Is demand chain management the new supply chain management? Will the demand channel trump the supply channel? *(abridged for POMS proceedings)*

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Abstract
We provide a contemporary view of demand chain management (DCM) and an in-depth literature review that has tracked all of the literature to date and detailed case studies. While the concept of DCM is believed to have been introduced in the 1990's, there has not been much research on DCM.

Keywords: Demand chain management, Customer relationship management, Channel optimization

INTRODUCTION

There is more and more media attention being focused on the discipline of supply chain management (SCM) and how important it is to our business and organizational operations. Four of U.S. News and World Report's top five job skills are supply chain and operations management related (U.S. News and World Report, 2009). The COO frequently becomes the CEO; one of the most high profile cases of this was the leadership transition from Steve Jobs to Tim Cook at Apple. Academics' bookshelves are heavily loaded with SCM textbooks which analyze the world from the manufacturers' perspective; produce goods in a factory then push products to distributors, wholesalers, retailers and end users. This requires much anticipation, i.e., accurate forecasting, and requires significant vision and research & development. Most operations and SCM research focuses on the supply side: raw material suppliers, manufacturers, distributors, wholesalers, and retailers who manufacture, move and sell products and services. Practitioners have written about the need to align the demand side of the supply chain (Anderson, Britt, and Favre, 2007) and games and simulations, such as the MIT Beer Game simulation (Sterman, 1992), have been developed to replicate the functions of the typical supply chain system. Much less time has been devoted to the customers and end users who should drive business decisions- i.e., the channel entities that really cause demand to occur. This appears to be somewhat short-sighted as this does not focus on all of the components of both the supply and demand channels. *Customer Relationship Management (CRM)* is one area of marketing research that has grown rapidly over the years; however, operations and SCM researchers and

professionals at times neglect the importance of the end-user customer, leaving them as an after-thought. Those in the operations & SCM field who have acknowledged this have coined the terminology *Demand Chain (Channel) Management (DCM)* to reflect those academics and practitioners that integrate the end-user into their supply chain strategy. This research line has the potential to change the way we think about the customer relationship, including the supply chain, and certainly will influence the way that work in process and finished goods are developed, produced and delivered to customers (manufacturing and logistics). For example, here are just a few of a seemingly infinite number of business situations that can be dictated by the customer in what we refer to as a truly *demand-centric* firm (reference removed for blind peer-review): (1) The customer interviews candidates for employment at the supplier's firm, (2) the customer influences decisions on supplier R&D and new product development projects, (3) the customer helps control supplier quality as changes to the process are partially initiated by customers.

In this article, we will present a comprehensive literature review and tracking of articles in the field of DCM and provide macro and micro level case studies for the DCM, or *demand-centric*, approach. The paper tracking methodology we utilized assessed the topics and methods used by scholars and researchers studying demand chain management. We have provided multiple business cases at a high-level in this article and in our detailed case study, we have found the DCM methodology to be very beneficial with great business results for our partners.

RESEARCH MOTIVATION AND BACKGROUND

This research project began with database searches to locate any and all articles which define and frame what DCM is and provide data, examples, and cases supporting the DCM theory. There was found to be a great deal of redundancy in the articles located; in some cases, the articles do not have much support of what DCM really is i.e., the searches pulled articles that do not truly apply, or are very specific applications of, DCM. As expected, most of these articles are fairly recent publications with much of the work in this area only dating back a dozen years (circa 2002) with an outlier or two from 1990's. This seems to be a truly emerging field within the supply chain and operations management discipline. We also theorize that the popularity of the concept may have lost some momentum during the Global Financial Crisis or Great Recession in the United States as there were many publications in the early-2000's, a sudden inexplicable gap in literature for nearly 10 years, followed by publications over the last few years from 2013 to 2015.

The origins of DCM appears to date back to around 1990 (Ploos Van Amstel et al., 1990), however, there were inconclusive findings to determine who can be credited as publishing the first article which specifically uses the terminology "demand chain management," i.e., who created or invented this terminology. We believe it evolved from a demand or customer centered approach to SCM. Chistopher and Ryals (2014) wrote a contemporary piece on DCM, but did not conduct a thorough literature review having not cited many of the key articles on the subject published over the past 20 to 30 years. The primary journal with articles published in the area of DCM is also one of the preeminent journals in the field, the *Journal of Operations Management,* JOM (Elsevier B.V., 2015).

LITERATURE REVIEW

This section contains a list of a dozen articles, most of which were JOM articles, which were complied with a focus on DCM within the field of supply chain and operations management. The objective for the literature review (Levy and Ellis, 2006; Gardner and Martinko, 1996), was to determine how the '*Demand Chain Management*,' term was developed, what was occurring in the applicable research at that time that led to its creation, what major challenges and issues had companies faced using DCM, how is DCM evolving over the time, and what methods firms have implemented in terms of DCM in practice. The vast majority of the articles were from the JOM special issue on the DCM topic; volume 20, issue 6 (2002). Due to the limited number of directly applicable articles, each key article has been reviewed.

Frohlich and Westbrook (2002), analyzed the relationship between demand and supply chain integration, and performance in both a manufacturing and service contexts and also enhanced the knowledge base about the implementation of supply chain improvements. The editors of JOM (2002) presented their contribution towards developing methodologies for addressing today's DCM challenges using a number of illustrative case studies, such as six customer cases of Nokia networks, DCM in manufacturing, and DCM in service. Landeghem and Vanmaele (2002) presents a framework which clarifies the roles of both supply chain planning & demand chain planning and discusses the impact of uncertainty in SCM & DCM planning. Williams, Maull and Ellis (2002) presents a case where strategic capabilities should be owned within production and operator supply chains within the dynamic aerospace environment. The oldest article referenced in in the background and history section (Ploos Van Amstel et al., 1990). Their study presents the question of managing and controlling the pipeline and the need for a balanced flow from input to output. Hines, Silvi and Bartolini (2002), focuses on gaining a grasp of the applicability of the operations management practices within industry by utilizing fully cross-functional integrative empirical research. Rosenzweig, Aleda, and Dean (2003) investigates the ways that manufacturing-based competitive capabilities mediate the relationship between supply chain integration and business performance since the mediating role of manufacturing capabilities have not been explored. Childerhouse, Aitken, and Towill (2002) explains the evolution of a focused demand chain over an extended period of time and presents a structured framework for implementing focused demand chains in an organization. Heikkila (2002) presents the challenges of modern manufacturing and fast growing industries which want to achieve good customer satisfaction with efficiency and contribute to effectiveness in SCM. De Treville, Shapiro, and Hameri, (2004) begins with the story of a Nordic pulp and paper producer that was experiencing difficulties in managing its supply chain. Per Hilletofth, Dag Ericsson, and Martin Christopher (2009) first presented the literature review of DCM addressing the fact that DCM is the replacement of SCM and can be defined as "the alignment of demand creation and demand fulfillment processes across functional, organizational and inter-organizational boundaries". Seethamraju (2014) explores different Australian organizations and their attitude toward DCM. DCM is a relatively new term for many organizations worldwide, but this approach has yet to be adopted by the researched Australian organizations.

THEORETICAL AND CONCEPTUAL DEMAND CHAIN MODEL DEVELOPMENT

Methodology, Results and Findings

A thorough review of papers for the purposed of categorizing topics and methods used was conducted and the comprehensive results are shown in Tables 1 and 2. Table 1 contains a log of

the specific papers reviewed in this study and Table 2 summarizes the methods used by the authors in their studies. The article topics covered by the authors is available upon request. Analyzing the papers in the tables yielded the finding that each article has unique topics of study. However, paper log article number 14 (Frohlich and Westbrook, 2002) and article 21 (Chong and Zhou, 2014) both utilized similar types of studies. The majority of the articles utilized case studies to study demand chain management, followed by interviews and large scale surveys of the articles. Most were published by the *Journal of Operations Management* (JOM) and involve manufacturing and service industries. Approximately 50% of the articles are from Journal of Operations Management.

The paper tracking sheet for the study of Demand Chain Management represents 20 unique articles and contains the name of the article, authors, topics of studies, methods used to study the topics, and the type of industry in which the study is primarily focused. There is also one book which is the only textbook we located on the subject (Hoover, Eloranta, Holstrom, Huttenen, 2002). We have created a paper log (code book) for each article so that they can be tracked easily with code number. We reviewed each article to present background of the topics and methods used in the study for given topics. This sheet demonstrates the most widely used methods followed by other methods in the study of DCM and also exhibits the topics of study to foster and cultivate the conceptualization of DCM. Each article presents a unique topic of study. The total number of methods used by these articles is 20. While there was no method used by the majority of these papers, approximately 35% of the articles used case studies, 25% used interviews and 25% used large scale surveys to study various DCM related topics. The case study companies usually are from manufacturing and services industries. However, paper log article number 20 (Madhani, 2013) uses eight case companies to study the topics in the manufacturing and distribution industries and paper log article number 21 (Chong and Zhou, 2014) uses the healthcare industry to study the topics.

Table 1. Paper Log

Paper Number	Article Name	Authors	Journal	Case Co.	Industry
1	Demand chain management: a Swedish industrial case study	Per Hilletofth Dag Ericsson Martin Christopher	Industrial Management & Data Systems	Swedish Manufacturer	Mfg.
2	Demand chain management — The implementation	Ericsson	ORiON	alfa	N/A
3	Demand chain management in the container shipping service industry	Venus Lun et. al.	Int. J. Production Economics	Not Applicable (N/A)	N/A
4	Effectiveness and efficiency: the role of demand chain management	David Walters	The International Journal of Logistics Management	N/A	N/A
5	The Supply Chain Becomes the Demand Chain	Christopher & Ryals	Journal of Business Logistics	Rolls Royce	Service, MFG.
6	From supply to demand chain management: efficiency and customer satisfaction	Jussi Heikkilä	Journal of Operations Management	Nokia	service
7	Robust planning: a new paradigm for demand chain planning	Hendrik Ban Landeghem, Hendrik Vanmaele	Journal of Operations Management	N/A	N/A

8	Operations in today's demand chain management framework	Willem Selen , Fawzy Soliman	Journal of operations Management	N/A	N/A
9	Demand chain management:an integrative approach in automotive retailing	Peter Hines, Riccardo Silvi, Monica Bartolini	Journal of Operations Management	automotive retailer	service
10	Analysis and design of focused demand chains	paul Childerhouse, James Aitken, Denis R. Towill	Journal of Operations Management	UK lighting company	Mfg.
11	DCM theory: constraints and development from global aerospace supply webs	Tim Williams, Roger Maull, Bruce Ellis	Journal of Operations Management	the lockheed Martin and the Eurofighter Typhoon the Boeing Company and airbus industries military helicopters	Mfg. Mfg. Mfg.
12	Demand chain management in manufacturing and services: web-based integration, drivers and performance	Ravi Seethamraju	information of technology and management	Fertco- manufacturing and distribution of fertilizer Consuco- manfg and distribution of fast moving consumer goods Pharmco- manfg and distribution of pharmaceuticals Enggo- manfg and distribution of engg. products Retailco- retailer of groceries and others Minco- mining company Conscol- SCM consulting practice Consco2- ERP and supply chain consulting practice	mfg, disribution mfg, disribution mfg, disribution mfg, disribution mfg, disribution mfg, disribution mfg, disribution mfg, disribution
13	Reinventing the wheel? A critical view of demand-chain management	Juliana Bonomi Santos, Simona D'Antone	Industrial marketing management	N/A	N/A
14	Demand chain management in manufacturing and services: web-based integration, drivers and performance	Markham T. Frohlich, Roy Westbrook	Journal of operations Managment	N/A	mfg,service s
15	Demand Chain management-integrating marketing and supply chain management	Uta Juttner, Martin Christopher, Susan Baker	Industrial marketing management	N/A	mfg, services
16	From supply chain to demand chain: the role of lead time reduction in impproving demand chain performance	Suzanne de Treville, Roy D. Shapiro, Ari-Pekka Hameri	Journal of Operations Management	N/A	N/A
17	The influence of an integration strategy on competitive capabilities and business perfortmance: An	Eve D. Rosenzweig, Aleda V.Roth,	Journal of operations Management		mfg

	exploratory study of consumer products manufacturers	James W. Dean Jr.			
18	Enterprise systems and demand chain management	Ravi Seethamraju	information technology and management		
19	Managing the demand supply chain (book)	Willam E Hoover Jr., Eero Eloranta, Jan Holmstrom, Kati Huttunen			
20	Demand Chain Management Enhancing customer value proposition	Pankaj M. Madhani	The european business review	Zara	service
21	Demand Chain Management: Relationship between external antecedents,web based integration and service innovation performance	Alain Yee- loong Chong, Li Zhou	INT.J.productio n Economics	N/a	health

Table 2. Article Tracking Methodology Results

Method	Which Paper Number (log)?	How many papers (qty.)?
Dyadic research exploring boundary-spanning practices	5	1
Large-scale survey	5	1
Case study and/or survey methods	5	1
Agent-based modeling	5	1
Case study and/or survey methods	5	1
Other Method?		
case study	1,2,6,7,9,10,11	7
secondary data	1	1
Interviews	1,6,9,11,12	5
Proposition development	3,6,16	3
path analysis	3	1
chi square test	3	1
regression model	3,17	2
sensitivity test	3	1
desk- based approach	4	1
quantitative analysis	7	1
Periodic order review (POR)	7	1
Economic order quantity (EOQ)	7	1
Echelon inventory POR (SCR)	7	1
Optimized echelon inventory POR(SCO)	7	1
Literature review	8,13,16,21	4
Hypothesis testing	8,14,17,21	4
large- scale survey	9,11,14,17,21	5
cluster analysis	9	1

analysis and design	10	1
qualitative field study(cross- sectional field study)	12	1
qualitative content analysis	13	1
Scheffe and Annova method	14	1
co-development work shop	15	1
focus group discussion	15	1

A FIELD ACTION RESEARCH CASE STUDY OF DEMAND CHAIN MANAGEMENT

We have now provided numerous examples of DCM in practice; this section details a consulting project in which the co-authors applied the demand-based concepts to a client situation free of most supply chain/channel influences. This case helps demonstrate the timely power of the influence of the demand-based concepts on a business. The consulting client studied operates a building materials/home center and is located in Michigan. The business experiences seasonal influences from many factors, including the weather. We have provided consulting and facilitating services to this company periodically over the past ten years. We were approached by their General Manager for advice as the year had started with a sales decline of 0.9%, despite new traditional sales initiatives throughout the organization. Their gross profit was down 3.4%. He asked if there was a way to immediately improve sales and gross profit performance without substantial risk to the organization. It was determined that the best approach was to identify one or more outside sales associates that could increase the probability of an increase in sales and gross profit. We did not feel that the traditional sales and profit optimization techniques would be adequate for the company to achieve a further sales increase. It should be noted that our calendar year traditional sales and profit initiatives were successful with sales up by 4.6% and gross profit up 10.5% (2014 over 2013). It seemed like it would be difficult to perpetuate these positive outcomes with traditional supply chain initiatives.

Therefore, we suggested a demand-based approach- we call this a *demand-centric* approach. In this case, we chose a methodology that would allow us to intentionally choose *demand-centric* strategies and attempt to minimize disruption to the existing business. What is important to this case study is our demand-based approach and our intentional avoidance of traditional supply chain influences.

Demand-Centric Action Research Approach

As previously noted, in a demand-based environment the end-user or the customer is the key influence to the demand source. Often-times they are not one in the same. For example, it is quite common to have a customer that is a contractor that works with end users. We believe that the closer you get to the source of demand, the better you can evaluate the influences that would tend to cause improvement with sales and gross profit results. These are a byproduct and result of customer and end-user satisfaction- at least in the demand-based world.

When seeking new associates, traditional companies in the building material industry will advertise job postings (print and electronic), use search firms, will ask for vendor referrals (supply channel) or will seek referrals from employees. We intentionally chose to avoid all of these options- they are costly and time-consuming. It can take an extended period of time to approach the market from a supply-based perspective and we needed results as soon as possible.

In order to develop the demand-based hiring techniques, we must first eliminate the supply-based techniques (as mentioned earlier). The demand-based approach required us to find a facilitator of demand-satisfaction- this would be our target for an addition to the company team. We chose a path that would not disrupt the existing customer base- so we expanded our target delivery area based on places where demand was likely to be found. We did this intuitively, but this can also be done quantitatively, using statistics such as the Buying Power Index (BPI) to identify possible sources of demand.

One complication that we encountered was the difficulty of finding the actual end-users. It was easier to identify contractors, remodelers and others that worked with the end users. Therefore, early in the project we surveyed the market to determine if there is was any common satisfier of demand in the targeted market area. One name kept surfacing and his name is John (individual's name has been changed for the purposes of anonymity). Keep in mind that at this point we had no knowledge of who John was or what caused the trusted advisor status that he seemed to enjoy. He was currently employed at a very large competitor based in another relatively contiguous market area.

Our next step was to identify the demand-based hiring techniques that would cause someone to want to join our team. Because this is a demand-based problem, these techniques could not be developed until we communicated with John (as John is closer to the source of demand than we are). After a couple of calls between the company and John it became clear that John is a family person that is driven by more than just work. Since time was of the essence, we suggested that the GM and his wife meet with John and his wife. We felt that they were co-decision makers and we needed buy-in from both; as such we suggested a dinner meeting between the four of them- the GM and his wife and John and his wife. We felt that we could not gain access to John without his spouse's approval- so she became an integral part of the demand-based recruiting process. We suggested that the GM and his wife eliminate as many supply-chain influences as possible and just let John and his wife lead the conversation. This dinner meeting took place early in the project and less than two weeks after the demand-based initiative began.

As a follow-up to the meeting it was clear that money was far from the most significant issue. The issues were appreciation, flexibility with family, trust and a clear path depending on performance outcomes. It was clear that the company he worked for would try to keep him and was able to increase compensation significantly if needed- maybe by as much as 50%. We could not compete with the dollars- we need to clearly understand and address the demand-based drivers that would cause John to want to make a change even with less initial income. Throughout that weekend we communicated with the GM and he communicated with John. Early the following week and as expected, his current employer countered with a substantial increase in compensation. After about three days of negotiation, John decided to join the company. He joined the company in late May 2015, after about a week off in between jobs.

Initial Observations and Case Results

First, we only interviewed one candidate. This saved a great deal of time, effort and money. All of our resources were focused on a validated driver of demand satisfaction. It is true that John could have chosen to stay where he was. But, the decision would have been swift and we could have moved forward with other demand-based initiatives. John would still have been on our relationship list and he might have still joined the company one day. There are both short-

term and long-term objectives with demand-based initiatives, similar to what we observe with the supply channel.

We were very excited about the new addition to the team at the company. But there was lots of work ahead. John had huge potential- he was really a store within the store. But, we did not want the existing sales team to be negatively impacted by John. This became the main interface point and still is to the GM, similar to an *ambidextrous organization* (O'Reilly and Tushman, 2004). There is some pressure on logistics- vendors were not necessarily the same and our fleet of trucks were feared to not be able to adequate satisfy our longer term objectives. This was somewhat expected since demand channel initiatives often-times require finding new vendors and reacting to demand as opposed to planning to work with the same vendors with the same continuing supply chain constraints.

It should be noted that we have found it can take ninety days to six months to hire a candidate for outside sales and the cost can be staggering. Hence, the positive results achieved can be delayed even if the effort is successful. We felt that John would bring us business immediately and there was a high likelihood that he could continue satisfying our new customer base. There is always uncertainty but we felt we did the best we could to minimize risk to the company. At this time we have five full months of results, plus a fractional month (really just a few days). As we previously mentioned, business declined year-to-date through April 30, 2015.

During the month of October, the company begins to experience seasonal declines in business which is anticipated to continue until spring, 2016. Of the sales increase of $486,418 caused by the initiative, none of these sales were to existing customers. Our goal was to capture all of this a pure net increase; this did not occur as certain elements of the existing business continued to decline. For example, sales transactions excluding John were down 3.1%. This is largely due to a decline with retail traffic into the store. There is little question that the company would not have a sales increase without the initiative. We developed a similar analysis for gross profit and fared slightly better here, retaining a net of 54.5% of the gross profit. As indicated above, none of the $93,845 in gross profit would exist if not for the new initiative.

DISCUSSION AND CONCLUSIONS

In this paper we have presented a literature review on DCM as well as multiple cases to show the theoretical underpinnings of the DCM concept. We are not suggesting that organizations should abandon their customer relationship management, quality function deployment, voice of the customer, net promoter score, etc. methods and metrics to capture customer wants and desires. What we are suggesting is that supply chain organizations need to become more demand based. They must work closer with their end users and suppliers to do everything possible to fulfill their customers' needs to become more demand-focused in their strategic thought process and tactical operations. Having spent years working as researchers and with consulting clients, we see this as one of the largest opportunities in modern day organizations.

Further validation of this will be accomplished by collecting data from industry partners. A survey instrument adapted from other, such as those used in continuous improvement (Bumblauskas and Meyer, 2015) will be used in the next phase of the project. We believe the future of SCM is actually the lesser known and discussed field of DCM as we have presented herein.

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