

THE INFLUENCE INTERNAL AND EXTERNAL CUSTOMERS HAVE ON A  
SUCCESSFUL DEMAND DRIVEN SUPPLY NETWORK (DDSN)

THESIS

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by

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By

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## **ABSTRACT**

### **THE INFLUENCE INTERNAL AND EXTERNAL CUSTOMERS HAVE ON A SUCCESSFUL DEMAND DRIVEN SUPPLY NETWORK (DDSN)**

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**SUPERVISING PROFESSOR: CECILIA TEMPONI**

In an ideal world, the instant a consumer picks up a product from a store shelf, another would immediately replace it, and so on back up the supply chain. The result would be that nothing would ever be grown, manufactured, or distributed for which there was no actual demand. While this can never happen, companies in all industries today, including consumer packaged goods (CPG), are trying to move their supply processes closer to this perfect vision. By encouraging the development of close relationships between partners, a supply network makes sure that only products and services corresponding to customers' demands will be produced. This concept is known as a demand driven approach. A demand driven supply network strategy is all about focusing

on customers' needs and demands to make sure that, the information required for manufacturing and assembly reaches all the departments of the firm, and is accessible to suppliers involved in designing, producing, and delivering a part or component and the activities in each of the firms involved in the network are aligned to respond adequately to the demand. The objective of this research is to understand the previous research carried out on the concept demand driven supply network and to develop a framework to organize the literature for better analysis. In addition, the research attempts to identify and analyze the impact and relationship internal and external customers have on a successful demand driven supply network. The responses from the interviewees reinforce that customers both internal and external have considerable influence in shaping a demand driven supply network. The findings further accentuates that people, processes and technology along with collaboration and sharing of information becomes imperative for the success of a demand driven supply network and hence become critical success factors.

## CHAPTER I

### INTRODUCTION

In an ideal world, the instant a consumer picks up a product from a store shelf, another would immediately replace it, and so on back up the supply chain. The result would be that nothing would ever be grown, manufactured, or distributed for which there was no actual demand. While this can never happen, companies in all industries today, including consumer packaged goods (CPG), are trying to move their supply processes closer to this perfect vision (Casper, 2006). However today, the goal of most organizations is to have enough merchandise on the store shelf until the next shipment arrives instead of replacing each and every item purchased by the consumer. Systems have not being developed well enough to trigger an order the moment a customer buys a unit off the shelf. The primary source of environmental uncertainty facing firms is volatile demand, as this volatility tends to be distorted and amplified along a supply chain. This phenomenon, commonly called the “bullwhip effect” as well as fierce competition and customers who are harder to please, has recently forced firms to transform the way they approach and do business with their partners (Hadaya & Cassivi, 2007). This volatility is especially true with seasonal items than everyday staples. The need to cope with volatile demand requires the capability to manage the supply chain in a way that enables quick response. In order to improve performance, businesses have been

impelled to develop closer relationships with their internal and external customers. Supply chains no longer consist of serial interactions between buyers, suppliers, and logistic players, but are more dynamic and malleable. They operate as value networks in which all players need to work collaboratively to acquire process and distribute information to maximize productivity and efficiency (Bitran, Gurumurthi, & Sam 2007). Shortened product life cycles, and the fragmentation of formerly standard products, impel a shift towards more “agile” and “customer responsive” behavior by suppliers of goods and services (Storey, Emberson, & Reade, 2005).

By encouraging the development of close relationships between partners, a supply network makes sure that only products and services corresponding to customers’ demands will be produced. This concept is known as a demand driven approach. A demand driven supply network strategy is all about focusing on customers’ needs and demands to make sure that, the information required for manufacturing and assembly reaches all the departments of the firm, and is accessible to suppliers involved in designing, producing, and delivering a part or component and the activities in each of the firms involved in the network are aligned to respond adequately to the demand (Hadaya & Cassivi, 2007). AMR Research defines the Demand Driven Supply Network (DDSN) as a system of technologies and processes that senses and reacts to real-time demand across a network of customers, suppliers, and employees. It enables organizations to improve operational efficiency, streamline new product development and launch, and maximize margin. In short, the DDSN is a roadmap for developing the next generation supply chain (Asgekar, 2004). The DDSN is the offspring of initiatives like continuous replenishment planning (CRP) and collaborative planning, forecasting and replenishment

(CPFR) that grew out of the Efficient Consumer Response project of the 1990s (Casper, 2006).

The objective of this research is to understand the previous research carried out on the concept demand driven supply network and to develop a framework to organize the literature for better understanding and analysis. In addition, the research attempts to identify and analyze the impact and relationship internal and external customers have on a successful demand driven supply network. In this analysis, whilst external customers are recognized as suppliers, customers and end consumers in the supply chain, internal customers will be defined as all individuals within a supply chain that rely on others to satisfy the external customer and end consumer. The concept of demand driven supply networks is relatively new in the field of supply chain management and as a result the literature addressing this concept are at the infancy stage. Even though literature that directly speak about the concept of demand driven supply networks are limited, there are many publications that are directly in line with the process of building demand driven supply network capabilities.

In addition to analyzing the customer impact on a demand driven supply network, the research also attempts to indentify factors that are critical to a successful demand driven network. The previous literature is examined to expound on the following topics/areas:

- A brief background on the demand driven supply network model.
- An analysis of the impact and relationship internal and external customers have on a demand driven supply network model.

- An analysis of importance and use of a Customer Relationship Management (CRM) system in the road to a successful demand driven supply network.
- An analysis of how supply chain flexibility supports the demand driven model.
- A demonstration of the ability of the demand driven model to effectively counter the bullwhip effect.

Many firms have understood that supply chain leadership means more than just low costs and efficiency; it requires a special ability to shape and respond to shifts in demand and innovative products and services. These companies follow this new model, the demand driven supply network for business excellence. Billions in margin and trillions in market capitalization separate the DDSN winners from losers (Mishra, 2006). Therefore, the demand driven supply networks place a significant importance in the fiercely competitive business environment of today and provides a unique opportunity for research and study.

The remainder of the paper will be organized into chapters. Chapter two will demonstrate the framework that was developed to organize the previous demand driven literature. Chapters three through six will in detail analyze each element in the proposed framework. These chapters are then followed by the methodology whereby a pilot study was carried out to understand the industry data. The methodology includes a discussion of the complete interview process and its limitations such as the sample used was one of convenience and the interviewees were limited to only two industries. The analysis and discussion of results of the data collected from the interviews are discussed in detail in chapter five. The final chapter of this thesis includes conclusions and recommendations for future research.

## CHAPTER II

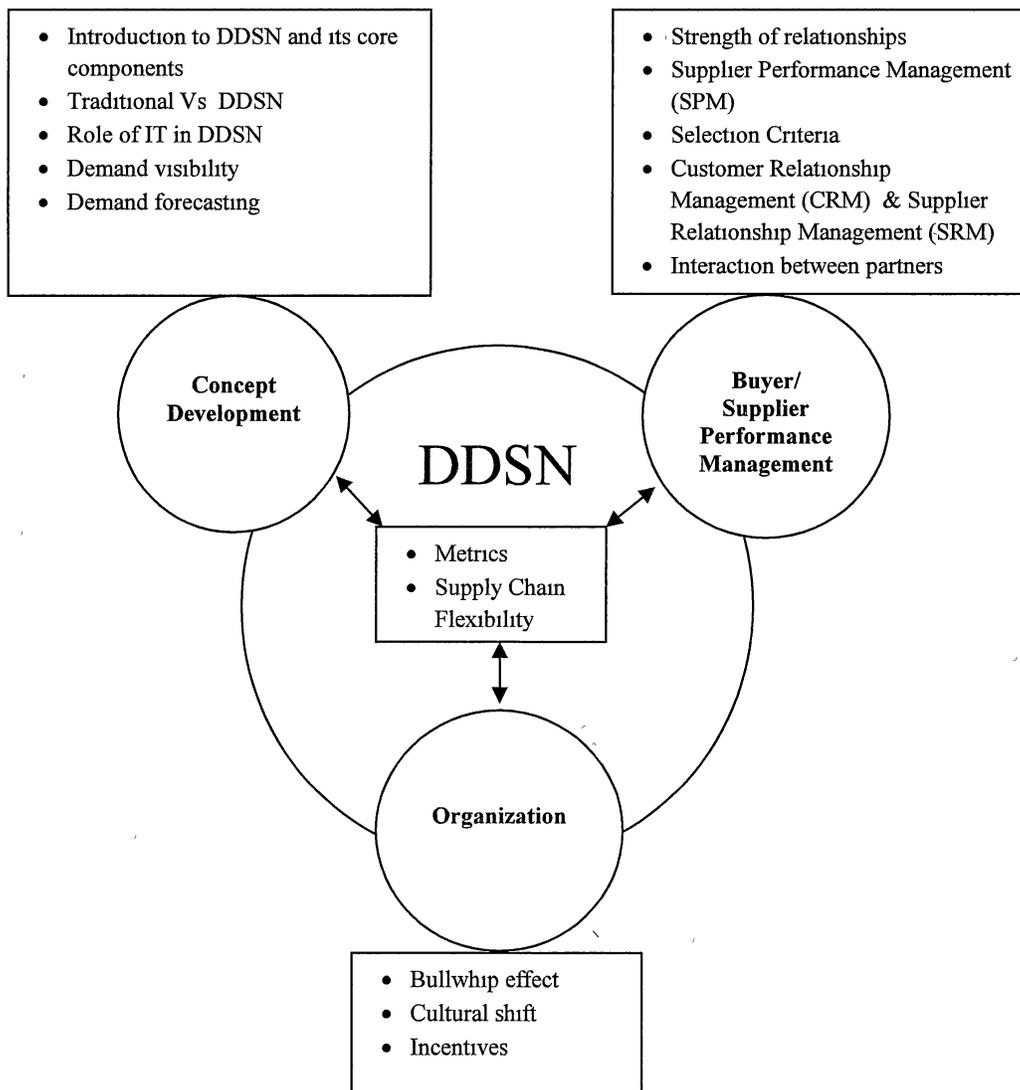
### FRAMEWORK FOR ANALYZING DEMAND DRIVEN SUPPLY NETWORK (DDSN) LITERATURE

Although the basic structure and essence of demand driven supply networks has been around for many years, the formal introduction of the concept demand driven supply networks was only brought into light in 2003, by AMR Research. To better understand the concept and its core components a framework was developed and is depicted in Figure 1. This framework summarizes all demand driven supply network literature into four broad categories:

1. Concept development
2. Organization
3. Buyer/ supplier performance management
4. Other common factors

While the concept development category covers the foundation and basic elements of the demand driven supply networks, organization category draws attention to all other elements that indirectly affect but play a major role in the demand driven supply network. The buyer supplier performance management attempts to highlight how the internal and external customers are involved in shaping the demand driven supply network. Finally, other common factors include two other elements that are common to

all three categories – metrics and supply chain flexibility. Each of the sub components of the four categories are inter connected to form a successful demand driven supply network and are further discussed in detail in the remainder of this paper.



**Figure 1. Framework for Analyzing DDSN Literature**

## CHAPTER III

### CONCEPT DEVELOPMENT

A demand driven supply network can be defined as a system of coordinated technologies and processes that sense and react to real-time demand signals across a supply network of customers, suppliers, and employees. It enables organizations to improve operational efficiency, streamline new product development and launch and maximize margin (Cecere, O'Marah, & Preslan, 2004). Key to the concept of demand driven supply networks is the generation of a high quality, credible demand signal that can be shared across supply chain partners, preferably in real time (Ledyard & Keough, 2007). The key elements of this definition are; system, demand, and network (O'Marah, 2005).

- System

To be effective, the next-generation supply chain must be scalable. Making use of technology such as software applications and databases with business processes, DDSN needs a system architecture to scale without compromising flexibility (O'Marah, 2005).

- Demand

Demand essentially carries different characteristics depending on where in the supply chain it is felt. Any supply chain has only one point of independent

demand. That is, the amount of product demanded by the end-use customer of the supply chain. Whether it is a consumer shopping in a retail store or online or a business buying products that it will use for its own operations the end-use customer determines the true demand for the product that flows through the supply chain. The company that directly serves the end-use customer directly experiences this independent demand. All subsequent companies in the supply chain experience demand that is tempered by the inventory levels and the order fulfillment and purchasing policies of the companies further upstream. That type of demand is called derived demand. It results from what the upstream companies do to meet demand from their immediate customers. The derived demand for one company is often the dependent demand of their customers – the demand for the components that go into a product (Mentzer & Moon, 2004). For DDSN to take root, companies must learn to see demand at all three levels, complete with buyers' willingness to trade off one benefit for another. Sensing and reacting to real-time demand does not mean fill the order. It means applying business judgment quickly across all demand (O'Marah, 2005).

- Network

A network could be defined as a collection or arrangement of items to resemble a net or in simpler terms, an interconnecting group or system. Contract manufacturers, outsourced design and development, and third-party logistics providers are all part of the rapid transformation of the supply chain away from vertically integrated corporations toward core competence based networks of businesses. For a network to succeed, standards and communication must be

pervasive and reliable. The internet has kicked off this transformation, but its effects have only just started to be felt (O'Marah, 2005).

The new supply chain thinking boiled down to 3 “sticky” concepts (Martin, 2008):

1. Transforming forecast-based, push-driven supply chains into demand-driven networks.
2. “Outside-in” translation of priorities from the point of product consumption and usage back into operations and “inside-out” execution at all points of the supply chain.
3. Transforming supply chains into end-to-end, process-orientated through joint value creation activities across the network.

The journey towards a demand driven supply network starts with a clear view of the customer that is shared across the organization and supply chain. Customer demand and sales are not the same. Sales data reflect specific purchases made by customers, which is quite often different from what customers demand. The primary reasons for this gap are that competitor actions, promotions, pricing, and product availability drive customers to make purchasing decisions that do not always reflect their intentions. For example a consumer who goes to the store to buy a product, may find the shelf empty. No matter what the consumer chooses to do (substitute, postpone, or walk away), the retailers Point of Sale (POS) data will not reflect the true customer demand. Thus, companies that use sales data to generate forecasts do not account for lost sales in their demand. This causes lower future demand forecasts and more out of stocks – a potentially vicious cycle

for lost revenue (Schrieber, 2005). Valuable to any business is the ability to sense and translate actual demand into operations plans, processes, and external partners in a relationship based structure organized for minimum waste and optimized working capital (Barrett, 2007). Demand driven supply network is a circular, self renewing approach that never takes its eye off end user demand (O'Marah, 2005).

Demand driven concepts are most logically suited for fast moving, shelf-sold, consumer-oriented product manufacturers such as consumer goods because of their lower margin and product velocity characteristics. The key messages in this model are (Martin, 2008);

- Recognizing that product, supply, and demand functions and processes in the business must be aligned and can no longer operate separately as silos.
- The confluence of product, supply, and demand side business strategies and priorities across business surfaces core initiatives at the intersections.

Barrett, 2007 identifies three core metrics to assess the health of a supply chain:

1) forecast accuracy, which is an indicator of demand visibility, 2) perfect order performance, which indicates responsiveness, and 3) supply chain costs, which show operational effectiveness and efficiency. The three main strategic imperatives that emerged in this century are low cost, high quality, and improved responsiveness (Duclos, Vokurka, & Lummus, 2003). Leaders in the demand driven supply network model believes that return on assets, earnings per share, and profit margin all correlate with the ultimate measure of customer satisfaction – the perfect order (O'Marah, 2005). AMR Research shows a direct correlation between improvements in the perfect order metric

and profitability. Perfect order fulfillment is a discrete measurement defined as the percentage of customer orders that are delivered on time, accurately, that meet the customer's requirements, and have zero defects (Barrett, 2007; Olin, 2005). In addition to cost advantages, these businesses can leverage superior responsiveness to market opportunity to grow – and in many cases, acquire or destroy the laggards.

Arntzen and Shumway (2002) in their case study identifies that in order for demand driven supply networks to be successful trading partner integration should be complementary to demand driven supply chain planning. Trading partner integration here refers to, integrating trading partners across the supply chain by connecting their information systems and sharing consumer demand information. The increased real-time visibility allows them to synchronize their activities, reduce cycle time, and eliminate large buffers of inventory (Arntzen & Shumway, 2002). This integration is a two way feed whereby suppliers too are able to share their capacity information and other information pertaining to the order.

At the highest level, variability could arise from either the supply side (variability of the component that make up lead time or cycle time) or demand side (variability in demand at the shelf). The classic answer in dealing with demand variability has been inventory. This buffer helps absorb sudden surges in demand (Olin, 2005). However, one of the biggest benefits of a build-to-order supply chain is that large stocks of inventory can be removed from the supply chain. But once these buffer stocks are gone, the supply chain must be agile enough to respond to the variability inherent in actual order stream. Real-time visibility and integration back through the supply chain allow suppliers to see the demand in real time and begin gathering the raw material needed to respond quickly

(Arntzen & Shumway, 2002). Success is measured by the reduction of the bullwhip effect within the network, the improvement in perfect orders to the retailer's customer, and the total time to value for ideas and product innovation (Cecere, O'Marah, & Preslan, 2004). DDSN shortens the cycle between demand signals (point of sale data, movements from the back of the store to the front), production and replenishment (Olin, 2005).

The concept of demand driven supply networks could similarly be called consumer driven supply networks (CDSN). CDSN means capturing and processing multiple sources of demand data and exception events to provide intelligence that, in turn, enables you to make smart trade-offs in production and replenishment (Olin, 2005).

Three important areas that demand driven organizations should strive to improve are; agility, adaptability, and alignment (Ledyard & Keough, 2007; Lee, 2004). These invariably help an organization shorten its response time.

- Agility - The ability to respond quickly to short-term change in the demand and supply equation and manage external disruptions more effectively.
- Adaptability - The ability to adjust the design of the supply chain to meet structural shifts in markets and modify supply network strategies, products, and technologies.
- Alignment - The ability to create shared incentives that aligns the interests of businesses across the supply chain.

More so than other two elements, agility is highly dependent on accurate and timely information. A company must be able to quickly identify changes (in either demand or supply) and be able to rapidly disseminate this information to everyone in the supply

chain who needs to act upon it. The only way to do this effectively is by establishing the processes and technical infrastructure that makes rapid response possible. Needless to say, this must be done in a seamless, coordinated manner as quickly and cost effectively as possible (Ledyard & Keough, 2007).

True agility requires rapid and appropriate responses to fluctuating consumer demand. This in turn requires much greater “visibility” through the supply chain than has conventionally been the norm. Ideally this would enable all players in the supply chain to see from one end of the pipeline to another in as close to real time as possible (Storey, Emberson, & Reade, 2005).

The DDSN is not just about being more responsive and flexible to demand. It is also about managing the demand more proactively to increase the supply chain yield.

Table 1 summarizes ten characteristics of demand driven organizations that differentiate them from others. These characteristics are further discussed throughout this research. Therefore the proposed way forward is to reduce the lead-time gap so that the manufacturing cycle is based on a richer picture of known orders and less on forecasts (Storey, Emberson, & Reade, 2005).

**Table 1. 10 Characteristics of Demand Driven Organizations**  
 (Adapted from Driven by Demand, Cecere, O'Marah, & Preslan, 2004)

Characteristic	Key Elements
1. Demand	<ul style="list-style-type: none"> <li>• Refine and develop the demand signal so that they can influence and shape demand in the market</li> <li>• Supply processes must be capable of using the demand signals</li> <li>• Creating a culture that uses the demand signals effectively is one of the biggest challenges facing companies</li> </ul>
2. Replenishment	<ul style="list-style-type: none"> <li>• Redefine inventory policy and manufacturing capabilities based on supply and demand variability</li> <li>• Align resources to balance pull vs. push</li> <li>• Refine processes to increase manufacturing and distribution flexibility, hold materials in the most flexible form, and use strategic tools to simulate and establish organizational goals</li> </ul>
3. Planning	<ul style="list-style-type: none"> <li>• Use decision-support technologies that take a probabilistic rather than deterministic approach</li> <li>• Understand that while demand error is large, demand variability is predictable</li> </ul>
4. Performance	<ul style="list-style-type: none"> <li>• Realize that measurement alone is not enough. Continuous improvement through technology with either buy or sell-side partners is the new mandate</li> </ul>
5. Architecture	<ul style="list-style-type: none"> <li>• Move away from control and common system of record to more flexible architectures that enable higher level of metadata management and modeling</li> </ul>
6. Organizational alignment	<ul style="list-style-type: none"> <li>• Decisions are made cross-functionally and jointly by a team dedicated to leading the DDSN efforts</li> <li>• Through this approach, demand, supply, and product innovation processes blend into a common set of processes</li> </ul>
7. Innovation	<ul style="list-style-type: none"> <li>• Base new product development on a deep understanding of customer-demand trends and buying behavior</li> <li>• Warranty information and customer data are key drivers in defining new product development</li> <li>• New product introductions are tightly coupled in all supply procedures</li> </ul>
8. Measurement	<ul style="list-style-type: none"> <li>• Customer-focused metrics are defined and disseminated through a commonly held system</li> </ul>
9. Shift in network boundaries	<ul style="list-style-type: none"> <li>• Focus is on the management and coordination of collaborative relationships</li> <li>• Understand that true collaboration is built on agreed upon goals between parties</li> <li>• Success is measured by the reduction of the bull-whip effect within the network, the improvement in perfect orders to the customer, and the total time to value for ideas and product innovation</li> </ul>
10. Customer-focused culture	<ul style="list-style-type: none"> <li>• Demand, supply, and innovation processes are trained to listen to and understand the customer</li> <li>• Demand driven companies base investments on the answer to the question: "How will this be profitable and benefit the customer?"</li> </ul>

## Demand Driven Supply Network Framework

Unlike the left-to-right linear chain based on hard assets, DDSN looks more like a self-renewing interaction among three strategic business domains – demand, supply, and product. Visibility and freedom to act in all three domains at once defines the demand driven business model of the 21<sup>st</sup> century (Barrett, 2007; O’Marah, 2005).

### *Demand Management*

Traditional supply chain has largely overlooked demand management, which is defined as the processes required to shape, sense, and respond to demand. These processes include functions in marketing, sales, service, price management, and demand forecasting/planning. Most problems of supply/demand balancing arise at this stage. In a DDSN, these groups collaborate to manage demand. Ongoing demand visibility is also what radio-frequency identification (RFID) is all about (Trebilcock, 2006). Seeing demand pulsing in continuously rather than in batches periodically gives businesses a chance to price higher when the customer is willing to pay.

### *Supply Management*

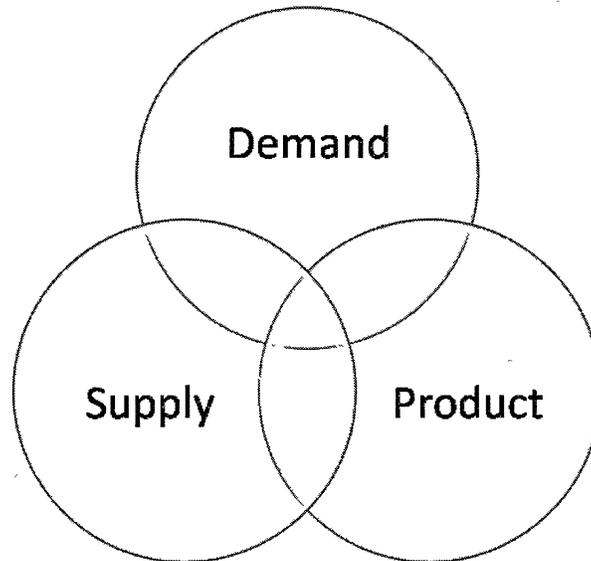
Common supply management functions include: direct materials sourcing, production operations, manufacturing and assembly, contract management, indirect procurement (excluding back office supplies), warehousing and distribution, and inventory management. Within a DDSN framework, supply management has two levels of activity:

- Strategic supply management – the ongoing establishment of supply policies and actual supplier relationships (internal and external) based on a demand driven supply plan.
- Tactical supply management – links the supply plan to tactical replenishment planning as well as the actual replenishment process itself.

### *Product Management*

New product innovation is the main source of new profits and growth, especially as product life cycles shorten and global markets accelerate commoditization of existing products. Demand driven businesses are those that proactively manage product life cycles to introduce new models or product platforms with minimal cannibalization of existing sales. They are also those that assure availability of complementary products essential to acceptance.

Demand driven organizations base new product development on a deep understanding of customer-demand trends and buying behavior. Warranty information and customer data are key drivers in defining new product development (Cecere, O'Marah, & Preslan, 2004). All key players in the supply chain must be willing to embrace collaboration as an essential enabler of the new product launch process. And improving the existing product designs requires visibility across the supply chain of all product information and specifications for search and analysis (Burkett, 2005).



**Figure 2. The 21<sup>st</sup> Century Supply Chain**

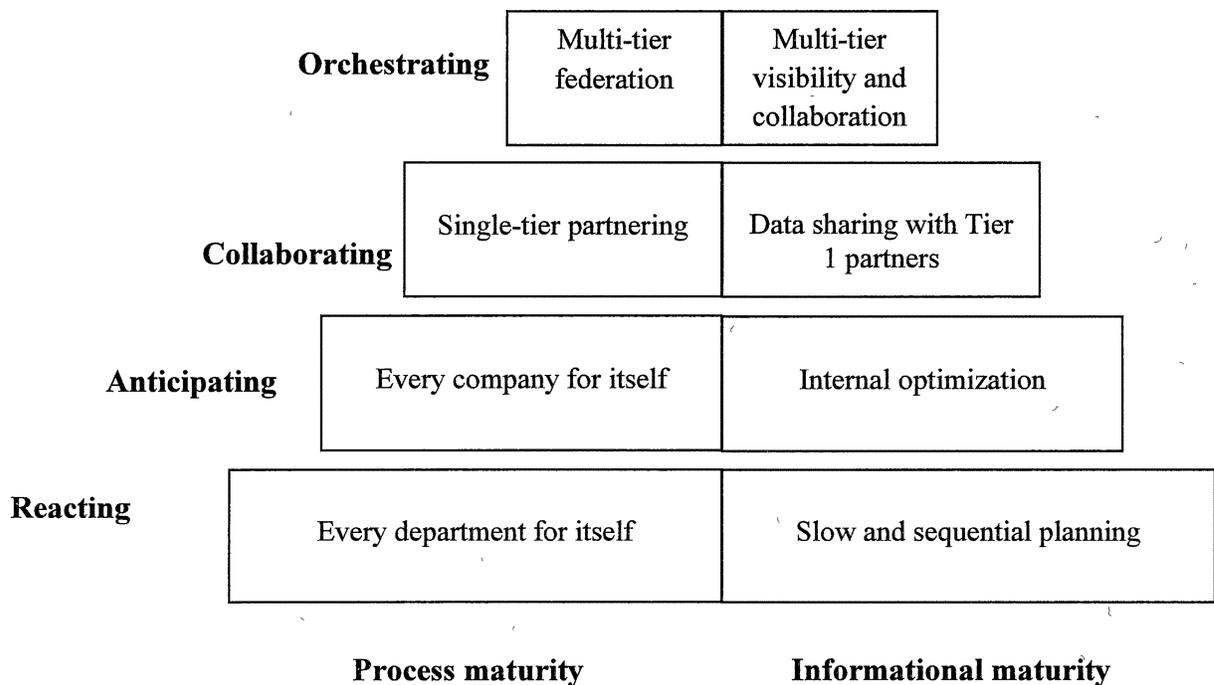
Source: AMR Research Inc., 2004

This model extends outside the enterprise to include demand insight programs with customers, supply risk management and co-design/development opportunities. As a result of implementing these strategies, DDSN leaders are more demand sensing, have more efforts for demand shaping through innovative products, and focus on a profitable demand response from an agile supply network.

AMR Research has developed a DDSN capabilities model that defines maturity of an organization's supply network in terms of process (the widespread, advance, and structured workflows supporting DDSN transformation) and information (the timely availability of supply and demand information to support process execution).

Barrett (2007) and O'Marah (2005) present the four stages of DDSN maturity and describe how well the network executes to deliver at the moment of truth. This is depicted in Figure 3.

- Stage 1: Reacting – Traditional supply chain in which integration barely happens.
- Stage 2: Anticipating – A connected enterprise in which there is internal integration but clumsy external links.
- Stage 3: Collaborating – A connected network with external integration but still no strategic control.
- Stage 4: Orchestrating – DDSN is in place and providing plug-and-play external integration. The organization enjoys the ability to create new businesses as opportunity arises.



**Figure 3. The DDSN Capabilities Model**

Source: AMR Research Inc., 2004

As organizations progress through these four stages of development, they can institutionalize certain practices. Best practices like design-for-supply, lean manufacturing and sales and operations planning enable and are enabled by migration up the maturity scale (O'Marah, 2005).

### Traditional vs. Demand Driven Supply Chain

As identified by O'Marah (2005), the biggest oversight of a traditional factory-centered supply chain was the management of consumer demand. Specifically, end-user demand was casually considered and hardly ever managed aggressively. The lingering effects of this oversight are reflected in certain deficiencies that exist, which suggest that the supply chain still largely serves the factory and not the consumer. Among those deficiencies are: the bullwhip effect, linear optimization techniques and no support for product innovation (O'Marah, 2005).

- The bullwhip effect:

Fluctuations in orders increase as they move up the supply chain from retailers to wholesaler to manufacturer to suppliers. The bullwhip effect distorts demand information within the supply chain, with each stage having a different estimate of what demand looks like. The result is a loss of supply chain coordination (Chopra & Meindl, 2007).

- Linear optimization techniques:

Failing to account for variability is fine in a factory with known task cycle times but no good across a network of flexible productive nodes (O'Marah, 2005).

- No support for product innovation.

Some other tribulations of a forecast-driven supply chain includes, inadequate delivery predictability, high inventories, long customer order cycle time, and raw material shortages (Arntzen & Shumway, 2002).

There has not been significant discussion about demand-driven supply networks until few years ago. Traditionally the supply chain has been driven from the back, by producers and manufacturers “driving products to market.” The dominant action in a traditional supply chain was to push products downstream towards end customers. This model was linear in its approach. Businesses in the supply chain were merely acceptant of demand based on the orders received from businesses in front of them. They rarely had any visibility into the true market demand for a product. To maintain downstream momentum in order to reduce inventory investments, upstream businesses constantly had to exert pressure on the downstream businesses to place orders. In this environment, demand could often be unpredictable. Items could go from a situation of under-stock to over-stock in very short spaces of time, and businesses across the supply chain did not have timely and accurate information in order to balance the turbulence.

In contrast, demand driven supply networks are driven from the front by customer demand. Instead of products being pushed to the market, they are being pulled to the market by customers. A demand driven supply network does not remove the ability of a company to push products to the market. It merely defines that companies in a supply chain will work more closely to shape market demand by sharing and collaborating information. In doing so, they will have greater and more timely visibility into demand.

The aim of this collaboration is to better position everyone with the ability to more closely follow market demand and produce, in tandem, with what the market wants. Rather than replace the force of pushing, products to the market, the DDSN strategy is to match a pull from customers with an equal and opposite push from all supply chain members.

Moving from a forecast-driven to a build-to-order system requires the redesigning of processes such as, new product introduction, demand planning, and order management (Arntzen & Shumway, 2002).

The following table summarizes the differences between traditional supply chain management and the DDSN.

**Table 2. Traditional SCM vs. DDSN**  
 (Adapted from The Demand Driven Supply Network, Asgekar, 2004)

Topic	Traditional Supply Chain Management	DDSN
Scope of Management Attention	<ul style="list-style-type: none"> <li>• Focus inside the four walls</li> <li>• Internal functional focus</li> </ul>	<ul style="list-style-type: none"> <li>• Focus on network of partners</li> <li>• Focus on networked, autonomous functional units</li> </ul>
Demand Signal	<ul style="list-style-type: none"> <li>• Push oriented, passive pull</li> <li>• Distorted demand signals</li> </ul>	<ul style="list-style-type: none"> <li>• Demand intelligence based system</li> <li>• Minimized demand distortion</li> <li>• Multistage demand signal</li> </ul>
Reaction to Rapid Change	<ul style="list-style-type: none"> <li>• Single stage demand</li> <li>• Hurt by supply-demand variability</li> <li>• Static flow supply chains</li> <li>• Redundant supply chain</li> </ul>	<ul style="list-style-type: none"> <li>• Builds for supply-demand variability</li> <li>• Dynamically reconfigured supply chains</li> <li>• Built around supply chain efficiency</li> </ul>
Supply Chain Optimization	<ul style="list-style-type: none"> <li>• Cost based/ optimize cost</li> </ul>	<ul style="list-style-type: none"> <li>• Value and risk based/ optimize opportunity against risk</li> </ul>
Process Execution	<ul style="list-style-type: none"> <li>• Isolated new product launch activity</li> <li>• Uncoordinated product phase outs</li> </ul>	<ul style="list-style-type: none"> <li>• Integrated product launch activity</li> <li>• Strategic, planned product phase outs</li> </ul>

### Role of IT in Demand Driven Supply Networks

IT capabilities play a crucial role in a demand driven supply network. Revisiting the definition of DDSN helps to get a better sense of what the role entails (O'Marah, 2005). DDSN is a system of technologies and processes that senses and reacts to real-

time demand across a network of customers, suppliers, and employees. The key information technology elements of this definition are “system” and “network”.

- System – a DDSN needs system architecture that can scale without compromising flexibility. Such a system should comprise of technology that incorporates applications and databases with business process tools like workflow, analytics, and reporting.
- Network – contract manufacturers, outsourced design and development activities, and third party logistics providers are all part of the rapid transformation of the supply chain away from vertically integrated corporations toward core competence based networks of business. For such a network to succeed, standards and communication must be pervasive and reliable (O’Marah, 2005).

DDSN pioneers have discovered that building the required system across the network calls for sharing ever richer and fresher information about both demand and supply. This is where IT comes into play as an enabler of the demand driven process. In a demand driven supply chain, partners generally implement inter-organizational information systems to cut inter-firm coordination costs, which enables them to benefit from the electronic integration effect of IT (Hadaya & Cassivi, 2007).

The creation of a Demand Signal Repository, which is a large data warehouse that provides a single, shared point of reference for all demand and customer related data, can be useful in ensuring demand visibility. This allows the creation of a single, detailed forecast that each function can leverage to generate operating plans that pursue a shared vision of the future (Schrieber, 2005). In addition, vendor-managed inventory (VMI)

increases customer-specific forecasting for suppliers by making them responsible for managing their customers' inventory levels and purchases. However, VMI has now become much less prevalent with the inception of the Sarbanes-Oxley act which called into question the accounting of this inventory. Electronic kanban (e-kanban) furthermore focuses on replenishment as it formalizes the customer's communications with its suppliers. Other methods encompass numerous supply chain activities such as collaborative planning, forecasting and replenishment (CPFR), which was designed to plan all collaborative actions and measures that will affect supply chain partners in their future supply chain activities. Whichever methods are adopted by firms to give directions and facilitate collaboration, a clear partnering process is essential to maximize the initiative's chances of success (Hadaya & Cassivi, 2007).

Sales and operations planning (S&OP) is the primary mechanism for integrated business planning in order to make smart decisions (Barrett, 2007). S&OP properly executed, can often be a big part of the solution. AMR Research defines S&OP as the cross functional process that translates market opportunity into an optimal, actionable operating plan. In other words, S&OP is a set of processes and technologies that enable a company to more effectively anticipate and balance demand and supply (Ledyard & Keough, 2007). It is an internal operation whereby the sales and marketing team carries out continuous discussions with the manufacturing team of the organization to develop an optimal plan. It is the engine that moves global manufacturing businesses forward, with more mature organizations including capabilities such as scenario planning and range forecasting into their process to manage demand variability and new product introductions better (Barrett, 2007).

Cecere (2006) identifies changes that have taken place in six major supply chain technology categories. These are summarized in Table 3 below.

**Table 3. Changing Supply Chain Management Processes**  
(Adapted from, A Changing Technology Landscape, Cecere, 2006)

<b>Solution Area</b>	<b>Focus in Early 2000</b>	<b>Today's Focus</b>
Network Design	Optimization of demand and supply	Risk mitigation, agility, and profitable demand response
Demand Management	Forecasting demand	Demand sensing and effective demand shaping
Inventory Management	Determining enterprise safety stocks	Multi-tier optimization and execution of inventory strategies
Sales and Operations Planning	Demand and supply matching	Demand shaping and profitable demand response
Manufacturing Scheduling	Focus on quantity	Focus on balancing cost, risk, responsiveness, and agility
Supply Management	e-sourcing and automated procurement	Reliable supply based on supplier relationship development through scorecards and dashboards

### Demand Visibility and Demand Forecasts

Given the imperatives of intense global competition, the buyers dominate the market and present their personalized and customized requirements. This makes the demand change rapidly and difficult to forecast. Demand forecasting is an essential tool for production and inventory planning, capacity management and the design of the customer service levels. Many demand forecasting techniques rely on the historical data and assume the validity of the past demand patterns for the near future. Demand forecasts

in practice, however, are rarely accurate and they become even worse at higher levels of the supply chain (Bayraktar, Koh, Gunasekaran, Sari, & Tatoglu, 2008).

The first step in designing a responsive supply chain is to accept that uncertainty is inherent in the innovative products. Uncertainty can be avoided by cutting lead times and increasing the supply chain's flexibility so that it can produce to order or at least assemble the product at a time closer to when demand materializes and can be accurately forecasted. The company can hedge against the remaining uncertainty with buffers of inventory or excess capacity (Fisher, 1997; Heikkila, 2002).

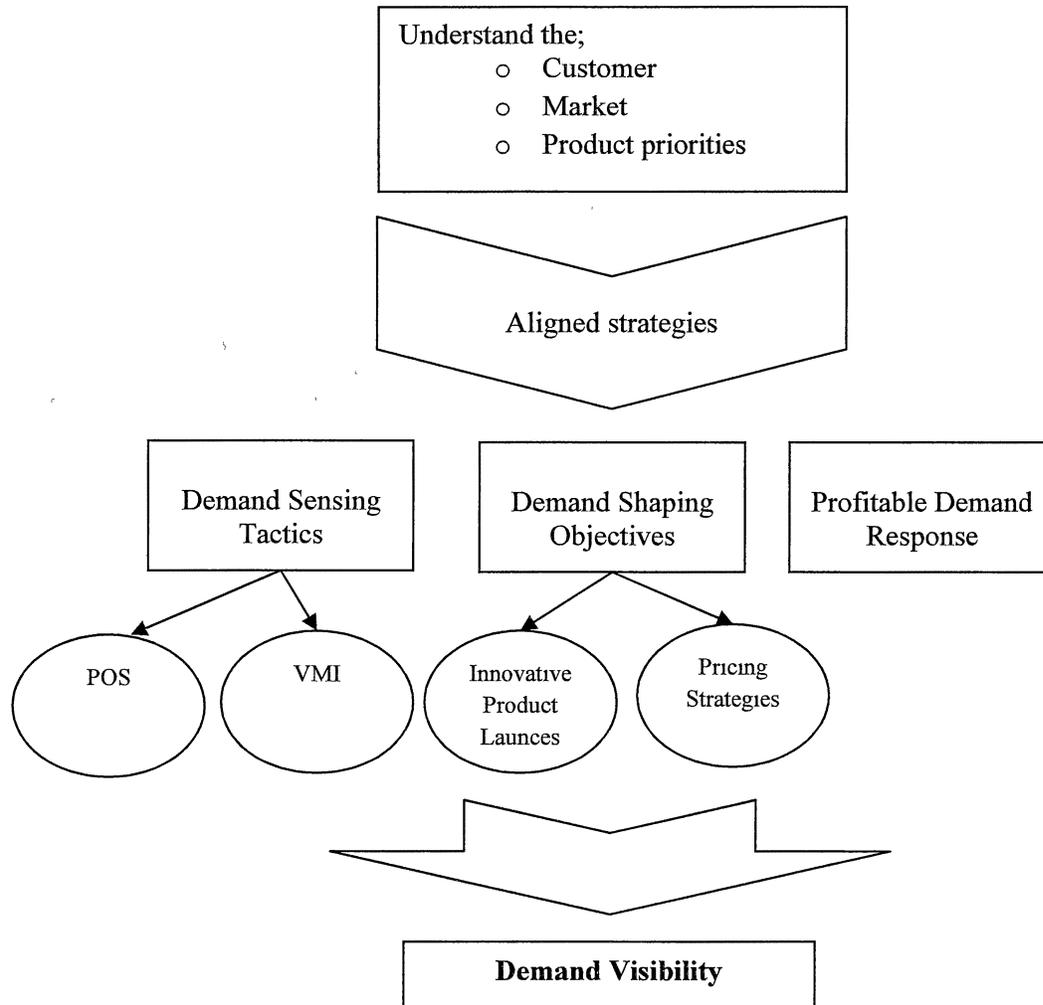
Different industries derive demand signals in different ways, particularly when determining the sales forecast for new products or predicting consumption at the product's end of life. For example, in the consumer product goods (CPG) industry, promotional tactics coupled with continual new product introductions and line extensions shape demand. In this case, past history becomes a predictor of future performance. In the high-tech industry, by comparison, the demand stimulus could come from introducing a new technology or directing a product at a different market segment, such as finding new applications for end-of-life products (Asgekar, 2004).

A more friendly organizational culture has a positive effect on achieving enterprise wide objectives and sharing common values, and on the sharing information and resources, because the reduced gap in interaction process reduces conflicts between supply chain members. In other words, enterprises will have a higher degree of visibility and transparency (Hsu, 2005).

By relying on a system of coordinated technologies and processes that senses and reacts to real time demand signals across a tight network of customers, suppliers and employees, a demand driven supply network can minimize demand distortions. Nevertheless, market demand remains very difficult to read and forecast within a number of manufacturing sectors (Hadaya & Cassivi, 2007).

Demand driven organizations refine and develop the demand signal so that they can influence and shape demand in the market. To do this supply processes must be capable of using the demand signal. Creating a culture in which true demand signals can be used effectively is one of the biggest challenges facing companies in this regard (Cecere, O'Marah, & Preslan, 2004). Although DDSN drives production with “real-time” demand signals, forecasting is still very important to permit long-term decisions. Forecast error measures the amount of unanticipated demand – the demand that causes disruptions in the supply chain (Olin, 2005).

Being a demand driven supply chain begins with a clear understanding of the customer, market, and product priorities. These strategies are then aligned to demand sensing tactics (such as using point-of-sale data or implementing vendor-managed inventory – VMI), demand shaping objectives (for example, innovative product launches and pricing strategies), and processes to drive a profitable demand response. After this alignment, demand visibility can then become the guiding light to become demand driven (Barrett, 2007). This process could be depicted in a diagram as shown in Figure 4.



**Figure 4. The Process of Attaining Demand Visibility**

Across industries, the projects that help improve demand visibility are different. Use of point-of-sale (POS) data and effective implementation of a global demand signal repository is a high priority for companies selling through retail channels. Programs like collaborative planning, forecasting, and replenishment and vendor-managed inventory also help (Barrett, 2007).

Demand forecast accuracy creates a high level of customer responsiveness and cuts cost through the supply chain. It also has a close correlation with perfect-order fulfillment (Barret, 2007; Friscia, 2005). Simply removing a single percentage point of error from a demand forecast can add millions of dollars to a company's bottom-line (Friscia, 2005; Schrieber, 2005). In addition, AMR Research has found that for every 1% improvement in forecast accuracy, companies can expect a 2 % gain in perfect order fulfillment. How well demand forecasts can be improved depends on how visible the underlying demand actually is. According to AMR Research, Demand Visibility is the ability to see undistorted and accurate demand within the timeframe necessary to react to it. The more visible the demand, the greater the likelihood of accurate demand forecasts (Schrieber, 2005).

Schrieber (2005) in his article identifies a number of factors that cause demand to become less and less visible. These factors are:

- New product introductions – The rapid growth of new product introductions has shortened product life cycles and expanded the numbers of stock keeping units (SKUs) that require forecasting.
- Opening of global markets – Wide differences in demographics, seasonal factors, packaging requirements and distribution channels across the globe further add to the number of SKU locations that must be forecasted. The more SKU locations to be forecasted, the less visible demand becomes because of the difficulties that arise in creating and managing so many distinct forecasts.

- Difficulty in deciphering historical demand – Most companies rely on historical data to help predict the future. But they find it difficult to translate historical sales into market demand.
- Traditional way of generating forecast – Demand forecasts generally do not provide a clear picture of demand because they are simply mean, point-estimate forecasts. Demand is probabilistic, and not absolute. The creation of probabilistic forecasts requires the ability to measure the degree to which actual demand deviates from prior demand forecasts at a very detailed level and over a significant period of time.
- Bias in forecasts – The way forecast error is typically measured also makes demand less visible.

Some measures that can be taken to improve demand visibility are as follows

(Schrieber, 2005):

- Get a closer look – Collaborative planning, forecasting and replenishment (CPFR) techniques are among the most common approaches that trading partners use to get a closer look. Taking on Vendor Managed Inventory (VMI) responsibilities is another way suppliers improve the levels of visibility and control they have over demand. In addition the application of Point-of Sale (POS) data to their forecasting, demand planning and replenishment activities help leading consumer products companies gain tremendous value. Another important way to get closer to demand is to reduce supply cycle time. This is because it is almost always easier to predict what will happen next week than what will happen next month.

- Shed more light on a subject – incorporating additional relevant information into the forecasting process most certainly help improve the visibility of demand and thereby improve forecast accuracy.
- Leverage Radio Frequency Identification Data (RFID) – of all the benefits stemming from RFID adoption, improved visibility holds the greatest potential to fundamentally transform supply chains.
- Take a historical perspective – improving demand visibility often requires companies to leverage a significant history of demand and causal data.
- Frequently update forecasts – frequent updates can help a business remain focused and enable forecasts to naturally adjust to market changes. This significantly reduces the gaps between planning and execution caused by infrequent planning cycles. The best planning cycles are not cyclical at all. Instead, plan resets are best dictated by changes in the marketplace rather than by changes in a calendar month.
- Apply multiple methodologies – using a wide range of methodologies not only ensures forecast accuracy but also corrects the bias inherent in each.
- Obtain perspectives from different functions – it is vital that perspectives from different functions are obtained and used when forecasting.

The critical decisions about capacity and inventory are not about minimizing costs but where in the chain to position inventory and available production capacity in order to hedge against uncertain demand (Heikkila, 2002).

## CHAPTER IV

### ORGANIZATION

#### How the bullwhip effect could be minimized

Lee, Padmanabhan and Whang (1997b) claim that the bullwhip effect is an outcome of the strategic interactions among rational supply chain members who are optimizing. They suggest the following sources of the bullwhip effect: demand signal processing, rationing game, order batching and price variations. In the existence of any of these four sources, bullwhip is caused by rational behavior of the members in the chain. Lack of inter-company communication combined with large time lags between receipt and transmittal of information are at the root of the problem (Metter, 1997). Consequently, solutions to the problem often involve increasing the abilities of companies to co-ordinate activity and cut lead times (Heikkila, 2002).

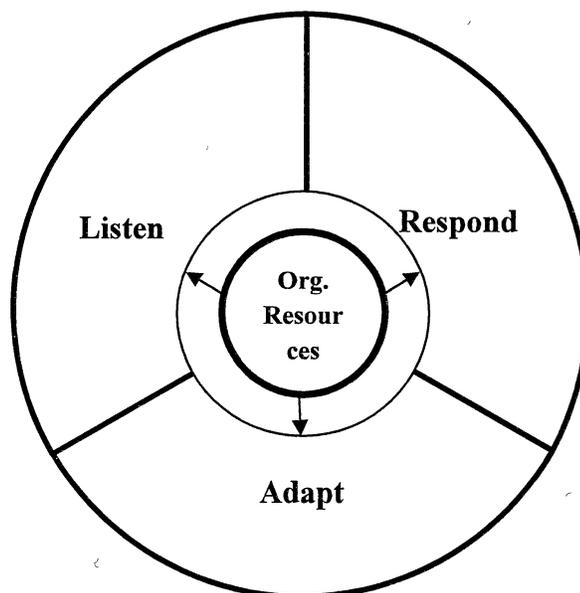
Spikes in demand made building to order extremely difficult because it is not practical to have enough spare capacity to handle these temporary peaks (Arntzen & Shumway, 2002).

With only a tiny buffer stock of finished goods, manufacturing in a demand driven system is exposed to the full variability of the order stream. Therefore it is

critically important to have adequately prepositioned raw materials ahead of the manufacturing lines (Arntzen & Shumway, 2002).

### DDSN & Culture

A demand driven supply network requires a rethinking of traditional supply chain concepts and a strong commitment to customer expectations and requirements. This typically involves a fundamental cultural shift that changes the organization's values and beliefs. Changing tradition requires a significant transformation process starting with an outside-in look at the business strategy (Barrett, 2007). The DDSN culture is built upon the ability to listen, respond and adapt to customers by using organizational resources (Figure 5) as a weapon for market competitiveness (Cecere, O'Marah, & Preslan, 2004).



**Figure 5. The DDSN Culture**

In a demand driven supply network, forecast error is a given. Yet the demand oriented company is constantly working to anticipate, shape, and influence demand. To do this successfully, it must become fully aligned towards discovering the true needs of the customer – in effect, establishing a demand driven culture (Cecere, O'Marah, & Preslan, 2004).

The most technically challenged change in moving to a demand driven supply network is in manufacturing. But this conversion requires a lot more than manufacturing. Product designs need to change too. Designs must be created that use standard parts and have fewer saleable configurations. It involves changing “everything” – processes, software, skills, job descriptions, relationships, and most of all thinking (Arntzen & Shumway, 2002). The whole organizational mind-set needs to change as well. For a company that is accustomed to planning, purchasing, stocking, manufacturing, assembling, and replenishing based on a forecast, it is a drastic change when the forecast no longer drives any of these activities. The forecast is still needed to pre-position raw materials and do long-term capacity planning, but that is where its role ends (Arntzen & Shumway, 2002).

The challenges on the transformation journey depend on the industry drivers, the industry-specific characteristics of demand, and the state of readiness of the organization. At the start of the value chain transformation journey, there needs to be cross-functional agreement at the highest levels in a company as to what constitutes demand driven across the value chain (Barrett, 2007).

Having the right metrics and performance management strategy in place, efficient and effective business processes linked to a continuous improvement plan, and an enabling IT strategy and architecture are necessary for the transformation (Barret, 2007).

### Importance of Aligning Incentives

One of the greatest challenges businesses face when embarking on the road to DDSN is that of alignment. Throughout the organization and externally with partners, metrics must be aligned with overall company and supply chain goals (Barrett, 2007). After decades where each business took care only of its own affairs, maximizing its own interests, guarding its own data and sometimes spying to acquire the knowledge of competitors, collaborating and sharing is not something to which business owners take an immediate liking. Yet, by its very definition DDSN is not something one company can do in isolation. A major motivator in getting individual businesses in a supply chain to collaborate is to get them to see a greater alignment. Most business owners are aware that aligning supply chain interests with their own is beneficial to their business. Business owners know firsthand that a lack of alignment causes many problems. Some of the methods businesses can use to promote alignment are; exchange information and knowledge freely with vendors and customers, lay down roles, tasks, and responsibilities clearly for suppliers and customers and also equitably share risks, costs, and gains of improvement initiatives.

However, most companies don't worry about the behavior of their partners while building supply chains to deliver goods and services to customers. Supply chains are expected to work efficiently without interference, as if guided by Smith's invisible hand. Executives tackle intra organizational problems but overlook cross-company problems because the latter are difficult to detect. Coordinating actions across firms is tough because organizations have different cultures and companies can't count on shared beliefs or loyalty to motivate their partners. To induce supply chain partners to behave in ways that are best for everybody, companies have to create or modify monetary incentives (Narayanan & Ananth, 2004).

A supply chain works well if its companies' incentives are aligned – that is, if the risks, costs, and rewards of doing business are distributed fairly across the network. Misaligned incentives are often the cause of excess inventory, stock-outs, incorrect forecasts, inadequate sales efforts, and even poor customer service. Three reasons why incentive related issues arise in supply chains are (Narayanan & Ananth, 2004):

- When companies cannot observe the other firms' actions, they find it hard to persuade those firms to do their best for the supply network.
- It is difficult to align interests when one company has information or knowledge that others in the supply chain do not have.
- Incentive schemes are often badly designed.

Furthermore, Narayanan and Ananth (2004) also identify three stages in which companies must align incentives. These are:

- Acknowledge that there's misalignment.
- Diagnose the cause – hidden actions, hidden info, or badly designed incentives.
- Creating or redesigning incentives that will induce partners to behave in ways that maximize the supply chain's profits.

Operating in silos with misaligned metrics is still considered the No.1 obstacle to becoming best in class (Barrett, 2007).

## CHAPTER V

### BUYER/ SUPPLIER PERFORMANCE MANAGEMENT

#### Importance of relationships in a DDSN

Good relationship between the customer and the supplier contributes to reliable information flows, and reliable demand information flows in turn contribute to high efficiency. One important problem to understand is, under what conditions the customer would be willing to co-operate with the supplier, to give access to real demand data and to coordinate its ordering policies for the benefit of the supplier (Heikkila, 2002). The more differentiation between groups and organizations, the more difficult it will be to coordinate the activities of the subunits and more resources will need to be applied for coordination.

In demand driven companies the focus is on the management and coordination of collaborative relationships. Companies driven by demand understand that true collaboration is built on the agreed upon goals between the parties (Cecere, O'Marah, & Preslan, 2004). And numerous studies have emphasized the importance of integrating suppliers, manufacturers, and customers (Clinton & Closs, 1997; Frohlich & Westbrook, 2001; Storey, Emberson, & Reade, 2005). In essence a demand driven supply network strategy forces its stakeholders to collaborate more closely with each other. A collaborative supply chain simply means that two or more independent companies work

jointly to plan and execute supply chain operations with greater success than when acting in isolation (Hadaya & Cassivi, 2007). Therefore, companies need to divide their customer-supplier relationships into classes along the continuum from 'arms-length' relationships to true partnerships. While true strategic partnerships create new value, they are costly to develop, nurture and maintain. Also, they are risky given the specialized investments they require. The number of real partnerships a company can build and maintain is limited. Hence, partnership type of relationships cannot be expected to be built with a large number of customers or suppliers, and focusing the resources on building the right relationship requires careful planning and decision making (Heikkila, 2002). An improvement in the management efforts or philosophy necessary for creating an operating environment where the buyer and supplier interact in a coordinated fashion, improves both the suppliers' and buyers' performance especially when the buyer emphasizes quality and delivery as its competitive priorities (Shin, Collier, & Wilson, 2000).

It is of utmost importance that a close relationship with both the internal and external customers is developed for an organization in a demand driven system. A close relationship means that channel participants share the risks and rewards and have willingness to maintain the relationship over the long term (Cooper & Ellram, 1993; Landeros & Monczka, 1989; Shin, Collier, & Wilson, 2000; Stuart, 1993). Furthermore, through a well developed long term relationship, a supplier becomes part of a well managed supply chain and it will have a lasting effect on the competitiveness of the entire supply chain (Choi & Hartley, 1996; Hsu, 2002; Shin, Collier, & Wilson, 2000). Furthermore, strategically managed long-term relationships with key suppliers have a

positive impact on the firm's financial performance (Shin, Collier, & Wilson, 2000; Storey, Emberson, & Reade, 2005).

Shin, Collier, & Wilson (2000) in their study identified four performance characteristics that are necessary in supplier selection. These characteristics are;

1. A long-term relationship with suppliers
2. Supplier involvement in the product development process
3. A reduced number of suppliers
4. A 'quality focus' meaning that quality performance is the number one priority in selecting suppliers

In addition, three factors that are the most critical determinants in choosing suppliers are; 1) the ability to meet quality standards; 2) the ability to deliver products on time; and 3) the performance history (Dickson, 1966; Shin, Collier, & Wilson, 2000).

A significant shift has occurred from the traditional adversarial buyer seller relationship to the use of a limited number of qualified suppliers (Hadaya & Cassivi, 2007; Helper, 1991; Shin, Collier, & Wilson, 2000). Contracts have increasingly become long-term and more and more suppliers must provide customers with information of their processes, quality performance, and even cost structure (Helper, 1991; Helper & Sako, 1995; Shin, Collier, & Wilson, 2000). Several important factors have caused this current shift to single sourcing or a reduced supplier base. First, multiple sourcing prevents suppliers from achieving the economies of scale based on order volume and learning curve effect (Hahn, Kim, & Kim, 1986; Reade, 2005; Shin, Collier, & Wilson, 2000). Second, the multiple supplier system can be more expensive than a single supplier system (Shin, Collier, & Wilson, 2000; Treleven, 1987). Third, a reduced supplier base helps

eliminate mistrust between buyers and suppliers due to lack of communication (Newman, 1988a,b; Shin, Collier, & Wilson, 2000). Fourth, worldwide competition forces firms to find the best suppliers in the world. Therefore, coordinating the supply chain in different geographic regions becomes more imperative (Monczka, Trent & Callahan 1983; Shin, Collier, & Wilson, 2000).

For leading manufacturing (buyer) companies, the primary objective is to manage their suppliers to achieve decreased production lead time, better delivery reliability, increased quality, and reduced cost (Shin, Collier, & Wilson, 2000). Supplier Relationship Management (SRM) is a comprehensive approach to managing an organization's interactions with its suppliers. The goal is to streamline and make more effective the processes between an organization and its suppliers. Hence, an effective SRM system will help an organization in its journey towards becoming more demand driven.

#### Supplier Performance Management (SPM)

A key piece of the DDSN strategy is supplier performance management (SPM). Through scorecards and dashboards, supplier performance management provides both the customer and the supplier a view of the supplier's performance to the customer's key metrics for cost, quality, delivery, and service. These key performance indicators (KPI) measure the supplier's success in terms of the customer's needs and provide a direct way of reviewing the value of the partnership between the two companies. SPM helps customers and suppliers develop a common focus on the supply network's output and on business-value drivers. The ultimate goal of a SPM strategy is to develop strategically

aligned partnerships. A key part of supplier performance management is effective metric management. Metric management involves measuring suppliers to the business requirements and expectations, usually in a scorecard format. Successful SPM programs start with a strategic review of the supplier network based on product requirements. They then establish critical measurements of success by collaborating cross functionally, both internally and externally. Finally, the leading companies evaluate their suppliers based on the value they bring to the supply chain. SPM, therefore, provides a means for companies to measure their success during their demand driven journey (Rizza, 2006).

Apart from supplier performance management, in order to manage the relationship with the customer an organization needs to collect the right information about its customers and organize that information for proper analysis and action. This information needs to be up-to-date, and should be made accessible to all employees. In addition, employees should be provided with the knowhow to convert that data into products better matched to customers' needs. This in essence is Customer Relationship Management (CRM). Customer Relationship Management is a business philosophy involving identifying, understanding and better providing for your customers while building a relationship with each customer to improve customer satisfaction and maximize profits. It's about understanding, anticipating and responding to customers' needs. This is the underlying concept of a demand driven supply network. Therefore, in order for an organization to gain customer insight, superior CRM software becomes critical. However, a computer based CRM solution cannot transform the relationship the organization has with its customers. That requires a cross-department, top to bottom, corporate desire to build better relationships. From an operations perspective, Bose

(2002) pointed out that CRM is an integration of technologies and business processes that are adopted to satisfy the needs of a customer during any given interaction. Whilst the potential benefits are attractive, CRM implementation must be managed carefully to deliver results (King & Burgess 2008).

In addition to maintaining relationships with the external customers, it is important that relationships are developed and maintained within an organization's internal customers. The effectiveness of a supply chain is primarily dependent upon how employees within an organization conducts operations and how aligned they are with the organizations supply chain goals. It is worth mentioning the old adage about systems only being as good as the information that they contain applies doubly to demand driven supply networks. If the information entered into a demand forecasting application is not accurate then invariably the forecast would be inaccurate. Similarly, if employees bypass the supply chain system and try to manage things differently, then the supply chain will not be effective. Articulating the strategies to reach organizational goals and rewarding employees to make positive contributions are part and parcel of demand driven supply chain success. Therefore, it is necessary that appropriate mechanisms are in place to ensure employees operate in a way that will benefit the entire supply chain. Hence, their importance in a demand driven supply network becomes crucial.

## CHAPTER VI

### OTHER COMMON FACTORS

#### Performance measurement in a demand driven organization (Metrics)

The evaluation of the performance should be done through the eyes of the customer. Most companies traditionally have defined and measured performance in terms of what they can easily control. Demand driven organizations, however, measure service in terms of what their customer wants. These could include, orders shipped as requested, goods received in a usable form, and a shipment received on time, every time etc. (Cecere, O'Marah, & Preslan, 2004).

Supply excellence for a demand driven company means the alignment of all assets in the network – which includes third party suppliers and logistics services providers – against these new customer centric measurements. Important areas to prioritize are service level fulfillment for demand management, perfect order at the customer's dock, and total time to value for product innovation (Cecere, O'Marah, & Preslan, 2004).

Demand driven organizations have in addition realized that measurement alone is not enough. Continuous improvement through technology with either buy or sell-side partners is the new mandate. Dashboards, scorecards, reports, and alerts are updated based upon demand signals. Innovation cycles, (for example, time to market, excellence

in quality of design, and market reception) and supply variation (such as lead-times, manufacturing cycle times, and quality of conformance) are tracked against customer requirements (Cecere, O'Marah, & Preslan, 2004).

Demand forecast accuracy, perfect order fulfillment (complete, accurate, and on-time shipments), supply chain cost, and cash-to-cash cycle time are the four most critical metrics a company can use to get a quick, balanced snapshot of its supply chain performance (Frischia, 2005).

Proctor & Gamble is one company that has moved from measuring performance on internal cost and efficiency to external processes targeting consumer satisfaction (Olin, 2005). Metrics that are consumer focused start with good Point of Sale (POS) data and need a good information system that allows having data instantly available in a real time basis throughout the entire organization (Sowinski, 2004).

One big difference between a DDSN and a traditional push supply chain are the metrics used. The traditional supply chain metrics include plant utilization, labor costs, and freight handling costs. The metrics that matter most in a demand driven approach, however, are a handful of overarching process measurements. These measurements cut across traditional functions like manufacturing, engineering, and sales and relate more closely to business value and actual demand. They span two key dimensions according to O'Marah (2005).

- Operational excellence – perfect order fulfillment rate and total supply chain management cost. The first metric is a strong blanket measure of customer service; the second accurately captures the cost of service.
- Innovation excellence – time to market, time to volume, time to value, and overall return on new product development and launch.

Operational and innovation excellence along the metrics discussed above can drive value in the business in the form of higher cash flow, profits, and price/earnings (P/E) multiples (O'Marah, 2005).

#### Developing Flexibility into a DDSN

Flexibility is a key performance measure in DDSN. Supply chain flexibility captures a system's ability to accommodate volume and schedule fluctuations from suppliers, manufacturers, and customers. Developing flexibility is not an easy task, as manufacturers need to tightly integrate all their internal activities and swiftly exchange the appropriate information with their business partners both downstream and upstream in the supply network. This requires the use of information and telecommunications technologies by all members of the network. Inter-organizational information systems allow information to flow quickly and transparently across multiple inter-organizational boundaries and make it visible to all supply chain partners. Electronic Data Interchange (EDI) is probably the most commonly used technology allowing the exchange of information between business partners. Firm flexibility captures the firm's ability to react through its operations to the needs and requirements of its supply chain partners (Hadaya

& Cassivi, 2007). Duclos, Vokurka and Lummus (2003) states that supply chain flexibility should be examined from an integrative, customer-oriented perspective.

Firm flexibility within a supply chain context encompasses five key dimensions (Duclos, Vokurka, & Lummus, 2003; Hadaya & Cassivi, 2007; Vickery, Calantone, & Droge, 1999). These are:

1. Volume flexibility – which captures the firm’s ability to adjust production capacity.
2. Launch flexibility – which captures the firm’s ability to rapidly introduce new products or product variations.
3. Access flexibility – which captures the firm’s ability to cover a widespread distribution network.
4. Product flexibility – which captures the firm’s ability to produce and customize products with numerous features and options.
5. Responsiveness to target market(s) – which captures the firm’s ability to respond to needs and wants of its target market(s).

EDI, POS, supply chain planning and execution applications, Computer-Aided Design (CAD)/ Computer-Aided Manufacturing (CAM) systems, private trading exchange, enterprise application integration software, web services and XML based data interchange are some of the inter-organizational technologies available to improve inter-organizational processes and thus increase firm flexibility in a demand driven supply network (Hadaya & Cassivi, 2007).

## CHAPTER VII

### METHODOLOGY

Given the nature of research in the area of demand driven supply chain, this study not only relies upon secondary data, or literature printed in peer-reviewed, scholarly journals, but is strengthened by primary data collected through interviews. This section describes the set of procedures used to conduct a survey that attempts to identify the practical aspects of demand driven supply networks. This section discusses the sample used for this research, the procedure used, how responses from the participants were analyzed, and the limitations of this procedure.

#### Sample

Due to the nature of information sought and problems associated with information confidentiality, potential interviewees were referred by professors, and experts in the field of supply chain management. The additional criteria used to select interviewees include: some minimum experience (approximately five years of experience in the field), area of expertise, availability and willingness to participate. Therefore a convenience sample was used. Three interviewees were selected and they currently work in the field

of supply chain, have at least five years experience and are considered experts in the specific area of the interview. The prospective interviewees were contacted via e-mail and were presented with a brief discussion of the scope of the research. All persons contacted agreed to participate in the phone interview and were scheduled accordingly.

### Procedure

All three interviewees were contacted via telephone at scheduled times and a structured interview was conducted. The interviewees were asked a standardized set of questions based upon the important aspects of this research study. Their responses were recorded using a pre-printed standard form (as shown in Appendix A), separating responses by question. Responses were transcribed directly to the standard form by the interviewer. Each interviewee's responses were transcribed to separate forms.

### Interview Questions

The interview consisted of 10 major questions. The questions are provided below for the purpose of discussion.

1. What is the industry in which your organization operates in?
2. What is the size of your company?
3. What are your product offerings?
4. What is your position/level in the organizational hierarchy?

The interviewees were asked to identify their position within the company which in effect helped to put their answers into context.

5. Have you heard of the concept “Demand Driven Supply Networks” and what do you gather by this term?

This question was designed to identify if interviewees were aware of the concept and to identify what their interpretation was.

6. Do you think your organization is fully demand driven? If not, to what extent do you believe your organization is driven by demand?
7. Do you have a close collaboration with the entire supply chain? If so, how do you manage it? If not, to what extent and where do you draw the line?
8. How do you believe your customers are involved in shaping your supply chain? And what information do you think is critical to extract from your customers?
9. How are your employees involved in the supply chain?
10. What do you believe are critical factors for a successful demand driven supply network?

These questions were designed to understand the practical aspects of a demand driven network and to further support or reject the literature on the topic. These also helped put interviewee responses into the context of this research.

#### Method of Analysis and Limitations

The interviewees’ responses were consolidated and summarized for each question using the standard form, and these provided additional insights about the demand driven supply network. The limitations that were encountered were as follows:

- The sample used was one of convenience.
- Interviewees were limited to only two industries.
- Interviewee responses were transcribed by hand, while also conducting the interview, and therefore are subject to inaccuracies.
- Because the interviewees' responses were transcribed and interpreted by the interviewer, the responses were subject to a possibly biased interpretation.
- Due to the nature of the research, it did not rely upon any numerical or statistical data.

## CHAPTER VIII

### ANALYSIS AND DISCUSSION OF RESULTS

The interviews were conducted with the intent of solidifying findings obtained through previous research and to generate an understanding of how organizations successful in supply chain management have attempted to transform itself to a more demand driven organization. Being exploratory in nature, the interview questions were general and responses were broad. The first four questions asked the interviewee about the organization they work for and their position in the organization. These questions were used to put their later responses into context. Two of the interviewees were from organizations that are renowned worldwide for their supply chain capabilities. The third interviewee was from an organization that works closely and provides consultancy to large firms incorporating supply chain practices for superior performance. Hence all three interviewees have extensive knowledge and experience in the area. In addition, the interviewees are in a high level in the organizational hierarchy and hence were able to provide a holistic view of the supply chain.

The concept demand driven supply networks was introduced by AMR Research in 2003. Question five helped understand if the respondents were aware of the concept and their general interpretation of it. The purpose of the question was to identify how the

definition of demand driven supply networks was laid out in the minds of business professionals. In order for an organization to transform its self from a traditional supply chain to a demand driven supply chain it needs to have an understanding of the concept, its complexities and how different it is from the traditional supply chain. All three respondents were aware of the concept and had a basic understanding of demand driven supply networks. They all emphasized on the need to focus on consumer demand and propagate this demand across all players in the supply chain in real time.

The next question in the questionnaire asked the interviewee the extent to which their organizations were considered to be demand driven. This question enabled to form an opinion on how well this concept is embraced. All three interviewees agreed on the importance of being demand driven but however, accepted that their organizations have yet not reached the level of being fully demand driven.

Question seven addresses the level of collaboration needed to attain a full demand driven network. Although in theory having a close collaboration with the entire supply chain seems achievable, in practice there are many reasons that prohibit such collaboration. All three interviewees agreed that their organization or the organizations they have worked with only collaborate with its close key upstream and downstream partners. The industry in which the organization operates in plays a key role in determining the level of collaboration one could achieve. In the case of a retail organization, the size and length of the supply chain makes it complex and difficult to partner with each and every node in the chain.

Customer involvement becomes crucial in a demand driven supply network as exemplified by the responses of the interviewees to the next question that attempts to

understand the level of customer involvement in shaping a supply chain. All interviewees agreed on the importance of focusing on customer demand which propagates along the supply chain. One interviewee pointed out that his organization focuses on satisfying the customer and hence have developed metrics around customer satisfaction in order to ensure repeat customers. Therefore the supply chain is geared towards satisfying the customer by ensuring that the product the customer is looking for is available as and when they need it. All emphasized on the importance of having sufficient technology in place to extract such demand information.

The next question addresses employee involvement in a supply chain. As pointed out by one of the interviewees the success of a supply chain primarily depends on employee performance. A supply chain in its raw sense will only be a collection of assets and flow of information. It is the employee who utilizes this important information and valuable assets and generates the profits required by the organization. It is the employee who uses information and assets to make decisions that are beneficial to the entire supply chain, as mentioned by one of the respondents. It is the employee actions that convert the raw materials to a finished good that is finally placed on the hands of the consumer. Therefore, from a person who stocks goods on a shelf to a person who unloads goods from a truck each and every employee affects a supply chain to a great degree. Thus, an organization should make every effort to sustaining and maintaining employee performance to ensure the supply chain is shaped appropriately.

As a final question, the interviewees were asked to comment in general on what they believed were the critical success factors of a demand driven supply network. All responses appear to focus on four important factors – people, processes, technology, and

communication throughout the supply chain. Employees within the supply chain, processes implemented to coordinate, synchronize and collaborate along the supply chain, technology that supports such coordination and finally communication from the customer up to the last node in the supply chain becomes vital in order to transform an organization to a demand driven status.

The information obtained from the interviewees helped to support some of the key elements stated in previous literature and provides a deeper understanding of how difficult it is to transform from a traditional supply chain to a demand driven supply network. Upon analyzing the interviewee responses, it was realized that attaining a demand driven supply network is more complex and demanding and requires significant effort from not only the organization but also every partner in the supply chain. All partners should have a culture set towards the attainment without which transformation becomes almost unattainable.

The major finding from this research is that customers both internal and external have considerable influence in shaping a demand driven supply network. The findings further accentuates that people, processes and technology along with collaboration and sharing of information becomes imperative for the success of a demand driven supply network and hence become critical success factors.

## CHAPTER IX

### CONCLUSION

Literature concerning demand driven supply networks tends to treat organizations as virtual individuals who make calculated rational choices. Much of the research seeks the nature of the criteria – or variables – which are supposedly weighed by these actors. But, in reality, supply chain issues and inter-organizational relationships more generally are not salient on corporate agendas. Relationships are built at a more operational level and they therefore, remain vulnerable to changes in corporate policy that intrude upon established, emergent, practices. In addition some of the underlying assumptions and claims in the literature that ought to be re-addressed are (Storey, Emberson, & Reade, 2005):

- The assumption that firms act in a similar manner as individual decision makers in considering and weighing series of options. Decisions are rather made more at an operational level and therefore as a result their outcomes can be easily overridden by competing corporate level priorities.
- The notion that buyer-supplier relationships proceed in a number of incremental stages.

- The dominant theme in buyer-supplier relationship literature of “commitment” and “trust” in relationship marketing and buyer-supplier collaboration need to be reconceptualized.

From a planning perspective, sales and operations planning, network design, inventory optimization, attribute-based forecasting, and demand visibility are some of the processes best in class companies are mastering to translate demand into profitable response from supply (Barrette, 2007).

The ability to build to demand versus build to forecast is contingent upon the ability of the information system to capture the correct data at the correct point in time such that operations can be adjusted to produce what the data has indicated as the market is demanding (Hadaya & Cassivi, 2007).

Customers’ need for instant gratification drives the requirement to operate in real time. Integrated processes lie at the heart of the demand driven supply network. These processes must be capable of generating a credible demand signal, sharing that signal across trading communities, and coordinating work flow and activity among all partners (Aşgekar, 2004). Integration, however, won’t come easy for many companies. Most supply chain project implementations to date have focused on getting the processes right within the four walls. Collaboration or building dependencies outside of the enterprise typically has ranked low on the list of priorities. Customer responsive supply chain management, which has been so elegantly described in the normative literature, is thus found in practice to be prone to a number of critical organizational and behavioral barriers to its smooth enactment. However, a customer responsive supply chain with minimal stock out events, minimal obsolescence, and prompt response to market

fluctuations – is technically feasible (Storey, Emberson, & Reade, 2005) and supply chain leaders, are now moving quickly towards a collaborative relationship, expediting the evolution of a demand driven supply network.

Companies in a demand driven network will work more closely to shape market demand by sharing and collaborating information. In doing so, they will have greater visibility into demand. The need to cope with volatile demand requires the capability to manage the supply chain in a way that enables quick response. In order to improve performance, businesses have been impelled to develop closer relationships with their internal and external customers. And this relationship between internal and external customers helps define and shape the supply chain enabling the transformation towards a more demand driven supply network. Supply chains no longer consist of successive interactions between buyers, suppliers, and logistic players, but are more dynamic and malleable. They operate as value networks in which all players need to work collaboratively to acquire, process and distribute information to maximize productivity and efficiency (Bitran, Gurusurthi, & Sam 2007).

This research provides a framework that organizes current literature into four broad elements that helps provide a better understanding of the concept demand driven supply networks. In addition, it emphasizes on the importance of internal and external customers on a demand driven supply network while identifying critical factors affecting such a network through the findings obtained via the interviewees carried out.

### Recommendations for Future Research

This research has brought together many ideas, as presented through the reviewed literature, and has provided a foundation that should be expanded upon. A more extensive interview process with more detailed and specific questions could reveal greater insight into the impact and relationship internal and external customers have on a demand driven supply network. Due to the time constraints and the nature of this research, the number of interviewees used was limited and the interview process was fairly restricted. In addition, future studies on the concept could be more statistical in nature and therefore provide supporting evidence of the extent to which internal and external customers influence the demand driven network.

Future research could also address barriers companies face in their journey towards a demand driven reality. Although the concept has been around for a few years, organizations that are renowned world over for their supply chain capabilities have yet not adopted a fully demand driven network. Hence, future research could analyze in detail what hinders the transformation to a demand driven supply network.

Retailers use the rate of sale to determine if an item is fast moving or not. In addition the rate of sale will have significant impact on the ability to forecast demand. In most instances, an item that sells less than one per store per week will not be considered fast moving, and forecasting demand for these items become statistically impossible. However, these types of items generally make up approximately 75% of most retailers stock-keeping unit (SKU). Although supply chain literature has suggested that demand driven supply networks are more logically suited for fast moving, shelf-sold, consumer-

oriented product manufacturers, future research could potentially identify how DDSN will impact such slow moving SKUs as well.

As identified in the research, a demand driven supply chain begins with a clear understanding of the customer, market, and product priorities. These strategies are then aligned to demand sensing tactics, demand shaping objectives, and processes to drive profitable demand response. After this alignment, demand visibility becomes the guiding light to become demand driven. However, many organizations do not have a clear understanding of one or all of these essential components that make a demand driven network. Hence, it might be useful to analyze how such companies or industries operate in their journey towards being fully demand driven.

Other areas future research could be carried out on includes, how metrics should be developed and shared across the partners in a demand driven supply network and how it could have an impact on its success and what potential conflicts arise when supply chain priorities are in disagreement with demand chain priorities.

## APPENDIX A

### STANDARDIZED FORM USED FOR RECORDING INTERVIEWEE RESPONSES

Date: \_\_\_\_\_

1. What is the industry in which your organization operates in?
2. What is the size of your company?
3. What are your product offerings?
4. What is your position/level in the organizational hierarchy?
5. Have you heard of the concept “Demand Driven Supply Networks” and what do you gather by this term?

6. Do you think your organization is fully demand driven? If not, to what extent do you believe your organization is driven by demand?
  
7. Do you have a close collaboration with the entire supply chain? If so, how do you manage it? If not, to what extent and where do you draw the line?
  
8. How do you believe your customers are involved in shaping your supply chain? And what information do you think is critical to extract from your customers?
  
9. How are your employees involved in the supply chain?
  
10. What do you believe are critical factors for a successful demand driven supply network?

## **APPENDIX B**

### **SUMMARY OF INTERVIEW RESULTS**

1. What is the industry in which your organization operates in?

Interviewee 1: Reputable management consultancy firm.

Interviewee 2: Retail industry.

Interviewee 3: Retail industry.

2. What is the size of your company?

Interviewee 1: Reputable management consultancy firm employs over 2000 individuals worldwide.

Interviewee 2: The organization has revenue of approximately \$340 billion.

Interviewee 3: The organization employs over two million individuals worldwide.

3. What are your product offerings?

Interviewee 1: Management consultancy.

Interviewee 2: Retail consumer product goods (CPG).

Interviewee 3: Retail consumer product goods (CPG).

4. What is your position/level in the organizational hierarchy?

Interviewee 1: Senior Manager.

Interviewee 2: Senior Manager – Logistics.

Interviewee 3: Senior Director – Logistics Strategy.

5. Have you heard of the concept “Demand Driven Supply Networks” and what do you gather by this term?

All three interviewees had heard of the concept “Demand Driven Supply Networks”.

Their interpretations of the concept were very similar and are as follows:

Interviewee 1: A Supply network designed primarily to propagate consumer demand throughout the supply chain’s nodes. For instance the entire supply chain will react to fluctuations in consumer demand instead of a single upstream or downstream node. Use this consumer demand as a basis for planning throughout the supply chain.

Interviewee 2: Working backwards, starting from the customer.

Interviewee 3: How you shorten cycle time. To be demand driven should be more responsive to customer purchases.

6. Do you think your organization is fully demand driven? If not, to what extent do you believe your organization is driven by demand?

Interviewee 1: The interviewee is not part of an organization that actually has a supply chain but offered his perspective on the importance of demand driven supply networks.

I believe it is extremely important to be demand driven. Planning and forecasting based on end consumers helps mitigate whiplashes or the bullwhip effect and avoids carrying unnecessary inventory in the supply chain. It also helps reduce loss of sales due to proper inventory management.

Interviewee 2: I do not believe the organization is 100% demand driven. But at least 85% is based on customer demand. To gather consumer information, focused groups, trend analysis, competitor analysis are constantly carried out.

Interviewee 3: The retail industry as a whole compared with the automotive or consumer electronics industries are at the initial stages of the supply chain maturity model. Therefore retail industry as a whole have yet not reached the stage of being fully demand driven.

7. Do you have a close collaboration with the entire supply chain? If so, how do you manage it? If not, to what extent and where do you draw the line?

Interviewee 1: Most companies I have worked for do not have a close collaboration with the entire supply chain due to inherent difficulties of communicating across all nodes in the supply chain. Instead, most firms opt to collaborate with its close key upstream and downstream partners, making it difficult to be a fully demand driven supply network.

Interviewee 2: Do not have a very close collaboration but the organization is getting better and improving itself every day. Working closely with your partners is extremely important and managing such relationships becomes critical especially in an instance where products from competing companies are being stocked on the shelves.

Interview 3: No not throughout the entire supply chain. Collaboration only takes place with the first tier partners. In my experience the only industry that is fully collaborative are the chicken manufacturers.

8. How do you believe your customers are involved in shaping your supply chain?  
And what information do you think is critical to extract from your customers?

Interviewee 1: Customers impact the supply chain to a great deal, especially if its demand driven. Customers of an organization could be looked at in two different perspectives. There are customers who are your immediate buyers and then there is also the end consumer. What plays a greater role is the end consumer demand. This is what propagates along the supply chain. Therefore, extracting end consumer demand information and analyzing the trends will help all nodes in the supply chain.

Interviewee 2: Customers play a critical role in shaping the supply chain. The organization is geared towards making a customer happy in order to have repeat customers. Many metrics are used to gather and track customer demand. The company attempts to gather information pertaining to what satisfies the customer. It may include price, quality, cleanliness in the stores etc.

Interviewee 3: They have a significant impact on shaping the supply chain. If the supply chain is not designed to deliver what the customer wants, when he wants it then the entire supply chain will fail. Therefore customer insight is crucial in designing a supply chain.

9. How are your employees involved in the supply chain?

Interviewee 1: Employees play a critical role in a supply chain. These are the individuals who at the end of the day plan and make decisions on behalf of the supply chain. Therefore their role in the supply chain becomes crucial for the success of the supply chain.

Interviewee 2: Employees too are very important in shaping the supply chain. Logistics alone has more than 100,000 employees. Be it a person stocking the shelf or loading or unloading a truck all employees are important to attain the ultimate goal of attaining customer satisfaction and repeat customers.

Interviewee 3: The supply chain in its raw sense will not make any sense. It is just a collection of assets and flow of information. If you don't have associates doing what they do then the supply chain will not add value. Employees are the people who are involved in moving the products by providing a physical force so that it moves from raw materials to the hands of the consumer.

10. What do you believe are critical factors for a successful demand driven supply network?

Interviewee 1:

- Close collaboration with downstream and upstream partners.
- 3 critical areas for a demand driven supply network are;
  - People
  - Processes
  - Technology

Interviewee 2:

Communication!

Sharing information throughout the supply chain will ensure customer needs/ demands are met. Information sharing is critical from raw materials up until the good reaches the customer's door. Accuracy of the demand is important too. This enables the company to identify repetitive customers, if purchasing is seasonal or one time, customer buyer behaviors etc. in order to shape the supply chain. Finally the critical piece that joins all these is systems and technology which enables information to be shared speedily. POS is an important tool that the organizations use.

Logistics and systems (IT) are two of the most important and unique areas in the organization. These bring in the competitive advantage for the company.

Interviewee 3:

It is important that as an industry supply chains move up from the level two maturity in the model. But in order for this to take place there should be a return on investment (ROI) for the company. If there is no ROI then there is no point in making a supply chain demand driven. But once you believe it will provide a ROI then technology, processes and people become critical factors. A lot of coordination, synchronization, and collaboration are required to become fully demand driven. This can be challenging to attain. It should also be culturally ingrained that the organization is moving towards a DDSN.

## REFERENCES

- Angeles, R., Nath, R. (2003). Electronic supply chain partnerships: Reconsidering relationship attributes in customer-supplier dyads. *Information Resources Management Journal*, 16(3), 59-84.
- Arntzen, B.C., & Shumway, H.M. (2002). Driven by demand: A case study. *Supply Chain Management Review*, 6(1), 34-41.
- Asgekar, V. (2004). The demand driven supply network. *Supply Chain Management Review*, 8(3), 15-16.
- Barret, J. (2007). Demand-driven is an operational strategy. *Industrial Management*, 49(6), 14-20.
- Bayraktar, E., Koh, S.C., Gunasekaran, A., Sari, K., & Tatoglu, E. (2008). The role of forecasting on bullwhip effect for E-SCM applications. *International Journal of Production Economics*, 113(1), 193-204.
- Bitran, G.R., Gurumurthi, S., & Sam, S.L. (2007). The need for third-party coordination in supply chain governance. *MIT Sloan Management Review*, 48(3), 30-37.
- Burkett, M. (2005). The perfect product launch. *Supply Chain Management Review*, 9(5), 12-13.
- Cecere, L. (2006). A changing technology landscape. *Supply Chain Management Review*, 10(1), 15-16.
- Cecere, L., O'Marah, K., & Preslan, L. (2004). Driven by demand. *Supply Chain Management Review*, 8(8), 15-16.

- Choi, T.Y., & Hartley, J.L. (1996). An exploration of supplier selection practices across the supply chain. *Journal of Operations Management*, 14, 333-343.
- Chopra, S., & Meindl, P. (2007). *Supply Chain Management: Strategy, Planning, & Operations*. Prentice Hall, New Jersey. Pg. 498.
- Clinton, S.R., & Closs, D.J. (1997). Logistics strategy: does it exist? *Journal of Business Logistics*, 18(1), 19-44.
- Cooper, M.C., & Ellram, L.M. (1993). Characteristics of supply chain management and the implications for purchasing and logistics strategy. *International Journal of Logistics Management*, 4 (2), 13-24.
- Dickson, G.W. (1966). An analysis of supplier selection systems and decisions. *Journal of Purchasing*, 2, 5-17.
- Duclos, L.K., Vokurka, R.J., & Lummus, R.R. (2003). A conceptual model of supply chain flexibility. *Industrial Management and Data Systems*, 103(5/6), 446-456.
- Frischia, T. (2005). The \$488-billion opportunity. *Supply Chain Management Review*, 9(1), 15-16.
- Frohlich, M.T., & Westbrook, R. (2001). Arcs of integration: an international study of supply chain strategies. *Journal of Operations Management*, 19(2), 185-200.
- Hadaya, P., & Cassivi, L. (2007). The role of joint collaboration planning actions in a demand-driven supply chain. *Industrial Management & Data Systems*, 107(7), 954-978.
- Hahn, C.K., Kim, K.H., & Kim, J.S. (1986). Costs of competition: implications for purchasing strategy. *Journal of Purchasing and Materials Management*, 2-7.
- Heikkila, J. (2002). From supply to demand chain management: Efficiency and customer satisfaction. *Journal of Operations Management*, 20(6), 747-767.

- Helper, S.R. (1991). How much has really changed between US automakers and their suppliers. *Sloan Management Review*, 15-28.
- Helper, S.R., & Sako, M. (1995). Supplier relations in Japan and the US: are they converging? *Sloan Management Review*, 77-82.
- Hsu, L. (2005). SCM system effects on performance for interaction between suppliers and buyers. *Industrial Management and Data System*, 105(7), 857-875.
- King, S.F., & Burgess, T.F. (2008). Understanding success and failure in customer relationship management. *Industrial Marketing Management*, 37(4), 421-431.
- Landeros, R., & Monczka, R.M. (1989). Cooperative buyer/seller relationships and a firm's competitive posture. *Journal of Purchasing and Material Management*, 9-18.
- Ledyard, M., & Keough, B. (2007). Demand-driven supply chain meets Offshoring. *Supply Chain Management Review*, 11(5), 11-12.
- Lee, H.L. (2004). The triple A supply chain. *Harvard Business Review*, 10, 102-112.
- Lee, H.L., Padmanabhan, V., & Whang, S. (1997b). Information distortion in a supply chain: the bullwhip effect. *Management Science*, 43(4), 546-558.
- Martin, R. (2008). The 2008 supply chain: Demand-driven reality. *Supply Chain Management Review*, 12(1), 10-11.
- Mentzer, J.T., & Moon, M.A. (2004). Understanding demand. *Supply Chain Management Review*, 8(4), 38-45.
- Metter, R. (1997). Quantifying the bullwhip effect in supply chains. *Journal of Operations Management*, 15(2), 89-100.
- Molina, A., Velandia, M. & Galeano, N. (2007). Virtual enterprise brokerage: A structure-driven strategy to achieve build to order supply chains. *International Journal of Production Research*, 45(17), 3853-3880.

- Monczka, R.M., Trent, R.J., & Callahan, T.J. (1983). Supply base strategies to maximize supplier performance. *International Journal of Physical Distribution and Logistics Management*, 23(4), 42-54.
- Narayanan, V.G., & Ananth. R. (2004). Aligning incentives in supply chains. *Harvard Business Review*, 82(11), 94-102.
- Newman, R.G. (1988a). The buyer-supplier relationship under just-in-time. *Production and Inventory Management Journal*, 45-49.
- Newman, R.G. (1988b). The buyer-supplier relationship under just-in-time. *Journal of Purchasing and Materials Management*, 10-17.
- O'Marah, K. (2005). It's all about the customer. *Industrial Management*, 47(2), 8-13.
- O'Marah, K. (2005). The leaders' edge: Driven by demand. *Supply Chain Management*, 9(4), 30-36.
- Olin, T. (2005). The truths about consumer driven supply networks. *Food Engineering*, 77(2), 67-67.
- Rizza, M.N. (2006). Supplier performance management can make a difference. *Supply Chain Management Review*, 10(7), 13-15.
- Schrieber, J. (2005). Demand visibility improves demand forecasts. *The Journal of Business Forecasting*, 24(3), 32-37.
- Shin, H., Collier, D.A., & Wilson, D.D. (2000). Supply management orientation and supplier/buyer performance. *Journal of Operations Management*, 317-333.
- Sowinski, L. (2004). P&G puts the consumer in the supply chain driver's seat. *World Trade*, 17(5), 18-22.

- Storey, J., Emberson, C., & Reade, D. (2005). The barriers to customer responsive supply chain management. *International Journal of Operations & Production*, 25(3/4), 242-261.
- Stuart, F.I. (1993). Supplier partnerships: influencing factors and strategic benefits. *International Journal of Purchasing and Materials Management*, 22-28.
- Trebilcock, B. (2006). Leading manufacturing trends. *Modern Materials Handling*, 41(5), 47-51.
- Trebilcock, B. (2006). The new look of demand-driven DCs. *Modern Materials Handling*, 61(9), 37- 39.
- Treleven, M. (1987). Single sourcing: a management tool for the quality supplier. *Journal of Purchasing and Materials Management*, 19-24.
- Vickery, S.K., Calantone, R. & Droge, C. (1999). Supply chain flexibility: an empirical study. *Journal of Supply Chain Management*, 35(3), 16-24.

## VITA

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