

# New Supply Chain Business Models – The Opportunities and Challenges

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**Recent developments in supply chain management offer the potential not just to cut costs but also to generate new revenues and higher profits. The remaining challenge is to link these novel approaches together to garner the competitive rewards of a synchronized supply chain.**

A casual reader browsing the three editions of ASCET might be tempted to conclude that little has changed. Isn't success basically a matter of excelling at design, manufacturing, procurement, and logistics and then synchronizing all these supply chain activities together?

However, closer review demonstrates how rapidly supply chain management has matured. Our original lead article concerned key concepts such as supplier relationship management, supply chain compression, collaborative design, and planning. By the second edition, the explosion of e-commerce methods such as e-design, e-mediaries, Web-based planning, and e-fulfillment was giving life to these ideas.

We have always warned that these changes go beyond iterative process improvements and herald entirely new ways of conducting business. This year, we are at a point of evolution that allows us to examine the new business models that are emerging.

First, let's be clear about what we mean by a "business model." Succinctly put, a business model is an organization's core logic for creating value in a sustainable way. For profit-making enterprises, that means how it makes money over the long haul – not just the most recent quarter.

That means more than an approach to pricing, more than a value proposition, and more than an organizational form. So business models described as "free through the Internet," "competing on quality," "spin-

offs" or "outsourced" are only painting part of the picture. In Figure 1, we show a useful approach to capturing all aspects of a business model.

Clearly, business models must change, particularly in today's rapidly evolving business climate. Companies find themselves with a difficult choice, accepting the status quo, and risking competitive stagnation or redefining their business model, a journey fraught with potential disaster. Despite the inherent difficulties, many leading companies are making radical changes to their core logic of value creation.

As they do so, we consider them to be advancing on the continuum shown in Figure 2, which serves as a road map to the change journey. Maximizing the value of any supply chain involves first integrating supply chain operations within the company itself, for instance, making sales and logistics operate together with the customer in mind. The second step requires collaboration with vendors and customers, for example, on shared forecasts. The final level is synchronization of the supply chain into one logical enterprise, operating it as a fully-linked and optimized capability from suppliers to customers.

This article will take a closer look at spe-

cific changes companies are making to their business models as they move along that continuum. Forging some overlap, we believe they can be categorized into four areas: design for supply chain by supply chains; e-marketplaces; collaborative manufacturing; and integrated fulfillment. We will finish with some thoughts on bringing these four developments together to synchronize the supply chain.

## Design for Supply Chain by Supply Chains

**Creating collaborative cross-company processes to design products that meet the market's need – and can be quickly and efficiently produced.**

The following are strategies to consider:

- *Customer-Driven Design*
- *Collaborative Design*
- *Leveraging R&D Assets*

As innovation rates accelerate and product life cycles shorten, organizations face rising research and development (R&D) costs and a decreasing time in which to recoup them. Since 1993, for example, the R&D expenditure of the top 20 pharmaceutical companies has more than doubled, and it is forecast to double again by the year 2005. So companies are increasingly sensitive to three key metrics: speed-to-market; speed-to-volume; and time-to-profit.

Shifting design from a departmental and sequential process to a cross-company and concurrent one has been discussed for several years. But using traditional product data management systems and exchanging engi-

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neering data with suppliers has proved difficult, slow, and geographically limited. Flawed coordination between teams, systems and data incompatibility, and complex approval processes are common. Too often the result is late product introductions, distraction of high-value staff, quality problems, or supply chain complications.

However rapid advances in the design tools are driving companies forward in three distinct directions.

### **Customer-Driven Design**

In this strategy, customers become far more integral to the design process, making designs more relevant to the needs of the marketplace.

For instance, Fiat involved a group of key customers in the conceptual design of the next generation Fiat Punto. Through a Web-based survey, 3,000 customers effectively co-designed a car on-screen by selecting from various styles and features. The software tracked the steps that customers took when evaluating and selecting options. Over 30,000 pages of such data gave insight into how customers prioritized various criteria and directly influenced styling and concept designs.

Another idea is tightly linking design decisions to the actual sales behavior of real customers. Zara, a \$2 billion Spanish retailer of women's fashion, analyses data right from the shop floor on a daily basis. Collaborative sessions between the store manager, central planners, and suppliers then guide design decisions. Allied with a less than 15-day manufacturing cycle and twice-a-week store replenishment, results have been impressive. Zara is experiencing 25+ % same-store sales increase and 34+ % yearly increase in profits in an otherwise weak retail sector.

### **Collaborative Design**

Even a product that is wildly popular in the marketplace will be less financially successful if its design is not supply chain "friendly." Minimizing design complexities that cause supply chain inefficiencies is therefore another strategy.

This, of course, is not a new concept. The key is to have multiple partners – manufacturers, suppliers, and contract manufactur-

ers – collaborate in the product development and design process. Typically this means that one member of the supply chain checks with others on the feasibility of a design – its potential manufacturability and serviceability, the availability of components, and any possible revisions or improvements.

Unfortunately, previous technology solutions have struggled to affordably and consistently support such integrated teams. But the universal, low-cost, real-time linkage of the Internet, combined with relevant process changes, can now help to avoid many of the disconnects, time delays, and hand-off issues that occur.

For instance Adaptec, a semiconductor manufacturer, uses Extricity software to connect with its manufacturing partner TSMC in Taiwan, its assembly partner ASAT in Hong Kong, and Seiko in Japan. During product development, chip designers send chip design data and diagrams to the partners for both simulated and real-world testing. The results highlight potential improvements that are relayed to Adaptec. Since the process can be quickly iterated in real time, the time-to-product-introduction is drastically reduced.

All the major public e-markets, such as Covisint, e2Open, Converge, and Exostar recognize "collaborative design" capabilities as a crucial part of their future offerings. Exostar is an aerospace & defense e-marketplace spearheaded by BAE Systems, Boeing, Lockheed Martin, and Raytheon. It provides, as an example, features such as demand planning, real-time design collaboration, product life cycle management, easy identification of qualified sources, order tracking, and product pricing.

### **Leveraging R&D Assets**

Another strategy aims to extract more value from R&D investments. When developers of a technology or intellectual property do not have a use for their developments, other companies may still find it invaluable. Rather than relying upon secretive independent negotiations, corporations are now commercializing innovations through development portals.

In the biomedical industry,

TechEx.com offers an online forum designed around three types of qualified participants, namely licensing professionals from research institutions, venture capitalists, and corporate licensing professionals capable of bringing early stage inventions to market. The latter two groups establish a confidential profile describing the licensing opportunities that interest them. Then research institutions, owning the technology for out-license, describe their technologies to the extent that they consider non-confidential. TechEx then employs research and licensing professionals to match opportunities with the relevant parties.

Yet2.com, by contrast, has enlisted corporations and government agencies from a wide array of fields. Companies joining yet2.com commit to offering their technology for license or sale exclusively on yet2.com's website. Potential buyers can quickly search the site for intellectual property and patents relevant to their own organization. Licensing such solutions gives immediate access for significantly lower investment than an R&D program of their own. To date, Yet2.com has signed up a variety of major corporations including Boeing, Siemens AG, and Toyota that represent over 10% of global R&D expenditures.

### **E-Marketplaces**

Using Web-based marketplaces as a fast-track mechanism to a tightly synchronized supply base.

The following are strategies to consider:

- *Industry Vertical Marketplaces*
- *Private Exchanges*
- *Horizontal Aggregators*

The e-marketplace concept started as a new way to procure product, particularly non-production items. The scope of services has since widened dramatically to change the way companies manage and interact with their supply base. Their true value is now as a mechanism to greater collaboration and synchronization between organizations.

The early evolution was led by dot-com start-ups. These exchanges, however, were typically based upon charging transaction fees, a business model that can succeed but

#### **more on the web**

*An Exostar case study illustrates how the trading exchange is revolutionizing A&D. Read it online at <http://plyer.ascet.com>*

only by achieving scale – not an easy task. Suppliers are often concerned that exchanges might not best serve their interests, and buyers resist paying any additional fees to a third party.

These concerns, combined with the start-ups' high valuations, led the industry incumbents to form consortium-based public markets. So we saw Covisint formed in the automotive industry, Trade-Ranger for oil, Omnexus for chemicals, and e2Open and Converge in the high-tech sector.

This discouraged dot-com investment and extended the start-ups' time-to-market. The stock market adjustment of early 2000 further stretched the start-ups' limited funding, and spectacular failures hit those with the weakest fundamental business propositions.

Most e-marketplaces now see that being a transaction hub alone is not sufficient and are therefore expanding their offerings. This might include value-added services such as inventory management and financial serv-

ices, as is the case of Zoho, a marketplace for the hospitality industry. Supply chain planning and coordination are other key features provided by some of the big public exchanges like Covisint, e2open, Converge, and TheSupply (a semiconductor marketplace). And, of course, the collaborative design services noted earlier are another way for e-marketplaces to add value.

With this in mind, both industry consortiums and the surviving start-ups are recognizing their own and each other's capability gaps and are actively seeking suitable partnerships. Each of the leading traditional chemical companies, for instance, has taken a 10% equity share in ChemConnect, with 5% shares being offered to other players.

Looking to the future, there will be noteworthy successes and significant failures as the reality of managing complex relationships and transactions takes hold. Ultimately, we expect to see a combination of three different plays: industry verticals, pri-

vate exchanges, and horizontal aggregators.

### Industry Vertical Marketplaces

Some industries are seeing one major vertical e-marketplace emerge, as with Trade-Ranger in oil. In others, such as food and retail, there is competition between groups of large multinationals to be the dominant e-marketplace.

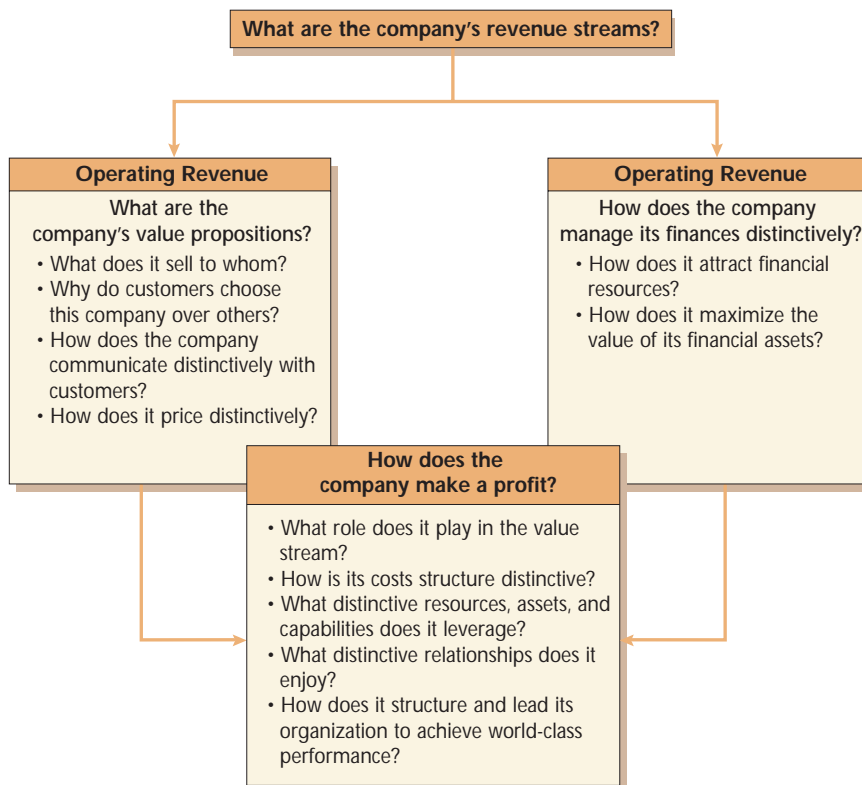
An example of a major industry vertical is Quadrem, founded by a consortium of leading players in the mining, minerals, and metals industry. Together they represent more than 60% of the industry's total market cap and more than 25% of its total buying power. The industry's need to work in remote areas means Quadrem must serve constituents in over 100 countries and in numerous languages. Preliminary estimates show that between 3.5% and 9% of a company's total spend might be saved through Quadrem, through trading and auction services for all products, not just MRO and off-production items.

### Private Exchanges

Some very successful companies have formed their own private exchanges – Dell, for instance, has built Valuechain.dell.com, while Cisco has created its famous eHub. This brings aggregation capabilities to their customers and suppliers and strengthens the whole value chain.

One reason for shunning the public exchanges is skepticism that industry consortia can hold together and build e-marketplaces in realistic timescales. These leading companies are also the most advanced at connecting with their customers and suppliers through the Internet and see no reason to level the playing field.

Building a private exchange is also easier in some respects. First, it is much easier to integrate a group of suppliers over which you have tremendous control. So while Covisint, after one year in operation, has only 20 suppliers signed up, Cisco has thousands of suppliers on their eHub. It is also easier to build business intelligence into the exchange, since the host can initiate it directly. So Dell has used i2 Technologies to help coordinate the demand planning of their suppliers. Cisco uses Manugistics to



Source: "Cautionary Tales" by Jane C. Linder and Susan Cantrell – Outlook 2001 Number 1

Figure 1 – Evaluation of revenue streams

coordinate production plans at multiple tiers of suppliers, to generate alerts should any potential shortages or production problems be detected, and to find the optimal ways to resolve such issues. In this way, the private exchanges potentially offer far greater value than merely supporting transactions more efficiently.

### **Horizontal Aggregators**

Horizontal aggregation is likely where anti-competitive regulations affects vertical integration or geographical isolation puts constraints on achieving critical mass. Perhaps the most obvious opportunity for horizontal e-marketplaces is fulfillment, but organizations will also look for opportunities in areas such as education, training, and asset management.

In the fulfillment arena, freight e-marketplaces have developed the most rapidly with over 150 such marketplaces operating globally. Most focus on a particular transport mode, while some take an industry or geographic tack. ELogistics.com, for instance, operates an online road freight procurement exchange that matches shippers' road freight requirements with carriers or truck owners.

CorProcure is an Australian-based horizontal exchange announced in July 2000 by some of Australia's largest companies including Amcor, Coca-Cola Amatil, Coles Myer, Foster's, Goodman Fielder, Qantas, and Telstra. It is estimated that \$8 billion (AUD) of transactions will go through the exchange over the next two years. The diverse range of products and services covered by the exchange includes advertising, computer services, energy, human resources, facilities management, and legal services.

### **Collaborative Manufacturing** Redistributing production assets and forming tight collaborative partnerships to achieve greater manufacturing flexibility.

The following are strategies to consider:

- *Transactional Integration*
- *Collaborative Integration*
- *Networked Integration*

Original equipment manufacturers (OEMs) are increasingly outsourcing core manufac-

turing operations and focusing on other strengths such as marketing, customer relationship management, or R&D. Many interconnected specialized firms are stepping up to carry out operations once completed by larger vertically integrated corporations.

The reason is, once again, these three measures: time-to-market; time-to-volume; and time-to-profit. In this particular case, the solution is downstream of the design process.

The electronics industry provides a dramatic example of these trends and demonstrates the evolution that other industries may also experience. Traditionally, OEMs used electronics manufacturing service (EMS) providers for capacity overflow and retained the manufacturing of printed circuit assemblies and final product assembly as core competencies. But OEMs now look to product innovation, customer and channel management, brand marketing, and sales for competitive differentiation. With the increasing complexity and cost of capital equipment, many are divesting themselves of capital-intensive manufacturing operations – thereby effectively converting fixed costs to variable costs. This allows rapid scale-up when markets are good but buffers them against economic downturns and seasonality. EMS providers, in turn, can build similar products for competing OEMs in the same facility, thus spreading their risk across a portfolio of customers.

As a result, the EMS industry is recording an exceptional compound annual growth rate in excess of 35%. The current top five EMS providers – Solectron, SCI Systems, Celestica, Flextronics, and Jabil Circuit – are growing, typically through acquisition, at a collective rate of over 50% per year.

But each partner relationship is not created equal. In the electronics industry, three levels of integration – transactional, collaborative, and networked – can be distinguished.

### **Transactional Integration**

The majority of outsourcing relationships today are transactional in nature, meaning assets are transferred but little else changes. Direct financial benefits are achieved but

operationally the supply chain remains basically the same.

Consequently old problems persist – communication is still essentially one-way. Data such as forecast information and product content changes flow from the OEM to the EMS provider with little or no advanced future visibility, driving the EMS provider to a reactionary role. The OEM in turn operates and makes decisions with little knowledge from the EMS provider on material or capacity availability.

In certain fundamental processes such as planning, forecasting, or new product introduction, old problems can even be amplified. For example, a supplier might assess the accuracy of the OEMs forecasted information and apply their own “fudge factor.” This can exaggerate demand fluctuations required by the EMS provider to maintain higher levels of inventory.

Additionally, a whole new process is required to transfer product information, such as bills of material and drawings, across company boundaries. The conversion of data formats and validation is often manual, introducing errors and time delays that affect time-to-market performance.

In response, OEM and EMS providers often resort to additional resources and layers of management at the company interfaces. But this additional cost can quickly outweigh financial benefits achieved through the exchange of assets.

### **Collaborative Integration**

Clearly, two-way collaboration is needed but it must be supported by joint decision-making. For example, an OEM might replace a component in the Bill of Material with an alternative item because of availability issues. Here, the partners must work together to determine the best timing of the change, taking into account demand for the product and the acceptable depletion of the obsolete inventory.

The challenge is that the supply chain is so dynamic that manual processes simply cannot keep pace and fully-tested and standardized software products are not yet built-out for all processes. The leading companies cannot afford to wait for the solutions to be fully built-out and standardized and so are

implementing available capabilities and working with supply chain software companies to improve functionality.

In the electronics and high-tech sector, EMS providers are experiencing rapid growth rates, fuelled by acquisition of OEM plants. Such growth brings a mix of processes, systems, and cultures that might limit design and manufacturing flexibility. One solution is the AgileAnywhere product from Agile Software, recently acquired by Ariba Inc. With their product, a customer concept can be designed, prototyped, and ramped to full volume in a consistent manner for every customer, at any time, anywhere in the world. It uses a standard format to integrate customer product information with the local ERP system. Reduced time-to-volume, lower inventory, improved customer service, and increased efficiency of key personnel are just some of the benefits. In total, these benefits can amount to over \$30 million to the bottom line.

**Networked Integration**

Beyond solutions between individual partners, there is a great opportunity to replicate those capabilities across other relationships and achieve a “network effect.”

A key benefit is to allow multiple partners to participate in planning and execution decisions. Probably the most advanced capabilities exist in supply chain planning software that give OEMs visibility of materials not only at their EMS providers but also at the Tier 1 suppliers and component distributors. They can then optimize the entire supply chain rather than just a single relationship.

A second benefit occurs as more and more partners use the same software tool set. Having standardized information formats and processes helps eliminate many of the inefficiencies of communicating across the supply chain. In the electronics industry, i2 Technologies for supply chain planning and

Ariba for product content collaboration are driving this effect. Where multiple supply chain software tool sets are found, the development and adoption of the standard information structures, such as RosettaNet, can drive value.

It is still in the early stages and most implementations are starting with only a few supply chain partners. As the more ambitious OEMs and EMS providers demonstrate the benefits of operating common systems, solutions, and processes, it will find wider adoption.

**Integrated Fulfillment**

Taking a holistic approach to managing the wide variety of Web-based or traditional fulfillment channels now available.

These are the strategies to consider:

- Logistics Postponement
- Resource Exchange
- Leveraged Shipments

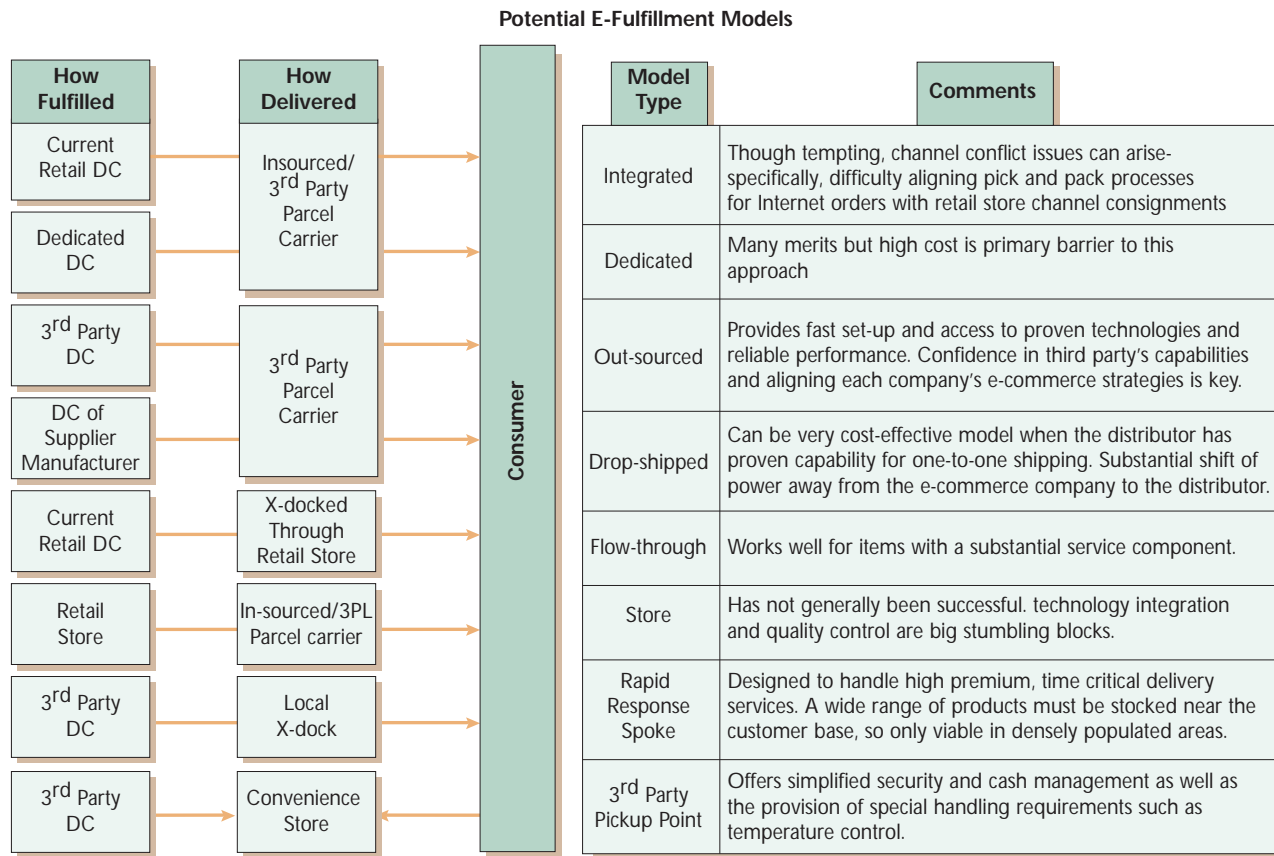


Figure 2 – Eight B2C fulfillment models and some of the issues involved.

#### •The Clicks-and-Mortar Model

Regardless of the degree to which a company conducts its operations online, the delivery of products generally remains a physical event. Both B2C and B2B businesses are seeing customers demand a choice of delivery channel. Matching these physical fulfillment methods with the newer business models is proving to be a significant issue.

An integrated fulfillment approach answers this challenge with a “back to basics” focus on the right warehousing, transport, and customer service solutions. But it also bolsters operational excellence with new kinds of networked relationships between supply chain partners and supported by new technologies and services to meet the new economy opportunities.

For example the smaller, more frequent, time-sensitive orders typical of consumer-direct models place high demands a distribution system. Arming customers with online order visibility demands extremely reliable fulfillment processes and yet margins are being squeezed because customers are not used to paying for picking, loading, and delivering – activities they previously did themselves. Companies are employing a variety of models to meet this challenge.

In the B2B realm another example arises from e-marketplaces that match buyers with sellers. They are recognizing that confirmation of availability and delivery in real time is a key requirement. So e-marketplaces such as Quadrem are placing a strong emphasis on features such as physical tracking, returns management, carrier selection, advanced shipment notice receipt, and supplier inventory visibility.

At the heart of integrated fulfillment, success lies in replacing physical flows with information flows and leveraging, as far as possible, the current physical infrastructures to deliver to the “last mile.” The following strategies can help achieve this.

#### **Logistics Postponement**

One strategy is to “postpone” shipments and so avoid shipments that become unnecessary or inappropriate as demand changes. Many third-party logistics service providers (LSPs) are investing heavily in information

technologies to build this capability.

Menlo-Logistics, an LSP, uses a “rolling warehouse” concept. Traditionally when shipping products from the West Coast to the East Coast, a truck is loaded with well-defined shipment quantities for each of its destinations, even though it may be several days before they are unloaded. During that time, demand might change – one warehouse may want more; another may want less. The new concept uses satellite communication to inform the driver how much can be unloaded at each destination at the time of arrival based on the very latest demand information.

#### **Resource Exchange**

If products are stocked at many locations, these locations can be pooled to form a virtual resource. On receiving a customer order, information flows can locate the closest inventories within the network. Order requests can be directed to the appropriate stocking locations, thus displacing the flow of physical goods.

Synchronet, for example, operates an e-marketplace for exchanging shipping containers. If company “A” needs to ship from Hong Kong, but only has empty containers in San Francisco, it will be matched with company “B” that does have an empty container in Hong Kong but requires one in San Francisco. A further example is a Korean cement company with East Coast operations that serves customers on the West Coast by partnering with a West Coast cement company. By “swapping” orders, they avoid the high cost of transporting cement.

#### **Leveraged Shipments**

Leveraging the existing physical channels that are already in place for the delivery of other products is another strategy. ECLine is a start-up Korean LSP that serves over 70 e-tailers. It has recruited a network of highly localized home delivery providers (called “dealers”). Each dealer is selected due to their familiarity with a specific area of a city through their other business interests. ECLine’s trucks pick up packages at the e-tail client’s site and drop them at the dealers’ depots. The dealers then take multiple daily milk runs on motorcycles to deliver the

packages to their respective neighborhood.

#### **Clicks-and-Mortar Model**

When existing physical channels only extend to retail outlets, it can be very costly to deliver products onto the final customer destinations. But if these retail outlets or similar locations are easily accessible then one approach is to have customers travel the “last mile” themselves.

For instance, CVS a major pharmaceutical retail chain, has over 5,000 items that can be purchased online. But 65% of customers elect to pick up their orders at CVS stores, and so the last mile problem is consequently made much easier.

#### **Synchronization**

The alignment of the supply chain into one logical enterprise and operating it as a fully-linked and optimized capability from suppliers to customers.

The following are key strategies to consider:

- *Know your best customers.*
- *Beware of unobtainable synergies.*
- *Make physical assets pull their weight.*
- *Use the latest collaborative tools and processes.*
- *Pick the right partners.*

We have reviewed four developments in supply chain business models. Stepping back to consider their effect on the overall business model, we quickly see how tightly interconnected these ideas are. Therein lies a very tough challenge. What can seem like a wonderful opportunity in one area, from a wider perspective, can raise conflicts that prompt a totally different strategic decision.

For instance, the seemingly valuable capability of an e-marketplace to identify a lower spot-buying opportunity may directly impede the collaborative supplier relations required to co-design a product. Or the wider variability of supply it creates might cause havoc to a make-to-order program.

This dilemma is at the heart of the synchronization referred to earlier as the final step in maximizing the value a supply chain can generate.

So how do you go about achieving synchronization? The first step is to get your aim right. It is common for the top 20% of

customers to generate 80% of revenue and profits, and yet the majority of supply chain designs still cater to the least profitable customers. But in the future, revenue and profit-driven supply chain will be the “gold standard.” So a careful, dispassionate review of where you can make the most money – and please your best customers – is a crucial first step.

In serving your best customers, recognize that additional or complementary offerings that look good on paper, are often less attractive to the market or much harder to achieve in practice. Therefore it pays to make sure that any supposed synergies are tested diligently in real-world client pilots. Conversely, it makes no sense to apply all additional offerings across every product, vendor, and customer – so look to utilize less costly alternative channels (perhaps Web-based or distributor-based) where necessary.

Next, be clear why you own physical assets and collaborate with supply chain partners on the optimal levels of warehouses, inventory, and transport. Despite significant rationalization in the past decade, significant, duplicative supply chain assets still clog existing channels. Physical assets must pull their own weight – so make sure yours provide substantial benefits over borrowing, sharing, or paying for their use.

Simply knowing which model presents

the best financial opportunities is not enough. Synchronization is based on the complex and well-timed interaction of many players. Multi-company supply chain planning and flawless execution therefore become critical. But sharing data and people to successfully do this is still a big hang-up for many companies. So draw up an information-sharing plan that details the most valuable information needed by your partners. Also define those processes and activities that can be shared and how to transition to new, less costly methods.

These activities will identify who the right partners are to make synchronization happen. This is often a tough decision – your longest-term partners may not be up to the challenge. And those partners who do make the grade must be clearly informed about how their relationships are to be transformed. Such rationalization must also become an on-going program that monitors channel relationship and generates new ideas to enhance customer value.

The day-to-day operation of a synchronized supply chain requires tools and methodologies that are very different from the past. Complex orders must be tracked and monitored as they move across the supply chain and metrics must evaluate customer-level revenue and profitability, not just traditional cost/service trade-offs. One

example of many developments in this area is Multi-Channel Order Flow Management pioneered by companies such as Yantra and Vigilance. It provides capability to customize availability and execute customer orders across myriad channels.

Despite the difficulties, the rewards of synchronization are worth the struggle. Ericsson’s global “Time to Customer” supply chain re-invention program employs many synchronization concepts. It has seen a 50% increase in the number of orders delivered within one week and surveys show the number of very satisfied customers has tripled. Synchronization is now embraced as a competitive focus for the next decade.

As we summarize our thoughts for this, the third volume of The ASCET Project, one conclusion emerges: Supply chain management is no longer the collection of operational disciplines it once was. New ideas and technologies have blurred functional and organizational boundaries. But each development is only a piece in a constantly evolving puzzle – a piece of the overall business model. Our final admonition is to be clear how your company can create value now and in the future. Keep this book as your guide as you select, adapt, and implement opportunities to synchronize your supply chain.