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MEASURING COLLABORATIVE PLANNING, FORECASTING, AND REPLENISHMENT (CPFR) SYSTEMS PAYOFF: A CASE STUDY

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Abstract

Measuring IT payoff of CPFR systems is challenging due to the impacts that span across organizational boundaries. This paper introduces CPFR and supporting technology, discusses the challenges of IT payoff measurement and presents a case study for the measurement of IT payoff.

Keywords: CPFR, payoff, IT investment, business value

Introduction

Competition today no longer occurs solely between individual firms; instead entire supply chains compete against each other. Collaboration among supply chain partners provides a fundamental competitive advantage in this environment. Collaborative Planning, Forecasting, and Replenishment (CPFR) is a set of business processes in which trading partners mutually agree on business objectives and measures, develop joint sales and operational plans, and electronically collaborate to generate, review and update sales forecast and replenishment plans. With joint responsibility, a buyer’s order cycle can be synchronized with the supplier’s production cycle. This lowers inventories across the supply chain, and provides higher service levels of the right products in the right locations. CPFR technology identifies exceptions, which are then jointly used to revise plans and forecasts on a regular basis (Syncra Systems 2000).

Challenges in Measuring IT Payoff

Achieving benefits from IT requires changes to organizational and business processes. If processes do not change and available resources are not reallocated, tangible payoff may not be evident. Second, IT investments take time to implement and affect the organization, thus, leading to a lag between the investment and the payoff (Devaraj and Kohli 2000). Third, IT benefits that are often qualitative, indirect, and create “ripple effects” inside and outside the organization are difficult to quantify (Wen and Sylla 1999). Further, there is no consensus on the optimal approach, measures, or level of analysis to be used when measuring the strategic value of IT investments by organizations (Banker, Kauffman and Mahmood 1993). Data collection is also difficult – firms either don’t track their IT investment data or are not willing to divulge it (Mahmood and Mann 1993). Finally, organizational dynamics affect the ability to achieve benefits from IT. Often clear responsibilities for change in business processes are not specified (Sherer, Ray and Chowdhury 2000) and when they are, those responsible may embellish IT payoff, if any.

In addition to the challenges of IT payoff measurement in general, the success of CPFR measurement depends upon the motivation of all partners. An understanding of the power relationships among supply chain partners and the sharing of benefits among the partners are crucial for assessing individual payoffs (Clemons and Row 1993; DeNitto 1992). The value of technology depends on the business goals it supports, and to what degree the technology helps achieve these goals. These goals may be different for different members of the organization (Boivie 1998).
Research-in-Progress Case Study

We present a case study of Collaborative Commerce, an IT platform enabled by CPFR methodology and a tool set accessed via the Internet. CPFR allows two partners, ReCo (Retailer) and MaCo (Manufacturer), to precisely align product shipment, stock level, and point of sale data, leading to large savings for individual partnerships and supply chains. MaCo and ReCo have been collaborating for less than a year, and are collaborating on some of MaCo’s products. Both partners believe that they have (i) profited from the alignment and greater accuracy of sales and promotional forecasts; (ii) created opportunities for improved efficiency and inventory reductions; and (iii) improved management of their supply chain by evaluation of point-of-sale (POS) data and trends. MaCo may have gained the additional benefit of evaluating the performance of its’ promotional activities with ReCo from this data.

The two partners have the capability to provide and share two basic forecast types (i) Sales Forecast, and (ii) Order Forecast. Sales Forecast is a projection of future retail sales for a given time period and location, created by combining POS data, seasonality, causal information, and planned events. An Order Forecast is a forecast of anticipated orders created by combining POS data, causal information and inventory strategies to generate specific ordering requirements to support the sales forecast. Actual numbers are time-lagged and reflect inventory objectives by product and receiving location. Each of the above two forecast types can have the following three forecast sub-categories which partners may choose to further define for collaboration purposes: (a) Base Forecast for specific time periods, (b) Promotional Forecast for promotional events for specific time periods, and (c) Seasonal Forecast for seasonal fluctuations in product demand.

ReCo supplies prior year and current data on the following data streams - Actual Sales, Actual Orders, and Actual Shipments- and current data on Buyer Inventory as well. Both partners can see the same data graphically represented on the screen and respond to the exceptions that are then generated from the forecast data presented. The extent of the analysis of CPFR data depends upon the motivation of the collaborating partners to generate performance metrics. Examples of basic metrics are the following: forecast accuracy, order fill rate, and inventory turns. The output of the CPFR collaboration is presented graphically for a specific context (Figure 1) and is based upon the data files provided by MaCo and ReCo. Both partners agree that collaboration has provided them with a number of anecdotal benefits, but how can these be defined as processes and optimized? Are there other complementary data elements beyond the scope of the collaboration data streams that are valuable to analysis of payoff from CPFR? What are the most appropriate methods to quantify the effects of missing or incorrect data between collaborating partners?

The collaborative focus of the product enables a view of the business processes between partners, and accelerates a dialogue on how to develop greater insight and analysis in managing the relationship. Current and accurate data are paramount to an effective collaboration process. Obviously, the value inherent in collaboration erodes most when forecast data (Sales, Order, and Promotion) are not presented, but are also impaired by missing POS or inventory elements as well. Time-based attributes of the data set not shared in a timely manner also inhibit effective collaboration. Similarly, intermittent data elements presented over n periods that are incomplete or late do not facilitate meaningful trend analysis. Partners in collaboration should agree to the appropriate time periods (n) to define intermittency in each circumstance. Unlike missing data, stale or intermittent data series are hard to detect and require special exception rules so that they can be flagged within the normal data set provided.

Analysis

The analysis of payoff resulting from CPFR can involve several possible research designs. First, an ex ante and post hoc design for the same product can be analyzed to identify incremental improvement in the process accuracy and efficiency, while controlling for organizational and economic factors. This approach leads to determination of actual payoff resulting from CPFR implementation. However, a weakness of this design is that comparable metrics for ex ante may not be available. In another approach, outcomes for two products within the same product category, one using CPFR partnership, can be analyzed. The advantage of this approach is that consistent data are available, however, product and partner differences can confound the CPFR payoff. Soofi, Retzer, and Yasai-Ardekani (2000) present an Analysis of Importance framework to determine relative importance of variables in a set of explanatory variables.

Future Research in CPFR

Several challenges remain in the development of wider adoption of CPFR. It requires partners to have a greater level of communication and trust than might be present in their current business relationship. As CPFR is a revolutionary and new process...
as a supply-chain initiative, it requires visionary leadership by the partners’ executive sponsor- and buy-in from IT, management and users. Management may be skeptical of the promise of fast attainment of IT/payoff- ROI from CPFR, as it does not require a large investment or long and expensive implementations as they are conditioned to expect from these initiatives. Business Process Reengineering may be required to redefine roles and job responsibilities to support the interaction. Technical issues regarding data delivery and transmission of data need to be overcome, such as interpretation of client’s EDI data. Most importantly, the data’s quality, definition of source and attributes, and creation of relevant and useful analysis are vital to supporting effective decision-making.

Conclusions

We present research-in-progress to examine IT payoff from a new e-business technology - CPFR. This paper addresses one of the commonly cited difficulties of IT payoff - combining organizational issues with IT implementation. The value of accurate, complete, and timely data is highlighted. In addition, we propose that the power relationships between the partners also have to be addressed.

Collaboration Analysis

Figure 1. An Example of Collaboration Analysis in CPFR between ReCo and MaCo

References

Available upon request