# The levels of CPFR deployment

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**Abstract.** The fundamental aim of Supply Chain Management as a philosophy is to eliminate barriers and confrontational policies between the participants in trade. This switch from confrontation to collaboration acts as a catalyst and has created a number of sub activities that facilitate this overall aim. Collaborative Planning, Forecasting and Replenishment (CPFR) is a prime example. CPFR is a business activity aiming to produce a single, reconciled statement of demand. This paper investigates what is meant by CPFR, what are the implementation issues and explores different levels of deploying the CPFR process.

**Keywords**. Supply Chain Management (SCM), Collaborative Planning Forecasting and Replenishment (CPFR)

## Introduction

Supply Chain Management (SCM) concept has had a major impact on businesses optimisation. The idea behind SCM originates from the realisation that certain supply chain costs cannot be reduced any further through competitive pressures and further improvements in results can only be achieved through collaboration. A good example is inventory stockpiling. While inventory optimisation is a known strategy to improve financial results, the reduction in inventory also yields an increase in exposure to uncertainty, which can become difficult to manage.

The management techniques that focuses on reduction of inventory within SCM are Vendor-Managed Inventory, Continuous Replenishment or Automatic Replenishment Programme (Stank, Daugherty et al. 1999). However, these techniques have shown weaknesses such as lack of visibility of the whole supply chain (Barratt and Oliveira, 2001) and inadequacy for long term planning.

Collaborative Planning, Forecasting and Replenishment (CPFR) is also a management technique based on collaboration and has the potential, in addition to inventory reduction, to reduce business uncertainty in both the short and long term. Additionally, it is expected to reduce out-of-stock items, improve asset utilisation, and rationalise deployment of resources. However, its usage is still not widespread and where implemented, the results are not always encouraging (Stank, Daugherty et al. 1999). This paper investigates some of the issues regarding the implementation of CPFR and explores the reasons why the technique is not taking off as fast as it could.

The paper is divided into five sessions. The introduction places CPFR within the SCM context and emphasises its importance. Second session explores CPFR issues, such as deployment steps, drivers, expected outcomes and implementation issues. The third session suggests alternative levels of CPFR implementation, termed deployment planes. Finally, a discussion is conducted on various CPFR management issues, indicating future research directions.

## SCM and CPFR

SCM is based on the principle of cooperation in which optimisation results provide gains for the whole chain. However, SCM implies that companies in the chain have to face challenges regarding the way their businesses are operated. For instance, Kopczak and Johnson (2003), list six major shifts in business focus as a result of the SCM. These shifts include:

1. From cross-functional to cross-enterprise integration
2. From physical efficiency to market mediation
3. From supply focus to demand focus
4. From single company product design to collaborative, concurrent product, process and supply chain design
5. From cost reduction to breakthrough business models
6. From mass market supply to tailored offering

The above list implies that SCM also has to be seen as a value-add process. Not only every company has to work hard to optimise internal processes but it also has to interface with other chain partners. A basic ingredient for achieving such SCM integration is information sharing. In this context, collaboration between partners is essential, as well as is trust. Several collaborative-based initiatives typical for SCM are well known, and we already mentioned Vendor-Managed Inventory (VMI) and Continuous Replenishment (CR), or Automatic Replenishment Programme (ARP). VMI's weakness lies in the lack of visibility of the whole supply chain (Barratt and Oliveira, 2001) while CR/ARP concentrates on day-to-day activities and is not adequate for long term planning. In addition, the influence of promotions on planning, lack of general synchronisation across the supply chain, and the issue of multiple forecasts within the same company have not been successfully tackled by these SCM initiatives.

## CPFR

One of the most recent collaborative techniques that have emerged from the SCM arsenal is called Collaborative Planning, Forecasting and Replenishment (CPFR). We define CPFR as a process and a business practice relying on technology and procedures, aiming to produce one, unified statement of demand and endeavouring to maintain optimum levels of stocks across the supply chain through sharing and reconciling forecasts. CPFR was first applied in 1995 when Wall Mart formed a working group with Warner Lambert to pilot a new approach on collaborating in forecasting and replenishment of one of the products (Listerine)[1]. It proved successful and it created many expectations. CPFR is expected to achieve reduction of out-of-stock items, decrease inventory, provide better asset utilisation and deployment of resources[2]. In addition to these primarily internal and cost focused drivers, other external factors also drive the adoption of CPFR, such as: improvement in overall

[1] For details see http://www.gmabrands.com/industryaffairs/docs/cpfr.pdf
[2] http://www.gmabrands.com/industryaffairs/docs/cpfr.pdf

chain competitiveness, transparency and cost structure, ability to cope with fashion trends (or shortening of product life cycle), possibility to cope with moves to offshore production, and a need to handle increasingly longer, global supply chains (Fliedner 2003). Marginal CPFR benefits come from increase in sales, improvement in both trading partner relationships and communication, and improvements in service level.

It is evident that CPFR promises to address some of the SCM forecasting challenges, however, some of the results do not fulfil the promise. For instance, empirical research by Stank, Daugherty et al. (1999) found that implementing a CPFR system did not affect significantly the following, yet commonly expected benefits:

- improvement in customer service
- reduced stockout
- fewer damaged, returned and refused goods
- lower inventory
- faster stock turns

The reasons for such poor performance are possibly due to the research being conducted at earlier stages of CPFR development. In this paper we suggest that there are different levels of deployment of CPFR. If this is true, than they need to be measured in a different way. The benefits, as well as the barriers associated with various levels, will inevitably yield different results because the set of circumstances and expectations for every level is different. Firstly we will address main CPFR implementation issues and later we will explain different deployment levels.

**Implementation issues**

Implementing CPFR within SCM requires overcoming some of the barriers and building of trust within the chain. Barratt and Oliveira (2001) identified a number of barriers associated with the implementation of CPFR, such as:

- No shared targets
- Difficulty to manage the forecast exception/review processes (both sales and order forecast)
- Trading partner focuses on the traditional supply chain steps, not on the exception/review processes
- Promotions and new items events are not jointly planned
- Non-existence of an integrated decision support system to provide consumer, customer and market data
- No adequate information technology/expertise
- Lack of discipline to execute preliminary (and preparatory) phases of the CPFR process (in particular, in the stages of issuing the front-end agreement and the joint business plan)

In addition, Fliedner (2003) identified other issues, such as:

- lack of trust in sharing sensitive information
- lack of internal forecast collaboration
- fragmented information sharing standards
- aggregation concerns (number of forecasts and frequency generation)
- fear of collusion

Sparks and Wagner (2003) argue that most of the issues result from the lack of close relationships between buyers and suppliers. The question is why is it difficult to develop those relationships, how close these relationships have to be and how structured and formal do they have to be?

We believe that the answer to these questions has to do with the role of trust within the chain. Trust is essential to CPFR since it provides the scope for reducing control (Gallivan and Depledge 2003) and has the potential to improve the speed and the amount of useful information in the stream. Improving the level of trust is a long-term objective for organizations. Barratt and Oliveira (2001) identified some steps to start the process of trust building:

- Define a single point of contact for each trading partner: this ensures that the information is neither lost nor deteriorates during its flow between the trading partners.
- Define an agenda for collaboration (short-medium-long term): stabilising the collaborative goals across the time.
- Expand collaborative projects (scope and complexity): to gain critical mass, the CPFR initiative must expand its scope and complexity across time.
- Ensure continuous sharing of information: the need to keep continuous information flow is paramount.
- Trust develops: a real trust-based relationship will only prevail after a relatively lengthy period. Meanwhile, small barriers are removed from the path of the CPFR process, which brings confidence

Trust seems to be inversely proportional to control. If this is the case, it is in the interest of all the participants in the chain to build it. The greater the trust, the easier it will be to manage not only relationships, but the underlying technology too.

**Implementation steps**

In order to minimise variability and promote rigour in applying CPFR, it is suggested that its implementation should follow a detailed nine-step process[3]. These steps could be summarised as follows:

1. Form partnership
2. Synchronise broader business plans
3. Share sales forecasts
4. Reconcile sales forecasts (exception handling)
5. Create order forecasts
6. Reconcile order forecasts

Broadly, the above steps imply that CPFR process can be divided into two stages:

A. Front-end stage (agreements, plans, infrastructure, etc.)
B. Managing forecasts stage (sales, orders, stock replenishment, etc)

[3] For details see http://www.cpfr.org/documents/pdf/CPFR_Tab_2.pdf

The first stage is a foundation for the second stage, and even more importantly, this is the stage where the trust between the partners starts to be built. At this stage, types of collaboration are established and formalised. Spedale (2003) refers to two ideal types of cooperation. One is structured cooperation, characterised by highly engineered partnerships and the other one is unstructured cooperation, characterised by informal relationships. The way SCM is implemented and supported today (in general) makes it fall more in the later category. On the other hand, CPFR as a special delivery method of SCM can be seen as the first type of collaboration. This implies that CPFR drives the SCM concept towards a highly structured, highly engineered type of partnership, requiring greater amount of trust among participants in the chain.

**Deployment of CPFR**

We base our notion of deployment levels on the work of Pramatari, Papakiriakopoulos et al. (2003). They explored four elements defining the CPFR process: place, product, time, information sharing. Thus, we could interpret CPFR as a process deployed in a multidimensional space defined by four axes representing the four elements:

- *place* axis - manufacturer, distributor and a retailer
- *product* axis - full range, specific category, or just promotional/seasonal products.
- *time* axis - daily, weekly or monthly frequencies
- *information-sharing* axis – point-of-sale data, stock data or just promotional items.

Such a space defined by these four axis and three different levels could be visualised as an inverse pyramid (see Fig. 1). The way to interpret this diagram is to start from the bottom and visualise the first participant in the supply chain as the peak of the pyramid. The lowest level (the first plane) of CPFR implementation is between this participant and their customer, i.e. another manufacturer. This also implies the lowest possible commitment and possibly just a monthly exchange of data. The manufacturer from the first plane communicates to the first participant only exceptions in demand, such as their promotional plans, which implies that CPFR does not cover the whole range, only products subject to programmed variations in demand. To establish this level of CPFR, clearly not a great deal of trust is invested, nor does it imply any kind of automated integration of systems. This is barely a form of SCM.

The second plane of CPFR is a more serious commitment, implying that the originator of the process has a relationship, via customer-manufacturer, with the intermediary, i.e. a wholesaler. The type of data exchanged is higher in frequency and covers perhaps weekly data. On this plane, not just promotional, but specific product categories (possibly critical items) are included. As far as the level of detail is concerned, this plane involves stock data exchange. This category of CPFR deployment implies that participants not only trust each other, but that they are prepared to share some common ICT infrastructure. Many traditional SCM models, based on EDI, are built around this plane. Nowadays it can also be implemented using extranet portals over the World Wide Web.

The third plane of CPFR implies that not only trust and control between the participants begin to be fuzzy, but that the whole chain participates in real-time and that the boundaries between the participants are becoming blurred. Retail data of high

frequency, i.e. daily POS data, are communicated down the supply chain for the full product range. This real-time imperative implies complete integration of the ICT infrastructure. Needless to say, this does not imply sharing the ERP system, for example, just using common technologies (such as web services, for example) that enable full integration of various platforms and applications. A form of a closed e-marketplace is a type of technology that can facilitate this CPFR deployment.

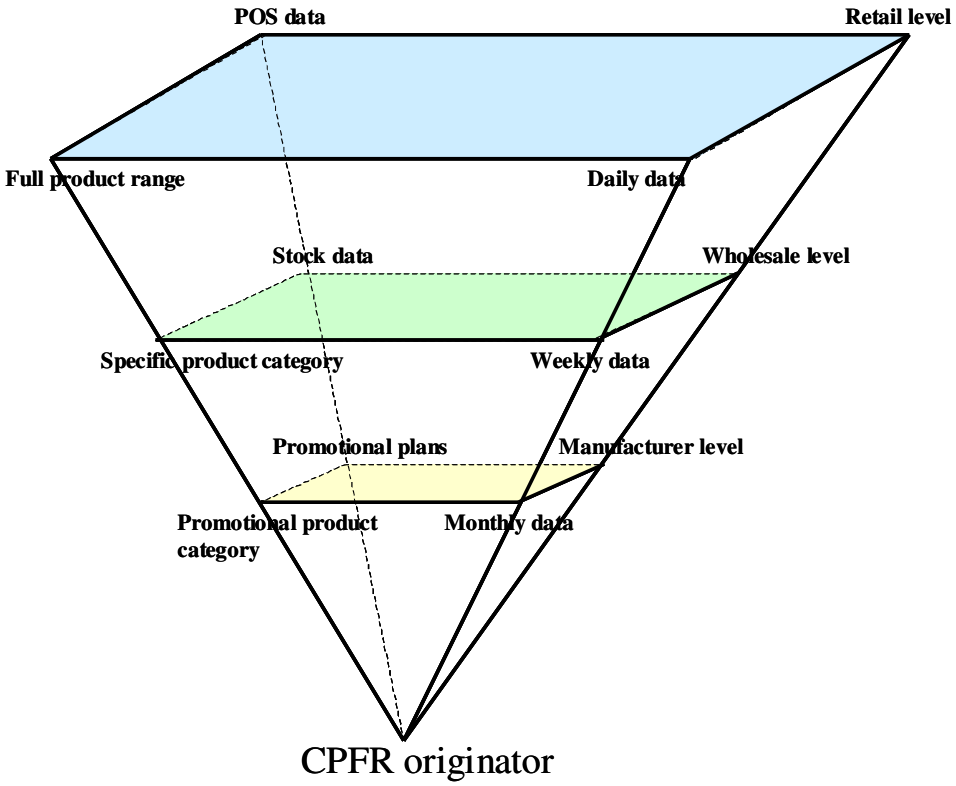


Fig 1. CPFR deployment planes

Pramatari, Papakiriakopoulos et al. (2003) picture the four axes as two coordinates perpendicular to each other and display the level of CPFR implementation in the form of a web diagram. Their representation indicates that different respondents in their study have reached different levels of CPFR implementation. In other words, the penetration of the CPFR philosophy is not linear and due to various circumstances goes more deeply, or more superficially, along one or two coordinates.

To us this also implies that when companies talk about CPFR, they in fact have different levels of deployment (the planes) on their mind. In contemporary sense, only the highest form of deployment we mentioned above deserves to be called CPFR. This is also the only plane that matches all the criteria we covered earlier.

## Management of CPFR

Once partnerships have been formed, trust established and technology selected, managing the CPFR process becomes a challenge. Many of these challenges are of a technical nature, but a significant portion of them remains non-technical. For instance, large organisations often suffer from the overconfidence syndrome, which is also

called an illusion of control (Durand 2003). The higher the perception of control, the higher the likelihood of underestimating risks (Schwenk, 1986). Although Schwenk quotes this behaviour in the context of forecasting accuracy, the same behavioural pattern applies to general collaborative forecasting scenarios. It is more than natural to expect a large brewery to take pub forecasts, for example, as just indicative and to produce forecasts which are self-driven rather than market-driven.

Corporate culture based on acceptance of ambiguity (e.g. in roles, power relations, organisational routines and practises) creates a strong, vibrant and committed work force. These are the findings of Robertson and Swan (2003) in the context of knowledge intensive firms. The employees' perception that they are free and autonomous contributes towards their satisfaction and sense of loyalty. The fact that autonomy is limited and imposed becomes irrelevant. The illusion of autonomy acts as a major motivating force. The same principle is of paramount importance in CPFR, especially if SMEs are integrated in the process as it is essential to maintain this perception of autonomy. Needless to say, the higher the trust level, the lower the level of control will be, and subsequently, the higher the illusion of autonomy.

The development and usage of collaborative forecasting requires consensus. Thus, multiple views have to be deemed necessary in order to identify one unified course of action. This course of action holds inherent dangers. Great discrepancies in individual views (forecasts) could be perceived as 'noise', or lacking relevance. It has to be emphasised that knowledge sharing with others is only valuable if one's views differ from that of the other parties in exchange (Walsham 2001). This means that the consensus forecasting has the greatest value when discrepancies (providing they are genuine and not politically motivated) are the greatest. Partners should find ways of reconciling discrepancies so that common forecast is accepted and used. However, this is often easier said than done.

Another fundamental issue in today's CPFR is that very few retailers forecast demand for stock-keeping units – the level that is actually critical for the suppliers. A reason for this might be that retailers do not get any benefit from forecasting when supplier service levels are already high. To make CPFR truly relevant, forecasting on the stock-keeping units (SKU) level is essential. A lean approach to forecasting is suggested, based on category forecasting.[4] Halmstrom, Framling et al. (2002) found a solution in mass collaboration in the chain, rather than partnerships. Yet this is truly a challenge for CPFR.

The issue of component lead-time also affects forecasts within CPFR. The cumulative time lag for a component with the longest lead time will determine the point in time for which forecasts need to be frozen and orders placed, or stock replenished. CPFR promotes flexibility and real-time response, but like any other system has constraints. The cascading effect of changes in forecasts and lagging that is associated with component delivery requires a lot of tuning and probably much more research in this domain is needed.

[4] Rather than forecasting on the SKU (Stock Keeping Unit) level, items are ranked and a relative share of each rank within the total category is expressed

Finally, if participants in the chain produce forecasts, which are subsequently used to produce other forecasts, what happens with potential errors? The propensity for errors, in such scenarios, is to grow exponentially. This inevitably takes the whole forecast reconciliation process into the realms of chaotic behaviour. In other words, in today's competitive world mistakes can be costly, but in tomorrow's collaborative world they could be catastrophic.

## Conclusion

This paper tried to illuminate some of the ambiguity associated with the notion of CPRF. We discussed a number of the issues linked with the CPFR deployment and implementation within the SCM. It is argued that CPFR is a process and a business model whose adoption is driven by chain optimisation and has to overcome some barriers such as trust building. We suggested that some misunderstanding that accompanies CPFR implementations, as well as the absence of reported benefits, could be explained through different levels of CPFR deployment. The only acceptable type of CPFR, which will yield expected benefits, is the one that goes down to the SKU level, involves daily POS data, spans the whole chain and includes exceptions, such as promotions. To reach this level, however, implies a great deal of front-end effort, which involves forming partnerships and building trust. In addition to this, some advanced technical infrastructure is more than essential.

We also included some of the issues that accompany the managing stage of the CPFR process. Although the level of technical sophistication that enables the CPFR process will play a major role, there are a number of other non-technical issues that will make this process either a success, or, a source of frustration. Most of the issues we selected to mention require further research and much more attention to detail.

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