Building a World-class Logistics, Distribution and Electronic Commerce Infrastructure

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INTRODUCTION

At the beginning of 1998, Federal Express was the undisputed leader in the overnight, express package delivery business. One of the first tasks of the New Year was the completion of a $2.4 billion acquisition of Caliber System Inc. – a provider of just-in-time delivery and transportation management solutions – and the formation of a new holding company, FDX Corp. With this move, the FDX group of companies (henceforth referred to as FedEx) consolidated its position in the package delivery business, where it already enjoyed 43% market share. More importantly, it had set the stage for rapid growth in the fast-emerging industries of electronic commerce and supply chain management. FedEx planes carried a bewildering variety of shipments across the globe, ranging from consumer electronics and computers to Maine lobsters, flowers, and surgical equipment. Its customers were geographically dispersed across 212 countries, and routinely transacted their business using a web-based interface. Even though the design and layout of the software was severely criticized by technology reviewers, this interface was widely used, and had attracted something that was still elusive on the Web; at the time.

However, FedEx’s competitors were not far behind. UPS and DHL,

Abstract

This paper takes a retrospective look at FedEx, a third party logistics intermediary that sought to capitalize on the rise of electronic commerce. By integrating virtual-world information technology and electronic commerce capabilities with real-world physical delivery of products through its air and ground transportation network, FedEx sought to exploit the new opportunities emerging in the digital economy.

Through a process of strategic acquisitions in late 1997 and early 1998, FedEx consolidated its position as a leader in the express package delivery business. This set the stage for rapid growth in the fast-emerging industries of electronic commerce and supply chain management – a new domain in which long-time competitors UPS and DHL were also quickly gaining ground. Simultaneously, many large American firms were beginning to revamp their logistics strategies in order to integrate other elements of the supply chain into their own systems. This significant market trend, in conjunction with several other industry developments at the time, created numerous new outsourcing opportunities for key players in the delivery, freight, and express transportation business.

The authors examine the motivations behind this industry phenomenon and the resulting shift industry leaders made in their business and IT strategies. The paper explores several of the strategic choices FedEx needed to make in order to compete in this new domain. We present an overview of various solutions offered by the firm, the role of IT and organizational culture at the company, and major competitive challenges.

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FDX's long-time rivals, although late to get on the 'e-commerce bandwagon', clearly saw themselves as being major players in this new domain. UPS had just announced a significant strategic alliance with Open Market, Inc., a Cambridge, MA based provider of Internet software, to deliver a complete Internet commerce solution providing integrated logistics and fulfillment. UPS also had other arrangements with IBM and Lotus with a view to standardizing formats on their Web site. DHL, a major player in the international market, had established seven express logistics centers (ELCs) and 54 strategic parts centers (SPCs) primarily to streamline supply chain integration. These developments represented competitive challenges that FedEx faced as it made plans for the future to expand its SPC network in the US 1998 with the creation of about 10 centers.

COMPANY BACKGROUND

Incorporated in 1971 by Fred Smith, with operations primarily out of its base in Memphis, FedEx had registered impressive growth. By the tenth year of its inception, FedEx revenues were $1 billion, thereby making it the first American company to reach the billion-dollar mark in a decade without mergers or acquisitions. At the end of 1997, its revenues were $10.3 billion (FedEx 1997). In the area of express packages and letters sent within the US and from the US to international destinations, FedEx had the predominant market share with 43% of the market, followed by UPS at 27%, and Airborne Express 18%, respectively (Grant 1997).

At the beginning of 1998, the newly formed holding company (FDX) was number 134 on the Fortune 500 list (Fortune 1997), and consisted of six major subsidiaries (Hoover 1998). The six companies retained their names (and brand identities) under the FDX umbrella:

- Federal Express, which delivered about 2.9 million express packages to 212 countries each working day;
- RPS, the second-largest ground carrier of small packages in the US;
- Viking Freight, a less-than-truckload (LTL) carrier in the western US;
- Roberts Express, the largest surface-expedited carrier in North America;
- Caliber Logistics; and
- Caliber Technology, which, with Caliber Logistics, offered just-in-time delivery programs, order processing, and transportation management.

In addition to its pioneering role in creating the overnight delivery business, FedEx also provided world-class logistics services through its Business Logistics Services Division (established in 1987). Using its capabilities grounded in a global delivery network, information technology, and expertise in warehousing, FedEx was soon offering services such as inventory systems, scheduling and routing, call centers, and warehousing know-how (including location identification, set-up and operational specifications). The Business Logistics Services division was primarily interested in customers who wanted holistic solutions to their supply chain problems. Customers interested in just one component of the FedEx solution (e.g. transportation, or warehousing or IT) were often directed to other providers.

Through these innovations in transportation and logistics, and increasingly in e-commerce, FedEx was poised to become, as one industry observer put it, ‘The Airline of the Internet’ (Lappin 1996). Virtual warehousing, e-commerce and integrated supply chain management were now being viewed as FedEx’s major source of future revenue and growth. There were several compelling reasons why firms were relying on third-party logistics providers like FedEx. First, an integrated supply chain solution allowed firms to concentrate on their core business, be it in manufacturing or service excellence. Second, electronic order taking and customer interaction drove down costs. Some firms reported that their margins were up as much as three to four percentage points due to these cost savings. Third, electronic enterprise interfaces (like extranets, or the use of an integrated tracking system, for example) had cut lead times significantly. Orders normally turned around in months now took days, and those that used to take days could now be done in hours. L.L. Bean, for example, now took an average of two hours between the time an order was placed and the time it was shipped by FedEx. This often meant a radical revamping of existing business models, as L.L. Bean discovered, but often led to significant improvements (Fast Company 1996a). Finally, a number of firms were finding out that placing company-related information and know-how on the Web (online catalogs, blueprints, troubleshooting FAQs, etc.) increased the number of customer visits and provided a flexible solution to customer retention and satisfaction. The transition to providing real-time package tracking capabilities to customers seemed naturally advantageous.

FEDEX’S VALUE CHAIN SOLUTIONS

The Concept

A number of large American firms had been revamping their logistics strategies in order to integrate other elements of the supply chain into their own systems, i.e. those of vendors and customers. This was a gradual evolution during the 1980s and early 1990s; an era when quality, flexibility and concepts like reengineering were beginning to make an impact on the business landscape. Integrated logistics management allowed firms to closely co-ordinate operations related to purchasing, transportation, inventory and warehousing; thus yielding significant cost savings, and also increasing service and performance levels (Anthony and Loveman 1996; Fast Company 1996b; La Londe and Masters 1994). A number of firms
were ‘outsourcing’ components like just-in-time transportation and delivery to companies like FedEx. These trends presented clear opportunities for players in the delivery, freight and express transportation business. In addition to the physical resources these third-party logistics providers normally possessed (like planes and trucks), they also were expert users of another key resource: i.e. information technology. FedEx was soon exploring ideas like ‘virtual warehousing’, which essentially gave a business an opportunity to outsource a lot more of its logistics operations, irrespective of size or nature of its business. In addition, the sharing of time sensitive demand, sales and shipment status data enabled further integration with other supply chain partners with access to the same computerized databases.

This strategy offered businesses within and across industries significant benefits: lower inventory and intermediary related costs, an increase in supply chain efficiency, simplicity and transparency in order placement, delivery, procurement, and management of suppliers and customers, and an ability to stay focused on their core competencies (Prahalad and Hamel 1990). All these factors contributed to making the firms within the same supply chain within an industry more competitive, as opposed to firms not yet within the chain. The firm would thus be part of a networked world, both in the figurative and literal sense (Thorelli 1986). Concepts like just-in-time manufacturing and mass customization were no longer just theory; a number of firms had carved out distinct niches in the marketplace by focusing on developing these capabilities in manufacturing and production. Tight supply chain integration was no longer perceived as a competitive advantage – it was being seen as a competitive imperative. This was reflected by the extent to which FedEx was critical to several top-notch manufacturers and retailers. National Semiconductor, for example, was slowly but surely handing over their entire logistics operations to FedEx. Virtually all of National Semiconductor’s products were being shipped directly to a FedEx distribution warehouse in Singapore, from factories and subcontractors in Asia (Janah and Wilder 1997).

**Market Trends**

In addition to the organizational changes mentioned above, there was a revolution underway in the marketplace. Customers in the US, and overseas, were increasingly shopping by mail order and online. US revenues in these industries were $21.8 billion in 1995. A Forrester Research Inc. study predicted that world-wide revenues from online retailing (popularly referred to as e-tailing) would rise from $518 million in 1996 to almost $7 billion by the year 2000 (Lappin 1996). As much as 75% of that total was predicted to come from the sale of hard goods (from apparel, gifts and entertainment products to food and computer equipment). Further, business-to-business Internet commerce was forecasted to grow to an astronomical $327 billion (in goods and services traded between companies), by the year 2002 (Erwin et al. 1997).

These developments constituted a threat to conventional retailing on one hand, and an opportunity for firms like FedEx and UPS, who operated in the logistics and e-commerce space, on the other (Andrews 1998). Further, the deregulation of the US transportation industry had also led to the rise of sophisticated third-party logistics providers. Industry analysts expected such activity to continue to grow in the future. Logistics spending in the US had continued to drop as a percentage of GDP, along with a corresponding drop in inventory investment, mainly due to the continued investment and reliance on technology in this sector.

**FedEx Solutions**

FedEx provided a host of logistics solutions to enterprise customers. These were segmented and based on the types of customer needs, ranging from turnkey distribution centers to full-scale logistics services that incorporated expedited delivery. The major services provided to business customers were:

1. **FedEx Distribution Centers**: This service provided turnkey warehousing services to businesses, using a network of warehouses located in the US and abroad. This allowed for instant expansion of distribution capabilities, especially to small businesses.

2. **FedEx Express Distribution Depots**: This service was primarily US based and provided a one-stop source of express distribution capabilities. This service was particularly targeted at time-critical businesses. Shipments in these depots were continuously available for 24 hour deliveries.

3. **FedEx Returns Management**: FedEx NetReturn was designed to streamline the return area of a company’s supply chain. The Internet-based system gave customers a service that offered pickup, time-definite delivery, and online status tracking and customized reporting that provided complete inventory control. As Laurie Tucker, Senior Vice President, FedEx Logistics, Electronic Commerce and Catalog division explained: ‘According to our customers, dealing with returns has traditionally been among the most vexing of their business issues . . . these frustrations combined with today’s increasingly short product life cycles have heightened the financial impact of delays in product return processes.’

4. **Virtual Order**: Virtual Order was touted as being ‘a fully integrated electronic commerce system that offers an easy solution to building an effective online catalog’. Initial response to this concept had been encouraging. The idea was to provide an integrated e-commerce backbone, and let the business customer figure out the
product offering. The customer could build a catalog from scratch, and use it on this backbone, which incorporated FedEx’s traditional services like online tracking (see Figure 1).

5. **Other Value Added Services**: FedEx offered several value-added services to customers in times of need. As pointed out earlier, the product would frequently originate not from the company plant or warehouse, but a FedEx operated warehouse or a depot. In addition, FedEx sometimes provided a merge-in-transit service to customers like Micron Computers, a leading maker of customized computers which boasted rapid turnaround and delivery. Under the merge-in-transit program offered to Micron Computers, FedEx would store peripherals such as monitors and printers in its Memphis air hub. It would then match those products up with the computer en route to a customer, as described in Logistics Management and Distribution Report (Cooke 1997): ‘If a customer in Boston, for example, ordered a popular PC model, FedEx would transport the computer from Mississippi to its Boston station. There it would match that computer up with a monitor shipped separately from Memphis prior to customer delivery. The FedEx driver would deliver both monitor and printer together. Micron would send an electronic file [to FedEx] that contained their tracking numbers, and FedEx would marry the products at the destination station.’

Typically, neither the final customer nor the business really cared how the product got there, as long as FedEx could take care of the logistics in between. The heart of FedEx’s operations was the 294-acre ‘SuperHub’ in Memphis, Tennessee, which was spread out over 294 acres including airport and sorting facilities. With over 200 miles of conveyor belts, more than a million packages were sorted and transferred to and from the 135 aircraft that arrived and departed each night. FedEx owned around 624 aircraft in its fleet and served 366 airports worldwide. Approximately 63 million electronic transmissions were processed through the FedEx system on a daily basis. The infrastructure to offer such services to its customers had proved to be a critical competitive differentiator. Built on the bedrock of information technology, an open and participative company culture, and an unrelenting focus on operations excellence, these infrastructural capabilities had enabled FedEx to lead the pack. Several of the services described earlier had been pioneered by FedEx, had also been deployed with alarming regularity by competition down the line. Speed of execution was therefore critical; being down the learning curve helped FedEx achieve scale economies faster, while competition was still busy catching up.

**IT STRATEGY AT FedEx**

**The Role of IT**

Information technology was critical to FedEx. As Laurie Tucker, Senior VP of Logistics, Electronic Commerce, and Catalog Division pointed out, one of the key strategic objectives was to ‘substitute inventory with information’ (Janah and Wilder 1997). Typically, the technology links created with customers were intimate, and hard to imitate. There was a ‘lock-in’ involved with using FedEx’s IT interfaces from the customer’s point of view. That had not deterred customers from selecting FedEx solutions. On the contrary, several customers saw FedEx’s commitment to technology as a major reason why they didn’t switch to other providers like UPS (FedEx’s IT investments were around $1 billion in 1997). As early as 1995, FedEx had pioneered Web-based package tracking, a concept which was enormously popular with its customers, and led to imitation by competitors like UPS.

Several business customers had signed up for FedEx services like Virtual Order, and had created extensive online catalogs. This was essentially an online catalog and hosting system. Individual customers could also build integrated web sites using FedEx APIs (Applications Programming Interfaces), and incorporate the free Web page code that would enable their customers to track packages directly from their site through the interface. Some of these included, Carson’s Rib, a Chicago-based company that sold barbecued ribs, and Unique Photo, a wholesaler of photographic supplies. Others, like Omaha Steaks, had chosen FedEx as their exclusive delivery service (Janah and Wilder 1997). At Omaha Steaks, for example, orders typically came in by phone, mail, fax, the Web, or America Online. Once an order was received, it was sent from Omaha Steaks’ IBM AS/400 to its warehouses (generating a shipping label), and to FedEx on a dedicated parallel line (generating a FedEx tracking label). The warehouse-fulfilled orders were delivered by truck to FedEx in Memphis, or to regional hubs in Indianapolis, Indiana, and Columbus, Ohio. FedEx took over the logistics from there on. Omaha Steaks employees had full access to FedEx data on delivery status, planned routing, and planned delivery day, which could be tracked simultaneously by a consumer on the Omaha Steaks Web-site. The AS/400 system would communicate directly with FedEx’s Hewlett-Packard and Sun Microsystems servers,

**Figure 1. FedEx virtual order (Courtesy: FDX Group)**
ensuring complete access to all in-process information. Such real-time global tracking and tracing systems allowed retailers and customers to follow the progress and completion of each delivery (Terry 1997).

Using such systems, said Pierre Wolf, an e-commerce strategy consultant, FedEx was trying to encourage the growth of unique, content-driven Web sites under merchant brands, which would also have the FedEx capabilities integrated into them. This was part of a larger enterprise strategy that was effectively opening new markets for FedEx, and allowing it to control costs using economies of scale and its capabilities in technology. For the end-user, the advantage of such a system would be that they (target merchants) could be small, medium or large, and the level of commitment could range from minimal to total. In early 1998, FedEx was also working with innovators like Marimba to build industrial-strength package delivery monitoring capabilities for merchants. This was in contrast to models offered by the competition. For example, the proposed UPS-Open Market product was seen as more of an integration into Open Market’s proprietary Transact technology. Pierre Wolf further noted that UPS response was a high-end solution only for those who could afford the hefty Open Market price tag (Wolf 1998): ‘Although, they [UPS], like FedEx, can support merchants with web-sites, they are not facilitating merchants’ ability to live.’

**IT Challenges**

FedEx’s solutions were not without blemish. Technology analysts like Stephen Manes of Digital Duo (a tech-review program appearing nationwide on US public television) voiced strong criticism over certain aspects of FedEx’s Web interface for the consumer, characterizing it as ‘absolutely, positively dismal’. He pointed out the difficulties in filling out online airbills, entering and storing addresses, and record keeping, due to poorly designed menus, besides the lack of functionality and ease of use. His conclusion was summarized in the form of a mock memo, published in his column in *Information Week* (Manes 1997).

Memo: To the Postmaster (and anyone else dealing with the public):

Have your programmers study FedExShip carefully as an example of what to avoid.

In addition, the lack of a single systems and data transfer standard meant that the integration process would not necessarily be smooth for all customers. Open EDI standards were still being discussed and debated by the IT community, and industry groups like the W3C (World Wide Web Consortium). Thus, despite FedEx’s widely acknowledged role as an IT pioneer in many areas, there were obviously several problems that needed to be ironed out. In addition, competition was getting aggressive. Industry analysts noted that, by March 1998, UPS had become extremely aggressive in establishing multiple relationships with e-commerce software vendors, like Open Market, and Pandesic. UPS’s new-found passion for technology, along with its extensive reach and market share (second only to the US Postal Service in total shipments), posed a major challenge to FedEx.

FedEx’s future success in deploying attractive systems for customers were tied intimately to investments in its own internal IT infrastructure. Given the uncertainty associated with standards, external linkages, and competition, any major change would have to consider several interlinked factors. Tentatively, a major overhaul of this infrastructure was planned under Project GRID (Global Resource for Information Distribution), developed in part based on customer requests and information. These were primarily to further develop capabilities in IT, and also respond to threats from competition.

In April 1998, FedEx announced that it would link its logistics and transportation operation with a software system from SAP of Germany. The system would provide shipping and tracking functions from order entry through package delivery, from within SAP’s R/3 software system, which was used by several of FedEx’s major customers. Also in April, FedEx announced another strategic alliance with Interworld Corporation of New York, a provider of enterprise-class Internet commerce software systems. Some of the potential benefits that FedEx hoped to reap from the deal included:

1. extended integration for shipment calculations, tax calculations, shipment and tracking, logistics, fulfilment and returns processes;
2. extended support for product merchandising, presentation, and product pricing; cross-selling and up-selling, promotions, showcases, catalog;
3. full-text and parametric search as well as advanced product relationships;
4. automated order management for reduced order cycle times, inventory levels, and carrying costs;
5. scalability designed to support thousands of concurrent transactions per second as well as hundreds of thousands of SKUs; and
6. transparency within the supply chain by providing trading partners, suppliers and customers with information on fulfilment, pick-pack-ship systems, and vendor and inventory management systems.

These developments suggested that FedEx was increasingly relying on external relationships so as to maintain an edge in the latest e-commerce technologies. Internally, a technocratic culture flourished within FedEx. Managers and employees constantly experimented and used new developments in technology to create a strong collaborative environment within the company. The use of teams was widespread within the organization, and often, technology served as the facilitator to performing daily functions. The
‘military model’ was used as a collaborative and managerial metaphor. One of the most important exercises that FedEx officers performed was the Daily Operations Review, with the objective of reviewing performance at the Memphis hub overnight. This was conducted along a military format, with rapid-fire inputs from contributing departments like Air Operations, Hub Operations, Customer Service, Computer Systems and Meteorology (Goldberg 1997). Chaired by the Global Operations Control and Co-ordination Group (GOCC), the meeting started at 8.30 a.m., but participants would already have had the opportunity to review glitches in the previous night’s performance through a taped voicemail summary.

FedEx officers often sat through a number of meetings on any given day. Typically, meetings were structured so as to accomplish objectives within a scheduled time period. Investments had also been made in collaborative technology-enabled meetings, where participants could brainstorm and reach a decision within a short time frame by providing inputs into a computer (Fast Company 1996b). At other times, meetings were an exercise in crisis management. FedEx management looked to leadership from their charismatic leader, Fred Smith, who was personally involved and highly committed to exploring new technological opportunities. ‘War stories’ were popular within the company. Company officers cited a particularly bad weather day at the Memphis hub, when Fred Smith actually considered using jet engines to ‘blow fog off the runway’. FedEx officers were thus generally upbeat about their ability to solve problems using technology. The fact that they had pioneered several technological breakthroughs within their industry was a testimony to their abilities. The recent spate of external linkages with enterprise software vendors raised an important issue: to what extent should an organization like FedEx outsource or co-develop technological R&D. Would learning through alliances and acquisitions be superior to internally developed solutions?

LESSONS LEARNED

The success of FedEx in providing solutions in value chain integration went beyond its abilities in understanding or utilization of technology. Rather, it was the ability to spot market opportunities before anyone else, and offer value-added solutions to customers that distinguished it from its competition. This required inherent flexibility within the organization at all levels, in order to prioritize objectives, allocate scarce resources, and implement creative solutions. It required the ability to work in teams, partner or outsource tasks if necessary, and manage multiple inter-organizational relationships in a dynamic environment. Technology was merely a tool and it could be duplicated easily, as clearly evident from the fact that all of FedEx’s major competitors soon offered package tracking. However, the collaborative organizational culture at FedEx, its environmental scanning abilities, its learning and response mechanisms, and its implementation skills were extremely difficult to imitate.

FUTURE CHALLENGES

Despite its success, there were a number of issues relating to this new business model that needed clarification and resolution. These were some of the issues confronting FedEx’s top management as they looked into the future, and we offer them as a stimulus to further discussion and analysis:

- How should FedEx capitalize on its ‘first mover’ advantage? What were some competitive threats in the short and long-term?
- How would customer demand patterns change with the explosive growth of e-commerce?
- What kind of investments would FedEx have to (continue to) make, in the area of human resources, systems and technology in order to serve this new demand?
- How should FedEx segment the supply chain market?
- Was the move toward Open EDI (Electronic Data Interchange) through the Internet a blessing or a threat?
- Could FedEx succeed in scaling up its operations and could the pace of innovation and rapid growth be sustained in the future?
- What was the impact of outsourcing technological R&D?

References


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