Building a More Responsive, Intelligent and Demand-Driven Consumer Goods Supply Chain

Executive Summary

Achieving supply chain management excellence requires organizations to sit at the intersection of supply and demand and deliver exemplary customer service without inadvertently allowing inventory to swell. That’s easier said than done. In the intensively competitive PC industry, Dell, for example, has deployed analytics to zoom into “not normal” peaks and troughs to balance supply with demand.

But Dell is an exception to the rule. Supply chain management practices have a long way to go in helping organizations achieve this long-sought-after demand-driven equilibrium. In fact, it is really only in the last decade or so that the direct link between supply chain management and corporate cash flow generation is well understood or, more accurately, has received a broad level of interest that can enable organizations to more effectively utilize precious capital.

According to Gerry Marsh, a supply chain financial consultant who works with some of the world’s largest companies, businesses that are able to use the supply chain to generate more cash flow than their competitors typically have higher stock price multiples even if earnings per share and growth rates are similar between the companies.1

Yet, leading up to the Great Recession, supply chains across many consumer goods sectors were not exceptionally nimble or flexible. Few companies were able to adjust supply to declining demand, and even those that could were unable to show bottom-line improvements that were directly related to better use of capital.

In addition, there are several external factors that influence the consumer goods supply chain (see Figure 1). These drivers, and their implications, include the following:

- **Economic volatility.** With globalization, emerging economies are growing at a relatively faster pace than established markets. Consumers in these markets are demanding more, causing demand volatility, which requires increased supply chain flexibility.
- **Consumer preference.** Consumer tastes and preferences change at lightning speed and vary from region to region. Supply chains must be optimized to address these ever-changing preferences.
• **Regulatory compliance.** With the advent of government initiatives such as the U.S. Food Safety Modernization Act, it is mandatory for importers to track and trace the entire supply chain for irregularities. This has benefits for customers but adds cost to the supply chain.

• **Sustainability.** Consumers are showing increased sensitivity to their carbon footprints. They want to ensure that the products they consume originate from a supply chain that is environmentally friendly. It has become ever more critical to integrate sustainability objectives with the broader supply chain objectives of the organization. Before the downturn of 2008, for instance, a UK semiconductor maker offered chips that tracked their carbon footprint along the supply chain. The company was able to command a premium for this product line, until recession-induced pricing pressures emerged.

• **Technological advances.** This relates to the exponential growth in basic computing power and the enormous quantities of data available to companies across the value chain. Companies can make use of “big data” to optimize their supply chains and enhance their profitability by intelligently responding to contingencies. By analyzing big data, they can more easily create supply chains that are green, responsive, flexible and intelligent.

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<td><strong>Economic volatility</strong></td>
<td>Worldwide demand has increased for consumer goods products, as has the need for regional customization. An example is Frito Lay, which has applied a successful practice of developing regionally popular snack food flavors in India to North America, where it now offers flavors developed to suit the palate of different areas of the U.S.2</td>
<td>Use flexible supply chains to enable regional customization. Design agile supply chains that can cost-effectively offer regional customizations.</td>
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<td><strong>Changing consumer preferences</strong></td>
<td>Demand patterns are changing from region to region.</td>
<td>Optimize the supply chain by using demand-sensing applications, which apply customer order flows, sales histories and shipping calendars. This enables organizations to more accurately forecast demand and address changing demand patterns.</td>
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<td><strong>Regulatory compliance</strong></td>
<td>Adverse supplier responsibility reports can damage company reputation. The U.S. Food Safety Modernization Act stipulates that importers track and trace everything in the entire supply chain.</td>
<td>Proactively embed regulatory aspects into the supply chain. This can lead to the generation of real-time alerts that identify non-compliance. Use IT to track and trace the entire supply chain. Use existing solutions to track the food supply chain from “farm to fork,” which helps consumer goods companies manage compliance at much reduced costs.</td>
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<td><strong>Sustainability issues</strong></td>
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<td><strong>Technology advances</strong></td>
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<td>Enhance supply chains with “big data” to reduce latency and create more responsive supply chains.</td>
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**Drivers of Change in CE Supply Chains**

Improving Supply Chain Management

The U.S. consumer goods industry has seen rapid growth, despite minor hiccups, since June 2009. This is indicated by the growth of shipment values from $120 billion to $130 billion3 in the intervening period (see Figure 2, next page). New orders increased to $201.5 billion4 in July 2011, which is a 4% increase from June 2011. In fact, in March 2011, the monthly value of shipments had exceeded the pre-crisis peak level. As shipment volumes increase, timely fulfillment requires a more robust and efficient supply chain. In fact, the consumer goods industry is only as good as the various supply chains that support it.
One way consumer goods companies have prospered is by dividing their supply chains into smaller, more manageable pieces. These pieces are tailored to individual components and stock keeping units (SKUs). Size is driven by scale; the smaller the piece, the more optimized the supply chain is likely to be. This drives the need to create an “area of comfort” for each SKU/group. For instance, a multinational CG company was able to reduce its cost of goods sold by 15% by using efficiently segmented supply chains.

To improve supply chain performance, we believe consumer goods companies must effectively respond to five key drivers: economic volatility (growth in emerging markets and price fluctuations of raw materials), changing consumer preferences, regulatory compliance, sustainability issues and technology advances.

**Economic volatility**

Amid ongoing global economic turbulence, geographically distributed demand, volatile exchange rates and wage inflation in emerging economies, supply chains are becoming exponentially more complex. The following are two cases in point:

- **With globalization and growth in emerging markets, the demand for products can come from any part of the world.** This also creates a situation where the tastes and preferences of global customers can vary significantly. Colgate-Palmolive, for example, has operations spread over 57 facilities in 11 different markets worldwide, which increases its operational complexity. Consumer goods companies must respond with supply chains equipped to accommodate vast differences in preference and demand elasticity.

- **Supply chains need to be flexible and agile; one size does not fit all.** The volatility of exchange rates and pricing of raw materials, as well as wage increases across the value chain, are wreaking havoc on supply chains. A CG company with a manufacturing facility in China and retailers and customers in the U.S., for example, could face problems if the U.S. dollar were to decline against the Yuan, China’s currency. If this happened, the price of raw materials would rise, as would the cost of shipping, since fees collected by offshore shippers tend to be denominated in dollars. This would put the supplier in serious jeopardy as a result of a significant reduction in its operating margins. The decline in the U.S. dollar would also increase wages in China in dollar terms, further reducing operating margins.

Organizations need to ensure their supply chains are flexible enough to avoid the aforementioned issues. Building a more flexible supply chain around product segmentation is one proven way to address these challenges.

A U.S.-based CG company, which had shifted all its manufacturing to China, faced this problem. Its China plant was accustomed to producing the company’s entire range of products, as well as the underlying components. Amid an increase in global demand volatility, customer complaints spiked as a result of product delivery delays. Some customers also experienced service issues, and forecasting was a problem, as well.

The company analyzed its portfolio of products to learn more about the volatility of demand for each SKU, as well as the overall volume of each SKU produced every week. This analysis was performed using cluster analysis on proprietary software. The impact on operational performance of the volatility in demand and volume of each SKU was also analyzed, using advanced regression models.

The company divided its products into four categories (see Figure 3, next page). For the high-volume and low-volatility products, it kept production in China. For high-volume/high-volatility...
and low-volume/high-volatility products, production was shifted to the U.S. For low-volume/low-volatility products, it moved production to both the U.S. and Mexico. This reduced the company’s cost of goods sold by 15%. It also improved product quality and service levels.

The above segmentation also increased the company’s supply chain velocity, which is defined as distance over time. If the time is reduced, needless to say, the velocity increases. The end-to-end pipeline time was reduced by the reconfiguration of the production facilities.

**Changing Consumer Preferences**
Consumers have become more demanding, which creates more time-to-market pressure. They seek better levels of service delivery. A quick analysis of the books of CG companies reveals that a few customers are often responsible for the majority of profits. Therefore, all customers cannot be treated equally. Customers need to be segmented depending on their profitability, and as a result, supply chains need to be altered and configured accordingly. Demand profiles can be used to segment supply chains for better results. Customer analytics should provide insights into demographic trends that contribute to targeted advertising and proportion management initiatives.

Procter & Gamble is a leader in tracing consumer preferences back to its supply chain. P&G has created methodologies to aid and abet this analysis, such as a consumer-driven supply network (CDSN), a continuous replenishment process (CRP) and efficient consumer response (ECR). CDSN uses demand-data and exception events data to inform decisions on product manufacturing and replenishments. CRP is a usage-triggered, vendor managed inventory system that frees up cash at both the supplier and retailer ends. ECR involves collecting sales data at the retailer’s end and immediately replenishing stock using automated order generation. The desired outcome of all these initiatives is a focused supply chain effort, starting at the customer. Further, performance consistency and value delivery form the bedrock of the supply chain.

It has been observed that there is an exponential increase in cost savings as a percentage of potential production savings if more ordering is done through CRP (see Figure 4, next page). In CRP, the focus is on the tradeoff between increasing inventory and reducing out-of-stocks. Inventory or out-of-stocks occur when the supply does not respond to demand immediately. It involves mapping of supply chain processes for product and data flow, assessing current capability and addressing improvement opportunities.

CDSNs have also demonstrated their value in improving organizational profitability. P&G reported $1 billion in incremental sales, a nearly 50% reduction in inventory and 20% lower supply chain costs, from the time it implemented CDSN in the mid-1990s to 2010.
Projected Manufacturing Cost Savings using CRP Ordering

Figure 4

Regulatory Compliance
Recent years have witnessed a major spike in the contamination of packaged food and other consumer products. The list is long, starting from melamine-contaminated milk powder, lead-tainted toys and salmonella-containing peanuts. Some of these tainted products resulted in thousands of hospitalizations; a few deaths were also reported.

Therefore, regulations are important to assess the impact on human health by tracing all imported, fully assembled goods and components that factor into the entire U.S. supply chain. These regulations are also beginning to impact how global supply chains are managed and monitored. Such regulations would add further — but necessary — costs to the supply chain. To enable this, regulators would need voluminous information and analysis on compliance activities. With today’s massive computing power, CG companies should be able to crunch data and present it to regulators in near real time. This data analysis, with the ranges specified, should be used to generate alerts whenever certain compliance parameters are crossed, meaning that a regulatory mandate has been breached.

Consumer goods companies are also required to publish a supplier responsibility report on their Web sites, consisting of labor and human rights violations, if any, employee health and safety, environmental impacts and ethical business practices, collected across the entire supplier base. One such report published recently by Apple disclosed that one of the company’s suppliers in China was using a chemical that was harmful to employees on the production line.10

Such findings can mar the reputation of any company. To prevent harm to employees and company reputations, companies can use data centers across the entire supply chain more effectively, to generate an alert when violations occur, analyze the situation and decide on an appropriate action.

Feihe International, a leading producer and distributor of premium infant formula, milk powder, soya bean, rice and walnut products in China, deployed an integrated food safety solution, with the objective of increasing customer confidence and improving quality. This solution enabled the company to trace foods, feeds, ingredients and food-producing animals through all stages of production, processing and distribution. It also enhances traceability across all stakeholders to significantly improve quality, safety tracking, compliance monitoring and issue resolution. Such solutions are becoming increasingly important, as consumers become more demanding and regulations, more strict.

Sustainability Issues
Consumers have become increasingly conscious of their carbon footprint and increasingly want insight into the entire production process before they consume a product. Is the process green? What is the environmental cost of product manufacturing? Are there any negative externalities in the entire process? Many CG companies hear about these issues directly from consumers and from social media. The answer to these questions is the use of green supply chains.

Companies that follow green supply chain practices proactively manage supplier environmental performance. Adoption of environmentally efficient manufacturing methods, such as those used by 3M, Procter & Gamble and Xerox, can help reduce the carbon footprint. This involves using improved technology like carbon dioxide filters to reduce environmental impacts, more tightly managing product lifecycles and taking back expired products.

The CG industry is increasing its efforts to reduce the weight and increase the recyclability of products. The recycling rate of CG product containers and packaging in the U.S. is 40%,
compared with the national recycling average of 34%. This not only reflects strong community support for green manufacturing initiatives, but it also influences the existing regulatory regime, wherein new regulations are framed to increase recycling rates.

Exploration of bio-technology-based products is another step in greening the supply chain, as is disposal of products when they have approached their “end of life.” Xerox has almost perfected this art,12 with an initiative that encourages customers to return products to Xerox for recycling, which the company then uses when remanufacturing machines, using strict specifications of quality and performance.13

European legislation also plays an important role in sustainability issues. The EU regulation on product quality and safety assurance requires organizations to identify, measure and control potential dangers related to food safety. Critical values must be defined that serve as a benchmark against which actual outcomes are measured. Systems such as integrated food safety solutions can cost-effectively deliver all the product quality and safety information required for decision-making.

Technological Advances
For years, consumer goods companies have used enterprise resource planning (ERP) systems, advanced planning solutions (APS) and supply chain execution (SCE) software, along with business intelligence tools. Although such systems result in more responsive supply chains, there is a huge amount of latency involved, between data collection and operational action.

Data collection process optimization and transparency across the supply chain is the future. With the advances in computing power and ubiquity of data, there is a case for big-data supply chains14 to reinvent the game. Such supply chains would not only be more responsive, but they would also operate more intelligently. The convergence of technologies such as mobile, geolocation and digital is a big driver for big-data supply chains. E-commerce players are using new techniques of capturing and combining structured data from smartphones and other digital devices, as well as unstructured data from social networking sites such as Facebook, to enhance the capabilities of big-data supply chains. This data would help identify consumer sentiment toward particular brands, as well as strong advocates for the company’s goods and services, who can be positioned as product ambassadors. Companies can engage such ambassadors to help convey positive brand messaging far and wide via social media, thus reaching a wider pool of consumers.

In this way, supply chains would become demand-driven. To get there, processes need to be designed from the outside-in, taking demand-side factors into consideration. Much of the data residing across the supply chain is hidden in isolated systems. The IT department has little awareness, for instance, about sales and marketing data. If this data can be integrated across all business functions, then new market opportunities can be identified, new product launches can be improved, and product recalls can be avoided. It is necessary to gain top management support to make this happen.

With technological advances, sophisticated models of data analysis become available for use by companies. Multi-tiered causal analysis (MTCA) is one such model. MTCA integrates point-of-sale data and syndicated scanner panel data into the forecasting process to determine the effects of consumer demand on factory shipments. Another causal model can be applied to predict POS data, using variables such as retail price, in-store merchandising vehicles, sales promotions and competitive retail activities.

For most manufacturers, up to one-third of procured parts will be “new” each year, with only small variations from earlier versions.15 A predictive model can identify these variations and use them to determine what the net price change should be, sparing manufacturers unnecessary expense.

Importance of Supply Chain Risk Management
Responding to these five drivers does not guarantee growth and survival. There is another set of events that can interrupt the most efficient of supply chains: natural disasters. The frequency of weather-related natural disasters has increased tremendously over the last 30 years, from fewer than 400 annual events in 1980 to more than 1,000 in 2008.16 Tsunamis, earthquakes
and hurricanes can damage supply chains, making global supply chain crisis management a key item on the CG agenda.

CG companies typically dispatch crisis teams to monitor supply sources, find substitutes for scarce inputs and assess potential risk factors. After a crisis strikes, these teams are tasked with finding patterns in price volatility and demand fluctuations. But such contingencies are often not enough to avert disaster.

Toyota was significantly impacted by the March 2011 Japanese earthquake and tsunami. As a result, the auto maker is taking steps to implement better supply chain risk management practices. As Shinichi Sasaki, Toyota Executive Vice President commented, “We are making checks now to see what needs to be done to enable recovery within two weeks when the next one – expected in the central Tokai region – hits.” The company is also working on a three-step program for risk mitigation, which includes standardizing auto parts across Japanese manufacturers; asking suppliers further down the supply chain to hold a few month’s worth of inventory for specialized components; and mandating that each production process operates independently in terms of parts procurement.

To mitigate the risk of natural disasters, supply must be diversified. And if particular suppliers are critical, then companies should consider acquiring component suppliers.

A poignant example of supply chain risk management emerges from a fire in 2000 that destroyed a New Mexico electronics component plant that supplies parts to both Nokia and Eriksson. Since Nokia had a risk management plan in place, it was able to secure parts from another supplier. On the other hand, Eriksson faced overwhelming supply shortages that led to estimated losses of $390 million that year.

Greater real-time supply chain visibility can offer data from both the supply side and the demand side (point of sale, etc.) If supply and demand chain information is shared just-in-time, then a back-up plan can be put into effect in the event of a natural disaster. This plan could include switching over to another supplier that may be waiting in the wings, or it may mean keeping inventory of repair components on-hand to quickly deal with a shortage caused by natural disaster.

Demand analysis can play a key role here. Demand signal data should include inputs from disaster prediction models to ensure the plan is comprehensive. The challenge arises from the ways and means of accessing and integrating huge volumes of data. With scalable data warehouses and integration techniques that compress latency to near-zero wait times, these challenges can be overcome. Deeper supplier relationships can also minimize losses from business disruptions caused by natural disasters.

Footnotes


“Supply Chain Lessons from Procter & Gamble,” Supply Chain Digest.

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