Order Promising/Fulfillment and Customer/Channel Collaboration in Supply Chain Management

by

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B.Eng., Power Machinery (1993), Shanghai Jiao-Tong University
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Submitted to the Engineering Systems Division in Partial Fulfillment of the Requirements for the Degree of

Master of Engineering in Logistics

at the

Massachusetts Institute of Technology

May 2006

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Order Promising/Fulfillment and Customer/Channel Collaboration in Supply Chain Management
Analysis of Best Practices across Industries

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Yimin An and Samuel Srethapakdi

Submitted to the Engineering Systems Division
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Abstract

This research investigates the order promising and fulfillment and customer and channel collaboration functions of a company. In addition to presenting more precise definitions, we identify and analyze current and emerging innovative practices in these two functions implemented by leading companies across nine industries, namely aerospace, apparel, automobile, computer, consumer packaged goods, petroleum, pharmaceutical, retail, and telecommunication. Based on our analysis, we propose a framework for categorizing order promising/fulfillment and customer/channel collaboration business models and strategies as well as future trends. Significance of integration of these two functions is also analyzed. Finally, we present guidelines for companies to optimize their operations vis-à-vis Customer and Demand management and prepare themselves for business success as far as into the year 2020.

Thesis Supervisor: Dr. Mahender Singh
Title: Research Associate, MIT Center for Transportation and Logistics
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Biographical Note

Yimin An joined the MLOG program with over a decade of professional experience in project management, business development, and general management through working at China National Machinery Group Corporation and several European companies. Over that period, Yimin acquired ample international exposure through working in China, Germany, South Africa, and Britain. Originally from China, he completed his undergraduate studies in Power Machinery Engineering at the Shanghai Jiao-Tong University, where he received a B.Eng. in 1993 and was awarded the Outstanding Student distinction by the Shanghai municipality.

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1 Introduction

1.1 Motivation

In the past decade, supply chain management has become an area with huge potentials for companies to improve their operations in order to survive and prosper in a fiercely competitive domestic and global business environment. To this end, Supply Chain 2020 (SC2020) is a multi-year research effort to identify and analyze the critical success factors of supply chain management in the future.

The SC2020 project is divided into three phases, with Phase I having been completed in 2005. In Phase II, research is being conducted by dividing the entire supply chain into five operational areas that will be analyzed separately. These areas are: New Product Development and Launch, Sourcing and Procurement, Supply-Demand Planning, Customer and Demand Management, and Service Parts Management.

Of these five areas, Customer and Demand Management is probably the most important as it involves interacting with end customers who inject cash into the supply chain and meeting their demand. The domain of Customer and Demand Management is evolving rapidly and offers many opportunities for much needed performance improvement.
1.2 Research Scope

1.2.1 Functional Areas

In this research we focus on two functions on the customer and demand management side of the supply chain, namely order promising and fulfillment and customer and channel collaboration. Fig. 1.1 provides a description of these two functions in relation to the whole supply chain. While we will focus primarily on customer side processes, i.e. the distribution network, where appropriate we will discuss inside process practices to the extent that they impact order promising and fulfillment (e.g. production, warehouse, and transportation management) and customer and channel collaboration.

<table>
<thead>
<tr>
<th>Process Areas</th>
</tr>
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<tbody>
<tr>
<td><strong>Supply Side</strong></td>
</tr>
<tr>
<td><strong>Strategic</strong></td>
</tr>
<tr>
<td>Source/make decision</td>
</tr>
<tr>
<td>Supplier selection and network design</td>
</tr>
<tr>
<td><strong>Tactical</strong></td>
</tr>
<tr>
<td>Supplier segmentation</td>
</tr>
<tr>
<td><strong>Operational</strong></td>
</tr>
<tr>
<td>Supplier management</td>
</tr>
<tr>
<td>Collaborative new product development</td>
</tr>
<tr>
<td><strong>Transactional</strong></td>
</tr>
<tr>
<td>Purchasing/procurement</td>
</tr>
<tr>
<td><strong>Inside</strong></td>
</tr>
<tr>
<td><strong>Strategic</strong></td>
</tr>
<tr>
<td>Product portfolio management</td>
</tr>
<tr>
<td>Facility and capacity planning</td>
</tr>
<tr>
<td><strong>Tactical</strong></td>
</tr>
<tr>
<td>Inventory segmentation</td>
</tr>
<tr>
<td><strong>Operational</strong></td>
</tr>
<tr>
<td>Inventory management</td>
</tr>
<tr>
<td>Production management</td>
</tr>
<tr>
<td>Transportation management</td>
</tr>
<tr>
<td>Warehouse management</td>
</tr>
<tr>
<td><strong>Customer Side</strong></td>
</tr>
<tr>
<td><strong>Strategic</strong></td>
</tr>
<tr>
<td>Distribution channels</td>
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<tr>
<td><strong>Tactical</strong></td>
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<tr>
<td>Customer segmentation</td>
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<tr>
<td><strong>Operational</strong></td>
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<tr>
<td>Customer management</td>
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<tr>
<td>Demand planning and forecasting</td>
</tr>
<tr>
<td><strong>Transactional</strong></td>
</tr>
<tr>
<td>Returns management</td>
</tr>
<tr>
<td><strong>Order quoting and promising</strong></td>
</tr>
<tr>
<td><strong>Order fulfillment</strong></td>
</tr>
</tbody>
</table>

Source: SC2020 website

Figure 1.1: Decision-Process View of Supply Chain

1.2.2 Industries and Representative Companies

To gain a cross-industry perspective on order promising and fulfillment and customer and channel collaboration, we will examine nine industries, namely: the aerospace, apparel, automobile, computer, consumer packaged goods, petroleum, pharmaceuticals, retail, and telecommunication industry. We will analyze firms identified as industry leaders in Phase I of the SC2020 project in some detail to evaluate each industry.

1.3 Methodology

As there are some inconsistencies in the commonly used definitions of order promising & fulfillment and customer & channel collaboration, we will first propose our definition of these terms for clarity. We will next compare and contrast the representative companies using a qualitative model in order to identify common practices among industry leaders. We will then attempt to generalize these practices using a framework to provide guidelines for order promising & fulfillment and customer & channel collaboration functions that can be applied across industries. Finally, we will comment on some trends in order promising/fulfillment and customer/channel collaboration, as well as determining quantitative and qualitative metrics for evaluating and substantiating the impact of these practices on overall business success.
1.4 Sources of Information

1.4.1 Literature

Our source is primarily the Phase I theses. Supplemental literature includes various other research papers as well as business publications such as books and journals articles. We also researched company websites and online databases.

1.4.2 Interviews with Industry Practitioners

We conducted several interviews with practitioners from leading firms involved in supply chain software development and consulting. A brief profile of the companies is as follows:

- **Accenture** is a global management consulting, technology services and outsourcing company. With deep industry and business process expertise, broad global resources, and a proven track record, Accenture is committed to delivering innovation. Its clients include both businesses and governments. The company has more than 100,000 employees and over 110 offices in 48 countries\(^1\).

- **CSC** is a technology services company whose single mission is to put information technology to work in practical, bottom-line ways. CSC has built and continues to operate some of the largest, most complex systems in use today. It has hundreds of commercial and government clients worldwide. CSC has approximately 80,000 employees in 80 countries worldwide\(^2\).

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\(^1\) [www.accenture.com](http://www.accenture.com): Accessed April 2006

• **Deloitte** is an organization of member firms around the world devoted to excellence in providing professional services in audit, tax, consulting, and financial advisory. Deloitte is focused on client service through a global strategy executed locally. Its clients include over half of the world’s largest companies, as well as fast-growth companies and public institutions. It has 120,000 employees in nearly 150 countries\(^1\).

• **i2** is a leading supply chain optimization software company. i2’s core competencies surround the end-to-end supply chain including products in Supplier Relationship Management, Supply Chain Management, Demand Chain Management, Service Parts Management and Transportation. The company has grown to more than 900 customers and 500 deployments in the last year alone\(^2\).

• **SAP** is the world’s largest inter-enterprise software company and the third-largest software supplier overall. SAP has a rich history in innovation and growth that has made it the recognized leader in providing collaborative business solutions for all types of industries in every major market. The company has over 32,000 employees in more than 50 countries\(^3\).

The individuals we interviewed were identified as experts on order promising/fulfillment and customer collaboration.

---

What is Order Promising & Fulfillment

2.1 Defining Order Promising & Fulfillment

Compared to customer and channel collaboration, order promising and fulfillment appears to be a more traditional supply chain function. As such, there is a broad consensus in the understanding of what the function comprises. We present some of the commonly held views on order promising and fulfillment from literature and practitioners in the following sections.

2.1.1 Literature Review

According to the Council of Supply Chain Management Professionals (CSCMP), order promising is “the process of making a delivery commitment, i.e., answering the question when can you ship.” Meanwhile, fulfillment is defined by the CSCMP as “the act of fulfilling a customer order. Fulfillment includes order management, picking, packaging, and shipping.” Customer order management in turn includes “order promising, order entry, order pick, pack and ship, billing, and reconciliation of the customer account.” Thus, order promising appears to be an activity within the order fulfillment process\(^1\).

\(^1\) www.cscmp.com: Accessed November 2005
According to i2, order fulfillment involves a multitude of steps from “order capture to invoice and settlement.” Specifically, it includes: order capture (from web, call center, stores, and other sources); configurations for build-to-order (BTO) and engineer-to-order (ETO) processes; order promising based on available-to-promise or capable-to-promise; order status mapping; credit modeling; returns management; shipment and invoicing. i2 further defines order promising as “the process of taking a customer request and providing an accurate delivery date for that request.” This may also involve providing “alternatives and tradeoffs for the customer to consider. These tradeoffs may include time, product option content, and price. The promise date is derived by checking availability of inventory (for make-to-stock items), the sequence and master schedule (for configure-to-order items), or the production plan (for build-to-order items), within the organization’s allocation policies. These various order promising strategies can be provided within the same product.” Here again, order promising appears to be a part of fulfillment.

According to Accenture, fulfillment can be described simply as the “completion of a sales order” or more extensively as “a process that supplies a product directly from a manufacturing facility to a distributor or end user. The fulfillment cycle may include receiving customer orders, configuring the products to order, shipping and invoicing.”

The objective of order promising and fulfillment, according to Oracle, is to “improve customer service by providing accurate, real-time delivery commitments while containing costs,” as well as considering “capacity constraints and product reservations.” This involves “reducing

1 www.i2.com: Accessed November 2005
inventories through improved visibility into the entire supply chain” and “improving margins with strategic order fulfillment - finding the most profitable way to fulfill an order.” Thus, orders are promised based on material availability, manufacturing capacity, transportation capacity, and supplier capacity, and fulfillment considers the most profitable selection of facilities, resources, to meet the expected demand and maximize fulfillment.

2.1.2 Interviews with Practitioners

Accenture views order promising and fulfillment as part of the same function. Accenture uses the concept of “order to cash cycle for outbound goods as defining the scope of fulfillment.” Hence, it includes “order capture, order management, credit validation, inventory allocation, physical picking, packing and shipping, freight management, payment collection and returns processing (if needed).” Capacity or stock planning is based on forecasted demand whereas fulfillment is based on actual demand. The decision of whether to commit to an order or not (e.g. validate credit) is part of fulfillment, as is the decision of which order to give preference to (e.g. likelihood of customer to return the product). Pricing strategy (dynamic pricing) is generally not seen as part of fulfillment. Which warehouse the product comes from, how the product comes together, and whether to use expedited delivery are all fulfillment decisions. Ideally, fulfillment attempts to deliver products against committed delivery dates at the lowest cost.

SAP also does not separate between order promising and fulfillment. Promising generally refers to available-to-promise (ATP) while fulfillment refers to the transportation elements. An

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1 Interview with Accenture: Conducted in March 2006
2 Interview with SAP: Conducted in March, 2006
example of the ATP procedure is: first look for the required product in this location, then look for substitute products in this location, and then for the required product in another location. Credit checks are typically considered part of promising/fulfillment.

i2's definition of promising and fulfillment is broader and often makes a distinction between the two terms\(^1\). Order fulfillment is a “closed loop business process” and “may encompass order promising along with a well orchestrated workflow for forecast adjustments, supply and demand collaboration, supply planning and positioning, and order planning/execution processes. Order tracking is a portal into the process of order fulfillment which manages the complete lifecycle of the order from capture to delivery.” Order promising attempts to “match customer demand with supply effectively” in order to achieve “exceptional customer service, excellent delivery confidence, complete supply utilization, lower operating costs, and increased order capture.” Order promising is also the “juncture between operations management (i.e. the manufacturing plan) and the logistics” in that information is needed from both sources to quote a delivery date. Once the promise is made, the “back-end” function of getting the product to the customer is fulfillment. Paralleling order promising, fulfillment also has two parts: creating the product (output from the factory including netting of demand forecast and supply planning), and transporting the product (logistics).

### 2.1.3 Defining Order Promising and fulfillment

For the purpose of this research, we will define order promising and fulfillment separately as follows:

\(^1\) Interview with i2: Conducted in March 2006
Order Promising is defined as determining if and when an order can be delivered by comparing current and expected product availability and production capacity to other order commitments.

Order Fulfillment is defined as the activities, including order promising, involved in getting ordered products to the customer based on the customer’s delivery requirements.

We present our basic understanding of the order promising & fulfillment process in Figure 2.1

![Figure 2.1: Basic Order Fulfillment Process](image1)

Product returns and backlogs are outside the scope of this research. Payment-related issues such as credit checks, pricing, discounts, and invoice settlements are also not included. Our research will only consider order management and product distribution aspects as indicated in Fig. 2.2.

![Figure 2.2: Order/Product Flow through Supply Chain Functions](image2)

Source: Y. Narahari, Workshop on Foundations of Global Supply Chain Management, 2003
2.2 Overview of Order Promising & Fulfillment

During the 1970s, order promising was limited to just lead-time quoting. With little or no software-based forecasting, this was the best that could be done, and was expectedly very inaccurate. Two major developments were responsible for driving changes in the domain of order promising. First, demand growth outpaced manufacturers’ abilities to supply products and stimulated the need for effective deployment of resources, which in turn called for more accurate forecasting. Second, improvements in computer-aided forecasting during the 80s and 90s gave companies the tools to better match manufacturing capabilities to orders. These tools included order promising software like Available-to-Promise (ATP) and later Capable-to-Promise (CTP).

The basic function of ATP is to allocate inventory and plan production of finished goods to customer orders. CTP expands on the capabilities of ATP and checks whether an order can be filled using existing inventory as well as planned and available production capacity. Currently, these are the two general methods of order promising in use. ATP and CTP capabilities have become more sophisticated and can be extended to:

- Select location or manufacturing facility from which to satisfy an order;
- Search for substitutes if requested items or materials are not available;
- Examine total lead time, including the time required for raw-material acquisition, setup, production, packaging, and transportation;
- Provide information on order options such as transport modes, split orders, expediting;
- Specify order allocation allowances and rules for prioritizing customers.
Since order promising is part of fulfillment, changes to promising will naturally trigger changes in fulfillment. With the arrival of the Internet, actual sales became more dependent on “demand pulls” rather than traditional “supply push.” Because customer demand is replacing supply as the primary value driver, firms are becoming increasingly customer-oriented. Since customers judge a firm based on the entire experience, from initial contact through purchase and delivery, fulfillment has become more critical to enhance customer satisfaction and loyalty. Firms are rapidly realizing the importance of upgrading fulfillment capabilities, and are adding capabilities such as order promising based on real time availability, configuration, and order tracking. Thus, order fulfillment has moved from essentially a supporting role within the logistics function to a means of generating revenue.
3 Analyzing Order Promising & Fulfillment Practices

3.1 Framework Development

According to David Taylor, “demand pattern is formed by the intersection of customer requirements and product constraints” (Taylor, 2004). Because order promising and fulfillment are driven by demand, we will combine customer and product characteristics to develop a framework for comparing different business models.

3.1.1 Identifying Customer Characteristics

Michael Treacy and Fred Wiersema propose that there are essentially 3 distinct types of business models, namely: operational excellence, innovative, and customer intimacy (Treacy, 1997). They further suggest that companies must select only one of these models in order to be successful. This implies that companies should only serve customers who fit the value proposition of their chosen business model.

Accordingly, the customers targeted by each business model can also be categorized into three mutually exclusive types, namely: price- or cost-conscious customers, product- or trend/technology-driven customers, and service-minded customers. We map the business model with the type of customer in Table 3.1.
3.1.2 Identifying Product Characteristics

We identified product characteristics that appear relevant to order promising and fulfillment (for that matter any operation) based on our interviews with industry experts. Various characteristics such as volume, value density, product lifecycle, degree of customization, production method (make-to-stock, build-to-order), distance to end customer, and seasonality were mentioned as key during the interviews. David Taylor also points to volume, customization, and uncertainty in demand as important product characteristics in shaping demand patterns. A recent study (Pil and Holweg, 2004) analyzed the relationship between product variety and order fulfillment strategies in the automotive industry.

Given the scope of the research, we selected four characteristics that played an important role in facilitating order fulfillment: volume, lifecycle, customization, and product features. Indeed, more characteristics can be added for a deeper analysis, although increasing the number of product characteristics will create greater complexity in interpreting the analysis. Also, as more characteristics are added, the effects of individual characteristics may be lost. We briefly describe the four characteristics below.

<table>
<thead>
<tr>
<th>Business Model</th>
<th>Customer Value Proposition</th>
<th>Type of Customer</th>
<th>Customer Wants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational Excellence</td>
<td>Low or lowest price and hassle-free service</td>
<td>Price-conscious</td>
<td>Value for money, not necessarily cheapest</td>
</tr>
<tr>
<td>Innovative</td>
<td>Offer products that push performance boundaries</td>
<td>Trend/Technology-driven</td>
<td>Latest fashion or hot products</td>
</tr>
<tr>
<td>Customer Intimacy</td>
<td>Delivering exactly what specific customers want</td>
<td>Service-minded</td>
<td>Extras e.g. free loaner car, expensive coffee while waiting</td>
</tr>
</tbody>
</table>

Table 3.1: Mapping Business Model – Customer Characteristics
- Volume: High, Medium, or Low; Commodities are usually mass produced.

- Lifecycle: Long, Medium, or Short; Fashion or seasonal products have shorter life cycles compared to commodities since newer versions are often quickly introduced. They also tend to have higher demand variability. Thus, product life cycle can also be used as a proxy for demand variability.

- Customization: More or Less; Products that are built-to-order, assembled-to-order, or engineered-to-order are typically more customized than standardized made-to-stock (also called made-to-forecast) products.

- Product Features: Many or Few; Customized products by nature have numerous variations. Standardized products can have many or few variants. For example, cars can come with many features engine size, colours, doors, and interiors. On the other hand, a brand of shampoo will have fewer variations. We distinguish between product features/variations (many versions of the same product) and product variety (many products). For example, the number of models a car manufacturer sells is its product variety.

Table 3.2 outlines the approach used to categorize the product characteristics. The categorization is necessarily qualitative and somewhat subjective. However, it is only intended as a relative comparison between products and not based on an exact quantitative assessment.

<table>
<thead>
<tr>
<th>Product Characteristics</th>
<th>Categories</th>
<th>Criteria for categorization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume</td>
<td>Low / Medium / High</td>
<td>Low&lt;br&gt;Commodity&lt;br&gt;Medium&lt;br&gt;High</td>
</tr>
<tr>
<td>Lifecycle</td>
<td>Short / Medium / Long</td>
<td>Short&lt;br&gt;Seasonal, Fashion&lt;br&gt;Medium&lt;br&gt;Long</td>
</tr>
<tr>
<td>Customization</td>
<td>Less / More</td>
<td>Less&lt;br&gt;Make-to-stock&lt;br&gt;More&lt;br&gt;Build/Assemble-to-order</td>
</tr>
<tr>
<td>Product Features</td>
<td>Few / Many</td>
<td></td>
</tr>
</tbody>
</table>

Table 3.2: Categorizing Product Characteristics
3.2 Application of Framework

As most of the representative companies have many product lines and also several products within each line, we have specified the product of each company that we will analyze using our framework in Table 3.3 in order to isolate the effects of product characteristics. For example, we will analyze Dell’s retail PCs/notebooks and not its corporate business.

<table>
<thead>
<tr>
<th>Industry</th>
<th>Company</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerospace</td>
<td>Rolls-Royce</td>
<td>Commercial aircrafts</td>
</tr>
<tr>
<td>Apparel</td>
<td>Boeing</td>
<td>Aircraft engines</td>
</tr>
<tr>
<td>Automotive</td>
<td>Zara</td>
<td>Clothing</td>
</tr>
<tr>
<td>Computer</td>
<td>The Limited</td>
<td>Victoria's Secret-basics</td>
</tr>
<tr>
<td>Consumer Packaged</td>
<td>Toyota</td>
<td>Cars</td>
</tr>
<tr>
<td></td>
<td>IBM</td>
<td>Networks (servers)</td>
</tr>
<tr>
<td></td>
<td>Dell</td>
<td>PCs &amp; Notebooks</td>
</tr>
<tr>
<td></td>
<td>P&amp;G</td>
<td>Basic CPG</td>
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<tr>
<td></td>
<td>Gillette</td>
<td>Razors</td>
</tr>
<tr>
<td>Petroleum</td>
<td>InBev</td>
<td>Beer</td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td>Shell</td>
<td>Petroleum</td>
</tr>
<tr>
<td>Retail</td>
<td>Eli Lily</td>
<td>Branded (non-generic) drugs</td>
</tr>
<tr>
<td></td>
<td>Amazon</td>
<td>Books, CDs</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>Lucent</td>
<td>Networks (routers, switches)</td>
</tr>
<tr>
<td></td>
<td>Cisco</td>
<td>Networks (routers, switches)</td>
</tr>
</tbody>
</table>

Table 3.3: Representative Products for Analysis

Note that each product will be evaluated on all four characteristics, whereas each customer will be of only one type. Consequently, our framework will effectively have five dimensions – four product characteristics and one customer type. We categorized the representative companies’ products using our framework as shown in Fig.3.1 and categorized the results of our analysis into six product-customer groups in Table 3.4.
Figure 3.1: Product-Customer Categorization Framework

Table 3.4: Product-Customer Classification Groups
3.3 Criticality Analysis

In this section we introduce the concept of Criticality Score as a means of interpreting the classifications identified in the previous section. Based on interviews with industry experts, we evaluate the fulfillment-criticality for each product characteristic using a scoring system:

- Volume: Generally, fulfillment is more critical for high volume products since more items are being moved, requiring more coordination and transportation expenses.
  (Criticality Score: High – 3, Medium – 2, Low – 1)

- Lifecycle: Criticality is higher for products with short lifecycles since the selling window fades quickly and product’s price tends to drop sharply as it gets nearer towards “going-out-of-style” or becoming obsolete.
  (Criticality Score: Short – 3, Medium – 2, Long – 1)

- Customization / Features: Fulfillment is more critical when providing customers with a wide variety of features from stock, less so for customized products where the customer is willing to wait for a “tailored” product.
  (Criticality Score: Standardized, more features – 3, Standardized – 2, Customized – 1)

The Criticality Score for each product-customer group is shown in Table 3.5.

<table>
<thead>
<tr>
<th>Criticality Score</th>
<th>Commodities</th>
<th>Affordable</th>
<th>Fashionable</th>
<th>Value For</th>
<th>Total</th>
<th>Custom</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Durables</td>
<td>Consumables</td>
<td>Money</td>
<td>Solutions</td>
<td>Made</td>
</tr>
<tr>
<td>Volume</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Life Cycle</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Customization / Features</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Aggregate</td>
<td>6</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 3.5: Criticality Score by Product-Customer Groups
For this research, we place equal weight on each individual score as we have no empirical information on the level of correlation between each product characteristic and fulfillment-criticality. Further research is needed to identify individual correlation and obtain a more precise weighting of the individual scores. Also, further quantitative research can identify other product characteristics with strong correlation to fulfillment-criticality that should be included in our analysis framework.
4 Guidelines for Order Promising & Fulfillment

4.1 Operating Guidelines

We identified several examples of leading practices in order promising and fulfillment during our research. We present a cross-sectional analysis of these practices with respect to each product-customer group classified in Chapter 3 to identify commonalities which may be adopted as operating models for that group. While we will focus primarily on customer-facing processes, i.e. the distribution network, where appropriate we will discuss practices in manufacturing to the extent that they impact order promising and fulfillment.

4.1.1 Value for Money

Dell is the “poster child” for what AMR Research terms the Demand-Driven Supply Network (DDSN), placing first on AMR’s ranking of Top 25 Supply Chains two years in a row (2004, and 2005). Both Dell and Amazon have succeeded in getting closer to the end consumers by using a direct-to-customer model that bypasses the traditional retail channels via the Internet (often termed e-tailer). This model works for this group mainly because customers are cost conscious. Thus, customers do not value a physical location such as a retail store to test out the product. Customers know what to expect from the product, and are satisfied as long as they are getting “a good deal.” Effectively, customers are willing to “buy it and try it.”
However, as distance to the end consumer shortens, the service component of fulfillment
becomes more critical. Dell and Amazon have some common practices that help contain
distribution costs while providing satisfactory service. Both maintain a fair number of
distribution centres (DCs) to provide some level of safety and speed. Dell has five US fulfillment
centres while Amazon maintains eight. In order to keep inventories down, both rely on upstream
supplier inventories to provide necessary cover. Amazon has two additional mechanisms to
support its DCS, namely drop-shippers (suppliers who ship directly to the customer) and a
network of 3rd-party sellers / partners. Dell also relies on some direct-to-customer shipment from
suppliers, such as monitors. These shipments are coordinated to arrive at the customer at the
same time as the rest of the shipments direct from Dell.

To further minimize cost, both Dell and Amazon cross-optimize order promising and fulfillment
by practicing service window management. At the time of purchase, customers are given pre-
defined delivery options. For instance, customers who want next day service will be charged
extra delivery fees, effectively transferring the added cost of expediting to the customer.
Customers willing to wait are given a more flexible 3-5 day window, which allows consolidation
of the orders into more FTLs for economies of scale. In return for accepting longer and less
precise delivery dates, customers pay less or receive free delivery. Dell and Amazon are able to
use financial incentives to manage service because their customers are cost-conscious. Dell also
provides the option for customer pickup at Kinkos or Fedex locations instead of home delivery if
customers wish to further reduce their shipping charges. Thus, Dell leverages Kinkos / Fedex
stores to replace storage outlets. Amazon operates an undisclosed number of transportation hubs
called injection points, which are effectively cross-docking facilities where FTLs from the DCs
are split into smaller loads for further shipment. The injection points replace the need for regional warehouses.

Modularization is another practice that allows Dell and Amazon to leverage their business model. Because PCs and CDs are commoditized and have short life cycles, reducing fulfillment lead time is particularly important for two reasons. First, customers want the product soon; otherwise they can find it elsewhere. Second, the products will become obsolete quickly, making it necessary to get them to the customer as fast as possible. By customizing the product from modular sub-assemblies, Dell is able to reduce lead time dramatically while mitigating the impact of obsolescence via Risk Pooling. Although Amazon is not thought of as customizing products, they do “customize” each order. That is, Amazon is not actually making any products, but rather putting together many products, i.e. parts, into an order, similarly to Dell. Amazon also pre-assembles their parts by pre-picking items into a “forward” storage location based on item activity and order profiles. Thus, the sub-assembly of component products allows Amazon to assemble the complete order more quickly.

Because Dell and Amazon are demand-driven, products are shipped in small parcels in response to individual orders rather than in bulk replenishment. Thus, they do not have the schedule certainty to benefit from a private fleet. Instead, they rely on carriers like UPS and Fedex. By letting the customer define the level of service they want and then paying for that service accordingly, these companies know exactly how much service to offer each customer.
4.1.2 Fashionable Consumables / Affordable Durables

There is considerable overlap between these two groups because companies in these groups typically sell both types of products. For example, Victoria’s Secret (VS) sells both fashion and basic products, while Toyota is also entering the market for trendy/technology customers with products like the Hybrid. Zara, although usually thought of as a fashion brand, also makes basic items. Leaders in this group are also trying to get closer to the end customer, but the direct model may not be appropriate. Customers typically want to test-drive a car or try on clothes before they buy it. Thus, dealers and retail shops are needed, and as such provide a layer of buffer. Zara and VS both own their own retail stores, thereby bringing them closer to the customer. Toyota operates a network of dealerships, most of whom are not exclusive. Toyota does not own the dealerships because the capital requirements to have such global coverage would be very significant. Furthermore, the cost of holding inventory is very high, which is why Toyota needs to push inventory on to dealers rather than own the stock.

Because of the need for retail outlets, fulfillment in these cases is based on store/dealer orders rather than customer orders. Stores in turn base their orders on actual as well as anticipated customer orders, which makes the demand information “noisier” and harder to forecast. The long lead times in production planning (several months) constrains the ability to respond to changes in customer preferences on a short notice. Furthermore, to better meet customer demands, companies in these groups must offer more product features, e.g. more colours of cars, more sizes of clothing. But because of the complexity in making the products – a computer typically has 30 parts while a car has 3,000 – as well as the rather continuous manufacturing process, assembling a large variety of products from sub-assemblies (i.e. mass customization) is not
financially viable. Thus, Toyota, Zara, and VS and are faced with the challenge of meeting diverse and specific customer needs from stock. This results in a high number of product variants (Toyota sells 200,000 SKUs in the US while Zara sells 200,000 SKUs per year).

Here, the challenge has different implications for each group. For trend-conscious customers, cost is not as important as latest fashion. Speed in getting to the market is therefore the key, so Zara produces locally even though it is costlier. Also, Zara has only one distribution centre in Zaragoza, relying on air shipments to distant stores (e.g. 6 New York stores) and outsourced trucks for local deliveries to enhance speed and flexibility, trading-off against transportation economies. Zara copies the trendiest designs rather than create them in order to shrink lead times for new fashion to only 2 weeks. In this way, production times can be shortened dramatically and products made in smaller batches, which allows Zara to adjust production quickly in response to shifting demand. Twice weekly replenishments further ensure that the latest fashions are in the stores and more importantly availability is not emphasized. In fact, scarcity is used to drive sales. Zara tests the market with a small batch of new products. If customers like it, their orders will drive the next, larger production lots. Because of the flexibility to vary lot sizes, they are able to effectively be partially mass made-to-order.

Toyota and VS are also trying to make production more flexible. VS worked to reduce concept-to-market time from 75 weeks to 40 weeks, while Toyota allows orders to be modified up to eight days before production. Both replenish frequently; Toyota daily and VS twice per week. However, unlike Zara, they must be more concerned with costs because that is their value proposition to customers. As such, VS sources manufacturing from low cost countries, as does
Toyota. Availability is also very important. To support these requirements, Toyota has a 2-tiered distribution system - two national centers and 10 regional DCs. VS has only one DC to replenish stores, but has over 1,000 stores, served by its own logistics network which comprises national carriers as well as 45 delivery agents who act as cross docks for further delivery to the store within a 2-hour window for 97% product availability. In this case, ownership of logistics network is felt to be more cost-effective than outsourcing. Similarly, Toyota also owns its logistics services. There have been attempts to incorporate elements of the Dell mass-customization direct model, such as use of interchangeable parts and sub-assemblies in Toyota’s manufacturing process and the introduction of VS online catalogs.

4.1.3 Commodities

Integrating more closely with major wholesalers and retailers in order to minimize inventories needed to service them has been the main theme of fulfillment practices in this group. We will discuss collaborative methods in more detail in later sections. For P&G and Gillette (now owned by P&G), powerful retailers, most notably Wal-Mart, dominate the distribution channels. Similarly, consolidation of wholesalers is resulting in stronger distribution channel partners for Eli Lilly. Shell continues to rely on traditional retail channels, namely owned and independent gas stations. InBev meanwhile has a combination of independent and owned distributors.

The focus of fulfillment in this group is high availability, e.g. case fill rate for Gillette, shelf availability for P&G, as success depends on the product being there for customers to try (P&G terms this the “moment of truth”, InBev the “point of connection”). Eli Lilly’s objective is also high customer service levels (99%).
Companies in this group manufacture most of their own products. Only 10% of P&G’s products are contracted to 3rd party manufacturers. Gillette only outsources packaging, but keeps all razor production in-house. Because of long lead times in the development and production phase, as well as the need to schedule regular production in large lots to take advantage of manufacturing economies of scale, production cycles must be planned well in advance that are inherently not very responsive for achieving short delivery lead times to customers (6 days for Gillette orders). However, because of the largely replenishment nature of the orders and the relatively stable demand, responsiveness of production scheduling is not critical. Fulfillment practices, such as VMI, cross-docking, or direct shipments to customers for fast-moving items (i.e. bypassing the company’s own DCs and warehouses) are generally intended to lower cost and enhance availability. These companies typically own or control extensive networks of distribution and manufacturing assets, although there is an increase in outsourcing of transportation and the logistics. P&G works with many logistics partners such as DHL and Schneider, who provides dedicated service to P&G. Gillette outsources its transportation activities to 3PLs, as does Shell. Distribution activities for Lilly are predominantly performed by wholesale distributors. One-third of InterBrew’s transportation is done by its private fleet.

Customer segmentation by tiers is used to determine priority in fulfillment. Customer Business Development Teams (P&G) and Value Chain Teams (Gillette) are assigned to key customers to enforce these priorities. Interestingly, these teams are intended to allow the company to “face customer as one,” much like the solutions companies.

Packaging seems to be the main area for improvements in fulfillment practices. Gillette keeps
products in bulk and outsources packaging to a 3rd party packager based on the specifications of a customer order (“package to order”). Smart packaging using RFID tags are being introduced by Gillette and P&G and under consideration by Lilly. Standardization of packaging is also being done by Lilly (e.g. move to blister packs in US, where drugs are traditionally sold in bottles).

4.1.4 Total Solutions

Having a “single face” to the customer, including customer care, is the key fulfillment objective of companies in this group. Although they maintain inventories of hardware components, such as routers, switches, and servers, they are essentially delivering personalized bundles of products and services. Thus, fulfillment is designed to maximize customer interactions throughout the process from order to delivery of the “end-to-end solution.” As such, fulfillment becomes part of the product. IBM’s Customer Fulfillment Team and Lucent’s Customer Delivery Organization have both been established to offer intimacy to the customer. Since fulfillment and customer support are also integrated, manufacturing facilities and DCs are streamlined and replaced with more customer support centers.

The need for customer intimacy also requires proximity to the end customer, preferably through the use of more personal channels rather than “faceless” websites. Thus, IBM’s sales channels include its direct sales force, IBM consulting, and partner vendors. Although much attention is given to Cisco’s online channel, which allows customers to configure their own networks similar to Dell’s direct model, 80% of Cisco’s sales are from distributors and its consulting arm, the Internet Business Solutions Group (IBSG).
Logistics does not appear to be a core requirement for this group. Both Lucent and Cisco outsource all logistics activities to third party logistics providers (3PLs). IBM also relies on a network of logistics service providers, who are “orchestrated” by IBM’s Global Logistics group.

Companies in this group seem to focus on delivery reliability due to lead time variability rather than lead time itself. In other words, on-time delivery is more important than shorter lead times. Cisco buffers its lead time to reduce variability of lead times by quoting 21 days even though production can usually be completed within 8 days. Cisco feels that customers are willing to wait for the “right” solution, as long as it arrives according to schedule.

Components that are part of the “solution” product have short life cycles. This is reinforced by all three company’s mission to incorporate the latest technology into their solution. Outsourcing is therefore used substantially to buffer the high risk of obsolescence of inventory. IBM outsources all commoditized products, keeping only manufacturing of critical storage components in-house to allow for faster time to market. IBM also has launch buffer manufacturing sites close to the customer to provide additional capacity when ramping up for new products. Similarly, Cisco outsources 98% of testing and assembly.

4.1.5 Custom Made

Companies in this group deal directly with its customers. Boeing sells directly to commercial airlines and Rolls-Royce directly to aircraft manufacturers. Delivery lead times are typically long due to complexity of the product – 12 to 18 months for aircraft, although Rolls-Royce is able to deliver an engine in 40 days. To this end, Boeing has launched an initiative to reduce product
complexity by using more sub-assemblies (resembling modules used in auto manufacturing) in its new 787 product line. Customers in this group are willing to wait for the latest technology. Also, the product is close to being engineered-to-order, so customers are willing to accept longer lead times in exchange for the higher degree of customization. In addition, long lifecycles and safety considerations mean greater emphasis is placed on product quality than fast, precise fulfillment.

Because the companies tend to be monopolistic, there is less competitive pressure to improve delivery service since customers have limited alternatives. Also, from the manufacturer’s point of view, the high value, physical nature, and low volume of the product offer little opportunity to economize on delivery costs. Companies in this group prefer to outsource logistics to 3PLs instead of developing in-house capabilities, as is the case with Rolls-Royce.

4.1.6 Summary

Table 4.1 summarizes the leading practices in order promising and fulfillment for each group as well as common to all groups with respect to the fulfillment-criticality of each group (based on Criticality Scores established in Chapter 3).
<table>
<thead>
<tr>
<th>Fulfillment Criticality</th>
<th>Specific Group Practices</th>
<th>Common Practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td><strong>Affordable Durables / Fashionable Consumables</strong>&lt;br&gt;Increasing flexibility by reducing production cycle times and producing more variable lot sizes&lt;br&gt;Integration of order promising and fulfillment to optimize distribution costs e.g. online grocery offers delivery time slots that are convenient based on how many vans are going in which directions and the space available on each van as the van fills up&lt;br&gt;<strong>Value for Money</strong>&lt;br&gt;Collaboration with channels&lt;br&gt;Increasing process efficiencies through packaging design and technology e.g.&lt;br&gt;➢ Bar-coding and tagging packages with RFID to improve accuracy of information&lt;br&gt;➢ Sell dolls online without display box and later shipping in standardized plain boxes to eliminate costlier packaging needed for store display&lt;br&gt;<strong>Commodities</strong>&lt;br&gt;“Event management” extending beyond order tracking to “holding the customer’s hand” throughout the purchase process and providing after-sales support&lt;br&gt;<strong>Total Solutions</strong>&lt;br&gt;Reducing product development and manufacturing time</td>
<td>• Real-time Point-Of-Sale (POS) data to drive manufacturing decisions&lt;br&gt;• Tracing real-time order status&lt;br&gt;• Outsourcing all or part of logistics function&lt;br&gt;• Implementation of IT tools such as ATP / CTP and transportation optimization /vehicle routing&lt;br&gt;• Warehouse automation, designing warehouse layout and arranging items expeditiously&lt;br&gt;• De-coupling variable demand from relatively stable demand by breaking demand into composite parts e.g.&lt;br&gt;➢ Zara produces fashion items with more variable demand close by for shorter lead-time; stabler items are made further away in where production costs are cheaper&lt;br&gt;➢ IBM moves production to low cost countries once demand for a product has become relatively stable&lt;br&gt;➢ Gillette out sources pilot production of new products, but keeps manufacturing of products with high and stable demand in-house</td>
</tr>
<tr>
<td>Low</td>
<td><strong>Custom Made</strong>&lt;br&gt;Reducing product development and manufacturing time</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.1: Summary of Fulfillment Practices
4.2 Trends Impacting Fulfillment Practices

4.2.1 Profitable to Promise (PTP)

The main objective of ATP and CTP is to reduce time spent in expediting orders and adjusting production plans because of inaccurate delivery-date promises\(^1\). While this is necessary, there is a growing opinion that companies must also focus on the profitability of orders if they are to maintain competitive advantage, as illustrated in this excerpt from Oracle\(^2\):

“[Companies] must make several considerations before committing to a customer. For example, how profitable is the order just placed? Would it be more profitable if the order were shipped next month instead of next week? Should working overtime be considered so that the order can be shipped immediately? Your challenge is to keep your customers happy while operating in the most profitable, cost-efficient way possible.

For example, your objective for a given order is to maximize customer service. Your customer requests the order by 9 a.m. on Tuesday. By splitting the order across two facilities, it can be delivered on time. If you can make the delivery by 3 p.m., however, the entire order can be fulfilled from the closest facility — saving additional shipping costs. With the customer still on the phone, you can ask if afternoon delivery is acceptable. If the customer agrees, you have just increased profitability of the transaction. Not all customers or orders are equal. You have commitments to key customers. You also have new markets you are trying to enter or grow, and new sales channels you are trying to develop.”

\(^1\) www.cscmp.com: Accessed November 2005
\(^2\) www.oracle.com: Accessed November 2005
In other words, companies should modify their ATP and CTP processes to launch PTP initiatives. Indeed, such a transformation would reprise a fundamental shift in the cost-driven mentality of the whole organization. Specifically, PTP involves matching orders and capability with lead-time, price, and option content tradeoffs. Adopting PTP would require considerable changes to the company’s operating model since it would incorporate pricing decisions (traditionally considered the realm of sales and marketing) into order promising.

4.2.2 Overall Trends

We collected opinions of our industry experts on general trends that are likely to have substantial impact on future practices in the order promising and fulfillment domain. We briefly discuss some of the trends below.

Outsourcing of production stands out as the most important trend that will continue to transform order promising and fulfillment. It was cited by experts as affecting all industries. With increasing globalization, companies are finding it cheaper to buy products from developing countries instead of making products themselves. Because of geographical separation, the lower product cost comes at the expense of longer and less reliable supply lead times, which in turn lengthens the fulfillment lead time. However, this impact can be mitigated by outsourcing some production or buying reserve capacity from outside to reduce the reliance on safety stock.

The Internet is another important trend that is affecting fulfillment in three ways. First, web-based technology is facilitating the outsourcing of fulfillment, reinforcing the outsourcing trend. Secondly, the convenience of e-commerce allows customers to place orders at anytime and from
anywhere, which makes demand patterns increasingly hard to predict. Finally, it has made on-demand services possible. This has raised customer expectations and higher service levels are becoming the norm. Due to an increase in the general awareness of customers, they are demanding more product customization to meet their exact needs, fueling the diversity in product portfolio characteristics and consequently making fulfillment more complex.

Globalization has also resulted in more competition from non-branded low cost manufacturers, which is putting pressure on margins. Combined with increasing logistics costs, this is forcing companies to find new ways to reduce fulfillment costs. Technological breakthroughs are shortening product lifecycles which, as discussed earlier, increases the criticality of order fulfillment, particularly time-to-market, as a key determinant of success.

All the while, “the gap between leaders and the rest in fulfillment is narrowing.” “Leaders must constantly reinvent and innovate, lest they lose ground to competitors.” At the same time, “aggressive supply chain initiatives have the potential to improve challengers’ marketplace performance and displace the current leaders.” This means the competition for new fulfillment practices is will be fierce.” (Accenture, 2004)

The push-pull boundary has been gradually pushed back upstream, first from inventory to manufacturing (build-to-stock to make-to-order), then to the supplier’s inventory and on to the supplier’s manufacturing. As outsourcing to cheaper countries becomes more attractive, companies like P&G will face more pressure to increase outsourcing to stay competitive. If they do not relocate their production assets to these countries, they could face the likelihood of being
caught between powerful retailers such as Wal-Mart and low cost producers from emerging markets. Owning neither the end consumer relationship nor the manufacturing cost advantage, P&G could end up as a distributor of consumer products unless they can develop innovative products or proprietary production methods. Thus, in this age of outsourcing (shifting of power to low cost suppliers) and web connectivity (shifting of power to end consumers), we will continue to witness disintermediation. Traditional manufacturers like P&G may have to transform into expert fulfillment “coordinators” to compete.
5 Measuring Performance in Order Fulfillment

5.1 Identifying Performance Measures

Measuring order fulfillment performance is important as this is the acid test of the supply chain’s effectiveness. Generally, there are two key objectives driving order promising and fulfillment: improving customer service (and thereby sales) and lowering costs. We identified various means of determining performance in order fulfillment in the course of our research, some of which we highlight below.

David Taylor talks about four areas of order fulfillment performance to be measured: time, cost, efficiency, and effectiveness (Taylor, 2004). He also discusses specific measures of performance in each area.

- **Time:** Fulfillment Lead Time is the time it takes from when the order is received to process, assemble, and ship the order. Cycle Time is another measure and refers to how long it takes to complete a process such as from the beginning to the end of the assembly line. This measure may be of particular interest for build-to-order products, where manufacturing time is part of the fulfillment lead time.

- **Cost:** These include transportation ($/mile) and storage capacity cost ($/cubic feet).
• Efficiency: Inventory Turns is the most common measure of asset utility, although technically for made-to-order products this number may not be meaningful, in which case % capacity utilization or load factor may be a more appropriate measure.

• Effectiveness: These measure reliability and availability, such as % on time deliveries, % item and order fill rates, % perfect orders (i.e. ship complete, arrive on time, and correct).

i2 also considers similar metrics when evaluating a company’s fulfillment performance, such as fill rate (requested line item performance); perfect order fulfillment; due date reliability (committed line item performance); inventory turn / utilization; service levels for key customers; response time / flexibility; and revenue increase. Of these, i2 views the following as having the most impact.

<table>
<thead>
<tr>
<th>Value Buckets</th>
<th>Degree of Impact</th>
<th>How is Value Achieved?</th>
<th>Which KPIs measure this value?</th>
</tr>
</thead>
</table>
| Inventory Costs | High             | WIP Inventory: *Greater visibility, constraint based planning, and what if analysis lead to reduced cycle time and down time reducing WIP | +WIP Turns  
+Total WIP Inventory                                                  |
|                | High             | Finished Goods Inventory: *Due date quoting and reduced cycle time lead to less required safety stock | +Finished Goods Inventory Turns  
+Total FG Inventory                                                      |
|                | Medium           | Obsolete Inventory: *Greater visibility to up/downstream changes lead to more accurate production plans | +Obsolete inventory as % of Cost of Goods Sold  
+Write offs                                                             |
|                | Medium           | RM Spend Reduction: *Greater accuracy in production plans lead to better forecast for suppliers and reduced cycle time lead to reduced RM safety stock. Increased responsiveness to material release. | +RM Turns  
+Total RM Inventory                                                      |
| Revenue Increase | High             | Increased Service Levels: *Better inventory plans and decreased cycle time lead to higher service levels | +Service levels  
+Customer Requested Ship Date                                             |
|                | High             | Due Date Quoting: *Ability to rapidly quote order due date leads to less loss sales and increased customer loyalty | +Customer Requested Ship Date  
+Frozen time horizon                                                       |

Source: i2 Fulfillment Whitepaper, 2006

Table 5.1: Key Performance Metrics in Fulfillment
Accenture emphasizes three key measures to evaluate fulfillment: inventory turnover, product availability, and fulfillment costs. For comparative purpose, fulfillment costs are usually measured as a percentage of sales, and include the following costs:

<table>
<thead>
<tr>
<th></th>
<th>% of Sales</th>
<th>% of Fulfillment Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>4.36%</td>
<td>47.7%</td>
</tr>
<tr>
<td>Distribution</td>
<td>2.40%</td>
<td>26.3%</td>
</tr>
<tr>
<td>Inventory Carrying</td>
<td>1.47%</td>
<td>16.1%</td>
</tr>
<tr>
<td>Order Entry/Customer Service</td>
<td>0.55%</td>
<td>6.0%</td>
</tr>
<tr>
<td>Administration</td>
<td>0.36%</td>
<td>3.9%</td>
</tr>
<tr>
<td>Total</td>
<td>9.14%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Accenture Fulfillment Brochure, 2004

Table 5.2: Overall Fulfillment Costs for an Average Company

Other metrics mentioned that appeared relevant include logistics cost, pick rate, order error rate, and on-time/in-full, a composite measure of the % of line items ordered that were available at time of pick and whether the order was shipped on time. Based on the metrics discussed above, we conclude that performance in fulfillment is measured broadly in three areas that parallel the operational objectives framework of the SC2020 Project ¹, namely operational efficiency (cost), customer service (time, reliability, availability, accuracy), and asset utilization.

5.2 Choosing Performance Metrics

A commonly held belief is that to be successful, companies have to be cheaper, faster, and better. Yet in order promising and fulfillment, companies are usually making trade-offs between costs and service. Generally, a leader in fulfillment excels in some metrics and performs satisfactorily

in other metrics, such as high on-time delivery while containing transport costs, or high product availability but maintaining inventory turns. Which metrics are emphasized depends on which area of performance is given priority by the company. This in turn depends on the business objectives of the company, i.e. its customer value proposition.

Although studies have been conducted in the past to measure fulfillment performance, they appear to focus only on measuring and comparing performance in each area separately. We assert that fulfillment should be measured by a collective performance indicator that combines all three areas of cost, service, and efficiency. Further, companies should ensure that their performance indicator is aligned with their position in the market as defined by their target customers and product offerings, i.e. product-customer mix, to maximize overall performance.

5.3 Benchmarking Performance

In the previous chapter, we introduced a framework for classifying companies by product-customer groups. In this section, we propose a general framework for benchmarking performance in fulfillment based on mapping these groups onto a set of cost-service-utilization metrics to analyze their respective positions and relationship with each other.

5.3.1 Comparative Performance Framework

Given the limited scope of the research, we will not be able to perform a detailed analysis, primarily due to the lack of information in the public domain. Most companies do not make customer satisfaction or detailed cost information publicly available, perhaps due to its
sensitivity. In addition, there is no standard method of calculating these metrics, which tend to vary between companies. For example, some companies include sales and marketing costs in their fulfillment costs while others do not. This complicates the selection of metrics that are consistent and applicable across companies. Acknowledging these limitations, we outline our benchmarking framework in Figure 5.1, which is based on AMR Research’s ranking of Top 25 Supply Chains for 2005 as well as our own quantitative assessment.

![Figure 5.1: Cost-Service-Utilization Matrix](image)

For instance, companies whose product-customer mix falls into the Affordable Durables group should benchmark themselves against the leaders in that group, such as Toyota, even though they may be in seemingly different industries. They should also select and focus on the same blend of cost-service-utilization performance indicators as Toyota.
5.3.2 Fulfillment Index

Improvements (or poor performance) in any or all three areas of fulfillment will have an observable and sometimes immediate impact on the company’s ROA, and consequently shareholder value. Strong performance in customer service will contribute to revenue growth and customer retention, while higher operational efficiency will lower the company’s overall expenses. And, while excellence in customer service and operational efficiency can have significant impact on the company’s top and bottom lines respectively, effective deployment of assets minimizes the resources needed to generate those profits.

![Fulfillment Index Model](image)

Figure 5.2: Fulfillment Index Model

Each company should therefore determine the performance balance that best fits its products and value proposition. Using the leaders in their corresponding groups as role models, companies should design an index of fulfillment metrics that will monitor their specific “vital signs.”
6 Defining Customer/Channel Collaboration

6.1 Existing Definitions

6.1.1 Literature Review

According to the Council of Supply Chain Management Professionals (CSCMP), Customer/Channel Collaboration originated with a focus on replenishment from upstream distribution channel members to downstream distribution channel members\(^1\). The operating models evolved over time from *Continuous Replenishment*, to *Continuous Replenishment Planning (CPR)*, to *Co-Managed Inventory (CMI)*, to *Vendor Managed Inventory (VMI)*, eventually culminating in *Collaborative Planning, Forecasting, and Replenishment (CPFR)*. The Council of Supply Chain Management Professionals defines these operating models as follows:

- **Continuous Replenishment**: Continuous Replenishment is the practice of partnering between distribution channel members that changes the traditional replenishment process from distributor-generated purchase orders, which are usually based on economic order quantities, to a replenishment process based on actual and forecasted product demand.

\(^1\) [www.cscmp.com](http://www.cscmp.com): Accessed November 2005
- **Continuous Replenishment Planning (CRP):** A program that triggers the manufacturing and movement of products through the supply chain when one such product is purchased by an end user.

- **Co-Managed Inventory (CMI):** A form of continuous replenishment planning in which the manufacturer is responsible for replenishment of standard merchandise, while the retailer manages the replenishment of promotional merchandise.

- **Vendor Managed Inventory (VMI):** A form of continuous replenishment in which the vendor is responsible for replenishment of all merchandise, while the retailer pays the vendor upon and based on its consumption of the merchandise.

- **Collaborative Planning, Forecasting and Replenishment (CPFR):** Supply chain partners jointly plan sales forecasting and all operations required to replenish raw materials and finished goods.

Semchi Levi et al expound on definitions of supplier-retailer collaborations in consumer packaged goods industry (CPG) in detail (Simchi-Levi, 2000). CPG is an especially challenging environment since the margins are comparatively low but the service levels expected by customers are rather high. As a result, the importance of building a strong relationship with retailers is crucial for suppliers. Simchi-Levi et al conclude that by integrating the supplier’s knowledge of production capabilities and lead time information with retailer’s knowledge of consumer demand, CPG companies can make the overall supply chain more efficient. They further describe some supply chain initiatives that suppliers and retailers can jointly work on to improve supply chain efficiencies, such as:
• **Continuous Replenishment (CRP) and Electronic Data Interchange (EDI):**

Continuous replenishment, or rapid replenishment, is defined as a strategy in which "vendors receive point-of-sale (POS) data and base shipments plan on these data so as to maintain previously agreed specific levels of inventory." This enables both the manufacturer and the retailer to hold minimal inventories and avoid costly stockouts that occur because of variation in demand. Electronic Date Exchange is a set of standards for transactions between retailers and suppliers. It allows trading partners to send electronic transactions rather than paper, thus contributing to a significant savings in cost and time.

• **Collaborative Planning, Forecast, and Replenishment:** Collaborative Planning, Forecast, and Replenishment (CPFR) is defined as a "collection of processes that enhance supply chain efficiency by facilitating buyer/seller interaction through improved information visibility and utilization." The objective of this initiative is to achieve targeted customer service levels, which will in turn lead to increases in profitability for both the retailer and supplier. CPFR is based on the reality that although suppliers often have insights on seasonality and regionality about their products, the retailers and distributors have insights on planned merchandising activities and supply network changes that can have an immediate impact on real-time demand.

"**Vendor-managed Inventory**" (VMI) gained visibility when Procter & Gamble and Wal-Mart successfully implemented it in the 1980s. VMI refers to inventory replenishment decisions where the "vendor monitors the buyer's inventory levels and makes periodic re-supply decisions regarding order quantities, shipping, and timing" (Waller, 1999). The VMI protocol transfers the transaction responsibility to the supplier from the buyer or distributor, who can then focus on
customer service levels, leading to reduced costs and improved customer service levels. From the supplier's point of view, VMI reduces the uncertainty and fluctuation of demand. The supplier can see the actual demand and plan production accordingly, thus improving asset utilization and reducing safety stock levels. From the retailer's point of view, sales can be increased in part due to the lowered purchase prices enabled by suppliers' lowered fulfillment costs and better service levels boosted by higher product availability.

In 1998, Blockbuster Video restructured its relationship with movie studios to improve their performance. Blockbuster deployed a Revenue Sharing scheme to better coordinate their supply chain. Blockbuster negotiated a deal with movie studios wherein it purchased movies at a considerably lower price in return for a 40% share of rental revenue. This restructuring enabled Blockbuster to buy more copies with the same capital investment, allowing it to capture more demand and satisfy more customers when demand was high. From the point of view of the movie studios, this operating model represents a collaboration with their customers/channels (Cachon and Lariviere, 2005).

6.1.2 Industry View

i2's definitions of customer/channel collaboration are similar to those of CSCMP. i2\(^1\) defines customer/channel collaboration as focusing on Collaborative Replenishment (Continuous Replenishment, Co-Managed Inventory, and Vendor Managed Inventory), which allows companies to manage various aspects of their replenishment programs, including collaborative forecast adjustments, customer demand changes, and program performance management.

\(^1\) www.i2.com: Accessed November 2005
Oracle views customer/channel collaboration slightly differently, with emphasis on accurate forecasting, visibility of demand, and customer satisfaction. According to Oracle⁵, Customer/Channel Collaboration are aimed subsequently at:

- Understanding channel demand variability and improving customer satisfaction;
- Managing demand variability and achieving accurate consensus forecasts;
- Optimizing inventory, accelerating planning cycles, postponing production, increasing on-time delivery, and extending visibility across all tiers of the supply chain.

### 6.1.3 Interviews with Practitioners

Based on the interviews conducted with practitioners from various consulting firms (profiled in Section 1.4), we note that most practitioners seem to agree that customer/channel collaboration refers to replenishment between distribution channel members. Some practitioners, however, mentioned that the scope of customer/channel collaboration should be extended to cover not only replenishment between distribution channel members but also all collaborative interaction between companies and their customers/channels (including retailers and end consumers). Such extended coverage is prompted by practices of various companies such as the online customer community for after-sales services set up by Hewlett Packard, the online configuration and customization services provided by Dell and Amazon, and the online interactive order management system set up by IBM. By facilitating interaction between customers so that they can support each other, this form of collaboration helps companies improve service levels without a proportional increase in customer service costs.

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¹ [www.oracle.com](http://www.oracle.com): Accessed November 2005
These observations are supported by data available in published literature as well. As reported by Paul Strassmann, Microsoft saved approximately $4 billion by having a community of highly committed and knowledgeable users test Windows 95. Through online customer communities, Compaq not only improves its customer satisfaction but also saves costs in recruiting engineers to provide customer services (Boyd and Zirn, 2002). Before adopting this practice, Compaq had to deal with hundreds of thousands of support inquiries every week. By launching online customer communities, Compaq was able to handle more than a third of such inquiries with the help of 100,000 members of its customer communities. Meanwhile, Compaq picked up only those questions that the community was not able to solve within eight hours. Moreover, every answer ever provided by Compaq's customer community is stored in a knowledge base. That means that both Compaq and its customers could quickly resolve a question if it has been asked before. As a result, 90 percent of all standard inquiries were taken care of without even bothering the community. Not only were Compaq's customers impressed, Compaq itself was also rated as best in online technical support.

Most practitioners interviewed agreed that the Blockbuster revenue sharing model represents a collaboration between companies and their customers/channels. The Blockbuster revenue sharing model is very relevant to the future operating model for cooperation between pharmaceutical manufacturers and their direct customers/channels - distributors (Singh, 2005).

New possibilities of facilitating collaboration in the retail channels were mentioned by some practitioners as well. Although production postponement is a mature operating model prevalent in the computer industry and increasingly becoming popular in the apparel industry, it has not
gained popularity in the retail channels. Such collaborative production might be another opportunity to promote customer/channel collaboration.

6.2 Modified Definitions
Generally, definitions of customer/channel collaboration have been in a state of constant revision. Over time customer/channel collaboration has evolved from suggesting pure replenishment of physical products along distribution channels to multi-functional and multi-interface interactions between companies and their customers/channels. To create a common platform for enhancing understanding and further research on customer/channel collaboration, we present a modified set of definitions for customer/channel collaboration at three levels:

- **Operational Collaboration** (CCC-1) takes place between companies and their customers/channels to better manage replenishment and fulfill customers/channels' demand, which includes operating models such as Continuous Replenishment, Co-Managed Inventory, and Vendor Managed Inventory.

- **Tactical Collaboration** (CCC-2) happens between companies and their customers/channels to improve demand forecast, production scheduling, and capital investment plans to better align companies’ order promising/fulfillment operations with customer's procurement operations, which includes practices such as Continuous Replenishment Planning and Collaborative Forecasting and Planning.

- **Strategic Collaboration** (CCC-3) between companies and their customers/channels facilitates development of new products, management of consumer demand, and
improvement in service levels, to boost customer satisfaction. It includes concepts such as *Collaborative New Product Development*, *Collaborative Postponed Production*, *Collaborative Revenue Sharing*, and *Collaborative Customer Service*.

![Diagram of Customer/Channel Collaboration](image)

**Figure 6.1 Definitions of Customer/Channel Collaboration**

**6.3 Trends in Collaboration Practices**

The evolution of definitions of customer/channel collaboration over time reflects a trend of maturing industrial practices in the area of customer/channel collaboration, practices which to a large extent are prompted by the development of technology. With the advancement of technology, some previously impossible collaboration approaches have now become feasible. For example, the access to low-cost, large-volume databases makes it financially feasible for
companies to collect and process data from multi-tier channel partners facilitating collaboration between companies and their multi-tier customers and channels.

So far, the basic level collaboration, i.e. the Operational Collaboration, has been widely implemented in industries. While some innovative practices, especially at the strategic level collaboration, have been initiated across several industries, no cross-industry benchmarking study could be found, indicating that adoption of strategic collaboration has been slow. A possible explanation of this slow progress can be attributed to the nature of customer/channel collaboration practices that generally evolve over time from the operational, to the tactical, and eventually to the strategic level. In other words, adoption of the higher level collaboration assumes a widespread implementation of the lower level collaboration practices.

In 2006, IBM conducted a Chief Executive Officer-targeted survey across industries to identify their key concerns. The survey revealed that innovation and business process outsourcing have become the top priority of executives. Indeed, to enhance a company’s innovative capability and maximize benefits of business process outsourcing, the best approach is to collaborate with customers/channels in developing new products, managing customer demand, improving service levels. As a result, satisfaction of customers/channels can be considerably improved by involving them in the process of incorporating their own inputs (Business Week, April 2006).
7 Framework for Analyzing Customer/Channel Collaboration Practices

The framework outlined in this chapter consists of three parts: Business Categorization, Customer/Channel Collaboration Operating Models, and Measurement and Criticality of Customer/Channel Collaboration. In the next chapter, we will use this framework to analyze some leading companies across nine industries and accordingly conclude with some guidelines for customer/channel collaboration operations.

7.1 Business Categorization

Since customer/channel collaboration focuses heavily on the interaction between companies and their customers/channels, it is only natural that research on customer/channel collaboration analyzes the interface between companies and their customers/channels. This interface has two basic elements: customers and products (both physical and service products). These two elements are also the building blocks of a business model since a business model requires companies to specify their products and targeted customer segment(s). Once these two basic elements are determined, all operations are designed to support the business model.
In this section, we will first discuss various categorizations of customers and products. Based on this analysis, we will propose a framework to evaluate and categorize business models of different companies.

### 7.1.1 Customer Categorization

Different customers require different combinations of price, technology, and service from their suppliers. The first step that companies can take to enable collaboration is to engage key customers to find out what they expect from suppliers. These findings will enable companies to decide if and how they can collaborate with each channel partner based on the fit between the company’s capabilities and the channel’s expectations. Each customer relationship should be examined from the perspective of company’s overall business strategy and the opportunity for collaboration. This insight into customer/channel requirements enables the organization to design and implement a collaboration operating model that responds to customer needs and enhances customer satisfaction.

Needless to say, customers possess different characteristics. For price-conscious customers, companies should pursue highly efficient processes which can enable companies to keep costs down and maintain margins. A self service model may be an appropriate strategy for collaborating with this group of customers. Service- or Trend-conscious customers, on the other hand, demand high levels of responsiveness; accordingly, intimacy and innovation will be attractive to this segment of customers. Thus, a possible way to categorize customers could be driven by a company’s value proposition to different customer segments (value proposition is specified by a company to match a particular group of customers with the value of the
company's products and services.) Therefore, customers can be categorized based on their sensitivity to certain value propositions.

One approach to categorizing businesses based on value propositions is to consider Operational Excellence, Product Leadership, and Customer Intimacy proposed by Michael Treacy and Fred Wiersema (Treacy, 1997). Treacy and Wiersema emphasize that no company can succeed by trying to be all things to all people. A company must find the unique value that it can deliver to a targeted group of customers. They go on to suggest three value propositions as follows:

- **“Operational Excellence”**: A value proposition of providing the lowest price goods and services while minimizing problems for the customer. Success of this value proposition necessitates the efficient management of people, transactions, and customer expectations and continuous improvement in operations.

- **“Product Leadership”**: A value proposition of providing the best possible products from the perspective of the features and benefits offered to the customer. Success of this value proposition necessitates encouragement of innovation and risk-oriented management, and recognition of people's importance and the need to educate and lead the market.

- **“Customer Intimacy”**: A value proposition of involving high-value customer niches with exhaustive efforts to understand these customers' demand. This requires not only anticipating the targeted customers' needs and understanding their business but also sometimes sharing risks with them when requested. Success of this value discipline necessitates a full range of services available to serve customers upon demand, a
corporate philosophy and resulting operations that encourage deep understanding of customers, and breakthrough thinking about how to help the customer succeed.

Evidently, Treacy and Wiersema’s three value proposition categorization encapsulates the key characteristics of customers. From a customer/channel collaboration perspective, their three value propositions can be translated into three corresponding types of customers, see Table 7.1.

<table>
<thead>
<tr>
<th>Value Proposition</th>
<th>Basic Philosophy</th>
<th>Customer Category</th>
<th>Customer Expectation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational Excellence</td>
<td>Low price and hassle-free service</td>
<td>Price Driven Customer</td>
<td>Low Price Hassle-free Service</td>
</tr>
<tr>
<td>Product Leadership</td>
<td>Products that push performance boundary</td>
<td>Technology Driven Customer</td>
<td>Innovative Features and Benefits</td>
</tr>
<tr>
<td>Customer Intimacy</td>
<td>Delivering exactly what specific customers want</td>
<td>Service Driven Customer</td>
<td>Assistance to define and achieve customer expectation</td>
</tr>
</tbody>
</table>

Table 7.1: Three Value Propositions and Categorization of Customers

We define the three customer categories as follows:

- **Price Driven Customer**: Customers who expect from their suppliers the lowest price products with hassle-free services
- **Technology Driven Customer**: Customers who expect from their suppliers the best possible products from the perspective of the features and benefits
- **Service Driven Customer**: Customers who expect from their suppliers assistance to define their needs and delivery of corresponding products capable of meeting such needs
7.1.2 Product Categorization

A natural way to categorize products is to examine product characteristics such as sales volume and value, extent of standardization, life cycle, production process, and so on. The famous Product-Process Matrix proposed by Robert H. Hayes and Steven C. Wheelwright provides a good basis for analyzing characteristics of products (Hayes, 1979), as shown in Table 7.2.

![Product-Process Matrix]

Source: Harvard Business Review 1979

Table 7.2: Product-Process Matrix

Hayes and Wheelwright’s matrix consists of two dimensions: product structure/product life cycle and process structure/process life cycle. The product structure/product life cycle dimension moves from a highly flexible, high-cost process toward increasing standardization, mechanization, and automation, and culminates in an inflexible but cost-effective process. The process structure/process life cycle dimension describes the process choice (job shop, batch, assembly line, and continuous flow) and process structure (jumbled flow, disconnected line flow, connected line flow and continuous flow) while the product structure/product life cycle describes
the four stages of the product life cycle (low volume to high volume) and product structure (low to high standardization).

Adapting the Product-Process Matrix to address customer/channel collaboration requirements, we propose the following categorization of products:

<table>
<thead>
<tr>
<th>Product Category</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production Sales Volume</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Extent of Customization</td>
<td>High</td>
<td>Medium (Features)</td>
<td>Medium (Components)</td>
<td>Low</td>
</tr>
<tr>
<td>Production Model</td>
<td>Build-to-Order</td>
<td>Assemble-Order</td>
<td>Assemble-to-Order</td>
<td>Make-Stock</td>
</tr>
</tbody>
</table>

Table 7.3: Categorization of Products

**Low Volume, High Customization, Build-to-Order**

This category refers primarily to unique products. The products in this category are usually one of a kind and require interpretation of the customer’s expectation. Once customer’s demand is recognized, pitched, confirmed, and understood, one or a small number of skilled employees are assigned to the task of designing and building a product or solution. The production flow is also unique. Examples include law offices, consultancy, medical practices, tailor shops, and so on.

**Low Volume, Medium Customization (Features), Assemble-to-Order**

This category refers primarily to products that are built in batches. Customers can customize non-critical features and frills, but no modification to the basic configuration of the model are allowed. Many critical production processes are executed using repetitive steps. Companies
usually make or purchase common components and start to assemble the final products after the order is confirmed by the customer. This production process is organized in batches and follows an intermittent production flow.

**High Volume, Medium Customization (Combinations of Components), Assemble-to-Order**

This category refers primarily to products configured using different combinations of standard components. Customers are allowed to select their own preferred combinations of different components. The products may be different but their components are standardized. The production is conducted using an assembly line, but the products produced are discrete and visually countable.

**High Volume, Low Customization, Make-to-Stock**

Products are made in highly standardized forms and in extremely large volumes. The product range is usually so narrow and highly standardized that it can be characterized as a commodity. This product is usually produced in a continuous process and some time can not be counted.

### 7.2 Operating Models for Customer/Channel Collaboration

In this section, we will analyze existing and potential practices in the area of Customer/Channel Collaboration, and then suggest several operating models for categorizing these practices.
Since customer/channel collaboration focuses heavily on the interaction between companies and their customers/channels, operating models in the area of customer/channel collaboration have to respond to the overall relationship between companies and their customers/channels. To this end, Jacob Varghese introduces a portfolio approach to collaboration (Varghese, 2003). Since his portfolio is designed for collaboration among all partners – both internal/external and downstream/upstream, customer/channel collaboration is a subset of this portfolio.

Varghese highlights two factors that play an important role in determining the nature of collaboration between companies and their suppliers, competitors, and customers:

- **Competitive Overlap**: The amount of commonality of suppliers or buyers that competitive enterprises share between their respective supply chains. This can be further broken down into Completely Disconnected Supply Chains, Completely Overlapping Supply Chains (such as Compaq vs. Dell) and Partially Overlapping Supply Chains (such as PCs—IBM, Compaq, Dell—vs. Apple's Mac).

- **Power**: Wal-Mart, Procter & Gamble and Dell are examples of companies that hold significant power within their supply chains and determine the nature of interaction that takes place. Power within a supply chain can work either as a driving force or a barrier to collaboration.

In analyzing customer/channel collaboration, power plays a critical role in determining the degree of collaboration between upstream and downstream partners, i.e. companies and their customers/channels. That is to say, customer/channel collaboration is to a certain extent determined by the comparison of overall corporate bargaining power of companies and their
customers/channels. Varghese concludes his paper with four operating models for collaboration among all partners, namely Public e-Marketplace, Private Trading Hub, Joint Family, and Big Brother. He emphasizes that, in order to maximize value, both in the short and long run, a company should adopt a portfolio approach to collaboration, choosing the set of tools most relevant to its supply chain ecosystem.

Based on one of the major factors – overall corporative bargaining power – and given the focuses of customer/channel collaboration, we propose the following portfolio for Customer/Channel Collaboration:

1) **Weak Bargaining Power over Customers/Channels**

   → **Passive (No) Collaboration (CCC-0)**

In the presence of a large number of competitors, companies generally hold minimal, if any, corporate overall bargaining power over their customers/channels. Price becomes the only basis of comparison and the only competitive edge. In this case, companies can “collaborate” with their customers/channels in three ways:

- Based on competitive price, companies can use the public marketplace to gain access to a wider customer base.

- Companies can actively participate in operational collaboration, like Vendor-Managed Inventory, initiated by customers/channels but, in the bargain, risk serving as buffers for customers/channels to transfer inventory holding costs.

- Companies can initiate operational collaboration with their “strong” customers/channels. However, the collaboration must be carefully tailored to ensure that companies can share the benefits generated by such collaboration.
Generally, companies that hold low bargaining power compared to their customers/channels passively follow their customers’ collaborative initiatives and end up selling at reduced net price therefore gaining no real benefit.

2) Medium Bargaining Power over Customers/Channels

→ Operational Collaboration (CCC-1)

→ Tactical Collaboration (CCC-2)

With comparable corporate overall bargaining power, companies and their customers/channels can build an alliance and thus achieve win-win collaboration and keep competition out. Such collaborative operations usually exist in the areas of inventory management, replenishment planning and forecasting, and production planning and scheduling. Companies and their customers/channels can build both replenishment-oriented collaboration and more complex collaborative capabilities such as joint forecasting and planning and connectivity to back-office systems. Companies can also seek to build irreplaceable and meaningful relationships with customers/channels, relationships that involve sharing proprietary information and making joint decisions to better coordinate and synchronize companies’ order promising and fulfillment operations with customers/channels’ sourcing operations.

3) Strong Bargaining Power over Customers/Channels

→ Operational Collaboration (CCC-1)

→ Tactical Collaboration (CCC-2)

→ Strategic Collaboration (CCC-3)

Companies such as Wal-Mart and Dell are examples of CCC-3 collaboration because of their high sales volume, financial resources, and the nature of their relationships with customers/channels. These companies can initiate collaboration and comprehensively interact
with customers/channels to maximize overall service levels while minimizing total fulfillment costs. With strong bargaining power over customers/channels, these companies initiate collaboration and make investments that not only build value differentiation with respect to competition but also ensure that significant entry barriers are in place for competition.

Such collaborative operations can exist not only in the areas of inventory management, replenishment planning and forecasting, and production planning and scheduling but also in new product development, production, sales and customer services. Collaborative partnerships can lead to unique offerings and value differentiations that combine respective capabilities in ways that cannot be easily replicated by competitors. The primary benefit of this operating model is the effectiveness of vertical integration (virtual vertical integration) without the downside of financial ownership. The resulting strategic alliance brings together the best of vertical integration and outsourcing while minimizing their disadvantages. Strategic collaboration also enables the initiator to build knowledge about the aggregated demand and develop business intelligence.

Lastly, regarding the operating models of customer/channel collaboration, it is especially important to understand that a single company could, in fact should, adopt different and appropriate collaboration models for different customers/channels, subject to its bargaining power over the customers/channels. Furthermore, for the same companies, collaboration could vary depending on the combinations of products and customers.
7.3 Measurement and Criticality of Customer/Channel Collaboration

To measure the criticality of customer/channel collaboration operation to overall business performance, appropriate metrics should be identified and analyzed.

For operational collaboration, metrics on a company’s inventory level can be used to quantify customer/channel collaboration performance. The most important and easily accessible information in this area is the inventory turnover rate. The ratio of a company’s inventory turnover rate and the average inventory turnover rate in its industry can be compared to benchmark the operational collaboration performance.

For tactical collaboration, accuracy of a company’s forecasting and planning can be used as a proxy to evaluate the impact of collaborative forecasting and planning on overall business performance. Companies routinely base their capital investment and organizational structure design on long term forecasting and planning outlook. Unfortunately, there is no direct measure of the impact of forecasting and/or planning on capital investment and/or organizational structure design. The accuracy of collaborative forecasting and planning can be quantified and compared to benchmark the tactical collaboration performance.

For strategic collaboration, some good metrics are collaborative new product development rates, collaborative new product launch rates, additional sales volume or profit generated by revenue sharing or collaborative marketing, the ratio of customer service level over customer service cost, and the ratio of customer satisfaction (Customer Loyalty Index) over customer service cost. Each metric, to some extent, represents the impact of customer/channel collaboration on a
specific part of overall business performance. Accordingly, each one of these metrics can be used to benchmark the strategic collaboration performance.

So far, we have discussed the performance measures for the operational, tactical, and strategic collaboration separately. Now, we propose an aggregate collaboration index for assessing the overall customer/channel collaboration performance by correlating all three levels of collaboration and overall business performance. The index is a weighted average of all three sets of metrics with the weight assigned to different level of collaboration based on its correlation to overall business performance.

Using the collaboration index, we can benchmark customer/channel collaboration performance across companies and industries. It is important to understand that some companies might perform well in the area of customer/channel collaboration while not so well or even poorly in overall business performance, and vice versa, or some companies perform well in both. For the first scenario, a correlation analysis can help rationalize the current spending level in customer/channel collaboration to match its benefits. For the second and third scenarios, a correlation analysis can help identify opportunities to further improve collaboration performance so as to improve overall business performance.
To validate the framework proposed in Chapter 7, we reviewed and categorized eleven leading companies across nine industries that were studied in detail in Phase I of SC2020. The categorization is summarized in Table 8.1. Leading customers and products of these companies were examined in detail based on our framework to do the categorization. We will discuss our analysis and approach in the following sections. Note that due to the limited amount of information in some cases, the analysis may appear incomplete. Finally, we will provide some guidelines for designing effective customer/channel collaboration operations.

8.1 Aerospace Industry

8.1.1 Characteristics of Aerospace Industry

The aerospace and defense industry has three main sectors: systems & frames, engines, and equipment. These three sectors manufacture products for three main segments: aircraft, missiles, and space. Products in all segments have a global market for government and private entities.
The aerospace industry is geographically dispersed but integrated supply networks that span North America, Asia, and Europe. Collaboration is mandated by the need for cost-effective manufacturing while leveraging research and development capabilities of suppliers all over the world. Many suppliers cater to more than one sub-segment. The industry is characterized by very high levels of capital investment, in addition to being heavily regulated, especially due to the safety requirements for its products.

The integration and collaboration in the industry has become increasingly important as the largest companies are delegating more design and assembly functions to their first and second-tier suppliers. The sharing of risk and responsibility is most pronounced in the aircraft segment.

Table 8.1: Customer/Channel Collaboration Analysis Across Industries

<table>
<thead>
<tr>
<th>Products</th>
<th>Price Driven Customer</th>
<th>Technology Driven Customer</th>
<th>Service Driven Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Volume High Customization Build-to-Order</td>
<td></td>
<td>Computer/IBM/Servers/Enterprises/CCC-3</td>
<td>Computer/IBM/Business Consultancy/Enterprises/CCC-3</td>
</tr>
<tr>
<td>Low Volume Medium Customization (Features) Assemble-to-Order</td>
<td></td>
<td>Aerospace/Boeing/Commercial Airlines/CCC-1+2+3</td>
<td></td>
</tr>
<tr>
<td>High Volume Medium Customization (Combinations of Components) Assemble-to-Order</td>
<td>Computer/Dell/PCs/Individuals/CCC-3</td>
<td>Telecommunication/Cisco/End to End Solutions/Enterprises/CCC-2</td>
<td></td>
</tr>
<tr>
<td>Automobile/GM GMA/Sedans/Dealers/CCC-1+2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Volume Low Customization Make-to-Stock</td>
<td>CPG/P&amp;G/All Products/Retailers/CCC-1+2</td>
<td>Apparel/Limited-Victoria’s Secret/Consumers/CCC-0+3</td>
<td></td>
</tr>
<tr>
<td>Petroleum/Exxon Mobile/Gasoline/Individual Consumers/CCC-0</td>
<td></td>
<td>Pharmaceutical/Elli Lilly/Patented Drugs/Cardinal/CCC-1+2</td>
<td></td>
</tr>
<tr>
<td>Retail/Wal-Mart/All Products/Consumers/CCC-0</td>
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<tr>
<td>Retail/Amazon/All Products/Consumers/CCC-3</td>
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This phenomenon reflects the transformation of the large aerospace companies from being manufacturers to system integrators focused on sophisticated marketing and sales organizations.

8.1.2 Characteristics of Boeing’s Commercial Airplanes

Boeing is undoubtedly the leading aerospace and defense company in the world. Boeing is organized into 6 main business units. The two major revenue generating business units are Integrated Defense System and Commercial Airplanes. The Integrated Defense System business unit sells only to governments. Its main customer is the U.S. military but it also exports to the armed forces of U.S. allies. Boeing’s commercial airline customer base is very small and remains stable due to the nature of the industry. Currently, Boeing’s only major competitor in the large commercial aircraft segment is Airbus, a European government backed consortium.

Boeing views product development as its core competency. But of late, it has started shifting the responsibility of designing along with manufacturing of components for the new product lines to its first and second tier suppliers. This has helped Boeing reduce the design and production lead times and ramp up or scale down its design and production capacity in order to cost-effectively respond to the commercial aircraft business cycles. Boeing’s product development strategy over the past few years suggests that it is diverging from its previous emphasis on traditional capacity configurations to a new emphasis on range. This change is motivated by the popularity of point-to-point transportation in the airline industry, in contrast to the traditional hub and spoke system.
8.1.3 Analysis of Boeing’s Commercial Airplanes

Commercial airplane customers are mainly influenced by the technological sophistication of new aircrafts when making a purchase decision. Once an aircraft model is finalized, Boeing allows only certain customizations, restricted to non-critical features and frills, of basic aircraft models defined by Boeing. Overall, Boeing’s commercial airplane customers can be categorized as technology driven, and the product as Low Volume, Medium Customization (Features), and Assemble to Order.

Given that two major manufacturers (Boeing and Airbus) compete for limited orders from airlines, Boeing enjoys medium bargaining power over customers. As a result, Boeing collaborates with customers in several aspects. For example, Boeing works with major airlines on new aircraft development. Boeing approaches customers at very early stage of designing when customers haven’t figured out their own demand. During the process of building the aircrafts, Boeing closely interacts with customers on incorporating new technology and market demand into product configuration. After delivery, Boeing continues to track each aircraft in operation for making future modifications. Generally speaking, Boeing conducts multi-functional, multi-interface, and multi-level operational, tactical, and strategic collaboration with its customers.

Clearly, customer collaboration plays a critical role in Boeing’s success. According to our analysis, Boeing evidently outperforms Airbus in customer collaboration supported new product development, annual order number, and annual deliveries. But the recent Airbus’s initiative to
closely collaborate with Chinese government – localization of aircraft production, is a significant move in this direction.

8.2 Apparel industry

8.2.1 Characteristics of Apparel Industry

The apparel industry is characterized by slow growth, overcapacity, and low-priced imports, and competes primarily on cost/price. It has historically been a labor intensive and low technology industry. This has led to large importation of goods from lower labor cost developing countries. As barriers to enter the area of manufacturing are low, a number of fragmented manufacturers and sub-contractors have been emerging in developing countries.

At the same time, there is a growing trend in the private label apparel designed and labeled by retailers and produced by lower cost apparel subcontractors in developing countries. The concept of private label apparel allows the retailers to bypass costly domestic designers and branded apparel manufacturers. Private label apparel is offered relatively cheaper than branded apparel, making it more affordable for the common consumers and resulting in mass marketing of apparel by large retailers, such as Wal-Mart and Sears.

8.2.2 Characteristics of Limited-Victoria’s Secret Store

A part of the Limited Brands, Victoria’s Secret is the leading specialty retailer of lingerie and beauty products. Victoria’s Secret Stores’ targeted customers are 20-30 year old women. Victoria’s Secret consists of three value channels – Victoria’s Secret Stores, Victoria’s Secret
Beauty, and Victoria’s Secret Direct\(^1\). Products offered at Victoria’s Secret Store can be divided into 3 broad categories: Launch Fashion Products, Non-Launch Fashion Products, and Basic Products. About 60% of units carried by Victoria’s Secret Stores are Basic Products, about 25% are Non-launch Fashion, and the remaining 15% are Launch Fashion products.

Basic Products consist of products which sell all year round and have styles and colors which can be sold in all seasons and, for the most part, never go out of style. Non-launch Fashion Products are loosely defined as items with styles, colors or silhouettes which typically sell for half a year and then shift to regular replenishment. Launch Fashion Products are items which are heavily promoted and may even be introduced as a completely new category. These products involve special planning and are typically launched two times per year in Spring and Fall. A pull-based replenishment model is adopted for basic products, whereas a push-based replenishment model is used for Non-launch Fashion Products and Launch Fashion Products.

**8.2.3 Analysis of Limited-Victoria's Secret Store**

Victoria’s Secret’s customers are mainly driven by “technology” – innovative and fashionable design. Although grouped into three categories, its products are all standard designs, and are manufactured in High Volume, offering low Customization, and Make-to-Stock.

Victoria’s Secret Store holds little bargaining power over its customers because of a large number of competitors. As a result, Victoria’s Secret Store collaborates with customers/channels in limited ways, such as pre-production and store test to examine customer demand. Therefore,

\(^1\) [www.limited.com](http://www.limited.com): Accessed April 2006
its operation in customer/channel collaboration is essentially price/feature based collaboration. Although Victoria’s Secret competes on fashion, innovative design, and brand name, it rarely collaborates with customers in new product development or brand building. As such, customer/channel collaboration plays a non-critical role in Victoria’s Secret’s successes.

8.3 Automobile Industry

8.3.1 Characteristics of Automobile Industry

The automotive industry can be divided into upstream suppliers, Original Equipment Manufacturers (OEMs), and downstream dealers and distributors. The suppliers are generally tiered from the manufacturer’s perspective. The first tier suppliers directly deliver products to the manufacturer, mainly in the form of larger modules and parts for the final assembly. The 2nd and 3rd tiers usually supply raw materials, components, and smaller modules to the 1st Tiers. The OEMs complete the final assembly of modules and components, market the vehicles, and ship the vehicles.

The products of the Automobile industry can be divided into 4 categories, namely passenger cars, light, medium, and heavy trucks. Parts in the aftermarket flow from component suppliers and OEMs to dealers and repair, maintenance, and customization shops. The segmentation of consumers is based on price, vehicle type, and demographics. The vast majority of sales are through dealerships. Direct sales through e-commerce sites are minimal, which are mostly hosted by dealers, and fleet sales for rental car companies are often managed through national sales companies (Holweg & Pil, 2004).
In order to capture economies of scale and maintain high asset utilization, the automotive manufacturers consider market share as their major pursuit. The automotive manufacturers also own financial service divisions which provide leases as an incentive to push the dealers to carry more inventories (Cocheo, 1986). In mature markets, such as the U.S., however, consumers have been showing increased demand for more variety in vehicles which has fragmented the market, in turn, driving lower sales volume per model. As a result, economies of scope are becoming more important, while economies of scale are declining.

8.3.2 Characteristics of General Motor’s GMA

Once leading corporate America, General Motors is organized into seven major business units. The largest one is General Motors Automotive (GMA), which consists of GM North America (GMNA), GM Europe (GME), GM Latin America/Africa/Mid-East (GMLAAM), and GM Asia Pacific (GMAP). The other business units mostly support GMA, and include GM Service Parts and Operations, GM Powertrain, OnStar, XM Satellite Radio, and GM Electro-Motive. In addition, there is the General Motors Acceptance Corporation (GMAC), which is a financial services division that supports GMA and partly spun off recently. The two main sales channels for General Motors are dealerships and fleet sales. Fleet sales make up about 26% of GM’s total sales. There are 7,700 retail outlets in North America, 800 in Canada, 260 in Mexico, and 15,500 overseas (GM Annual Report 2003).

GMA’s interaction with dealerships is managed using the Vehicle Ordering and Management System (VOMS), Production Order and Material Scheduling (POMS), and Materials Global Organization (MGO). VOMS allows the dealers to enter orders, check the status, and see the
shipment dates, as well as modify their orders. The order is then sent to POMS. POMS receive and aggregate information from all orders, and then schedule production. It first determines the location of production by choosing one of the plants, and then lays out a weekly production schedule. The schedule is usually determined 20 weeks in advance.

8.3.3 Analysis of General Motor's GMA

As mentioned earlier, GMA’s major customers are dealerships and fleet purchasers. As a mature product, automobile is seldom perceived as technology bearer, and combination of price and lease variations are used to push dealerships to carry more inventories. Accordingly, dealerships constitute an almost purely price driven retail channel. However, GMA is making huge efforts to introduce new technology/trend bearing models such as the hotly promoted hybrid models. These efforts are obviously targeted at technology driven customers. To mitigate the effects of model proliferation, GMA offers non-critical customizations to customers to diversify its product lines. In summary, GMA’s automotive products are characterized by High Volume, Low Customization, and Assemble-to-Order.

Given its traditional leading position in US auto market, GMA holds medium bargaining power over dealerships. But threatened by the fierce competition from Japanese and Korean automotive manufacturers, the bargaining power is diminishing. Partly as a result of the increasing competition, GMA created VOMS to improve collaboration with dealerships. Clearly, GMA’s collaboration with dealers/channels is mainly at the operational and tactical level – CCC-1 and CCC-2 Collaboration. Given that the dealership is its major sale channel,
collaboration with dealership plays a significant impact on GMA’s sales and consequently its overall business performance.

8.4 Computer Industry

8.4.1 Characteristics of Computer Industry

The computer industry has two major segments: software and hardware. Our research focused mainly on the computer hardware industry, which can be segmented into three broad product groups: the personal computers, the servers, and the workstations. These three product groups meet distinct customer needs, and firms in this industry often compete in each of these product groups separately.

The personal computer segment includes desktops, notebooks, and other computer peripherals and is targeted at both businesses and individual customers. The server segment includes mainframes and supercomputers and is mainly targeted at business customers and high end research institutions. The workstation segment includes high-end computers that are used for engineering purposes.

The personal computer business is the largest segment in the whole computer hardware industry, as well as fiercely competitive. The growth of this segment is primarily driven by exploding consumer demand. In this segment, the notebook has driven the majority of the new sales because of aggressive price cuts and improved technology. Because of price pressures, the
personal computer segment is fairly consolidated, with only five leading players, namely Dell, HP, IBM, Fujitsu, and Simens (IBM spun off its personal computer division to Lenovo in 2005.)

The server market can be subdivided into three categories based on usability and performance of servers: entry-level server, the midrange servers, and the high-end servers. The leading players are IBM, HP, Sun, Dell, and Fujitsu. As personal computers have become stronger, they have increasingly become capable of handling many of the high-end engineering and scientific tasks for which workstations were traditionally used. Due to the cannibalization of the demand by personal computers, the revenue share of workstations has constantly declined in the recent past.

8.4.2 Characteristics of IBM’s Servers and Business Consultancy

IBM has four business groups - the Hardware Group, the Software Group, the Global Services Group, and the Global Financing Group. The Hardware Group consists of three sub-groups: Technology, Personal Systems, and Systems. The Technology Group is the main R&D arm of IBM that is responsible for developing the core technologies used in IBM Computers. The Personal Systems Group (now owned by Lenovo) manufacturers personal computers, printing systems, and various retail points of sales solutions. The Systems Group manufactures IBM’s flagship servers and storage products, and the Software Group manages the database information management software. The Global Services Group is one of the largest groups in IBM that consists of the Business Consulting Services, On Demand Innovation Services (ODIS), Application Management Services, E-business Hosting Services, Integrated Technology Services (ITS), and Strategic Outsourcing Services. The Global Financing group consists of Customer Financing, Commercial Financing, and Remarketing. This group provides financial services to
its customers to purchase IBM's various products. IBM's business value proposition is to provide software and services to its clients to improve their business performance.

8.4.3 Analysis of IBM’ Servers and Business Consultancy

With the spin-off of personal computer business to Lenovo in 2005, IBM now focuses on high-end, service driven institutional customers. Accordingly, IBM organizes production in Build-to-Order fashion so as to support highly customized total solution products. This gives IBM the required flexibility to build systems based on customers’ exact requirements. The Build-to-Order production process also helps IBM to stay abreast of the latest technology developments and provide cutting-edge solutions to its customers.

IBM’s collaboration with customer/channel is largely managed by its Customer Service Online System (CSOL). CSOL is a combination of web, telephone and subject experts for customers and channels. CSOL provides inventory online, contract online, and order status online etc., allowing the customers to take care of standard administrative needs themselves such as timely access to invoices, query for order status, and questions on services contracts. As a result, CSOL helps minimize routine interaction of customers with sale teams. This in turn increases customer satisfaction as they now get real time assistance and access to information. This also frees up valuable sales time by boosting self service, which leads to low service cost and increased customer satisfaction via more visibility. CSOL also provides information to customers in different electronic formats, enabling them to link up with IBM’s sales systems.

IBM has maintained a firm grip on the leading position in high-end total solution market. As a
result of its leading position and solid reputation, IBM enjoys strong bargaining power over its customers/channels. IBM’s customer/channel collaboration operation can be seen as strategic level multi-functional and multi-interface collaboration, which in return plays a significant part in its overall business performance.

8.4.4 Characteristics of Dell’s Personal Computers

As a direct sale icon of corporate America, Dell offers products to two groups of customers: high performance servers, desktops, workstations, and notebooks for business and large institutions group and cost-effective desktops and notebooks for consumer group. Dell aims at being the lowest price provider of standardized computers. Its operating model is characterized by direct sales and Assemble-to-Order. For the configuration of products, Dell sticks to standard components and technology which enables Dell to offer product customization and continuous upgrade of technology without significant process changes.

Dell sells products mainly through two channels: the web based transactional channel and the sales force driven relationship channel. The transaction channel serves online procurement of desktops and laptops by individual users and the relationship channel serves bulk orders from the government, educational institution, and businesses. Meanwhile, Dell still maintains Television, Internet, mail, newsletters and stores presence to meet the demand of small- and medium-scale business customers and individual consumers.
8.4.5 Analysis of Dell’s Personal Computers

Dell engages in intensive demand shaping to steer customer demand by changing price and delivery time and free upgrades. Such direct interaction with customers/channels enables Dell to leverage real time demand information for aligning its supply chain. The ability to dynamically match demand and supply reduces Dell's operational cost and delivery time. Dell follows Assemble-to-Order production strategy, which not only saves inventory carrying cost including obsolescence cost but also allows customization of computers as requested by customers.

Although Dell has entered the high-end market segment to compete with IBM and HP, its targeted customer segment is still price conscious. Through direct sales and close interaction with customers and channels, Dell strikes a perfect balance of high volume and medium customization. Positioning itself as a price leader, Dell is firmly in control of the low-end computer market. Such a corporate image provides Dell with strong bargaining power. Dell's collaboration with customers and channels covers new product development, customer service, and demand management – the strategic collaboration, CCC-3.

8.5 Consumer Packaged Goods (CPG) Industry

8.5.1 Characteristics of CPG Industry

The Consumer Packaged Goods industry can be broadly categorized into Food and Beverage, Footwear and Apparel, Cleaning Products, Consumer Electronics, and Personal Care Products which includes cosmetics and toiletries. The direct customers of CPG companies are retailers and distributors. But CPG companies must understand the end customer segments for their
products and market their products to them instead of retailers or distributors. Typically, CPG products are Made-to-Forecast/Stock and held as inventory in the vendor’s warehouses or distribution centers until an order is placed. Many CPG companies outsource their production as it is not considered a means of gaining competitive advantage. There is an increasing demand for higher-margin items, and the customer segmentation is becoming more important. In addition, private labels and premium brands have also become more prevalent.

The demand for CPG goods is affected by many factors including advertising and marketing, price and household income, and product innovations. It is important for manufacturers to keep these factors in mind when developing new products as well as throughout the life cycle of the products. Of late, CPG has started moving towards Demand Driven Supply Network (DDSN). Compared to the traditional cost-based supply chain view, DDSN focuses on value and profit and optimizes opportunity against risk.

Having the right product at the right place at the right time at the right price for the targeted consumers is the operational paradigm for CPG companies. The number of stock keeping units (SKUs) in the CPG industry has increased by 20-50 percent since 1993, but the time an average consumer spends shopping has decreased by 25 percent (Drayer, 1999). This indicates that consumers have more products to choose from in a shorter time than a decade ago. With so many new products that are only slightly improved entering the market everyday, the consumers are faced with a challenge every time they visit a retail store and stand in front of the shelves to choose a product. Unfortunately, it is still impossible to meet customers' exact needs, since their desires are becoming more specific, more diversified, and thus less predictable.
8.5.2 Characteristics of Procter & Gamble

With 16 billion dollar sales revenue and over 300 branded products in more than 160 countries, Procter and Gamble (P&G) is one of the biggest players in the household products market around the world. According to its annual report, the main business goal of P&G is “to focus on providing branded products of superior quality and value to improve the lives of the world’s consumers.”¹

P&G divides its business into three segments: Beauty Care; Health, Baby and Family Care; and Household Care. P&G’s core products are Baby Care, Fabric Care, Feminine Care, and Hair Care. P&G is the global market leader in all of these categories, both in terms of market sales and market share. P&G’s products are sold primarily through retailers, wholesalers, grocery stores, membership club stores, and drug stores. About half of P&G’s sales volume comes from retailers that operate their own distribution centers and warehouses, while the other half comes from wholesalers who serve smaller chains and independent stores. Sales through grocery stores and membership club stores are also growing, as they continue to offer products at a lower price.

P&G’s business strategy is to be the leader of innovative branded products to the consumer markets by building strong brand portfolios and introducing innovative products to the market place before its competitors. P&G’s operating model focuses on providing high on-shelf availability with guaranteed quality. Interestingly, even though customers/channels care about quality and services, they are essentially price driven.

P&G manufactures most products based on forecasts, i.e. Make-to-Stock. P&G does not allow

¹ [www.pg.com](http://www.pg.com): Accessed April 2006
customization of products, although it entertains some requests in terms of packaging and bundling. About 10% of P&G’s production is outsourced to third-party manufacturers, and the rest is produced or assembled at P&G-owned facilities around the world. The percentage of outsourcing, however, is on the rise.

8.5.3 Analysis of Proctor & Gamble

P&G collaborates with major customers/channels in the spirit of CPFR, i.e. at the operational and tactical levels. Using Electronic Data Interchange (EDI), P&G gathers from retailers daily sales data which is then used to determine the shipments to the respective retailers. P&G has played a leading role in the launching of Efficient Consumer Response (ECR) initiative with focus on Efficient Assortment, Efficient Product Introductions, Efficient Promotion, and Efficient (continuous) Replenishment.

P&G manages orders using Ordering, Shipping, and Billing (OSB) system that integrates all pricing, ordering, shipping, invoicing and credit system activities related to serving channels. This system allows P&G to integrate its ordering, shipping, and billing data with its customers’ information system, hence enabling its customers to focus on end consumers by providing better service and marketing new products rather than spending time on unproductive procurement processes. P&G treats the value chain as a network of partners rather than a linear set of links in a chain. It collaborates with all downstream partners in the network by using POS information to facilitate store-level visibility based replenishment and to do collaborative production and capacity planning.
P&G deploys dedicated cross-functional sales team - Customer Business Development Team (CBD), to serve a single major customer. Beginning with Wal-Mart, P&G now has more than 80 CBD teams to serve its most strategic customers. This allows P&G to face key customers as a single company. These teams enable customers to grow profitably in P&G's product categories by satisfying consumer demands more effectively. In short, P&G invests heavily in collaborating with customers to drive out non-value added activities and processes from the supply chain. The effects of deployment of CBD can be comprehensively illustrated using the collaboration between P&G and Wal-Mart, which is worth further analysis.

P&G sells high volumes of almost all products through Wal-Mart. Given that both are enjoying leading positions in their respective industries, there is a balancing of bargaining power. P&G collaborates with Wal-Mart on replenishment, forecasting, and planning at multiple interfaces, multiple levels, and multiple functions, which can be further explicitly demonstrated by Figure 8.1 as created by M. Grean and M. Shaw (Grean, 2000). However, it appears that there is a lack of collaboration at a strategic level for driving collaborative new product development or production. The collaboration between them can be categorized as CCC-1+2.

Figure 8.1: P&G vs Wal-Mart: Transformation of Collaboration from single to multiple interfaces/levels/functions
8.6 Petroleum industry

8.6.1 Characteristics of Petroleum Industry

This industry is the foundation of any national economy. The petroleum industry value chain can be divided into upstream and downstream activities. The upstream activities cover the exploration, production, and transportation to the point of transformation into final products of crude oil and gas. The downstream activities deal with the processing of crude oil in refineries and the distribution and marketing activities of all the oil derived products. This analysis will focus on the downstream activities, i.e. the refining and fuel marketing activities that result in products used in everyday life and in the petrochemical industry.

The petroleum downstream serves customers through two channels: the direct delivery to big consumers and the retailers selling through a network of service stations. The petroleum downstream customer base can be divided in two types of customers:

- Wholesale customers: Petrochemical manufacturers, power plants, transportation companies, and other industrial customers.
- Retail customers: individuals who use the fuels essentially for transportation and domestic heating.

The main channel of fuel retailing is the network of service stations. The service station can be further divided into branded or non-branded, depending on whether the service station is using the brand image of one of the major integrated oil companies or not. Although major oil companies strive to differentiate their gas stations by offering value-added premium services, the petroleum downstream industry is usually characterized as a mature and competitive industry (Hackworth, 2004; Roeber, 1994).
8.6.2 Characteristics of Exxon Mobil

Exxon Mobil is the world’s largest non-public oil company in terms of sales, profits, and market capitalization. It is a vertically integrated oil company with presence across the entire oil supply chain. Its upstream activities focus on the geological exploration and production of hydrocarbons. Its downstream activities focus on providing finished products and feed stocks to customers, mainly through global supply organizations. The refining usually takes place at in-house refineries. The global supply organizations coordinate and optimize the supply of crude and feedstock to the refineries, the mix of products manufactured, and the working inventory levels. With a globally diverse customer base, Exxon Mobil’s downstream business units service local consumers all over the world using standardized business processes and marketing programs.

8.6.3 Analysis of Exxon Mobil’s Downstream Activities

Being highly vertically-integrated, Exxon Mobile owns the entire downstream supply chain, and controls interactions from the refining point of oil to the final sales to end consumers. As a result, all interactions along the supply chain are internal affairs of Exxon Mobile, giving it absolute bargaining power and discouraging collaboration with customers, i.e. CCC-0. What Exxon Mobil can do in terms of customer collaboration is to leverage its bargaining power and the current soaring oil price to exploit all three level collaborations with customers so as to prepare itself for challenges such as dramatic drop in oil price, depleting oil reserves, and development of substitutes for oil.
8.7 Pharmaceutical industry

8.7.1 Characteristics of Pharmaceutical industry

The pharmaceutical industry is very unique in its business operations. Of late, it is plagued by pricing pressures, lack of Research & Development productivity, heavy regulations, quality issues, and explosion of generics, to name a few obstacles. While both the managed care organizations and the patients constantly complain about the high prices of patented drugs, the new drug development cost, as well as associated operational costs, has risen dramatically. The pharmaceutical distribution is also under turmoil and under pressure from manufacturers and customers, such as hospitals and drug stores. In other words, the whole pharmaceutical supply chain is fraught with inefficiencies and undergoing rapid transformation.

In addition to the current challenges, the pharmaceutical manufacturers have to be ready for a dramatically different world while improving operational efficiency. Some of the upcoming challenges facing the pharmaceutical industry include:

- Personalized medicines
- Move from mass production to batch production
- Move to multi-channel fulfillment and more involvement with downstream activities and direct interactions with consumers
- Outsource or collaborate with external resources to improve Research & Development efficiency.
8.7.2 Characteristics of Eli Lilly and Cardinal Health

As a leading pharmaceutical manufacturer, Eli Lilly’s operations focus on innovative drug development, marketing and sales, high availability, and consistent quality. With customer response and asset utilization as two major metrics of measuring performance, Eli Lilly’s operating model is characterized by:

- High customer service level
- Exclusive marketing
- New product development and innovation oriented
- Make-to-Stock, Push-to-Market, maximal Assets Utilization Rate
- High inventory level and high reliance on distributors
- Integrated Launch Management for global introduction of new drugs

As a leading pharmaceutical distributor, Cardinal Health’s operations focus on new products and services, warehouse network and capacity, flexibility, and speculative buying opportunities. Two metrics of measuring operational performance are customer response and efficiency. To improve customer response, Cardinal offers multiple value added services to both customers and pharmaceutical manufacturers. To pursue operational efficiency, Cardinal has strong purchasing teams that employ yield management techniques, and maintains large warehousing network to ensure high availability, and keep large amount of working capital to exploit speculation opportunities.
8.7.3 Analysis of Collaboration between Eli Lilly and Cardinal Health

The supply chain of pharmaceuticals includes four essential parts: development, manufacturing, distribution, and sales, and in our case it corresponds to Lilly, Cardinal, and hospitals/end consumers. The product is patented medicines. Its production model is Make-to-Stock.

It can be argued that Lilly does not enjoy a strong bargaining power over Cardinal. Currently, due to dramatic changes underway in the distribution model, there is some friction between Lilly and Cardinal and the supply chain appears to be disintegrating. In any case, the collaboration between Lilly and Cardinal is at best operational and tactical, i.e. CCC-1 and CCC-2. At the same time, both companies are involved in pursuing other opportunities or even attempting to encroach into each other’s territory. While fully owning the upstream activities like development and manufacturing, Elli Lilly is increasingly looking at downstream activities through collaboration with multiple channels, although Cardinal, as a distributor, is still dominating the interaction with hospitals/end consumers.

Indeed, the ability to manage drug distribution will allow Elli Lilly to become more flexible. Direct involvement with the downstream activities will also allow Lilly to better introduce new products and supply hospitals/consumers more effectively. But uncertain about trend of the supply chain of pharmaceutical industry, Lilly is also strengthening its collaboration with distributors by way of VMI, multiple distribution channels, etc. Faced with expansion pressure from Lilly, Cardinal is also exploring its own initiatives to grow in other areas. Its main efforts are focused on developing contract manufacturing and hospital services as it moves from Buy-and-Hold model to Fee-for-Service model in the distribution domain.
According to Singh, the future of the pharmaceutical supply chain is a ‘networked’ pharmaceutical model, where major pharmaceutical companies will eventually perform only 40% activities in-house and most of the remaining activities will be conducted externally, via a carefully selected, risk-managed portfolio of outsourcing arrangements and strategic alliances (Singh, 2005). This model can provide pharmaceutical manufacturing with agility, lead time reduction, rapid market access, and better resource utilization. The pharmaceutical supply chain in the future will most probably use a Blockbuster video type revenue sharing collaboration model to coordinate its actions. This model offers tremendous opportunities to all partners to boost their revenues and profits. Singh further concludes that this type of supply chain coordination will end up with a proliferation of distribution service providers and, consequently, a dilution of the market share of the big three distributors. Such fragmentation of the distribution service provider base will lead to increase in competition and improvement in customer service and operational efficiency. The best option for the big three distributors in this case will be to exit the field (meaning no collaboration between major manufacturers and big three distributors any more) and focus on other lucrative business opportunities that will be available to them due to their healthcare expertise and availability of ready cash.

It is also possible, however, that Cardinal will not allow Lilly to cultivate potential substitutes by offering better service and value. Given its centralized management system, Cardinal will not remain passive and allow Lilly to make sweeping changes. One potential solution for Cardinal might be to reach a nation-wide revenue-sharing agreement with Lilly as well as its competitors, i.e. move from the current CCC-1 and CCC-2 to CCC-3, and collaborate with major pharmaceutical manufacturers at all three levels.
8.8 Retail industry

8.8.1 Characteristics of Retail Industry

Retail industry covers both products and services sold in stores, through catalogs, and through the Internet. Although luxury goods play an important role in the recent growth of Retail industry, the majority of Retail industry is still dominated by mass merchandise retailing within traditional and internet channels. The products of Retail industry can be grouped into various categories, such as apparel, consumer packaged goods (CPG), groceries, entertainment media, and other luxury goods such as jewelry and automobiles. Retail also includes services, such as after sale automotive services. Another categorization of retail products is to separate them into durable goods, such as automobile and furniture, and non-durable goods, such as general mass merchandise, apparel, and grocery items. Retail industry can also be divided based on retail outlets: department stores, general merchandise, stores, hypermarkets and supermarkets, specialty stores, and Internet and value-based high-end retail, moderate retail, and deeply discounted retail.

Clearly, Retail industry has an extremely broad scope. Based on the recent developments, general merchandising and Internet retailing offer an effective way to segment Retail industry. Leading companies in these categories are Wal-Mart and Amazon.com respectively. Wal-Mart primarily serves customers through physical retail locations and Amazon.com does so through an online storefront with distribution provided by Amazon.com, partner distribution centers, and third-party companies.
Understanding demographic patterns and customer segmentation are vital to retailers’ business successes. With such understanding, retailers can determine the spending patterns of their targeted customers and adjust their inventory and sales models accordingly. In both mass merchandising and Internet retailing, customers look for availability of a wide selection of products at reasonable or low prices. In response to such expectations, Retail industry attaches high attention to inventory management policies and supplier vs retailer relationships so as to achieve high on-shelf availability at low cost. The increasing competitiveness of the retailing environment, especially for mass merchandisers, has exerted significant pressure on already low profit margins. As a result, more efficient operations are paramount to further lower inventory levels to reduce overall supply chain costs without affecting availability. Consequently, collaborative efforts are hotly pursued by Retail industry to globally optimize the supplier vs retailer relationships.

Multi-channel retailing has become a mainstream trend in Retail industry, especially with the introduction of Internet retailing. Shoenbachler and Gordon discuss the importance of multi-channel retailing for the survival of retailers (Schoenbachler, 2002). Studies have shown that multi-channel retailers, who first had a traditional retail outlet and then established a web presence, acquired double the consumer click rate of retailers who were only Internet-based. This development shows the importance of establishing a brand-recognition with consumers through traditional retail outlets and then making products available through other retail channels such as Internet to increase sales and brand name presence.
8.8.2 Characteristics of Wal-Mart and Amazon.com

Wal-Mart is considered a mass merchandiser and it is the top retailer in the world in terms of annual revenue. Wal-Mart’s business strategy is to provide “Every Day Low Prices” or EDLP for all of its products and services. As a result, Wal-Mart guarantees that its overall prices are consistently lower than most retailers. Wal-Mart competes on Efficiency, Service, and Utilization Rate. Wal-Mart’s operating model is based on efficient flow of products through its distribution processes and finding a balance between customer service levels, supply chain efficiency, and asset utilization. Wal-Mart’s three business units are Wal-Mart Stores, SAM’S CLUB, and their international retailing business. Within Wal-Mart Stores, there are three different types of retailing facilities: Discount Stores, Super-centers, and Neighborhood Markets.

Amazon.com started as an online bookseller but later expanded into a wide variety of media, electronics, and other general merchandise categories seller. Amazon’s business strategy is to “offer customers low prices, convenience, and a wide selection of merchandise.” Amazon.com competes on selection, convenience, and competitive pricing. Amazon.com’s operating model, multi-tier inventory network, and efficient distribution center processes enhance Amazon.com’s competitive edge in selection, convenience, and price.

Amazon.com is an Internet retailer accepting orders through the Amazon.com website, or the website of a partner store. Amazon.com is responsible for the technology, inventory, and fulfillment of the order. Amazon actually acts as an intermediary platform which utilizes third-party sellers who own inventory and distribute products to customers. This operating model allows Amazon.com to offer a wide selection of products while minimizing operating costs. As
a pure Internet retailer, Amazon.com has no retail outlet. Amazon.com employs a three-echelon inventory management system where orders may be filled by Amazon’s distribution centers, wholesalers and suppliers, or other third parties. A novel aspect of Amazon’s supply chain network is the utilization of supply chain partners to deliver orders directly to customers. These partners include book distributors, publishers, manufacturers, and independent third-party sellers. Shipments from these partners bypass the Amazon.com internal distribution center network.

8.8.3 Analysis of Wal-Mart and Amazon.com

Wal-Mart and Amazon.com share common principles in leveraging supply chain capability to support their business strategies. Both of them attach high attention to the one-stop shopping experience, on-shelf or online virtual availability, operational efficiency, process profiling, partner collaboration, IT capabilities, and leveraging scale. Excellent supply chain management is probably the most important reason why Wal-Mart and Amazon.com can sustain and reinforce their lead in the highly competitive, low-margin Retail industry.

To examine Wal-Mart, we look at its merchandise products and their end consumers. The customers in this segment are mainly driven by price. The products are characterized by high volume, low customization, and Make-to-Stock (shelf). Wal-Mart enjoys bargaining power over end consumers due to its size and low prices. However, it seems that, besides public image campaign, Wal-Mart is paying little attention to collaborating with end consumers, although Wal-Mart does have the chance and channel to attempt some strategic collaboration with end consumers, namely collaborative production and demand shaping.
Amazon.com is also selling similar products and serving similar customers as Wal-Mart does. Its customers are also mainly driven by price. In contrast, Amazon.com does have some collaboration initiatives. One example is its “Product Wiki”. Amazon allows “customer editable product information” to appear right alongside the items the customers are browsing. This initiative allows customers to design their own purchasing package, in the bargain saving Amazon cost in providing similar services and boosting customer satisfaction. This practice is similar to those of various companies such as the Internet-based online customer community for after-sales services set up by Hewlett Packard and the online configuration and customization services provided by Dell as mentioned by some practitioners during the interviews (discussed in section 6.1.3). This kind of collaboration can be categorized as CCC-3 collaboration.

8.9 Telecommunication Industry

8.9.1 Characteristics of Telecommunication Industry

Telecommunication industry is the driving force behind the dramatic shifts shaping the future. Nowadays, computer networking and telecommunication have practically become one. One evidence of this phenomenon is that products required for Internet network and telephony network are manufactured by the same company. Moreover, both networks are providing services that were traditionally within the scope of the other network; both are targeting voice, data, and video services. The market is increasingly seeking end-to-end solutions and rapid introduction and adoption of new technologies. Other characteristics of this industry are the heavy R&D investment and the quick shift towards any new technology. To follow such trends, companies have to improve their abilities to correctly forecast demand and adjust manufacturing
abilities at a short notice. This in turn encourages the use of outsourcing for achieving desired flexibility through contract manufacturers. It also highlights the need to boost customer collaboration to obtain better demand information and make better forecasts.

Key customer segments in this industry include enterprises (large corporations, governments, and educational institutions), service providers (datacom and telecom, cable companies, and wireless service providers), and small and midsize businesses, home offices and residential users. Different sales methods are used to serve these segments, with many vendors using a two-tiered approach with direct sales focused on large corporate clients and distributors versus re-sellers for smaller corporate and individual customers.

8.9.2 Characteristics of Cisco
Cisco’s strategic goal is to dominate the networking market by offering end-to-end networking solutions. It is widely agreed that Cisco leads market shifts through its aggressive acquisition practices and effective marketing and excellent execution. Cisco’s success has forced other competitors to scramble to meet the standards it sets. While manufacturing and labor management are not considered core to its success, Cisco views engineering and design, managing supply base, acquisition and virtual manufacturing as its core competency. Cisco also views the network as a strategic asset, rather than as an operating expense. Essentially, Cisco acts as an information exchange facilitator and project manager even without touching manufacturing of physical products.
Cisco divides its customer base into three groups: Enterprise, Small and medium business, and Service provider. Cisco’s sales pitch is built around selling end-to-end enterprise-wide solutions. In addition, Cisco offers free consulting services not only to provide customers with valuable insights, best practices, and support, but also to help Cisco generate demand, identify technology trends, and capture signals of customer needs. In terms of total revenues, about 20% is generated by direct orders from end customers, while the remaining 80% is generated through distributors.

8.9.3 Analysis of Cisco

Cisco produces a wide array of products, ranging from high volume/low customization to low volume/high customization. However, we will focus on one of its major products/services, namely end-to-end networking solutions. This product/service is targeted at enterprises or service providers, both of which are mainly interested in Cisco’s innovative technology in addition to high service level and fair price. Despite being a global leader in telecommunication space, Cisco does not enjoy significant bargaining power over these customers, since these customers, to an extent, monopolize their local markets.

Evidently, Cisco collaborates with customers at both operational and tactical levels since it:

- maintains complete visibility into distributors’ inventory and control their inventory level, thus avoiding pile-up at distributors, facilitating new product introduction, and reducing costs of returning products from distributors,
- recognizes only 20% of the revenues at the time of the sales to the distributors, and the rest is recognized at the time of the final sales to the end customers,
- emphasizes and guarantees consistent rather than unreliable short delivery times,
assists customers in improving business processes and capturing business opportunities, thus creating demands for Cisco itself, and

provides customers with “free” consulting.

8.10 Guidelines for Effective Customer/Channel Collaboration

Using the framework created in Chapter 7 and the preliminary findings summarized at the beginning of this chapter, companies can examine their own customer/channel collaboration operations and explore collaboration possibilities with customers/channels.

First, a company can look at other companies who fall into the same group. If other companies in the group are collaborating with their customers/channels but the company is not, the company should compare its business models and bargaining environment with those of the others and decide whether to follow. Second, if a company notices that characteristics of its customer/product are shifting toward another group, it should look at the customer/channel collaboration operating model of the other group and plan to adjust its own customer/channel collaboration operations accordingly. Third, even if a company is leading one group, it should continuously examine its own customer/channel collaboration operation and attempt to move from operational level to tactical level and finally to strategic level.

However, before rushing to implement any operating models in customer/channel collaboration, companies must first understand the value proposition of collaboration to their business.
Customer/channel collaboration can be implemented and run well only if certain pre-requisites are met, namely,

- Trust between companies and their customers/channels is an absolute pre-requisite for any form of customer/channel collaboration.

- Dedicated vehicles/organizational units acting as a bridge between the companies and their customers/channels that understands both worlds.

- Means to facilitate information exchange to boost shared understanding and promote trust.

It is important that customer/channel collaboration’s benefits are clearly recognized and appreciated. According to Stowe Boyd and Markus Zirn (Boyd and Zirn, 2002), the value of customer/channel collaboration is reflected in both real cost saving and increased customer satisfaction. In many organizations, customer support (collaboration) costs are considered as purely a large portion of Cost of Goods Sold. Emphasis on both cost savings in customer supports and increased customer satisfaction leading to higher sales can trigger real interest from top management.

In addition, companies should also recognize the technology infrastructure necessary for deploying customer/channel collaboration. Compatible database management system between companies and their customers/channels is the first step to deploy any kind customer/channel collaboration model.
Finally, companies can follow the hierarchical progression from operational, tactical, and strategic levels to seek opportunities for improving collaboration with customers/channels in the following specific functions.

- Collaborative Replenishment
- Collaborative Sales Forecasting, Identify Exceptions for Sales Forecast
- Collaborative Planning
- Collaborative Production
- Collaborative Sales Planning, Resolve/Collaborate on Exception Items
- Collaborative sales
- Collaborative new product development
- Collaborative customer service

After evaluating their capabilities in each of the above mentioned areas, companies can decide whether to pursue customer/channel collaboration. If the answer is yes, companies can use the framework described in the Chapter 7 to examine their own business model. For different customers/channels, companies also need to judge their bargaining power against them. Based on the business model and bargaining power, one or several realistic operating models in customer/channel collaboration can be selected. Thereafter, companies should benchmark their performance and compare with the leading companies with similar customer/channel collaboration model. Finally, a detailed implementation plan should be prepared and executed.
Elevating Performance: Collaborative Fulfillment

9.1 Integrated Fulfillment & Collaboration

Companies constantly wrestle with the trade-off between better service and lower cost. During the course of our research, we found that it is not always necessary to make this trade-off. We also found that fulfillment leaders shared a common trait and that was their ability to figure out how to make simultaneous improvements in cost and service. According to a research report by Accenture, more “inter-company collaboration is needed to allow companies to do both well” (Accenture, 2004). Our research also supports this point of view. We believe that the value of customer/channel collaboration is reflected in both real cost saving and increased customer satisfaction. Therefore, companies that hope to excel in fulfillment must invest in collaborating with their customers and channels.

Essentially, uncertainty makes servicing customers costly. To maintain high service levels, companies take many actions that are far from optimal, such as building up inventory to buffer against uncertainty and scheduling deliveries using LTL (Less-than Truck-Load) to meet variable demand. Collaboration with customers/channels can help in reducing this uncertainty. The key to collaboration is availability of precious information. Collaborative operating models such as Continuous Replenishment and Co-Managed Inventory provide companies with more accurate demand signals from customers/channels that allow companies to be more responsive to
customers/channels, resulting in higher customer satisfaction. Additional benefits, such as reduction in inventory and transportation cost savings, are also common.

Meanwhile, in many channels, the materials management function of the customers performs many activities that duplicate the fulfillment activities of the vendor. For example, vendors pick and pack an order and deliver it to the customer’s receiving area, where it is unpacked by the customer for storage in the customer’s stockroom. The items are re-picked and packed when an order is received from downstream locations. Thus, products move from the vendor’s shelves to the customer’s shelves interrupted by a number of non-value adding activities. Operational collaboration such as Vendor Managed Inventory eliminates these redundancies so that both companies can avoid duplication of work.

Furthermore, forecasting uncertain demand is also costly. In an uncertain environment, companies must constantly update demand information and adjust forecasts using expensive information and technology solutions. In such a situation, tactical customer/channel collaboration models can allow companies to work with customers/channels on forecasting and planning, mitigating the impact of uncertainty and consequently develop better production plans and superior capacity investment decisions.

Strategic customer/channel collaboration can help companies make unique offerings and design value differentiators that leverage joint capabilities of companies and their customers/channels. This association can create additional demand for the whole supply chain, and even erect entry barriers to keep competition out. Strategic models of collaboration such as postponement of final
assembly to the customer can save money, reduce delivery lead time, and provide customers with flexibility of customization, thereby improving customer satisfaction and generating more revenue. Collaborative revenue sharing lets customers/channels order more with the same capital, allowing them to capture more demand and eventually generate more revenue. Collaborative new product development helps companies to obtain insights into customers’ demand patterns and develop new products that better fit customer expectations while saving new product development cost. Collaborative customer service allows customers to serve each other, thus improving service level while saving cost and even improve companies’ knowledgebase.

In short, the primary benefit of strategic collaboration is to harness the power of vertical integration without the downside of financial ownership. The resulting strategic alliance brings together the best of vertical integration and outsourcing while minimizing their respective disadvantages. Moreover, strategic collaboration can also enable companies to build knowledge about the aggregated demand and develop business intelligence. It is especially worth mentioning that, while improving both cost and service level, customer/ channel collaboration also frees up customer service resources to undertake other value-added services that can further enhance customer satisfaction.

9.2 Collaborative Fulfillment Portfolio

Our research suggests that the degree to which a company collaborates with its customers and channels depends primarily on the criticality of fulfillment to its business model, which in turn is shaped by two factors:
The fulfillment-criticality of the company’s product, and

The bargaining power of the channel.

In this section, we will apply these two critical dimensions in conjunction to propose a collaborative fulfillment portfolio as shown in Figure 9.1:

![Collaborative Fulfillment Portfolio Diagram]

**Figure 9.1: Collaborative Fulfillment Portfolio**

The portfolio provides a general framework for companies to determine the appropriate level of customer/channel collaboration based on their product’s characteristics and the relative influence they have over their customers/channels. For example, there is little to gain from thinking in terms of collaboration for a small company selling a commodity product to a large retailer such as Wal-Mart (Quadrant I). In this instance, any “collaboration” will effectively be enforced by the needs of the customers/channels. The best that the company can do in this situation is to produce at the lowest cost so as to sustain margins, hence resulting in CCC-0 (no collaboration).
On the other hand, firms in Quadrant III should consider CCC-1 because they are faced with the most demanding situation in terms of fulfillment. Fulfillment is highly critical for their products and they have the added pressure of delivering high service at low cost to a more powerful customer/channel partner. As such, they are likely to receive the most benefits by working closely and integrating operations with the customers/channels through initiatives such as CRP and VMI. In contrast, if the company is a large commodity producer and its customers/channels are small retail stores (Quadrant II), then there is lower need for operational collaboration from the producer’s end since it can dictate replenishment terms at will, e.g. all stores must take 20 cases of goods per month. In this case, the company will benefit more from strategic collaboration (i.e. CCC-3), such as soliciting input from its customers/channels on trends in consumer preferences that can be used to develop new products, or postponing final assembly to customers/channels, which saves assembly cost and delivery lead time and can also improve customers/channels satisfaction.

Finally, firms in Quadrant IV will benefit the most by collaborating with its customers/channels on all levels. Although these firms have higher bargaining power relative to their customers/channels, they do not want to simply push products onto the customers/channels and let them bear the risks (costs of stock-outs and holding inventory) as this is likely to quickly lead to the demise of the customers/channels or a defection to other producers. Additionally, poor service in the customers/channels such as low product availability will eventually reverberate back to the company in the form of lower sales and poor reputation. Thus, in addition to using customers/channels to obtain market intelligence (CCC-3) and as a source of planning information (CCC-
2), companies in this quadrant also need to operate closely with their channels (CCC-1) to ensure high fulfillment performance.

Once a company has determined the appropriate level of customer/channel collaboration, it should focus the collaborative efforts on improving fulfillment performance in the area that has the most impact on its customer value proposition. For example, a low-cost commodities producer in Quadrant II will want to collaborate with its customers/channels in developing strategic new ways to lower distribution costs, increase inventory turns, and maximize availability. Similarly, a manufacturer of trendy items in Quadrant III should work closely with its customers/channels on an operational level to ensure high flexibility, responsiveness, and speed in delivery products to the market. Likewise, a service-oriented company in Quadrant IV can benefit from all levels of collaboration to improve customer satisfaction by finding new ways to ensure that the product is provided defect-free, on time, and accurately.

9.3 Recommendations for Further Research

The consolidated framework outlined in this chapter is created based on literature review, practitioner interviews, and examining twenty-one leading companies across nine industries. As a whole, the framework can be used to examine any company/customer/product in any industry. Indeed, this framework has its limitations. To further strengthen this framework, we recommend the following steps.

First, more interviews with practitioners and an extensive investigation of the representative companies should be conducted. Most importantly, a variety of additional companies should be
examined to validate the framework and synthesize additional operating models for Order Promising/Fulfillment and Customer/Channel Collaboration.

Second, needless to say, the effectiveness of this framework is heavily dependent on the type of companies investigated. Most of the information regarding companies used to validate the framework is sourced from SC2020 Phase I research, which primarily covers leading companies across various industries. A lack of non-leading companies in the sample data might bias the framework as well as resulting guidelines.

Third, criticality analysis requires further research to identify more metrics to measure Order Promising/Fulfillment and Customer/Channel Collaboration performance and to assign appropriate weights to each metric in order to develop an aggregate fulfillment and collaboration index. The fulfillment and collaboration index can be then used to benchmark Order Promising/Fulfillment and Customer/Channel Collaboration performance across companies and industries. Correlation between Order Promising/Fulfillment and Customer/Channel Collaboration performance and overall business performance need also to be further quantified and analyzed.
Bibliography


