The value of CPFR

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RIRL Conference Proceedings
Lisbon. Portugal, October 13 -16, 2002
(Submitted: Jan 2002; in revised form: March 2002, in revised form: May 2002)

Abstract

The last several year has witnessed an explosion of interest in business collaboration. This paper looks at the latest form: collaborative planning forecasting and replenishment (CPFR). It looks at the possible benefits of business collaboration based on several pilot projects and pro-forma analysis and describes in some detail a case study, focusing on the mechanics of the CPFR process and its benefits.

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1. Introduction

One can classify inventory into two types: process time inventory and decoupling inventory. Process time inventory is carried during the time that the inventory undergoes another process, such as manufacturing (work-in-process inventory) or transportation (in-transit inventory). This inventory can be reduced only if the underlying process is sped up.

The amount of time that material and goods spends in process inventory is typically dwarfed, however, by the time it is spending in decoupling inventory, in-between processes. That inventory is the subject of most of the work in logistics and supply chain management. Decoupling inventory ensures that the process that feeds it and the process that it feeds work at their peak efficiency. It is also the inventory that is stationary and it adds no value to the enterprise, aside from its enabling role regarding the processes around it. Decoupling inventory results from consideration of lot sizing, anticipation, and safety stock.

The focus of this paper is on decoupling inventory and in particular on safety stock. The main problem facing retailers is out-of-stock (OOS) situation, which could, of course be remedied by extra safety stock, but the carrying cost of such inventories is prohibitive. Another possible remedy for OOS is better forecasting. Statistical forecasting, however, is fundamentally limited in predicting the future in an environment where the underlying buying behavior may change due to promotions, competitive product introductions, market entry and exit of retail chain, etc.

It has been long recognized that one of the most efficient methods for improving forecast accuracy and increasing service, while reducing costs, is better collaboration between trading partners. To this end, many supply chain partners have devised inter-enterprise collaboration processes to move the information to where it can add value and better coordinate supply chains.

The paper is organized as follows: the next section (No. 2) reviews some of these efforts to introduce collaboration processes and evaluates them. Section 3 then looks at the current collaborative Planning Forecasting and Replenishment (CPFR) process. Section 4 reports on the results of several CPFR demonstration projects and looks at the expected results from implementing CPFR across the consumer packaged goods industry and at a model manufacturer. Section 5 looks at a more detailed case study and Section 6 concludes the paper.

2. 1990-s Collaboration Efforts

The 1990-s saw an explosion of collaboration attempts. Dixon and Porter (1994) describe JIT II, a process initiated by BOSE, the audio system manufacturer. Under JIT II, BOSE brought key suppliers in-house and gave them authority to function as an integral part of the BOSE material and purchasing systems. The process replaced traditional buyers, planners, and salespeople with “in-plant” supplier personnel, thereby freeing up buyers' time to conduct value added activities. At the same time it gave the in-plant supplier representatives a better understanding of their customer’s changing needs.

Many leading companies adopted the process on a small scale but it never caught on across whole industries, since many companies were not ready to make the long-term commitment to their suppliers and engage in the openness required for the JIT II process to work.

The Efficient Consumer Response (ECR) movement began by the grocery industry in the US in 1993 and continued in Europe, where, as Bhulhi (1997) reports in his overview of ECR, the ECR Board (1995) defined the mission of the process as "working

together to fulfill consumer wishes better, faster and at less cost." As described by King and Phumpier (1996), ECR focused on category management (enhancing the effectiveness of the demand creation and satisfaction process through better promotions, new product introductions and store assortment); product replenishment with high consumer service and low inventories; and the development of enabling technologies.

Continuous Replenishment Programs (CRP) have been frequently cited as key processes in the quest toward ECR implementation. Yet CRP implementation, rife with challenges, requires the management of new and more abundant sources of information and an understanding of the unique “rules of engagement” associated with each new relationship established among trading partners. In fact, Brown and Bukovinski (2001) claim (albeit tentatively) that most ECR adopters did not exhibit the positive results suggested by ECR proponents.

In response to strong offshore competition, the American apparel industry in the early 1990-s started to formulate the set of initiatives known as “Quick Response” (QR). The QR leadership committee (1994) commissioned by the apparel industry defined the QR process goal to “continually meet changing requirements of a competitive market place which promotes responsiveness to consumer demand, encourages business partnerships, makes effective use of resources and shortens the business cycle throughout the chain from raw materials to consumer.”

Both of the ECR and QR initiatives were slowly adopted across the respective industries that spawned them. They did help change attitudes and create the realization that companies must look beyond their own boundaries to achieve high level of customer service and low costs. The collaborative aspect of these processes, however, were never implemented as originally envisioned on a large scale, mainly due to the cultural difficulties associated with collaborative management and the lack of scaleable software.

Another approach for mitigating the communications problems between retailers and their suppliers is to let the vendor manage the retailer's inventory[1]. In its purest form, vendors get information on sales and inventory levels and are committed to keep a certain level of service. This allows manufacturers to control the entire cycle of sales and order forecasts, order placement and replenishment. It also allows them to pull the forecasting risk across all their customers (see, for example, Bernstein, 1997). Retailers, naturally, enjoy lower inventory carrying costs since the suppliers carry the product until it is sold. In reality most VMI programs cover only the retailers' distribution centers and not the stores.

Many VMI programs have been discontinued since retailers were not satisfied with the lack of collaboration with their suppliers as well as with the forecasting ability of the suppliers, which led to low level of service. Thus, many of them turned into Co-Managed Inventory (CMI) or Joint-Managed Inventory (JMI) processes. These include a more detailed business process, which is mapped out front, and an explicit involvement of both sides in the sales and order forecasting and in the process of generating the replenishment orders.[2]

3. Collaborative Planning Forecasting and Replenishment

All the initiatives mentioned in the last section are aimed at coupling supply chain more tightly by allowing for better forecasting and planning through information sharing, leading to synchronized channels. In other words, if suppliers have better visibility into the retailers' sales forecast they can plan their operation better and if they have better visibility into the retailers' order forecast they can plan their replenishment better. By the same token, retailers can lower the frequency of their OOS conditions and mitigate their consequences by getting continuous information about the replenishment status.

[1] This is referred to as VMI – Vendor-Managed-Inventory.
[2] In 1998 – 1999 Kmart went from 300 VMI relationships to less than 50 CMI relationships. While requiring more intensive effort, these relationships provided the collaborative benefits which Kmart sought.

While some of these initiatives were adopted more widely than others, clearly they all contributed to the recognition, by leading retail and manufacturing participants, of the need for cooperative information exchange. Many of the expected benefits of these ideas failed to materialize since trading partners could not work with enough partners for the collaboration to "scale," and thus none of these initiatives developed a critical mass of participants. Consequently no partner could experience better forecasting of either sales or orders on a scale that would impact the bottom line. A significant part of the problem had to do with the EDI technology, which was the cornerstone of all the collaboration initiatives mentioned above.

Verity (1996) reported in Business Week that Wal-Mart and Warner Lambert attained significant improvements of in-stock positions while reducing inventory through collaborative planning, forecasting, and replenishment (CFAR, now called CPFR). The VICS (Voluntary Inter-industry Commerce Standards) committee[3] then followed with the development and publication, in January 1998 of the draft CPFR guidelines.

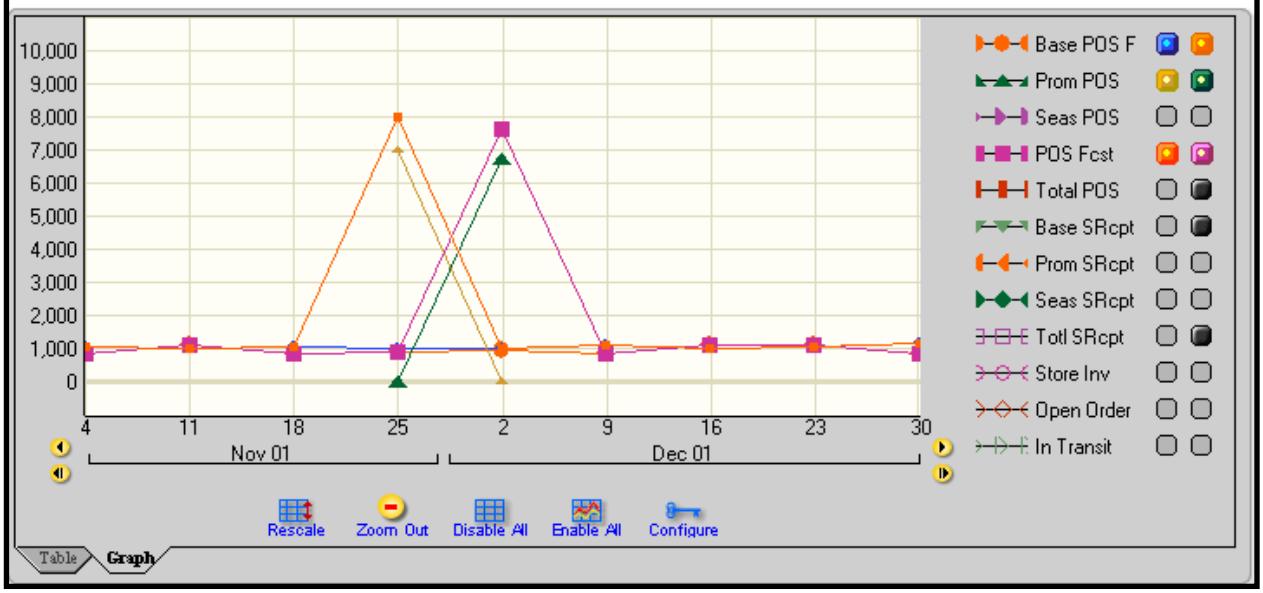
Under CPFR, both trading partners develop a joint business plan, which includes a promotion calendar. The retailer and manufacturer agree on a joint sales forecast and a joint order forecast.[4]

The joint sales forecast can drive production scheduling, distribution planning, and store activity planning. Any changes from any of the forecasts, beyond an agreed-upon threshold are defined as exceptions, which generate collaborative actions by both parties to re-align the planning for the channel. Order forecasts are also checked for exceptions and then realigned to generate the actual replenishment orders. All the steps mentioned above, starting with a business plan and ending with replenishment, were codified by the VICS (2001) committee is a nine-step process.

[3] Creators of bar code and EDI standards in general merchandise
[4] Order forecasts account for retailer-generated adjustments due to changes in assortments, store availability, competitive products, etc.

One of the main differences between CPFR and other collaborative arrangements is that under CPFR, both parties are informed of exceptions, which generate the collaborative activities aimed at resolving these exceptions. A second difference is the reliance on the exception engine to be able to point out discrepancies, when operating at scale – in other words with a large number of stores and many stock keeping units. Figure 1 portrays an example of a graphical depiction of an exception.

Figure 1. Graphical Depiction of Exception (from Syncra))Systems)



Modern exception algorithms used by advanced CPFR software can compare any two data streams and generate exceptions. Furthermore, these exceptions can be for data aggregates (like a sales forecast for a family of SKU-s or a group of stores), thus increasing substantially the value of the process and the software.

4. Value of CPFR

There have been many reports on the benefits of CPFR. The CPFR documents available on the VICS Committee site[5] describe the results of several pilot projects[6].

[5] www.cpfr.org

These projects achieved 30% - 40% improvements in forecast accuracy, significant increases in customer service, sales increase between 15% and 60%, and reductions in days of supply of 15% - 20%. (See also Ireland and Bruce, 2000.)

AMR Research (2001) reported on the range of results actually achieved by many early adopters of CPFR. Their report is summarized in Table 1.

Retailer Benefits	**Typical Improvement**
Better Store Shelf Stock Rates	2% to 8%
Lower Inventory Levels	10% to 40%
Higher Sales	5% to 20%
Lower Logistics Costs	3% to 4%
Manufacturer Benefits	**Typical Improvement**
Lower Inventory Levels	10% to 40%
Faster Replenishment Cycles	12% to 30%
Higher Sales	2% to 10%
Better Customer Service	5% to 10%

Table 1. Typical CPFR Benefits

A study of a leading consulting firm with a leading consumer goods manufacturer catalogued every relevant process that the manufacturer was involved in to see how it would benefit from the adoption of CPFR. The manufacturer has approximately $10B in revenue, $3.6B in COGS and $4.1B in SG&A. Assuming 40% retailer adoption in the third year of the implementation, affecting 30% of single category initiatives and 50% of multi category initiatives, the study concluded that the effects would be as shown in Table 2.

[6] The pilot projects include Wegman's and Nabisco; Kmart and Kimberly-Clark; Wal-Mart and Sara Lee; and Procter and gamble with five retailers (Target, Tesco, Meijer, Sainsbury's and Wal-Mart).

	Area	Area	Now	Potential
1	O/B Transportation	SG&A	4.0%	0.50% - 2.50%
2	Unauthorized deductions	SG&A	1.0%	0.00% - 0.50%
3	Slotting fees	SG&A	1.0%	0.00% - 0.15%
4	WIP Inventory	W. Cap.	2.1%	0.11% - 0.13%
5	Finished goods inventory	W. Cap.	8.8%	0.44% - 0.66%
6	Obsolescence & Write-offs	COGS	0.5%	0.10% - 0.25%
7	Out of Stock conditions	Revenue	5.0%	1.25% - 2.50%
8	Effective trade promotions	Revenue		0.25% - 1.00%
9	Smarter assortment of goods	Revenue		0.25% - 1.00%
10	Speed to maturity of new products	Revenue	10.00%	2.50% - 5.00%
11	Raw material & overtime	COGS	36.40%	1.82% - 3.64%

Table 2. Financial Impact of CPFR on a $10B Manufacturer

Thus, this manufacturer may see a cost reduction of 3% - 7.8% and revenue increases of 1.75% - 4.5%, not accounting for speeding the introduction and ramping up the volume of new products.

5. Superdrug Case Study

On December 2001 Superdrug reported in a web seminar on their CPFR pilot with Johnson and Johnson (J&J), powered by Syncra System's exception engine.

Superdrug operates more than 700 stores throughout the United Kingdom, offering its customers an average of more than 6,000 product lines. It came to CPFR with the goal of to trimming inventory so that it would more closely match sales. In addition, Superdrug wanted to improve forecast accuracy and looked forward to an improved relationship with their trading partner—in this pilot's case, J&J. Superdrug chose J&J

not only due to compatibility of systems, people and strategy, but most importantly, due to the similar culture of the two companies.

Before launching the pilot, Superdrug developed a clear blueprint of the trading partners' roles and responsibilities to make sure that their own strategy and structure were aligned with the CPFR process. They also developed a detailed plan to capture both the benefits and the costs of the pilot. Superdrug began the pilot process in April 2000 and by May 2000 the front-end agreement and joint business plan were agreed to and signed between the two companies.

In August 2000 Superdrug and J&J started collaborating. Superdrug compared their sales forecast to J&J's order forecast. They also collaborated on the order forecast against the actual order that was received.

The collaboration process developed its own rhythm week by week. The first steps during the week was for the IT department to capture all the information at either Superdrug or J&J, compose the file, validate the data and send it through to Syncra—typically on a Sunday evening.

Syncra's processing engine crunched through the data and returned the exceptions. Personnel in the replenishment and supply chain departments at both Superdrug and J&J reviewed the information and prepared for a Wednesday conference call. During this call, decisions were reached as to which partner would adjust their forecast number and by how much—all with the ultimate goal of achieving one sales forecast.

On Friday the CPFR pilot project manager at Superdrug would review the forecast and see that the necessary changes were made in Superdrug's forecasting systems. By the weekend, the IT department could update all the new information and the process would begin again.

The results can be divided into “soft,” subjective benefits and “hard” numbers. The subjective benefits included:

- Many problems were avoided since Superdrug was able to highlight future issues and resolve them with their trading partner.
- CPFR also gave Superdrug access for the first time to a range of previously unavailable data such as suppliers’ sales and order forecasts.
- Superdrug also found that communications were improved with their supplier through the weekly conference call, which resulted in J&J’s profile within Superdrug being raised, and conversely, Superdrug’s profile was raised within J&J.

The measurable results are as follows:

- 13 percent average reduction in Stock, at Superdrug’s distribution centers, for the lines that were collaborated on.
- Warehouse availability increased by 1.6 percent.
- Superdrug’s forecast accuracy, which they thought was good before the trial began, saw an improvement of 21 percent.
- Superdrug also saw RDC cover (Present Stock On Hand/Last Week’s Sales) reduced by 23 percent for those J&J’s product lines that were subject to CPFR. Moreover, RDC cover during the pilot period increased by 11.8% for those product lines not subject to CPFR.

Superdrug judged the pilot to be a success. It is now adding all of J&J’s SKUs to the CPFR program and adding at two additional suppliers. They are also planning to start collaboration in other areas, particularly new product introductions and post-promotion analysis. The critical success factors for them were:

- Careful selection of trading partner
- Having a joint front-end agreement to refer back to when the project got off track

- Selecting the right people within both organizations to work on the project - making sure they all believe in the project and want to see the results.

5. Conclusions

CPFR is the latest in an array of collaborative schemes aimed at better coordinating supply chain, thereby squeezing out decoupling inventory from the system. The roots of CPFR can be traced to the ECR and VMI/CMI initiatives. Unlike these initiatives, however, CPFR was designed as a balanced collaborative approach where all forecasts and exception are communicated to both retailers and manufacturers and the collaborative process of solving these exceptions is carefully laid out. It is also supported by much more robust software – in particularly, strong exception engines that can deal with a very large number of retail selling points, vendors, and SKU-s, as well as various aggregations of these data.

As one contemplates the future of collaboration, several trends are emerging:

- Companies are accelerating their collaborative relationships – whether CPFR, Just-in-Time, ECR, CMI, or many other initiatives – companies are getting on board
- CPFR is gathering momentum. Ireland and Bruce (2000) report that The Sport Authority is rolling CPFR with all its suppliers and many more companies have announced CPFR pilots.
- Companies are finding new and innovative ways to collaborate. For example, Procter and Gamble has implemented CPFR not only with some of its retail customers, but also with its suppliers, and even inside the company, between functions and divisions.

While this paper focuses on the promise of CPFR, one has to remember that as one of the latest trends in supply chain management, consultants and software vendors are touting CPFR as the next “silver bullet.” This paper shows that CPFR is a continuation of many collaborative business trends. As such, it will be only as successful as the

underlying desire to actually collaborate and the incentive system that drives behavior in the collaborating partners. While CPFR may be supported by more robust software than earlier collaborative movements, it still requires a significant dedication of effort on the part of the collaborating partners, and while companies may be able to have more CPFR relationships than CMI, such relationships will still be reserved for their top vendors and customers.

There are many parts of the supply chain and related enterprise activities, which are not covered by CPFR. These include the following:

- Demand management – including collaborative merchandising, category management, promotional planning and even collaborative space management (in the stores and the distributing centers). On the manufacturer side, collaborative product design and new product introductions are already taking place in leading companies. As Ireland and Bruce (2000) comment, such complete collaborative merchandising plans can lead to even better forecasts since it looks at causal factors beyond random demand fluctuations.
- Fulfillment – CPFR does not extend to many of the other parties involved in the fulfillment process. For example, transportation carriers, forwarders, public warehouse operators, are not yet part of any standard collaborative process. Interestingly, the VICS committee is developing guidelines for Collaborative Transportation Management (CTM) to start and address this deficiency.
- Joint optimization – collaborative relationships allow enterprises to start optimizing operations outside the walls of the enterprise and across entire supply chains. Today's collaborative efforts are laying the foundation of trust and joint business processes that will enable future supply chain optimization.
- Real time collaboration – most of the processes in use, in testing, and in development focus on planning activities. Many of the problems, however, arise in real time while the product is moving and the unexpected happens. Clearly, better planning and forecasting will yield a smaller number of real time discrepancies -- but processes for collaborative problem solving in real time,

based on data from visibility tools, can help retailers avoid stock-outs and manufacturers avoid plant stoppages.

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