there is a need for more robust replenishment solutions, new measures to illustrate benefits and a distributed planning architecture and software.

Fliedner (2003) examined CPFR, a web based tool to coordinate the various supply chain management activities including production planning, demand forecasting and inventory replenishment among trading supply chain partners. Author identified what CPFR is and explained the CPFR process along with benefits and obstacles for implementation.

Gelinas and Makus (2005) showed how performing CPFR not only involves the processes of collaboration (e.g., sharing information and resolving exceptions) but also a set of routines for managing data and technology (e.g., manually entering updates, building system integrations and data extraction algorithms). Business partners IT skills and infrastructures consequently appear to matter quite considerably for whether and how they adopt CPFR, the costs and benefits each partner receives. Chen *et al.* (2000) discussed an important observation in supply chain management, known as the bullwhip effect, suggests that demand variability increases as one moves up a supply chain. Yan-Fang and Yue (2007) considered CPFR which provides a way to reduce huge loss led by bullwhip effect by scientifically forecasting the customers demand and reasonably replenishing the inventory.

It is also observed that research is not limited to traditional methods of inventory control and sales forecasting, but more advanced techniques like Simulation and Artificial Neural Network are also used for optimization and decision making in CPFR.

Sari (2008) observed through simulation output analysis that the performance increase gained from CPFR and Vendor-Managed Inventory (VMI) significantly depends on three factors; these are capacity tightness of the plant, replenishment lead times and uncertainty in market demand. Huang *et al.* (2008) used to present an autonomous Collaborative Forecasting (CF) system which is an extensible architecture based on ANN s that were implemented to perform the prediction for the real-time supervision of Stock-Keeping Units (SKU's) inventory and sales status in the collaborative trading circumstances.

It is observed from literature review that researchers have studied CPFR from a various perspectives, although this study gives the better understanding of CPFR activities and its mapping by discussing the rational behind CPFR.

UNDERSTANDING CPFR

Concept of CPFR

CPFR is the initiative aimed at increasing collaboration and information sharing between trading partners in order to achieve improvements in supply chain management.

In the simplified supply chain, the point of collaboration utilizing CPFR becomes the retail level demand forecast which is then used to synchronize replenishment and production plans throughout the entire supply chain (Fliedner, 2003).

For understanding CPFR, let us discussed few definitions here which would give an idea in a nutshell, for example, (VICS) define CPFR as a business practice that combines the intelligence of multiple partners in the planning and fulfilments of customer demand. The benefits resulting from a successful application of CPFR include reduction in stock-outs, improved inventory management, shorter cycle times, increase in sales revenues, stronger relationships between trading partners, better overall system visibility, customer service and improved cost structures.

Shu *et al.* (2007) quotes The working principles of CPFR are to analyze market data provided by customers, pass them on to the suppliers and also to provide feedback about products without losing sight of the capabilities of the suppliers and the purchasers. Chen *et al.* (2006a) argued the basic theory of CPFR as information sharing and collaboration operation to get multi-win. The foundation of collaboration should be equality. Enterprises in the union should trust each other. Thus, the process of collaboration along with flow of information are pinpointed which would help organisation to achieve maximum efficiency for the overall supply chains. According to Gelinas and Makus (2005) CPFR is a supply chain innovation in which business partners (e.g., retailers and manufacturers or manufacturers and suppliers) attempt to improve supply chain performance (e.g., on time deliveries and lower inventory costs) by sharing forecast information (e.g., promotions and planned orders, sales and inventory data). Author emphasizes the various activities undertaken by the various trading partners involved in the supply chain and sets the performance indicators as the low cost of inventory and on time deliveries. Shu *et al.* (2006) quotes CPFR is demand oriented extended supply chain. CPFR is a whole set of working flows and these flows aim to improve customer's value by means of collaboration between enterprises, sharing standardized information and setting up objective plans. This definition aptly includes the information flow for value addition instead of emphasizing the economic aspect only like previous definitions.

According to Huang *et al.* (2008) CPFR, as its name implies, responds to the conduct of an enterprise's planning, forecasting and replenishment by drawing its supplying products with collaborative operations of all trading partners through the distributed channels in an supply and demand chain. Hence the focus is on tools and techniques required for conduction business effectively. Terwiesch *et al.* (2005) quotes CPFR is characterized as much broader cooperative arrangements where retailers and suppliers jointly develop forecast by sharing Point Of Sale (POS), inventory, promotions strategy and production information.

Thus it is clear that deriving the specific objectives and scope of CPFR is a formidable task depends on various factors.

Need for CPFR Management

The next important issue is why the firms need to manage CPFR. It involves the cost of managing the flows of product, information, funds, collaboration and so on.

The operation costs of CPFR are substantially higher along with greater implementation difficulties (Sari, 2008). However, the demand forecast and overall equipment effectiveness information allow to make more accurate replenishment decisions through proper CPFR planning and replenishment lead times, inventory cost and thus production loss can be reduced (Chen *et al.*, 2006b).

The global business environment as a whole continues to face increasing competition in an economic environment that is becoming ever more volatile. One of the ways in which many firms tried to overcome these challenges is to improve supply chain performance as a means to achieve competitive advantage.

Recently a methodology referred as Collaborative Planning, Forecasting and Replenishment (CPFR) is being espoused as a means of integrating all members of the supply chain including distribution and retail activities (Fliedner, 2003).

CPFR is built on the basis of the optimum grading practice and finally the value of the entire alliance supply chain is improved (Shu *et al*., 2006).

Issues to Ponder in CPFR

It is found that CPFR encompasses planning, forecasting and replenishment by drawing its supplying products with collaborative operations of all trading partners to bring a product to the market place. This section would provide insights on the aspects and the issues that are to be managed in CPFR.

Information Technology and Information Flow Management

The advent of the internet and related information and communication technologies made information flow faster, easier and cheaper. Although supply chain integration and collaboration are not new ideas, the emergence of technologies that enable low cost electronic communication and information sharing have made them more attractive than ever (Cross, 2000; Graham and Hardaker, 2000; Stein and Voehl, 1998). One of the cornerstones of CPFR is the sharing of information concerning, for example, end-customer demand, upcoming promotions and sale forecasts (Quinn, 1999). In a framework developed by Kumar and van Dissel (1996), information technology is viewed as both an enabler and supporter of collaborative efforts. It is important to note, however, that technology in and of itself is not enough to lead to successful collaboration (Mentzer *et al*., 2000). It has been suggested that firms must know how to use information technology to reap the benefits of collaborative processes (O'Marah, 2001). In essence, human contribution through data analysis and information utilization is; where the true benefits of information technology lie (Mentzer *et al*., 2000). Authors provided insights into the adoption of information technology and the impacts on organisational performance. Web services have recently afforded an essential opportunity for inter-enterprise integration along the supply chain to realize a dynamic virtual network for enterprises (Van Hillegersberg *et al*., 2004). Disney *et al*. (2004) gives five different e-business scenarios of supply chain, including Traditional Supply Chain (TSC), reduced supply chain, e-shopping, EPOS (Electronic point of sales) enabled (with no CPFR and with CPFR) and VMI (Vendor Managed Inventory).

These developments are transforming integration of trading partners through real time communication which enables to optimise resource allocation, synchronise information and inventory flow.

E-BUSINESS IMPACT

Businesses, progressing from the notion of the extended supply chain into e-supply networks facilitated by electronic B2B marketplaces, or e-markets. Introducing collaborative planning within e-business and operating as through one seamless organisation, synchronised to meet customer demand which can achieve significant cost savings and service enhancements (Nokkentved and Hedaa, 2001). As higher levels of product variety,

global marketplaces, shorter product life cycles and demand for premium customer service are increasing supply chain complexity and cost, the impact of e-business have forced companies to take look at and redefine their supply chain strategies (Yaxin *et al*., 2007).

Liu and Kumar (2003) discussed how the development and impact of e-business have forced companies to redefine their supply chain strategies. Hong-Minh *et al*. (2000) provides four distinct e-business strategies as, Electronic Point Of Sales (EPOS) means marketplace information forwarded to all players throughout the supply chain, Excel means the stock levels in all echelons controlled by factory, emergency transhipment means fastest delivery of goods to deal with rush orders from customer and eliminate' means one or many echelons removed from supply chain. Authors then exploits deployment of e-business supply chain applications which bind firms through electronic communication, interdependent transactions and collaborative processes.

Customer-Supplier Relationship Management

Global competition and other environmental pressures foster the companies to be more responsive to their customers. Hoffman and Mehra (2000), Harris *et al*. (1999) and Sparks and Wagner (2003) discussed Efficient Consumer Response (ECR) as a supply chain strategy by analyzing adoption of ECR strategy in some industries. It should be noted that CPFR encompasses all aspects of delivering products to customers, while supply management emphasizes the inter-organizational relations also widely known as buyer-supplier relationships (Leenders *et al*., 2002). Carr and Pearson (1999) among others studied the relationships of strategic purchasing, buyer-supplier relationships and supplier evaluation system and performance outcomes. Customer responsiveness has been recognized as one of the principle aims of supply chain integration (Narasimhan and Jayram, 1998).

Experiences of organizations like Caterpillar, General motors, ICL, Philips and Rank Xerox have shown that focusing on fast, reliable delivery and responsiveness to changing customer needs is important to achieve integration of the supply chain (Armistead and Mapes, 1993).

The integration of the supply chain emphasized on, managing the interface between customer-supplier relationships at each link in the supply chain.

CPFR DESIGN

CPFR unifies managerial objectives with an implementation scheme. CPFR drives suppliers, manufacturers and retailers, combines the sales forecast and plan and shares information (Shu *et al*., 2006).

The CPFR process has three major sub-processes namely planning, forecasting and replenishment each of which is formed by numerous steps. The number of processes involved in the collaboration depends on the product/market characteristics and the supply network's physical structure (Danese, 2007). It is observed that the CPFR design depends on the various variables and constraints. Mentzer *et al*. (2000) proposed that the supply chain consists of not only customer downstream flows but also third party organizations, such as logistics and transportation providers.

The most important components that foster fast and inexpensive customization are the integration among partners in the supply chain. As part of the integration mechanism, the CPFR model is a valuable technological innovation tool to strategically, tactically and operationally led support the implementation of several types of transactions among the partners (De Paula *et al*., 2003).

Authors proposed that CPFR model can provide support to supply chain management so that the partners in this chain can increase their customization capability and improve the design process.

Bullwhip Effect

Bullwhip effect is a result of inefficient coordination between supply chain partners. Lee *et al.* (1997a) discussed that the ignorance of the information flow has contributed to one important problem in supply chain literature which is called bullwhip effect. The bullwhip effect refers to observation that the variability of orders in supply chains increases as one moves closer to the source of production. The effect is costly because it causes excessive inventories, unsatisfactory customer service and uncertain production planning (Wu and Katok, 2005). Moreover, inventory management decisions taken by individual members of the supply chain also affect the supply chain performance. Croson and Donohue (2002) surveyed results from a series of human experiments and confirmed behavioural causes for the order amplification phenomenon in supply chains known as the bullwhip effect. In bullwhip effect, the variability in demand increases as increase in number of stages in supply chain. Chen *et al.* (2000) examined that the bullwhip effect will exist even when demand information is shared by all stages of the supply chain and all stages use the same forecasting technique and inventory policy. Lee *et al.* (1997a) demonstrated that the bullwhip effect is an outcome of the strategic interactions among rational supply chain members. Metters (1997) measures the impact of the bullwhip effect by comparing results obtained for highly variable and seasonal demand against the ease with low demand variable and seasonal demand against the case with low demand variability and seasonality. Cachon (1999) proposes methods to reduce the bullwhip effect using balanced ordering.

Most of the research on bullwhip effect is now focusing on reducing its impact on supply chain management.

Logistics and Collaborative Transportation Management

The logistics and distribution function can provide a tool for building collaborative supply chain partnership improving the efficiency of supply chain thereby. Further enhancements in supply chain performance will necessitate speeding the flow of information on orders to upstream supply chain partners and expediting logistics activities like storage and delivery of materials or products through the entire supply chain (Bhatnagar *et al.*, 1999). Earlier practitioners and professionals were confused between logistics and supply chain management the usage of each term varied according to industry. Lummus *et al.* (2001) examined the historical definitions of both terms and proposed a hierarchy for the relationship between logistics and supply chain management. Indian organizations are increasingly deploying supply chain strategies for logistics improvements- to increase sales revenue, enhance profits, reduce order to delivery cycle time and minimize inventories (Sahay and Mohan, 2003). The logistics services play an important role in fulfilling the strategic objectives of shipper (Manzini *et al.*, 2007). Logistics has also been playing a tremendous role in providing a competitive advantage for companies in a network economy and market (Gunasekaran and Ngai, 2004). It is observed that managing the logistics is one of the important supply chain challenges. One of the primary new extensions of the supply chain collaboration conceptual framework is Collaborative Transportation Management (CTM). The goal of (CTM) is to develop collaborative relation among buyers, sellers, carriers and third-party logistics providers (3PL's) to improve service, efficiencies and costs associated with the transportation and delivery process (Karolefsky, 2001). Esper *et al.* (2003)

suggested that, to survive against global competition and other environmental pressures, companies are forming strategic supply chain partnerships and alliances. Such relationships are designed to realize increased efficiencies, streamline processes, provide a broader rang of integrated services and enhance customer service through long-term collaborative efforts, as in the case of CPFR and CTM.

Outsourcing and Global Issues

During the last two decades, globalization has emerged as a major force of shaping business strategies, leading firms, to develop products designed for a global market and to source components globally (Cooper, 1993). Gooley (1992) added flexibility as another reason for outsourcing based on his experience with European firms. Although, the decision to outsource can have both positive and adverse effects on key areas of the manufacturing supply chain, one positive effect is that the manufacturers supply chain agility is increased (Mason and Towill, 1999). The literature on the strategic aspect of global sourcing is large, detailed studies on this procurement strategy from a process perspective are limited. Jennings (2002) and Zeng (2003) projected strategic benefits and problems relating to the outsourcing decision. The logistics costs often comprise a large portion of the total global sourcing cost. It has been estimated that about 40% of the global logistics is outsourced (Wong *et al*., 2000). According to Millen *et al*. (1997) outsourcing should not be seen as an all or nothing kind of decision. Their analysis suggests that a mixed system, combining the use of in-house and third party facilities, may prove the best.

It is concluded that many research work focus on managing logistics relationships, selection and contract management of service providers for building collaborative supply chain partnerships.

Suppliers Impact on Business Performance

The critical objectives of purchasing departments of an organisation and the customers are to get the right quality of product, at right cost and right quantity at right time from the right suppliers. This increases the importance of effective supplier selection and assessment (Kannan and Tan, 2002). Krause *et al*. (2000) examined the impact of supplier development on supplier performance and Vonderembse and Tracey (1999) investigated the impact of supplier selection and involvement on the buying firms manufacturing performance. Many researchers and practitioners are using analytical hierarchy process (AHP) for supplier selection (Barbarosoglu and Yazgac, 1997; Nydick and Hill, 1992; Narasimhan, 1983). In the past, commonly used supplier evaluative criteria have focused on quality, service or delivery and price. In recent years, the channels literature has indicated other areas, such as relationship factors, that may affect channel partner performance (Simpson *et al*., 2002). A truly integrated supply chain requires a massive commitment by all members of the chain. Poor supplier performance is not the only risk; the purchaser needs to worry about the possibility of a supplier passing trade secrets to competitors or, with its newfound abilities, venturing out on its own (Tan, 2002).

A general conclusion is that supplier's performances significantly affect the performance of the business.

Processes and Technology

There are many tools, technologies and processes such as RFID, VMI, ERP, ARP, ANN that can facilitate the CPFR process. The application of RFID (radio frequency identification) in the supply chain is to improve inventory accuracy. RFID offers non-line of sight

identification and unique object identification which can lead to more accurate and timely information in supply chain (Penttila *et al*., 2004). McFarlane *et al*., (2003) deals with RFID with case level to improve replenishment. RFID technology is a wireless Automatic Identification and Data Capture (AIDC) technology which can increase the visibility of information at various layers of the supply chain, allowing members to gather precise information on real demand and improve replenishment process (Fosso-Wamba *et al*., 2008). RFID systems can be developed to enhance both external and internal supply chains (Truong, 2007). Enterprise Resource Planning (ERP) software systems helps in supply chain information sharing, cooperation and cost optimization (Kelle and Akbulut, 2005). Vendor Managed Inventory (VMI) is a supply chain strategy where the vendor or supplier is given the responsibility of managing the customer's stock. Disney and Towill (2003) shown that VMI is to be significantly better at responding to volatile changes in demand such as those due to discounted ordering or price variations. VMI and CPFR are the partnership programs primarily developed to encourage retailers to share information (Lee *et al*., 1997b; Disney and Towill, 2003). Internet can enhance CPFR by making real time availability of information and enabling collaboration between trading partners. Swaminathan and Tayur (2003) describe various ways of how internet influences SCM; firstly they consider that internet has facilitated the use of ERP and APS (Advanced planning and scheduling); Secondly, they consider the impact of internet on information sharing and finally, they consider the possibility of integrating information sharing and decision making across the supply chain. Automatic Replenishment Programs (ARP) intend to increase the efficiency in inventory management by substituting inventory with information (Daugherty *et al*., 1999). ARP includes those programs where replenishment is triggered by actual sales figures rather than on forecasts and safety stock buffers (Sabath *et al*., 2001).

Johnson and Whang (2002) defines e-collaboration as business to business interactions facilitated by the internet. McDonnell (2001) considers e-collaboration as internet- based collaboration which integrates people and processes giving flexibility to supply and service chains.

McGuffog and Wadsley (1999) cover the information and knowledge share aspects of internet and consider the effects of e-commerce and collaborative planning on the supply chain as a whole. New e-business technologies facilitate quick information sharing between downstream and upstream partners and enable companies like Dell computer to trade inventory for information (Milgrom and Roberts, 1988). EDI is computer-to-computer exchange of business documents without human intervention (Gunasekaran *et al*., 2002). According to Attaran (1997) EDI will help to reduce inventories, foster JIT management, promote engineering interchange and improve work scheduling. Dresner *et al*. (2003) and Schroeder *et al*. (1981) argued that increased use of firm is associated with an improved inventory performance of the firm. This is because MRP enables effective scheduling and co-ordination of production activities, which tend to reduce the customer delivery lead time. During 1990's the software support systems transited from Manufacturing Resource Planning (MRP II) to enterprise resource planning (ERP) to illuminate the importance of planning and controlling all resources in a manufacturing firm; not only material and capacity (Olhager and Selldin, 2004). ERP software systems have focused on internal process integration of traditional function such as sales, production and inventory management (Kelle and Akbulut, 2005). Stubbings *et al*. (2008) suggest that an Artificial Neural Network (ANN's) is used as a service forecast combination method. Donaldson and Kamstra (1996) applied ANN's to the combination of price volatility forecasts of the stock market. A unique virtue of ANN is its ability to learn the relationship between input examples (feature vectors)

and output information (solution) by means of repeatedly presenting examples to it. This relationship learning process is performed through the adaption of the strengths (weights) connected between neurons of each layer within ANN (Huang *et al*., 2008).

Managing CPFR

For successful CPFR implementation, senior management must understand the issues concerned with executing the strategy, purpose and structure to retailer-vendor partnerships. This section highlights necessary stages required for adoption and implementation of CPFR.

The term CPFR was first introduced in 1995 in connection with a pilot project between Wal-mart, Warner-Lambert, Bench marking partners, SAP and Manugistis (Cooke, 1998). In 1998, the voluntary interindustry commerce standards (VICS) committee, a group dedicated to the adoption of bar-coding and EDI in department store mass merchandise industries, developed a nine step process model as a guideline for CPFR implementation (VICS, 1998).

The CPFR model consisting of; developing front end agreement, creating joint business plan, creating sales forecast, identifying exceptions for sales forecast, resolving collaborating on exception items, creating order forecast, identifying exceptions for order forecast, resolving/collaborating on exception items and generating orders. The CPFR process has three major sub processes- namely planning, forecasting and replenishment (VICS, 1998).

Planning

This phase relates to people, processes and development of trust. Partners must break down cultural barriers and company-centric perceptions so they can view the bigger picture. The two major steps in this plan are developing a front end agreement and creating a joint business plan. Sadler and Hines (2002) investigated how a team of managers from the companies in supply chain can help to formulate strategic plans for operating the whole chain to benefit each company and to benefit the whole chain. The VICS Guide (1998) suggests that participating companies first formally commit to a program of demand forecast collaboration including an agreement on sponsors within each organisation and key metrics and develop a joint plan that establishes item management profiles, such as order minimums and multiples, lead times, reorder frequency and promotions for those stock-keeping units (SKUs) upon which they will collaborate (Danese, 2007).

Collaboration

Collaboration is an effort by two or more organisations to get a competitive advantage that they cannot achieve by working alone. Collaboration in the supply chain comes in a wide range of forms, but in general has a common goal: to create a transparent, visible demand pattern that paces the entire supply chain (Holweg *et al*., 2005). There are a variety of forms of potential supply chain collaboration, which can be divided into two main categories; first, vertical; which could include collaboration with customers, internally (across functions) and with suppliers and second, horizontal; which could include collaboration with competitors, internally and with non-competitors, e.g., sharing manufacturing capacity (Simatupang and Sridharan, 2002). Barratt (2004) proposes that a supply chain segmentation approach, based on customer buying behaviour and service needs, is the most appropriate context for collaboration. Author also proposes the need for a greater understanding of the elements that make up supply chain collaboration and in particular how the relevant cultural, strategic and implementation elements inter-relate with each other.

Bowersox *et al.* (2000) suggests that the essence of supply chain collaboration is to share information, jointly develop strategic plans and synchronize operations. Collaboration in the supply chain goes beyond mere exchanging and integrating information between suppliers and their customers and involves tactical joint decision making among the partners in the areas of collaborative planning, forecasting, distribution and product design (Kumar, 2001). Collaboration also involves strategic joint decision making about partnerships and network design (McLaren *et al*., 2002).

Forecasting

Forecasting considers the present circumstances in relation to the past. Conventional wisdom suggests that sharing of forecasts within a supply chain improves the forecast accuracy and leads to higher profitability (Yue and Liu, 2006). Raju and Roy (2000) analyze the impact of firm size, product substitutability, intensity and mode of competition on the value of forecast information. Gavirneni *et al.* (1999) examine the conditions under which gaining information about the retailer's inventory level is beneficial. The literature on different forms of Advance Demand Information (ADI) has been rapidly increasing in recent years (Vives, 1984). Tan *et al.* (2007) investigate the impact of using imperfect ADI on inventory policies. DeCroix and Mookerjee (1997) consider a periodic-review problem in which there is an option of information, perfect information allows the decision maker to know the exact demand of the coming period, whereas the imperfect one identifies a particular posterior demand distribution. They characterize the optimal policy for the perfect information case. Gaur *et al.* (2005) study two stage supply chain model in which retail serves auto progressive moving average (ARMA) demand and a manufacturer fills the retailer's orders. Some of such demand signalling models includes the Bayesian updating model by Azoury (1985) and serially correlated demand models of Kahn (1987), Miller (1986).

Replenishment

Replenishment collaboration broadens the replenishment process throughout the supply chain, from raw materials to the store shelf. The benefits includes, improved service level, reduced inventory and aligned production capacity. Collaborative transportation planning has also been identified by VICS as a key lever in replenishment. Leopold-Wildburger *et al.* (1997) consider the items tapping to construct strategic purchasing include the extent to which purchasing is included in the firm's strategic planning process. Son and Sheu (2008) shed light on the impact of replenishment policy deviations on supply chain performance and develop a benchmark case where all supply chain parties follow a base stock policy that maximizes overall supply chain performance. Levi Strauss and co incorporates certain aspects of the CPFR process into its retail replenishment service (e.g., by creating joint business plan and identifying exceptions) (Aviv, 2001).

DISCUSSION AND CONCLUSION

Companies today face a highly competitive global market; the focus is to deliver the customer the desired product within a fitting time-frame, at the right price and at the right place. To seek these objectives companies employ various business performance improvement approaches. These approaches often focus on any one operational area of organization, but the approach (CPFR) which we have discussed covers all functional areas of the organisation. The objective of CPFR is to better align supply and demand through trading partner's data interchange which bind firms through interdependent transactions and

collaborative processes to meet customer demand. Although, the CPFR concept may seem simple, turning it into practice is not an easy task. It requires a change in business processes and change from an inward focus to a broad multi-enterprise view. Researchers and practitioners have developed a sustainable body of knowledge by deploying various qualitative and quantitative tools and techniques. It is observed that organization have unique product/market characteristics and the supply network's physical structure. Therefore, there is not a one fits all solution to all organizations. Depending upon corporate strategy, organizations have to develop a suitable CPFR management strategy. It would be a formidable task for managers if they do not understand why companies implement different types of CPFR collaborations which are valuable from both a managerial and theoretical perspective.

In this study, we have suggested that managers must investigate the reasons why to manage, what to manage and how to select the most appropriate action to be taken to implement CPFR. We interrogated the theory and research practice to find what the various CPFR activities are. This study also throws light on the potential of CPFR. The theoretical development presented here also helps organization to understand the concept of CPFR by all means. Sooner or later all organizations would adopt CPFR; therefore, we recommend that managers should examine the domain of CPFR to achieve business excellence.

A recent trend in system technologies and processes presents an opportunity for development of CPFR. It is felt that in future all organization will have to initiate inter enterprise relationship through collaboration based management of planning processes and information sharing. Therefore, establishment of win-win relationship between business partners to share information for effective CPFR practice and development of suitable model for the same would be the greatest challenge for researchers and practitioners.

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