Next Big Thing: Collaborative Planning Tools accelerating Supply Chain Management

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Abstract: The purpose of this research is to study the impact of collaborative planning tools on supply chain management. Method adopted in this study is to conduct a review of different surveys, case studies, paper and articles collected from authentic resources. The outcome of the review is a table indicating the "name of references" and relevant "drivers".

Keywords: Collaborative Planning, Supply chain management, collaboration initiatives

1.   INTRODUCTION:

Supply chain collaboration is continuing to emerge as a fundamental change toward new methods of conducting business. Closely united partnerships with emphasis on greater supply chain visibility and proactive response to changing market conditions are going to be the requirements rather than the Goals placed on businesses. Today,,s technologies are accelerating the race toward the development of new business models and collaborative solutions. This trend is encouraging heavy investments in Technology infrastructure as businesses prepare to be part of this new business environment.

Companies preparing for this new economic model are faced with several key challenges:

• Support of multiple technologies
• Support of multiple collaborative business models
• Scalability of collaborative solutions

Disparate systems and processes present challenges to businesses looking to execute on the supply chain collaboration vision. As business transactions that have historically been internally focused now need to become external to the organization, your ability to succeed will be based on your ability to provide an integrated view across your business processes. Organizations that rely on human intervention or lack integrated systems will run into scalability issues as the business world begins to transact at an accelerated pace. Response times expressed in days will no longer be an acceptable measure as the business world continues to move towards the real-time exchange of information. The emergence of trading exchanges for specific business transactions such as procurement and transportation adds additional complexity to the underlying infrastructure challenges. Very few companies will have the luxury of dealing with a single exchange. Most businesses will need to comply with the specific business process and data requirements of multiple trading exchanges. This will again force issues of infrastructure flexibility to the forefront in order to support multiple business channels and trading partner relationships. Internet-based communications technologies surrounding the transfer of XML-formatted data will continue to evolve. Many

existing trading partners will require support of EDI-based transactions for years to come while more forward-looking companies will require conformance to XML-based standards. The proliferation of multiple XML-based standards will fuel the requirements for flexibility at a trading partner level. Businesses will be forced to support multiple communication technologies and partner-specific communication standards well into the future. A seamless 360-degree customer and partner view of your business is critical to your continued success. All outward-facing systems must be integrated across your internal organization. Throughout the process of customer contact, order placement, procurement, production, and fulfillment your outward communications must be consistent, timely, and accurate. As you prepare your business for collaborative commerce, you must ensure that your systems are tightly coupled, flexible, and allow you to extend your reach outside the walls of your business.

2.   COLLABORATION INITIATIVE

Supply chain collaboration occurs when two or more companies share the responsibility of exchanging common planning, management, execution, and performance measurement information. Collaborative relationships transform how information is shared between companies and drive change to the underlying business processes. Businesses are looking toward collaboration as an opportunity to optimize their supply chain and relationships with their trading partners. Supply chain collaboration poses complex challenges to supply chain partners in that there is a broad spectrum of collaborative initiatives, disparate standards for communication, and various levels of trading partner competencies and business processes. Table 1 lists some of them.

Table 1- Different varieties of Supply Chain Collaboration Initiatives

Collaboration Initiative	Description
Vendor Managed Inventory (VMI)	Supplier manages a customer''s inventory levels using either traditional Min/Max/EOQ or forecasting replenishment models.
Collaborative Planning Forecasting and Replenishment (CPFR)	Supplier works with the customer to develop a joint sales forecast that is used as the basis for replenishment. Actual sales vs. forecast are compared to alert parties of variances so that proactive action can be taken.
Scan Based Trading	Suppliers provide manage customer inventory levels and provide goods on consignment. Customers exchange point of sale information with suppliers to drive both replenishment and billing activities from actual sales activities.
Procure to Pay Transactions	Traditional transactions that are used for placing a purchase order, communicating changes, and acknowledging receipt with a supplier.

Table.2 Source name along with keywords

Item / Product Information	Suppliers and customers share information related to items that they purchase/sell. This initiative is focused on keeping the information in synch across multiple suppliers and customers.
Catalog Management	Customer centric exchange of supplier catalog information with facility for customers to place orders against new products/items with minimal data entry.
Order to Cash Transactions	Traditional transactions that are used receiving sales orders, communicating changes, sending an advanced ship notification, and invoicing a customer.
Promotions Management	Suppliers provide notification to customers for planned promotions, exchange activity information against a promotion
Third Party Logistics	Suppliers can outsource the fulfillment of goods to a third party logistics (3PL) provider to service smaller regions, or to handle excess inventory. The 3PL must receive sales order information and send back shipment details.

NO	Name of Ref	Drivers						
		Objective	Feature of SCM	Methodology	Collaboration models	Industry	Benefits	Tools
1	Terry L. Esper, Lisa R. Williams: "The Value of CTM, Its Relationship to CPFR and Information Technology" Transportation Journal, summer 2003 vol. 42/No. 4	The relative study of CTM with CPFR and IT	Logistics and operational matters	Case Study with in Paper	Collaborative Transportation Management (CTM)	Logistics (Transplace, Weyerhaeuser, Anheuser-Busch, and Office Depot)	Transportation cost, on-time performance, asset utilization, administrative cost	Dense Network Efficiency (DNE) by Transplace
2	Paul Demery: "Web-enabled scan-based trading emerges as a trusted tool for managing in-store inventory", www.internetretailer.com , Feb. 2006	The emphasis of scan-based trading over VMI and CPFR	Inventory management	Article	Scan-based trading (SBT)	Food (Ahold USA)	Accuracy of product retail pricing and inventory costs,	Park City Group"s collaborative Scan Based Trading solution
3	Mu-Chen Chen, Taho Yang, Hsin-Chia Li, "Evaluating the supply chain performance of IT-based inter-enterprise collaboration", Information & Management, Feb 2007 vol. 44	The comparison of collaboration and non-collaboration through simulation	Production, replenishment and inventory management	Paper that investigate the result through simulation	CPFR	General study through simulation	Improved service level, fulfillment rate, order cycle rate and reduce total system cost	ARENA simulator
4	Luc Cassivi, "Collaboration planning in a supply chain", An International Journal, Volume 11 · Number 3 · 2006 · 249–258	Identify the electronic collaboration tools used in a supply chain and analyze how they affect different partners along the supply chain	Transactions and information managements	Research paper using surveys and field study	CPFR	Telecommunications equipment industry	Reduction in errors, Transactions processed faster, Fewer information losses, Simplified information access, Inventory reductions, Packaging consolidation, Faster and more effective communication, Contract negotiations with less human interaction	NA
5	Oscar Rubiano Ovalle, Adolfo Crespo Marquez, "The effectiveness of using e-collaboration tools in the supply chain:	The simulation and assessment of the impact of using e-collaboration tools in a SC	product information, customer demand and transaction information, and inventory information sharing	Paper that find result through simulation	Collaborative Forecasting and Replenishment (CFAR)	NA- General study through simulation	Produces the smallest movement and storage of materials along the chain and efficient inventory administration and less investment	Continuous Replenishment Programs (CRP), Vendor-Managed Inventory (VMI)

	an assessment study with system dynamics", Journal of Purchasing & Supply Management 9 (2003) 151–163						
6*	Luc Cassivi, Elisabeth Lefebvre, Pierre-Majorique Leger, "The impact of e-collaboration tools on firm performance", The international journal of logistics management 15 (2004) 91-110	The identification of e-collaboration tools, the assessment of their relative efficiency through the entire chain and analysis of both upstream and downstream perspective	Collaboration of upstream and downstream partners of SC	Research paper that shows result through surveys and case study of seven organizations that are common members of SC	Collaboration among SC members- No specific model discussed	Telecommunications equipment industry	Increase visibility among SC partners, increase SC velocity and flexibility, reduce human intervention in procurement process, improve data integrity and traceability	8 collaboration tools are discussed which are business strategy, direct procurement, replenishment, capacity planning, delivery and tracking, project shortage, forecasting and design tools
7	Adolfo Crespo Marquez, Carmine Bianchi, Jatinder N.D. Gupta," Operational and financial effectiveness of e-collaboration tools in supply chain integration", European Journal of Operational Research 159 (2004) 348–363	To study the operational and financial benefits of using various e-collaboration tools	The integration of supply chain partners collaboration in operational and financial perspective	Paper with simulation	No specific model discussed	NA General study through simulation	Improve operational and financial performance of the entire supply chain	Real time information sharing, document sharing, collaborative forecasting, collaborative planning and automated payments implementation tools
8	Zhensen Huang and Aryya Gangopadhyay, " A Simulation Study of Supply Chain Management to Measure the Impact of Information Sharing", Information Resources Management Journal, 17 (2004) 20-31	To study the performance of the retailer, distributor, wholesaler and Manufacturer with respect to the degree of information sharing	Replenishment and inventory	Paper with simulation	No specific model discussed	General study through simulation	Decrease in backorder, new order quantity and end inventory	NA
9*	Elisabeth Lefebvre , Luc Cassivi, Louis A. Lefebvre, Pierre-Majorique," E-collaboration within one supply chain and its impact on firms' innovativeness And performance", Information Systems and *e-Business* Management	The study of relative benefits (supplier vs. customer) achieved from e-collaboration tools	Operational and administrational matters	Paper	Collaboration among SC members- No specific model discussed	Telecommunications equipment industry	Improve firm innovativeness and overall performance	Business strategy, direct procurement, replenishment, capacity planning, delivery and tracking, project shortage, forecasting and design tools

	Springer-Verlag (2003) 157-173							
10	Raffaella Cagliano, Federico Caniato, Gianluca Spina, "Reconsidering e-business strategy and the impact on supply chains", International Journal of Operations & Production Management 25 (2005) 1328-1332	To show the domain of adoption of internet based tools (B2B) used for collaboration and integration of these tools as well as to Show the level of information sharing and system coupling among upstream and downstream members of SC	Procurements management	Paper based on survey	NA	Electronic machines industry and the transport equipment industry	Accessing broader market, fostering completion among suppliers and automated process that results in reducing purchasing costs and increase purchasing efficiency	Internet based B2B applications such as e-integrators, e-procurement, e-operations and e-commerce tools
11	Luc Cassivi, " Collaboration planning in a supply chain", An International Journal of Supply Chain Management 11 (2006) 1359-8546	To identify the electronic collaboration tools used in a supply chain and analyze how they affect different partners along the SC and categorizing firms according to collaboration planning.	Production and administration	Paper with field study and electronic surveys	CPFR	The telecommunications equipment industry	knowledge creation capabilities, process and relational innovations are enhanced	VMI and CRP
12	Pamela Danese, " Des collaborations: insigh case studies", Intern of Operations &P Managem Volume 27 Number 2 2007 pp.191-204	To point out the dimensions explaining the variety of CPFR collaborations and the contingent factors influencing these dimensions	Supply chain strategy	Paper based on 7 case studies	Various forms of CPFR	NA	Suggests managers how to select the most appropriate action to be taken to implement CPFR, through the analysis of the context in which CPFR should be implemented	No specific tools discussed instead research focus on various kind of CPFR methodologies exist across the supply network
13	JDEDWARDS"CPFR – Collaborative, Forecasting , and Replenishment, February 2003	How to tackle CPFR model and achieve the target objectives set by the CPFR committee using J.D. Edwards supply chain management and interoperability tools.	Production and Distribution planning Demand Planning, Order management.	Article Retrieved from Google without author name and published on JDEDWARDS website	CPFR	NA	J.D. Edwards Web Portal offers cost-effective collaboration with trading partners and Increased employee productivity because data is centralized and Improved customer service and reduced call volume and Rapid deployment and integration of new applications.	J. D. Edwards integrate Advanced Planning and Supply Chain Execution software, Production and Distribution Planning application, Demand forecasting and Demand consensus application and order Promising software.
14	Jerold P. Cederlund, Rajiv Kohli, Susan A. Sherer, and YuliangYao " How Motorola put CPFR into Action" October 2007	How Motorola Reduce Forecast Error and Out-of-Stock to improve collaboration with customers using CPFR.	Demand Forecast, Stock, On-time delivery, Inventory management, Order management, Logistics	Article published on VICS website	CPFR	Electronics (Motorola)	Increased product availability while simultaneously reducing transportation, logistics and inventory costs. Reduce inventory and transportation cost and stock-out rates	EDI and Formal communication process and Manugistics system incorporating XML.
15	Jose Geraldo Vidal Vieira, Silas Costa Ferreira Junior	To present CPFR implementation cases in Brazil as a technological	Collaboration, frequency in transactions, stock,	Paper based on two case studies.	CPFR implementation as a	Consumer packaged goods industries and	potential reductions in transaction costs, better demand forecasting,	VMI, EDI

#	Reference	Objective	Parameters	Methodology	Focus	Industry	Findings	Tools
	Hugo T. Y. Yoshizaki " COLLABORATIVE PLANNING, FORECASTING AND REPLENISHMENT: STATE OF ART IN BRAZIL", *CEP: 05508-900 – São Paulo, SP – Brasil (55-11) 3091-5363 R. 423*	innovation, describing interaction issues between strategic partners during that process and to suggest actions in order to reduce transaction costs along the supply chain,	inventory, Production and Distribution planning, Logistics,		technological innovation	their retailers, Brazilian market,	better information exchange, improved relationship with the partner, standardization of delivery processes and data exchange, reduction in stocks at stores and DC, Reduction Stock-out rate,	
16	Stradella S.Nicola " Collaboration forms, information and communication technologies, and coordination mechanisms in CPFR" International Journal of Production Research, Vol.44,No.16,15August2006,3207–3226	To investigate differences in CPFR implementation as to the type of inter-company collaboration put into practice and the Information and Communication Technologies (ICTs) and coordination Mechanisms adopted to perform CPFR and analyze the relationships between these dimensions in order to comprehend and explain the rationale behind the managerial choices that lead companies to implement different CPFR configurations.	Forecasts, Promotional activities, inventory plans, POS data, transportation requirements, and changes to previously agreed-to plans Stock and DC	Paper based with seven case study	Different CPFR implementation with ICT.	N/A	This research aims to provides managers with a Framework for anticipating changes in ICT and liaison device adoption, as they anticipate changes in CPFR collaboration and it also Links between the CPFR collaborations, ICTs and liaison devices	VMI, APS, low-tech approaches(face-to-face planning meetings, sending daily sales information via fax, spreadsheets of sales, Ordering and promotional data via email or by using special interfaces for data transfer, such as Electronic Data Interchange (EDI). Web-based collaboration tools for Event management and analysis, Tracking and reporting, Distribution Requirements Planning(DRP) tools
17	Kazim Sari, "On the benefits of CPFR and VMI: A comparative simulation study", Int. J. Production Economics 113 (2008) 575–586	To determine an appropriate level of collaboration according to their specific business conditions	Demand forecasts, production and purchasing plans, and inventory replenishments,	Paper based with Simulation model to investigate the benefit of CPFR and VMI	CPFR and VMI comparative simulation study	NA	Can solve majority of the problems that are encountered in adaptation of VMI, Reduced inventory and increased customer service level, To minimize the uncertainty, produces lower total supply chain cost as well as higher customer service levels	CPFR and VMI
18	Yossi Sheffi " The value of CPFR " RIRL Conference Proceedings Lisbon. Portugal, October 13 -16, 2002	Decoupling inventory and in particular on safety stock and to solve out-of-stock (OOS) situation.	production scheduling, distribution planning, and store activity planning,	Paper based with case study to review the value of CPFR	CPFR	consumer packaged goods industry	improvements of in-stock positions while reducing inventory through CPFR, improvements in forecast accuracy, increases in customer service, Increase sales,	EDI technology, ECR and VMI/CMI

19	Chen, Hsing-Kuang, Lin, Woo-Tsong "To establish a CPFR business process implementation methodology base on SCOR model "	To develop an implementation methodology which contains both spirits from SCOR (Supply Chain Operations Reference) process model and CPFR collaborative model that facilitate supply chain operations	Production and purchase planning, demand forecasting and inventory replenishment and transportation planning.	Paper based literature review	CPFR	Globalized market and general business firm	Reduce uncertainty on demand, Inventory and Safety Stock and determine the production and purchasing requirements, on-time delivery and shorten product development lead time.	NA
20	Tien-Hsiang Chang, Hsin-Pin Fu, Wan-I Lee, Yichen Lin, Hsu-Chih Hsueh, "A study of an augmented CPFR model for the 3C retail industry", Journal: Supply Chain Management: An International Journal Volume: 12 Number: 3 Year: 2007 pp: 200-209	To improving forecasting accuracy and then reducing the "bullwhip effect" in the supply chain.	Replenishment, distribution, transport, and logistics,	Research paper	A-CPFR, CPFR	retail businesses, retailer of computer, communication , and consumer (3C) products	Reduction in bullwhip effect, inventory level, increase sales, and improve trade partnerships, and improve inventory turnover rate, capital turnover, out-of-stock rate, and service level	"just-in-time" (JIT) and vendor-managed inventory (VMI), ASP

* *No 6 and 9 are papers from the same authors and same domain but with slightly different results. The first paper points to benefits achieved along the SC like reducing inventory, production lead time and operational cost along with the identification of relative (supplier vs. customer) benefits from e-collaboration while the later focus on the relative (supplier vs. customer) ranking of e-collaboration tools.*

3. SOURCES LOOKED-UP

In this research we have used many papers, articles and case studies which are collected from different sources. Table 2 shows the names of the sources, the key words used to search the material and the no of relevant references found/total no of references for that specific key word. The notation used in the last column of table 2 is relevant references/ total references. But this does not mean that we have checked all the references. Because for each key word the search engine returns a lot of references and the no of relevant references may be more but we just checked top 10 to 20 results returned from search engine.

CLASSIFICATION DERIVERS

For the purpose of analyzing research papers, articles or case studies we have used 7 classifications derives in Table 3. The definition of each of these derives is given below.

1) **Objective:** This deriver identifies the object of the material currently under consideration.

2) **Feature of SCM:** This means that what specific feature of SCM is discussed. We used this deriver for identifying different features like inventory management, order management, procurement, logistics, forecasting and planning and return management etc.

3) **Methodology:** This describes the method used for the material to express the idea. It can be a paper, article, case study, simulation or combination of them.

4) **Collaboration models:** We have shown some of collaboration models initiated by different organizations in table 1. This deriver takes its value from that table but not necessarily because some articles or papers do not mention something about the specific model adopted by organization.

5) **Industry:** This deriver describes if any specific industry is discussed in the current material.

6) **Benefits:** If paper identify or points some benefits achieved by collaboration tools then those are mentioned under this deriver.

7) **Tools:** This means that if some specific collaboration tools used by the organization or the study may points some collaboration tools not by the name of the tool itself but by the functionality of the tool (like order management tool etc), so those are mentioned under this column.

CONCLUSION: The study conducted in this research is mostly based on the research papers that are published in well reputed journals and from famous researchers. About seventeen out of twenty are papers and three out twenty are articles that we have found in the relevance of our topic "Collaboration planning tools" from Google scholar and web of knowledge. We have analyzed this material to the best of our level according to seven different drivers. Almost all of the derivers mention their proper values except the last one-Tools. Initially our intention to use this deriver was to specifying any software program that is described in the material we used for this report. But unfortunately some of the papers or articles do not mention the exact name of the software tool itself but rather they mention those tools (if any) by the functionality of the tools. Like business strategy tools, direct procurement tools, replenishment tools, capacity planning tools, delivery and tracking tools, forecasting and design tools etc. This nature of the material limits us to identify the exact software although some researcher explicitly mentioned the name of the tools and we have specified those in the proper column. So finally we decided to use the deriver-Tool- to point out both types of tools either described by the name or by the functionality.

Similarly some of the papers or articles we have chosen for our topic does not provides exact description of the collaboration model. And the reason for this issue is that some originations do not emphasis on the adoption of collaboration model but instead they plain the collaboration according to their own business strategy and interests. And that"s why authors who conducted surveys or case studies about those organizations do not describe the model of collaboration in their papers. Some values of deriver (Collaboration Model) do not point out the exact collaboration model.

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