1
Introduction

1.1
Initial Thesis Overview

Companies in today's marketplace face an ever increasing requirement to improve customer service level, usually measured as order or case fill rate, to reduce product Out-of-Stock (OOS) on the shelf, at the same time reduce supply chain costs, defined as the sum of manufacturing, transportation, inventory, and distribution costs, to remain competitive in the marketplace.

However, when it is analyzed what actually happens in practice, it clearly be seen that most of the companies still experience high Out-of-Stock levels of critical products, as reported by several different studies, described below:

- Research done by Kraft foods and AC Nielsen in Brazil market in 2004 with 528 SKUs, 402 stores in São Paulo and 185 stores in Rio de Janeiro reported 8,0% OOS.
- Research done by a Beverage company in 2005 together with one of the biggest retail customer in the Brazil market reported an average OOS of 10,9%
- Research done by Gruen (2007), reported a worldwide OOS level greater than 8%, as illustrated in figure 1 below:

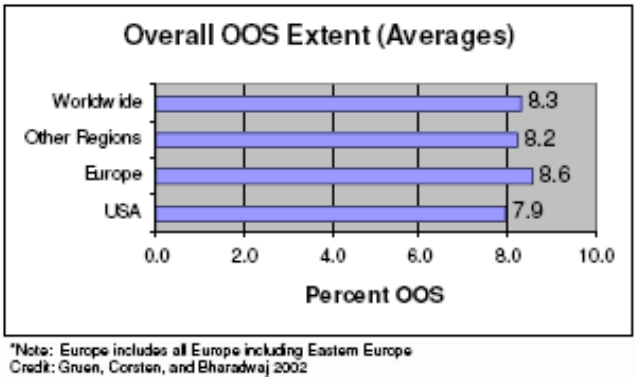

Figure 1 – Percent of OOS by Geographical Region (Gruen, 2007)

- Research done by The University of Colorado, together with Grocery Manufacturers Association (GMA), Food Marketing Institute (FMI) and the National Association of Chain Drug Stores (NACDS), reported several root causes of OOS, being low demand forecast accuracy one of the critical causes.

Several companies have been implementing forecasting tools and processes to improve demand planning performance, but these initiatives have not been enough to eliminate OOS problems, and improve supply chain efficiency, due to a mismatch between supply and demand, low forecast accuracy for medium and low volume products, high demand variability and/or a high number of new product introductions, which usually are much more difficult to predict than regular products. Kahn (2002) reported a study made with 53 products, from 16 firms in the US market that found a mean forecast error of 53% for new product forecasts. More recently, Jain (2007) reported a benchmarking study on new product forecasting, and as expected, the forecast error was 44% for products new to the company and to the world, and only 31% for products resulting from improvement of existing ones.

With low forecast accuracy and/or high demand variability, companies usually have to increase safety stock levels or transship products from one warehouse to another, on an expedite basis, when a warehouse is short of inventory, otherwise they will lose profit margin and become less competitive. However, these operational initiatives despite allowing companies to achieve the required service level, hurt operational efficiency and increase supply chain costs.

To cope with this scenario, many companies are trying to move from a pure Push strategy, produce and distribute based only on forecast, to a Pull system, operate based on actual customer demand, in order to better balance supply availability with customer demand, delivering the expected customer service level while, at the same time, achieving the required supply chain efficiency.

This thesis is a first step to reduce current gap in the academic literature and also among supply chain practitioners, to the best of the research performed, there is no framework available to help companies identify the required steps to move towards a demand driven supply chain.

This thesis aims to provide three main contributions: A detailed and robust description of the concepts and components that makeup a Demand Driven Supply Chain, a structured and integrated framework companies can use to

assess their supply chain in light of Demand Driven Supply Chain concepts, and based on the results, a supply chain strategy process to move towards a customer centric operation. To accomplish these objectives, a detailed review of academic literature was performed to identify the components and characteristics of a demand driven supply chain, as these characteristics are not currently available in one single source.

The thesis is divided in nine chapters, starting in chapter 2 with a review of the current academic literature available on Demand Driven Supply Chain concepts and assessment methodologies, and in chapter 3, it is described the proposed framework to assess supply chains. In chapter 4, it is reviewed and detailed the three key components of a Demand Driven Supply Chain. Based on the review made in chapter 4, it is described the Demand Driven Supply Chain Model in chapter 5, which consists of a 5 level maturity model that describes the characteristics of each supply chain functional process from a basic push operation level (level 1) to an optimized demand driven supply chain level (level 5), and in chapter 6, the proposed Analytic Hierarchy Process (AHP) approach is presented to define weights for each component / category to be used in the assessment process. In chapter 7, the assessment model is applied to three operations of a global beverage company to assess their current state, and also to validate the proposed model. In chapter 8, results are summarized and also main conclusions identified after applying the methodology, as well as suggested future developments, and end the thesis with a reference review in chapter 9.

1.2
Current Market and Business Environment

An article from The Economist Intelligence Unit (2009) reports that, due to economic uncertainty, volatile energy prices and intensifying global competition, large multinational corporations are seeking strategic and operational advantages, more than ever before. Among the key operational components, most demonstrably tied to business success, is the efficiency of global supply chains: the network of people, technology, activities, information and resources involved in supplying products or services to customers.

Velocity-based competition, less consumer loyalty, shortened product lifecycles, increased demand variability, globalization and global sourcing, leaner supply

chains, more mass customization, and competitive pressures have altered the supply chain management requirements in fundamental ways, forcing organizations to rethink how they operate or risk being left behind.

For years, the world's leading companies have been wringing inefficiencies out of their global supply chains, shrinking excess inventories and speeding order fulfillment, thus utilizing cash more efficiently, and better matching supply with customer needs. The principles of lean manufacturing and just-in-time inventory management famously helped Toyota leapfrog General Motors, as the world's largest vehicle manufacturer, and vaulted Wal-Mart to the forefront of global retailers, with US$405 billion in net sales revenue in 2010.

However, in today's fiercely competitive environment, it is not enough simply to streamline global supply chains and eliminate excess costs. Leading companies are applying new technologies and sophisticated analytics to make their supply chains more responsive to customer demand, rather than letting availability of supply drive the chain.

While planning remains a core part of any business, the faster pace of change not only in demand, but also supply and product, multiplies the problems that planning cannot always prevent. The financial impact to a company unable to respond to change can be crippling. Poor response can affect both the top line (e.g. inability to win new business, loss of customers to competitors, etc.), and bottom line (e.g. negative impact on margins, write-offs of excess and obsolete inventories, etc.).

At the end of 2007, and for the third year in a row in 2009, the 25 companies identified by Boston-based AMR Research (AMR Research, 2009) as maintaining the top supply chains among the Fortune 500 enjoyed market-beating stock performance, with an average total return of 17.9% compared with 6.4% for the Dow Jones Industrial Average.

Over the past years, to effectively manage the volatility in demand, companies across a wide range of industries (e.g. automobile, fashion, etc.) have adopted demand-driven supply networks, using the "pull" of actual customer demand, rather than the "push" of available supply, to manage their network of suppliers, materials and components from manufacturing to distribution to improve supply chain efficiency while simultaneously meeting customer service requirements.