Who Will Be the Next Winners in Supply Chain Management?

E-services, trading communities, portals, and value collaboration networks (which we foresee as the next evolutionary step) are changing our view of the business world. This world features a more functional, capable, and vastly extended supply chain. Users within it have convenient access to the information they need to make optimal supply chain decisions, and transactions are transparent to all players trading goods and services. The end result could well be a global, supremely efficient market with as yet unthought-of measures of supply chain and operational excellence.

In the 1980s, the single most important mark of operational excellence for a company, it could be argued, was a healthy bottom line. Finance executives used massive enterprise resource planning systems to achieve the efficiency needed to wring costs and inefficiencies from their companies' business processes and systems. Since the latter part of the 1990s, top-line growth has assumed new status, with competitive advantage won through vision, innovation, and mind share. Increasingly, however, companies are judged heavily on both top and bottom lines. We live in a world of "ands." We need to wring out all the inefficiencies from business processes and systems inside our companies and cut costs, and we have to generate new revenue. We have to show both quarter-over-quarter growth in profits and long-term growth potential. We have to demonstrate operational efficiency and innovation. Investor confidence is very much about whether people believe a company can innovate, make smart decisions, and then capitalize on those decisions to reduce expenses and increase profits.

The next decade, heavily sculpted by the Internet, will redefine what we mean by operational excellence. And one of the key drivers of achieving that excellence will be a company's supply chain. Supply Chain Management – of strategic importance because it reaches into virtually all aspects of a business and because it has profound implications for customer relationship management – will separate the winners from the losers in the years ahead.

Learning from a Major-League Supply Chain Challenge

Customers no longer buy just products. In some sense, they also buy the whole supply chain, basing their purchase decisions on such things as which company is the easiest to do business with, which will ship fastest, and which is the least expensive.

HP, a global company with a diverse product line and more than 110,000 suppliers around the world, may be one of the most complicated supply chains in the world. The company maintains the largest parts database in the world, with 205,565 part numbers across 258 categories of products. Some products are sold exclusively through channels, including computer resellers, retailers, wholesalers, and OEMs. Others are sold direct to both consumers and businesses via HP Shopping Village and HP Business Store, respectively. Managing the channel component alone requires skillful planning.

Manufacturing aspects are equally challenging. HP printers – produced at the rate of one every second – are manufactured through contractors in 13 separate locations worldwide. Cartridges, on the other hand, are manufactured in-house. Managing several outbound distribution flows is made even more difficult by the need to move the final options and choices as close to printer customers as possible.

As for HP's personal computers (PCs), the company has more than 100 separate suppliers and three methods of manufacture. HP uses 11 primary manufacturing sites worldwide, complemented by four secondary sites dedicated to

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configuring systems to order. Additionally, channel partners at 18 channel assembly sites complete final product configuration. Again, the goal is to move final PC assembly as close to the customer as possible.

Market and competitive pressures also play into supply chain complexity. In the PC business, HP deals with expected seasonal events, such as year-end or holiday shopping and back-to-school. For example, demand for post Thanksgiving Day shopping – one of the busiest, if not the busiest, shopping days of the year – can be unpredictable. For each of the last two years, HP has participated in a sales blitz with Wal-Mart on the day after Thanksgiving. Last year, HP delivered a record number of PC and printer bundles to Wal-Mart for this promotion and sold out in just five hours. HP also deals with unexpected events precipitated by competitors and suppliers. It is not uncommon for competitors to start price wars, for example. Overnight, cost structures can topple. Meanwhile, suppliers can shift to a next-generation microprocessor without warning, immediately rendering a current product obsolete.

Paths to Progress

Considering all the complexities involved, how can any company achieve operational excellence through supply chain? HP uses a two-pronged approach to Supply Chain Management: technology and processes. Each has a key role in optimizing supply chain and customer relationship manage-

ment systems, allowing the company to work more efficiently, generate new business, and, most of all, help build customer loyalty. Neither part, no matter how well developed or fine-tuned, is useful without the other.

On the technology side, the good news is that, thanks to the Internet, there are now platforms, tools, and solutions that allow partners across an entire supply chain to share information. Rather than having to make totally independent decisions on critical issues such as forecasting, production schedules, inventory levels, and distribution plans, companies can now share information with partners and make the best choices for everyone involved. The tighter the integration of information among the companies, the greater the benefits to all.

As a result of its many supply chain initiatives in demand planning, demand and supply matching, and in distribution and logistics, HP has compressed its supply chain processes from months to just hours, with substantial improvement in reducing inventory and inventory-driven costs. In fact, HP's channel inventory is the lowest in its history, with inventory-driven costs declining by more than 20% each quarter last year.

The second area of supply chain focus at HP comprises the processes that will enable HP to adapt supply to meet demand on a real-time basis around the world. To achieve that, a fast-reaction supply chain is a must.

Success at HP

HP's printer supply chain is just such a chain. HP's manufacturing process combines steady manufacturing in low-tax markets with flexible, local-market manufacturing that allows HP to respond quickly to market demands. For example, HP's Asian factory manufactures products primarily for customers in North America and Europe, more than 80% of HP's worldwide sales. These markets are very dynamic; the product life cycles are very short; and product pricing declines very rapidly. So the company uses the factory in Asia to build products that it knows will sell. This

keeps the factory very focused. Meanwhile, the factories in North America and Europe are tuned repeatedly to respond quickly to market changes. This local presence is used as a sort of shock absorber in the event of sudden market shifts. HP attributes much of its success in the printer business to this dual-response manufacturing approach.

In its computer products business, HP assesses daily the supply and demand for parts. The process requires that demand patterns be synchronized to the flow of parts and that parts be moved around the world daily to meet demand. To accomplish this, HP built an organization that monitors the supply chain as a continuum from the customer to the supplier. Within that context, focused teams monitor and manage various aspects of the chain so that sub-parts of the chain can be managed while optimizing the whole.

In both the printer and computer businesses, critical processes are required to create fast-reaction supply chains.

How Does the Internet Strengthen Supply Chain Management?

The Internet has provided a way to connect businesses to one another, thus making supply chains more efficient, but HP sees a world emerging beyond e-business and e-commerce as we know it today. The Internet has fostered rapid advances that will prove essential to the future of supply chains:

- Money can be exchanged
- Information can be shared
- Key business processes are on the Internet

The next step, HP believes, is to catalyze this whole infrastructure so that it can support billions of new devices and trillions of new transactions, and become fundamental to the fabric and economics of business and society. This will be achieved by the mass proliferation of Internet-based services that HP calls e-services.

Think of e-services as assets made available on the Internet. Assets can be applications, computing resources, services, processes, or information. They can

be dynamic and automate transactions without human intervention, complete tasks, or solve problems. As such, e-services can be used by people, applications, businesses, cars, cell phones, equipment, or machinery on the factory floor.

The proliferation of e-services is expected to span all industries. Whole sets of business-to-business e-services are already on the rise, driving new revenue

the near future e-services will handle entire transactions over an Internet that will be accessible from a variety of devices (some already in existence). The new e-service paradigm is devoted to driving transactions and capturing new revenue streams as opportunities arise.

Many forward-looking companies will also provide a variety of means for their users both to interface with modular

application e-services they needed over the Internet when they needed them. Businesses could realize an almost instant return on investment because systems would scale quickly by adding capacity on demand, and new functionality could be added on a modular basis.

Dynamically brokered e-services could help businesses meet thousands, if not millions, of new customers or trading partners. In addition, business intelligence e-services, such as data mining, can provide the real-time information needed to help meet customer and partner needs better than the competition.

Intelligent e-services can integrate systems dynamically and make business operations more efficient – no more isolated islands of data.

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streams and creating new efficiencies in the supply chain. Possibilities already within reach for corporate use include automated billing, automated Supply Chain Management, procurement, and even modular enterprise resource planning. All are expected to be available on the Internet as services that can be subscribed to.

Computing e-services will give companies much more flexibility in the way they manage their Information Technology (IT) infrastructures. These e-services, all available via the Internet, will include such things as MIPS on demand, outsourced storage, directory services, and data mining services.

Consumer e-services – still in their infancy – will, over time, offer the public streamlined financial or vacation planning, home relocation, or traffic routing (many of these services may be available on a pay-as-you-go basis). In the business supply chain realm, users will use services with "utility-like" infrastructures to access information and data resources anywhere on corporate networks. Unlike current corporate intranets and large proprietary e-business and e-commerce systems (to say nothing of their EDI predecessors), these new e-services will be modular and highly accessible to a larger number of users.

Today's Internet typically requires user-initiated transactions; Web sites are accessed from a user's PC. We expect that in

e-services and to pay for them. IT infrastructures and e-services may be paid for on a per-usage basis. When will this become reality? Many indicators imply that this revolution has already arrived and will influence how companies will manage IT and business processes, including Supply Chain Management, in the future.

This means that traditional software companies are already beginning to offer their products as a pay-as-you-go service on the Internet. The results promise that companies will be able to lease or rent e-services that do the same job as a large in-house system, including e-mail, procurement, human resources, or enterprise resource planning applications and customer relationship management. Application service providers (ASPs) are at the center of the new enterprise IT architecture. Companies will install these applications on a rental, subscription, or pay-as-you-go basis. By outsourcing as much as possible, companies will be able to free on-staff IT resources and capital to apply to strategic initiatives

Optimizing Supply Chain Management Systems

E-services would also help optimize Supply Chain Management systems to better meet business needs. For example, instead of building expensive in-house systems, businesses would pay for the infrastructure and

Here's an example of how e-services can optimize supply chain interactions: If one of a manufacturer's distribution points is short of inventory, an intelligent e-service can select another ship-from location. But it can go even further than that. It can consider not only the location, but also the current weather conditions. If the closest alternative is snowed in, for example, it can order from a more distant shipping point with good weather. This e-service considers both structured data, such as distances, and unstructured data, such as weather maps.

E-services can also benefit the supply chains that nonprofit organizations use. For example, HP has sponsored an innovative way to distribute surplus food to charities. ResourceLink is an Internet-based collection of e-services that connects companies that have food to donate with the homeless shelters and disaster-response centers that need it. One of ResourceLink's e-services even lines up transportation companies that have extra cargo space so they speed delivery of donated items.

The Rise of Next-Generation Trading Communities

The next major evolution of business-to-business e-commerce is a new digital marketplace – portals, which can be catego-

rized as either horizontal or vertical. Horizontal portals, or functional hubs, automate business processes like human resources, accounting or procurement across different industries. Vertical portals or hubs are designed to serve as trading communities for buyers and sellers in specific industries.

For example, PlasticsNet is billed as the trading post for the 5,000 suppliers and 18,000 buyers that make up the $370 billion plastics industry. e-Steel specializes in matching buyers and sellers of steel.

VerticalNet is helping nearly 50 different vertical industries create their own content-driven communities, with a goal of moving toward facilitating trading in those communities.

According to a recent cover story in *Business 2.0* magazine, these new digital marketplaces create value by aggregating buyers and sellers, creating marketplace liquidity, providing a critical mass of buyers and sellers, and reducing transaction costs. By 2002, online exchanges are expected to account for 29% or $129 billion of the $446 billion Internet economy. Business-to-business exchanges are expected to account for $88 billion of the proceeds.

HP is helping to fuel the creation of a number of these new trading communities, many of which are optimized around supply chain integration.

Trading community participants gain valuable information and capabilities that enhance their planning and execution activities, including the following:

- Forecasting of customer demand through complex, multi-tier channels
- Real-time collaboration with trading partners and their customers
- Fulfillment and delivery of complex, multi-vendor orders
- Ability to comparison-shop across vendors
- Complete visibility into order status

These trading communities are beginning to use a variety of transaction models or brokering mechanisms to mediate transactions between participants. These models range from fixed-price mechanisms, typical of catalog purchasing, to dynamic pricing mechanisms such as auctions, exchanges, or barter.

The online listing or catalogue model simply creates value by aggregating buyers and suppliers in one place. It's ideal in situations where demand is predictable and prices don't fluctuate much or very often.

The auction or bid model works best for industries where non-standard or perishable products or services are bought or sold. For example, iMark.com uses an auction model to sell used capital equipment, and AdAuction.com auctions perishable goods online and print advertising inventory.

The auction model also works well in industries where demand and prices are volatile and businesses are looking for ways to manage excess supply and peak-load demand. PaperDeals.com is a marketplace where paper mills can unload excess inventory or slow-moving paper stock to commercial printers.

One of the biggest benefits of these dynamic marketplaces, or online auctions, is that they allow businesses to sell excess inventory to their distributors, resellers, or corporate accounts. Companies can choose to participate in auctions only occasionally, or they can work with market-makers and brokers to actively manage all aspects of their supply chain. The implications of this are many. Buying and selling would not be based solely on price, but also on the basis of terms and conditions, warranties, or any number of business factors.

Real Options Theory

E-business exchanges facilitate the real-life manifestation of a revolutionary concept: real options theory. In a recent *Business Week* story, the reporter wrote that real options theory essentially boils down to this: When

the future is highly uncertain, it pays to have a broad range of options.

HP experimented with applied real options theory in the early 1990s; this was a response to the 1980s process of customizing inkjet printers for foreign markets at the factory, then shipping them in finished form to warehouses. While customizing at the factory was cheaper than doing it in the field, demand forecasts often prompted the production of too many printers for France and not enough for Germany, or vice versa.

The solution was to ship partially assembled printers to the warehouse and have them customized there. While customization costs for HP have risen, matching supply and demand still saves $3 million a month. HP has carried out other real options theory applications in excess inventory management, channel management, logistics, and the buying and selling of components. In some cases, dynamic pricing models have enabled HP to trim total inventory costs by as much as 20 to 30%.

Over time, these dynamic trading marketplaces will add e-services such as payment processing, receivables management, credit analysis, shipping, logistics tracking, fulfillment services, warehousing, inspection, and risk mitigation services such as escrow and warranties. They will essentially help to manage all of the critical components of the supply chain.

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