DERIVING COMPETITIVE ADVANTAGE THROUGH A
SOPHISTICATED
INFORMATION TECHNOLOGY INFRASTRUCTURE

(A LOOK AT FEDERAL EXPRESS AND UPS)

by

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Submitted to the Sloan School of Management
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ABSTRACT

This thesis examines the hypothesis that firms can differentiate products that
were once viewed as commodities by exploiting an advanced internal
information technology (IT) infrastructure and thus gaining a competitive
advantage. United Parcel Service (UPS) and Federal Express, leaders in
the package delivery industry, are used as examples of competing
companies with two completely different corporate views of the IT role within
the firm. UPS, a long time leader in package delivery, has always viewed
this service as a commodity product, competing with lower prices. Federal
Express chooses not to compete on price points but instead offers a
premium service which is differentiated in many ways, one being real-time
package tracking information available to the customer. Federal Express
has been able to provide this information because of its organizational
commitment to IT which has effected a sophisticated IT infrastructure.

This thesis explores the factors affecting the development of such an
advanced IT infrastructure. First, five corporate factors are discussed which,
together, create the corporate view of the role of IT within the firm. The
argument is then presented that the corporate IT infrastructure should
consistently reflect this corporate view and that the evolution of this
infrastructure is dependent on incremental or drastic changes of one or more
of these five factors to realign the corporate view toward a more strategic
view of IT that will subsequently drive IT infrastructure change.

This study was carried out with a methodology of research, interviews, and
synthesis. Customers, executives, and personnel were interviewed and the
resulting information was combined with public domain research to
determine the IT level within each organization as well as the organizational
factors affecting the determination of these levels.

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FOREWORD

At the 1989 CD-ROM conference hosted by Microsoft Corporation in
Anneheim, California, Dr. James Burke, a prestigious British speaker with a
BA from Jesus College, Oxford University renowned for the production of
several BBC and PBS series based upon the value of information, opened
the first day of seminars with a speech espousing his value judgement of
information technology. He began his speech by postulating that the reason
for the existence of life in this universe is due to the ability of DNA molecules
to respond and introduce complexities in accordance with interfering
information from the surrounding environment, thus opposing the universal
law of entropy (which states that all forms of energy, when changing states,
moves from more complex states to less complex states). Burke went on to
describe how societies react to information and how the complexification of
the societal information infrastructure has driven civilization from the
cavemen's primitive lunar calendar carvings to today's computerization.

This well respected man spent one hour of a $1000/seat conference
extolling to over 3000 businessmen and women the inseparability of
dynamic reaction to information and social progress. He concluded his
speech by describing how many institutions and corporations have ignored
the importance of dynamic reaction to information, how these organizations
have based their strategic objectives on archaic information infrastructures,
and how they have resisted IT as a way to update their information
infrastructures and thus achieve new foundations from which to act (as an
example he cited how our current educational information infrastructure is
based on a system dating back a century or so when the base of global knowledge was known and not expected to change in one's lifetime. Today in a world where the amount of knowledge is so vast and so dynamic, we, as a society should consider alternative methods of teaching, possibly using advance IT platforms).

This speech, this conference, and the high level interest attracted represent changing attitudes toward IT. The information infrastructure as a foundation or impetus for progress is quite different from its traditional image as a set of support tools. In many organizations, IT managers are moving from the ranks of staffing positions to corporate strategists, and information systems, historically used only as a means to support an organization's routine functions such as payroll or accounting, are now being used in innovative ways.

There are certain variables such as industry, size, product complexity, etc. that affect to what degree IT can be used as a strategic weapon but these variables are not as well defined as were once thought. In fact, the package delivery industry examined in this thesis is a perfect example of an industry traditionally viewed as static, unable to draw benefits from IT due to the commodity orientation of its service. But now Federal Express has entered the arena wielding innovative strategies and have shown how IT can make a difference.

Other variables that influence the effective use of IT within a corporate strategy are less discrete than those mentioned above. One significant
variable is the degree of organizational commitment to IT. The degree of organizational commitment to IT can be ascertained by looking at various organizational factors. These factors and how they affect the organization view of IT are discussed in the body of this thesis.

Whatever the mix of variables that determines whether IT should or can be used effectively as a strategic weapon, we are seeing many organizations change their attitudes toward IT. Advanced IT networks are being developed to effect efficient information exchange, information technologies - such as CD-ROM - are making big headlines, worldwide communication standards are being set; we are in the midst of an IT revolution.

Companies such as Federal Express are deriving competitive advantages by exploiting this revolution. But are these companies deriving sustainable competitive advantages or will competitors such as UPS react with similar strategies that will eliminate these advantages? Regardless of the individual industry outcomes, it is clear that the societal information infrastructure is once again bucking the universal law of entropy and moving away from equilibrium toward complexity with the use of advanced information technologies. If Burke is correct, the organization flux caused by this societal information infrastructure change is natural and, in many organizations, is flux that has been stifled during past societal changes and is now long overdue.
INTRODUCTION

The purpose of this thesis is to examine the hypothesis that an organization can derive a competitive advantage through the exploitation of information technology (IT) and to analyze what affects a company's infrastructural development so that such advantages can be achieved. As an example, the package delivery industry is analyzed with a focus on two main players: Federal Express and United Parcel Service (UPS).

Chapter 1 presents an industry overview. Chapters 2 & 3 provide company overviews. Chapter 4 examines the basic issue of IT as a competitive advantage. Chapter 5 analyzes five organizational factors (which will be referred to within this thesis as the 5K - or 5 Key - factors) that affect the the corporate view of the IT role within the firm. Chapter 6 links the corporate infrastructural development with the corporate view of the IT role discussed in Chapter 5. The argument is presented that the corporate IT infrastructure should reflect the corporate view of IT and that to change this infrastructure, a company must change its view of IT by changing one or more of the organizational factors presented in Chapter 5. Chapter 7 discusses the issue of sustainability with regard to a competitive advantage created using IT and examines possible future scenarios of UPS and Federal Express.

Chapter 8 forecasts possible futures for UPS and Federal Express and how each will use IT in the global arena.

A significant outcome of this study is that a corporate infrastructural development should be made to reflect the corporate view of the IT role.
within the firm and to effect a change in this infrastructure, it is necessary to alter this corporate view by creating real changes in one or more of five organizational factors. These factors are top management commitment, corporate strategy, corporate culture, corporate structure, and personnel policies. Although this result has evolved from focused research, it can probably be applied to other industries as well.

CHAPTER 1: The History of the Package Delivery Industry

The package delivery industry, in one form or another, has existed as long as civilization itself. The early stages of the industry simply consisted of individuals hand-carrying their own packages to whomever they wanted. Obviously there were several constraints, such as package size, package weight, number of packages, distance of delivery, etc., inherent within this structure.

As civilization progressed, so did the package delivery industry. Messenger systems were devised where hired (or subservient) couriers, on horseback, delivered packages to the desired destination. This new system, although alleviating some of the earlier constraints - such as distance of delivery - added some new constraints like the social class or financial situation of the sender (only one with servants or money to hire a messenger could afford such a service).
The package delivery industry continued to evolve simultaneously with the transportation industry; with each new innovation in transportation came a new medium of package delivery which would reduce some constraints and introduce others. But for the most part, the new vehicles of transportation made it much easier to deliver more packages to more places. Consequently, cultural infrastructures were erected that, with each new advancement in delivery service, would first become dependent upon that advancement and then constrain the capacity limits of this medium of delivery. Therefore more effective modes of package delivery were constantly being sought and, since the package delivery service was already using the most efficient means of existing transportation, innovations (usually operations innovations like scheduling, etc.) within that mode of transportation were developed to meet the market demand. Then with the introduction of a more efficient mode of transportation, this cycle would begin all over again.

In the United States, the 213 year evolution of the package delivery service has been highly dynamic, involving several introductions of effective transportation vehicles for delivery as well as efficiency innovations within each mode of transportation. Transportation introductions like the locomotive, steam boat, automobile, bus, and the airplane coupled with efficiency innovations like the Pony Express service, the expansion of the railway network, and deregulation of cargo airlines have significantly advanced the sophistication of the package delivery industry. With each new advancement, has become a nationwide infrastructural change creating
a culture dependent upon the existing levels of package delivery service and demanding increased sophistication.

Within this 213 year history of the United States, there have been several players involved directly with package delivery; with each transportation introduction came an array of new companies exploiting that transportation vehicle for package delivery. Different types of services increased as carriers created niches for themselves with the types of packages (documents (mail), small packages - usually less than 50 pounds and under 100 inches in length, small shipments, and heavy freight) they delivered. Also carriers differentiated themselves by how much delivery responsibility they would assume (e.g. Airfreight forwarders and air cargo carriers are different mainly because forwarders provide complete door-to-door delivery while air cargo carriers offer only airport-to-airport delivery). The number of couriers as well as the different types of services rendered seemed to grow almost exponentially.

For the purposes of brevity and relevance, this industry evolution will be curtailed to include only those air and ground carriers who, during this evolution, sought to provide small package door-to-door delivery on a nationwide level. The big players in this arena are the U.S. Postal Service, trucking companies, and airfreight forwarders. This marketplace was dominated by the U.S. Postal Service until UPS entered the ball game in 1907 and it was really not until the early 50's, when UPS acquired the
common carrier rights for small package delivery throughout the U.S.¹ (before that UPS, had focused primarily on retail delivery) that any company became a real competitor to the U.S. Postal Service.

From the early 50's until the early 60's the playing field consisted of these two players but in the early 60's, airfreight carriers entered the picture, and from 1961 to 1972, there was an increased emphasis on airfreight delivery. Airfreight volume grew 500% from 733 million ton-miles in '61 to over 4200 million ton-miles in '72². Although there were several airfreight carriers, Emery Air Freight was the largest, handling over 10,000 shipments a day by 1970.³

Airfreight probably would have grown more quickly had there not been so great a pricing disparity between airfreight and ground delivery without a substantial increase in reliability. The only packages that customers did choose to ship by air were 'time-sensitive' packages (e.g. perishable products, medical supplies, etc.) that required fast delivery (delivery time disparity between airfreight and ground service was 1-to-8 days as opposed to 3-to-20 days⁴).


² Ibid.


So in the early '70's the cultural infrastructure was, once again, constraining the limits of the existing delivery industry and a new innovation, either in a transportation mediums or efficiency methodologies, was called for. A few years earlier a Yale student named Fred Smith had noticed these constraints and had conceptualized a system with airlines devoted to package delivery that would alleviate reliability and expediency problems of the existing package delivery markets. But his professor shot down this paper with a C replying that Civil Aeronautics Board (CAB) regulations would not permit such a schema.

In 1971, Fred Smith founded Federal Express and set out to influence the CAB to deregulate the airfreight industry. From '71 to '77, Smith only made marginal progress procuring CAB permission to devote aircraft to packages to freight, . . . but only small aircraft. Smith realized that with this limitation on aircraft size, he could never achieve the economies of scale necessary to make a profitable business so he kept insisting on total deregulation. Finally, in November, 1977, Congress passed legislation eliminating the CAB's control over market entry and pricing¹, thus opening the door for carriers to use any size aircraft they wished to use.

After deregulation, the package delivery waters became very turbulent with intense competition. Emery, still the largest air forwarder, challenged Federal express head to head. But Federal Express choose to focus on time

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sensitive packages, offering reliable overnight delivery which Emery could not match due to its pre-deregulation structure.

Emery as well as other forwarders like Airborne Freight and Burlington Northern Air Freight (BNAF) then tried to copy FedEx's hub and spokes strategy, but Federal Express had a head start and by 1982, had surpassed Emery in sales and was quickly becoming the dominant leader in airfreight delivery. Additional competition came from air cargo carriers who, facing the loss of business from air forwarders who had been their largest customers, tried to expand their traditional service to provide door-to-door service for small package delivery. Flying Tiger, the most significant of these carriers, was making an aggressive entry into this service. Also common couriers who, until deregulation, concentrated on ground-shipped documents, were now pursuing small package air delivery. Purolator Courier, the largest of the common couriers with its business concentrated in the mid-west, was deriving 29% of its revenue from air shipments¹.

Not until 1982, did UPS decide to enter the airfreight arena but when the decision was made, UPS devoted substantial resources to this business. By 1987, UPS owned 89 aircraft, leased 140, and had thirteen 757 Boeing jets to support its airfreight service².

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¹ Seward.
In 1985, Roadway Package Systems (RPS), a subsidiary of Roadway Services, Inc (RSI) which included one of the largest over-the-road trucking businesses in the U.S. began small package delivery operations in 18 Midwest and Northeast states\(^1\). An important aspect of RPS' entry into the industry was that it was the first company, since deregulation, who had tried to enter this arena with an established ground network. This network, in addition to FedEx-like IT focus ruffled a few feathers at UPS.

In the later half of the 80's, many of the smaller competitors were being eliminated due to the growth of Federal Express and UPS. In 1987, Emery and Purolator merged to fight FedEx/UPS leviathan but even with these joint resources could not effectively compete and in February, 1989, this merged company sold out to Consolidated Freightways, another RPS-like trucking company that has decided to enter the airfreight industry. Also in late 1988, Federal Express further consolidated the industry by purchasing Flying Tiger to achieve an extensive international network.

The only other significant entries into the small package market place have been international couriers, like DHL and TNT, who have, since deregulation, aggressively moved into small packages.

Throughout this post-deregulation period, the U.S. Postal Service has continued to be a player but its role has been reversed from the player with a monopolistic edge to the one with the least degrees of freedom, relying on

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\(^{1}\) Ibid.
Postal Rate Commission approval before initiating any new service. But, the Express Mail service, boasting break-even revenues of $543 million\(^1\) for 1985, is a valiant attempt to remain a viable competitor in this industry.

The timeline on the following page represents significant industry activities from 1900-1989.

\(^1\) Seward.
Today the small package delivery industry has been narrowed. Only those companies with combination air/ground networks can effectively compete. There are only two players, Federal Express and UPS, holding significant shares (i.e. >15%) of the U.S. market and only one additional player, DHL, with similar significance in the global market.
The few remaining players within this industry are now trying to differentiate their services from each other with features like advanced package tracking capabilities and extensive global networks. These features can only be offered by building elaborate infrastructures (IT infrastructure for package tracking and operational infrastructure for a global network) that fewer and fewer companies are able to afford.

CHAPTER 2: The History of UPS

UPS was founded under the name of American Messenger Company as a small Seattle messenger service in 1907 by a 19 year old by the name of Jim Casey. The initial service offered was that of hand-delivering messages that were phoned into the central headquarters but as the telephone became more common creating a downturn in the need for message delivery, the company turned to small package delivery through the most efficient modes of transportation available.

In 1913, the company took advantage of the new wave of transportation and bought its first car, a Model T, to facilitate its service. With a focus on inexpensive dependable service, the small company slowly grew and with 1919 came one of the most significant years in the company's history. First the company changed its name to United Parcel Service (UPS) and second, and more importantly, Jim Casey, believing that labor unions were unavoidable, invited the International Brotherhood of Teamsters to represent
the UPS drivers and part-time employees. Casey formed a flexible union-management that was lauded at the time as notably progressive.

In 1922, UPS began an experimental 'common carrier' service to Southern California. The term 'common carrier' meant that the company was "legally required to service any shipper who was willing to pay, no matter how small the shipment or how remote the location within the service territory."1 This trial service and the procedures that it produced (e.g. automatic daily pick-up calls, additional delivery attempts, etc.) were very successful, so successful that seven years later, in 1929, The Policy Book was published to standardize the policies enacted during this experiment. The Policy Book laid down the UPS moral code, most of which is still upheld to this day. These laws varied from the renowned hire-from-within policy to vehicle maintenance policies requiring that all UPS vans be washed daily.2

From the the 20's to the 50's, UPS expanded its geographic network and serviced primarily retailers, but as retail business started to decline, so did the demand for UPS' service. So UPS decided to expand its services and, in the early '50's, acquired federal approval for common carrier rights for small package delivery throughout the U.S. This strategic change of direction, placed them in direct competition with the U.S. Postal Service who, until that time, had held a monopoly on personal package delivery.


2 "The UPS Policy Book".
From this point to 1980, UPS was completely focused on this common carrier ground service (much of this time was spent pursuing state approval for common carrier status which had to be acquired in addition to federal approval) which operated in a multi-hub and spokes framework where carriers within a designated area picked up packages within that area and then returned them to a centrally based hub so that they could be sorted by destination and routed accordingly.

During this roughly 30-year period from the early '50's to 1980, UPS grew significantly, plowing much of its retained earnings into its extensive industrial engineering group which designed and built (or sometimes commissioned) all of the company's operationally efficient and inexpensive hubs, operating centers, sorting systems, and delivery vans.

There were four events of significance during this period. First, in 1953, the company incorporated the Blue Label Air two-day door-to-door service employing air cargo companies, like Flying Tiger, to fly its packages between UPS hubs. This was an incredibly visionary action by Jim Casey but, because of its trucking company history, UPS only pushed the service when comparable service could not be achieved through its ground network. Second, in 1962, Jim Casey retired after 55 years of leadership and Paul Oberkoter took over as CEO. Third, in 1976, UPS expanded internationally by setting up a wholly owned subsidiary in Germany. Finally, in 1977, Congress deregulated the airfreight industry opening the door for an array of air forwarders to compete with UPS' ground and air service.
At first, this deregulation was not viewed as a significant event in the eyes of the UPS management. UPS viewed their service as a reliable commodity service that competed primarily on price and that only a few customers could afford to send packages by air. But Greg Lamb, who took over as CEO in 1980, was not so sure; he commissioned a study of the air delivery industry. The results of this study were that two-day delivery was adequate and that the Blue Label service needed to be promoted more heavily. But, then in 1981, apprehensive due to Federal Express's increased market share, UPS decided to enter the overnight delivery service. It established a Louisville hub, purchased its own planes (for its Blue Label service, UPS had been leasing air cargo plane space) and in 1982, opened its doors for for next-day service (only if the customer already had daily UPS pick-up service; otherwise a customer still had to call 24 hours in advance for a pick-up) with prices half those of Federal Express. Also around this time UPS began a mass-media advertising campaign which was a big change for a company which, historically, had been obsessive about secrecy.

By 1985, UPS had 64 aircraft and was delivering some 200,000 packages a day\(^1\). Corporate revenues were 7.68 billion, almost quadrupling those of Federal Express\(^2\). That year the company added an overnight letter to compete head-to-head with Federal Express's core business.

\(^1\) Seward.

\(^2\) Ibid.
Before 1985, UPS' operations were a replica based on the results from its 1922 Southern California common carrier service trial run. The UPS strategy was:

To fulfill a useful economic purpose - satisfying the need for prompt, dependable delivery of small packages, serving all shippers and receivers wherever they may be located within our service areas - with the best possible service at the lowest possible cost to the public.¹

All attempts to differentiate the service were attempt at lowering the cost of the service through streamlining the operations (such as regulate van-to-door delivery times). Although Federal Express had chosen a completely different strategy of competing through technology investments and adding value (e.g. tracing information) to its air delivery service, UPS management thought this strategy inappropriate for them since the company's main business was ground delivery service which was not as time sensitive as air delivery service.

It was not until Roadway Package System (RSP), in 1985, began operations in 18 Midwest and Northeast states that UPS became interested in alternative ways of differentiating its services. This new entrant was blessed with an extensive ground network of its parent company, Roadway Services, Inc. (RSI), one of the largest over-the-road trucking businesses in the U.S. Industry sources predicted that this new entrant would, by 1991, have a daily

¹ "The UPS Policy Book".
volume 7% that of UPS.\(^1\) Why? One reason was an advanced billing and tracking system. A shipper could call a toll-free number to find out the location of a package.

This prediction of RPS as a viable competitor caused UPS to take a closer look at investing in technology: the number of computer terminals increased from 600 in 1985 to over 17,000 by 1988, the company purchased two small high-tech companies, Roadnet Technology and II Morrow to help it develop a FedEx-like package tracking system, and management pledged to invest $1.4 billion in IT from 1986 to 1991\(^2\). But although these massive investments signal a financial commitment to IT, there is doubt as to whether this commitment is proactive, as some UPS public releases indicate, or just a reactive measure to defend its current market share.

The time line on the next page exhibits significant events in UPS' history.

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\(^2\) Seward.
UPS is a 62-year-old monolith that has stood the test of time in an extremely dynamic industry. It is a company that has rooted in its socialistic culture of puritanical morality, evidenced by stark functional buildings, its egalitarian personnel policies, and its strict corporate standards (like a no-beard policy and two 15-minute break restriction). It is a company that has pursued and grown wealthy on one basic strategy: for 62 years. It is not a company that is

UPS Company Time Line (1907-1962)

1907
1913
1919
1922
1929
1953
1962
1973
1976
1977
1982
1985

Casey founds UPS
Company buys first car
Establish UPS Name & Teamsters as Union
The S. C.A common carrier experiment
The policy book is published
Blue label service started
Federal approval of common carrier status
Jim Casey retirees
Fedex begins service
Germany subsidiary opened
CAB deregulation
Overnight service is initialed
Company begins investing heavily in IT
not very easily changed and with 82 years of success, it is easy to understand why.

CHAPTER 3: The History of Federal Express

The Federal Express story begins with the infamous tale of the Yale paper in which Fred Smith espoused his theory of a freight-only airline company exploiting a central hub and spokes operation to develop an overnight package delivery service. The professor gave Smith a C.

Fred Smith started Federal Express in 1971 after being graduated from Yale and then serving two tours as a Marine in Vietnam. He founded the company with money out of his own pockets (and the pockets of some of his family members), money that was inherited from his father who was an early entrepreneur in the transportation business founding Dixie Bus Lines - a successful southeast bus company that he eventually sold to Greyhound.

Smith started Federal Express based on the concept he had put forth in the Yale paper that he had written six years earlier; his focus was to serve customers with time sensitive needs and therefore sought to create a reliable overnight delivery service. This service was based on three principles:

1. A single hub provided centralized sorting and control over packages. This not only provided economies of scale, but improved security and easier quality control.

2. Federal Express would have complete control of every package from the moment it was picked up until it was delivered, thus providing security and the possibility of
treating the complete shipping cycle as a whole.

3. Parcels were limited to 50 pounds, and a combination of 108 inches in all dimensions. By restricting package size, Federal Express hoped to realize operating efficiencies, as well as targeting a specific market\(^1\).

On March 12, 1973, after a year devoted to acquiring CAB approval to use Smith's aircraft choice - the Falcon jet - as a freight vehicle, hiring employees, and setting up the Memphis hub, the Federal Express overnight service was inaugurated, only to deliver six packages - one sent by Smith himself\(^2\). But then after an extensive sales campaign and establishing a network serving 22 cities, the service was again introduced on April 17, 1973 (the day Federal Express claims as its first day of service). By October of the same year, the nightly average of packages delivered was 2,517\(^3\).

After two disappointing years, in 1974, Smith hired a man by the name of Vince Fagan to head up the marketing department. Fagan stressed two things: That Federal Express raise its prices because timely service was a service customers were willing to pay for, and second, that mass media advertising, rather than direct sales efforts, would be an appropriate mechanism for marketing this service. These two suggestions were taken to heart and the 1975 "America, You've Got A New Airline" was the first of a

\(^1\) Seward.

\(^2\) Sigafoos.

\(^3\) Ibid.
long series of innovative media campaigns that have captured the public eye.  

Also in 1975, Federal Express introduced the Courier Pak, a 12 x 15.5 inch envelope which could contain documents weighing up to two pounds and set at a fixed price, regardless of delivery destination. In July of that same year, the company netted its first profitable month and by the end of the year FedEx had achieved a 10% market share of the overnight small package market.  

In 1976, Smith began to look at information technology as a way to differentiated his service. He decided to install a centralized phone system combined with an 800 number to facilitate order processing for FedEx customers. There was some resistance to this but Smith was unyielding insisting that ease of ordering is a valuable service to the customer.  

Also in 1976, studies were done that indicated that if the CAB did not allow Federal Express to operate bigger planes, the economies of scale that Smith had written about 11 years earlier, would never be realized and Federal Express would be constrained to remain a small company yielding relatively little revenue. With huge debt on Smith's shoulders, this constraint was unacceptable. On November 9, 1977, much due to Smith aggravating presence in Washington, President Carter signed a bill known as PL 95-  

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1 Ibid.
163\textsuperscript{1}, the domestic all-cargo deregulation statute that eliminated CAB’s control over market entry and allowed any size aircraft to be used solely for package delivery.

Many of those who observed Smith during this Congressional ordeal believe this victory to be his greatest single achievement in building Federal Express\textsuperscript{2}.

With deregulation behind him, Smith could now focus on his service. Smith began investing heavily in information technology (IT). In 1977, the same year as deregulation, Federal Express developed COSMOS (Customers, Operations, and Services Master On-line System) to initially store customer information and rate tables, allowing agents to access this appropriate information when customers called to request a pickup\textsuperscript{3}. COSMOS enabled FedEx operators to quickly process an order and therefore reduced the amount of time a customer had to spend on the phone requesting a pickup; it is probably the most well-known information system in the country with the possible exception of American Airline’s SABRE.

During the next several years, additional functionality was added to COSMOS to facilitate the collection and distribution of customer information. Other systems like FAMIS (Field Activities Management Information System)

\textsuperscript{1} Ibid.

\textsuperscript{2} Ibid.

and ORBIT (On-line Billing & Invoicing Technology) were also developed to streamline internal operations.

Also in '77, Smith assigned a team to investigate the possibility of using bar-coding as a way of capturing information from each package. Obviously, Smith was committed to using IT to differentiate his company from commodity service competitors.

In 1978, the company boasted revenues of $160 million\(^1\), three short years after its first profitable month. In this year, Federal Express reorganized to form a highly centralized company so that the corporate structure would parallel its service structure and its IT structure.

in 1979, Federal Express established service to and from Canada, thus promoting a commitment to international service. Also that year, Smith, further evinced his commitment to technological development by creating a Technology Center in Colorado Springs to attract talented technical people to the company.

Federal Express continued to grow and in finally attracted the attention of UPS who, in 1982, decided to enter the overnight air delivery service. In response, Federal Express reset its guaranteed delivery time to 10:30 instead of 12:00 noon. Federal Express was surprisingly unaffected by the entry of UPS because UPS did not make on-call pickups nor did they offer

\(^1\) Sigafoos.
any package tracking capabilities - services to which FedEx customers had grown accustomed and valued highly.

Also in 1982, Federal Express introduced DADS (Digitally Assisted Dispatch System). This system consisted of mounted computer terminals in every van with real-time links to COSMOS. After the full-scale implementation of DADS, a customer could call FedEx’s 800 number at 9:55 for a delivery and have a FedEx van arrive at his/her front door at 10:00. This real-time link had, once again, exemplified Federal Express’s devotion to customer service improvements through technological innovations.

In 1983, the company broke a historical precedent by breaking the $1 billion revenue mark less than 10 years after its inception¹. This was a significant achievement for a company based upon concepts from a C paper.

In 1984, FedEx introduced its first (and to this day, only) major market failure: ZapMail. ZapMail was a high quality facsimile network which provided two-hour door-to-door document delivery service. But the unanticipated fast decent of facsimile technology down the price curve was the demise of ZapMail and, a year later, in 1986, Federal Express removed the service from the market with a pre-tax loss of $326.8 million².

¹ Ibid.
² Ibid.
Also in 1986, the company introduced the COSMOS IIIB system which incorporated a hand-held wand called a Super Tracker used for package scanning by the couriers and the sorters. The retrieved package information was then routed to COSMOS IIIB and immediately available to a FedEx operator. This system enabled a package to be traced to the exact location at any point of the delivery cycle whether this package was being sorted in the central hub or en route to its delivery destination.

In 1987, volume had grown to such levels as to severely constrain the huge Memphis hub, even though two smaller hubs had been opened the year before. To manage this volume, Federal Express purchased Puralator's Indianapolis superhub. These new hubs did not fit perfectly into the highly centralized company, and integration was a slight problem.

Last year, 1988, Federal Express both increased pack size limits and decreased its prices due to market share loss to UPS. Due to cost constraints, many companies reevaluated the need for packages to be shipped overnight and began choosing cheaper couriers for their time insensitive packages. Therefore, searching for an additional differentiation strategy, Federal Express decided to focus on becoming a leader in the global marketplace. Toward this goal, in December '88, Federal Express purchased Flying Tiger to expand its international network.

The timeline on the next page exhibits significant events in Federal Express' history.

Federal Express is an organizational that thrives on change. In its 18 year existence it has revolutionized the package delivery industry. Everything about this Federal Express, from its modern corporate offices to its highly automated self-sufficient Memphis hub seems to reflect this innovative
approach. This company has made a fortune by setting new industry standards and if there are additional industry standards to be set in the future, Federal Express will probably be the company to set them.

CHAPTER 4: Deriving Competitive Advantage Through IT

How can a company create a competitive advantage using IT? The company can develop information systems to streamline internal operations to effect more efficient processes that could provide operational value such as reduced development cycles and/or a company could bundle product information with its product and thus adding value that differentiates the product from competing products. The company can then choose to charge its customers extra for this value and/or simply use this value as a barrier to market entry. The graph on the next page is a price/value (added product value refers to either informational value bundled directly with the product or time advantages gained IT-imposed operational efficiencies - e.g. a product has additional value if it is the first on the market) that illustrates competitive advantage options through added value provided by IT.
Competitive Advantage Through IT Added Value

There are a couple of well known examples of companies that have gained tremendous competitive advantage by using IT. The American Hospital Supply Corporation with its ASAP on-line ordering system, American Airlines with its SABRE reservation system, Merrill Lynch with its Cash Management Account are the classical examples of companies deriving competitive advantage from their innovative utilization of IT. The glorification of these 'big wins' have prompted many companies to invest millions of dollars into the development of strategic IT systems, and in most cases these developments have not created competitive advantages.

(Due to an array of disappointments), an alternative school of thought has arisen: competitive advantage information technology may, in fact, be too elusive to plan for. In this view,
most applications of information do not lead to competitive advantage and may even be poor investment decisions.\(^1\)

Therefore, even though it is generally conceded that a company can derive a competitive advantage from IT, it is still vague when and how a company can derive this advantage.

First, it is important that a company invest in IT for a specific purpose, not just because IT is a current hot topic in business literature. This purpose could be to automate the Engineering Change Order (ECO) process within the manufacturing process to reduce new product development cycles or to develop a customer data base useful to the Marketing department for market analyses.

But how does a company decide what this specific purpose should be? Most importantly an organization such focus on processes critical to the organization's objectives. To this end, the objectives of the organization should be analyzed (One useful analysis technique for such an analysis is the Critical Success Factors - CSF - technique developed by Professor J.F. Rockart of the MIT Sloan School and detailed in *Engaging Top Management in Information Systems Planning and Development: A Case Study* - a joint working paper, CISR WP No. 115, Sloan WP No. 1586-84, by J.F. Rockart & A.D. Crescenzi). Then management should, before automating, ensure that these processes are efficient in their state; automating an inefficient is a waste of time and money. Finally different automation alternatives should be

investigated (It is not always necessary to internally develop a system. Sometimes off-the-shelf software can be inexpensively customized to meet a variety of needs). Whatever the automation strategy, it is probably not wise to copy information systems directly from other companies unless it is determined by an interorganizational analysis that the critical processes of the firm are the exact same processes - operationally, integratively, geographically - as those automated by the system to be copied.

IT applications . . . should be timed to minimize total lifecycle costs, not to duplicate competitors adoption of similar uses of IT. The same initiatives may not be equally cost-effective for all competitors¹.

Furthermore, the selected processes ripe for IT are usually not stand-alone processes; they are often processes dependent upon other processes within the organization. Incorporation of IT in such a process usually involves a complex integration of all involved processes. To undertake such a project, detailed up-front analysis should be completed to determine the feasibility of IT integration into the environment.

This analysis should address the technical feasibility associated with the development as well the organization issues involved. For example, when Federal Express developed first conceptualized the hand-held terminal (HHT) as a scanning device for its couriers, a detailed feasibility study was done to survey the HHT technology market, to determine if hand-held devices were durable enough to use on the road, to see if large numbers of sequential numbers could be printed in bar code, to determine the impact of

¹ Ibid.
scanning on field people's morale, the ensure that the information provided could be easily transferred to the company's existing computer system.¹ This analysis provided data that was used to determine the appropriateness of bar code technology for package delivery as well as predict the impact of package scanning on the entire company.

Determining the feasibility of differentiation through IT may be even more difficult because, customers may not be able to relay how much they value product information if they have never been exposed to this information before. For example, a pre-FedEx package delivery customer may not have ranked tracking information as being an important component of a delivery service but today this feature is viewed by customers as extremely important, second only to having a wide geographic network². Knowing what information is important to consumers, although in many cases can be revealed through market analysis, must sometimes be predicted by by the 'gut feel' of the company decision makers. Fred Smith was sure that tracking information would be important to his time-sensitive customers and history has proved him correct.

Second, it is important that IT development genuinely reflect the corporate view of how IT should be used within the corporation. This argument that IT development and infrastructure should be an extension of the corporate

¹ Nehls, C.

view of IT is discussed in depth in Chapter 6 and is based upon the idea that this corporate viewpoint is an agglomeration of specific interorganizational factors which are introduced in Chapter 5.

Finally, it must be realized that the advantages gained through IT development may not be inherent aspects of the systems themselves but byproducts achieved from the whole development and implementation process (An important variable affecting these byproduct advantages is when, relative to industry competitors, such a development is initiated - i.e. first mover, second, etc.). Some of these advantages are presented in the Chapter 7 as competitive advantages that are more sustainable than the actual information systems which can probably be easily copied by competitors.

Competitive advantage can be achieved through IT but it is not assured simply by investing in IT. Focused goals, up-font analyses, and organizational alignment all play important roles in the determination of whether or not these investments will result in competitive advantages. Federal Express, since the development of COSMOS, has blatantly exploited IT for competitive advantage in an industry that has traditionally been viewed as a commodity industry. Through selective (selected by combination analyses/'gut feel') automation of internal processes that streamlined operations in addition to supplying package tracking information for which time sensitive customers are willing to pay extra, Fred Smith redefined small package delivery as a specialty service.
CHAPTER 5: Factors Affecting IT Infrastructure Development

5.1 Introduction

There are many acronyms such as MIS (Management of Information Systems), IS&T (Information Systems and Technology), or just plain IS (Information Systems or Information Services) that refer to a department that is responsible for the flow of information within a company and the technologies/systems required to facilitate this flow. Until very recently the raison d'être of the this department, in almost all corporations, was to provide support functions. Systems served the employees of the organization by facilitating processes, like order administration, or supplying information, such as historical sales data, helpful for analyses. Although these support functions remain an important role for the IS department, some companies are have decided that information systems can do more than simply support existing operations and these companies have begun to rethink the corporate role of IS.

In such organizations, the IS department has been elevated in importance and a new position, that of a Chief Information Officer (CIO), has been created to design an IS strategy for the company. To what degree this IS strategy is integrated with the overall corporate strategy varies with each company, but the fact that there is an IS voice in the executive boardroom signifies a change from the traditional data processing image of IS. But is this new image just that - an image created as a reaction to the IT focus of recent business literature or are these companies truly viewing information
as a valuable resource that can provide many benefits apart from simple support functions?

First of all, not all companies are placing a greater emphasis on IS. But a trend is clear. As early as 1984, the role of CIO was identified in 30% of the fortune 100 companies surveyed.\(^1\) Secondly, of those companies that have elevated the role of IS; there are not just two levels - one with the CIO as a figurehead and one of a corporation driven by its information systems - but many different elevations which can be achieved.

The reasons for these different IS elevations are even greater in number than the number of possible elevations. There are certain industries that value IS more than other industries (brokerage firms probably have a greater need for advanced information systems than, say, dairy farms) and certain market environments in which information is more valuable than in others (there is more need for information in a highly competitive environment than that of a monopoly environment). Also, there is a certain critical mass necessary, both in terms of company size and available capital, to even consider investing in advanced IT.

But what about firms within the same industry, in the same market environment, and with the critical masses necessary to allow IS investments? Why, within this framework, do companies differ with respect

\(^1\) Madnick, S. E. "The Strategic Use of Information Technology". 1987 Oxford University Press.
to IS? Why would one company spend a fortune on its systems and create a reputation as company breaking new ground with IT while its competitor uses IT solely for support systems?

The reason is that different organizations have different views of the role of IT within the firm. One firm may view the IT role as that of a support function while the other company views the IT role as that of a strategic weapon. In this chapter, five factors will be discussed which, when combined, seem to define this corporate view. These factors (which will be referred to in this thesis as the 5K - for 5 Key - factors) are:

- Top Management Commitment
- Corporate Strategy
- Corporate Culture
- Corporate Structure
- Personnel Policies

The diagram on the following page depicts how the 5K factors together affect the corporate view of the IT role within the firm.
The next five sections are devoted to these five factors. Each factor is discussed with regard to its influence on the overall corporate view of the IT role. Some of the factors overlap (Corporate Structure, Personnel Policies) and some influence others (Top Management Commitment, Corporate Culture) but there are enough discrete aspects of each to warrant separate discussions.

5.2 Top Management Commitment

There is a heightened awareness among almost all senior executives that they must drop their passive role with regard to information systems. Recognizing that information is a strategic resource implies a clear need to link information systems to business strategy and, especially to ensure that
business strategy is developed in the context of the new information technology environment.

This heightened awareness, although well documented in current business literature, is not easily discernible in many companies. This is because awareness does not necessarily translate into commitment. It is essential for this awareness to evolve into commitment to effect a change in the corporate IS role.

The level of senior executive commitment to IT is the single most driving factor affecting the corporate view of the IT role within the firm. If senior management is convinced that IT is critical to the firm, this will be reflected in the IT infrastructure within the firm. This is true whether 'senior executive' refers almost solely to one man, such as Fred Smith - dictator of Federal Express, or a large group, such as the group - combination 'partners', union representatives - who govern UPS policy.

From the Yale term paper inception of Federal Express, Fred Smith valued information as an essential resource of an express delivery service; he equated time sensitive packages with an information sensitive service. And after the deregulation of the airfreight industry and Federal Express had begun to produce positive revenues, he made a more formal commitment to IT by telling his staff, "The revolution in telecommunications will have

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2 Interview with Fred Smith. 1/5/89.
enormous implications in the way Federal Express does business and we need to be aggressive in this area."¹ This statement directly translated to the financial commitments required for its initial systems like COSMOS.

Smith, in addition to monetary investments, has gone out of his way to create an entrepreneurial environment at Federal Express that is conducive to IS development. For example, in 1979, when Federal Express had begun to outstrip the supply of technical people in Memphis, Smith decided to construct the Technology Center in Colorado Springs with a more developmental atmosphere that would attract the best technical people around.² Whatever is needed to foster IS innovation is done. Fred Smith's commitment to IT as a driving force behind the FedEx service has created the leading-edge IS environment which exists at Federal Express today.

Conversely, IT has never been valued as a strategic component of UPS. Until 1985, the IS department was called the data processing department which consisted of "a small group of UPS mavericks unable to exert influence over any function within the company except for accounting."³ Not until the attack by Federal Express in overnight air delivery and RPS in ground delivery did UPS realize that to remain the dominant carrier in the

¹ Sigafoos.
² Nehls.
package delivery, they would have to begin placing a greater emphasis on IT. Yet a shift to an IT commitment there wasn’t.

The DP department did change names to the IS department and the number of personal computers in operation did jump from 600 in ’85 to over 17,000 in ’881, but there were no strategic changes made to accommodate a new IT framework. When the time came to hire employees to fill the open positions of the rapidly growing IS department, there was a push to hire all new staff from within the walls of UPS to comply with the traditional UPS hiring policy. But even with an extensive ten week training course, these internally staffed employees were only qualified for the most junior positions.2 Even after the inevitable decision to hire ‘outsiders’, was finally made, the employees hired had to meet the stringent UPS restrictions like the no-beard policy and two 15-minute breaks during the working day.

Now, most corporate software development environments are quite different from corporate America, even if they reside in the most conservative of companies. For example J. C. Penny, not known as a new-wave corporation, boasts a New York City skyscraper which houses its IS development personnel. One long time J. C. Penny store manager once said, “I don’t know what goes on inside (the NYC IS building) but you go


there, and there are guys with long hair walking down the halls in flip-flops
tossing a frisbee back and forth."¹ This open attitude, including no dress
codes, flexible work hours, and limited policy constraints, is believed by most
to foster an innovative spirit necessary for software development.

Yet UPS refuses to bend its policies. One hired-in systems manager
commented:

They shouldn't try to run an IS environment like a hub . . .
We should absolutely be allowed to have coffee at our
desks. Instead every day at 3:30 PM this place looks like
a factory on break! Everyone jumps up from their chairs
and goes to the cafeteria to socialize and drink coffee.²

UPS also refuses to bend much away from the promotion-from-within policy.
For an IS hire-in to move up in management, it is still necessary to transfer to
a hub or own a delivery route so that s/he can learn the guts of the
organization.³

These constraints upon the IS department show that, although UPS has
reactively decided to invest in IT, there is no corporate commitment to create
an environment to whole-heartedly promote IS as a strategic weapon.

¹ Reflections on Conversations with Paul K. Banks.
² Sonnenfeld, J. "United Parcel Service (A)" Case write-up #9-488-016.
³ Interview with Patty Brice, Research Assistant of Professor J. Sonnenfeld.
4/89.
One final note on top level commitment to IT: it is even more significant if it has been a commitment that is seeded in the company's history so that it has affected a cultural commitment to IT as well.

Federal Express has always been manned by Fred Smith who created and has maintained a commitment to IT. If UPS management does develop an full fledged commitment to IT, there will be cultural norms, adverse to this commitment, to overcome (as was evidenced by the complaints voiced against the decision to fill IS vacancies with outside hires).

5.3 Corporate Strategy

Explicit control of IT and full integration into corporate strategy formulation are necessary prerequisites for the successful exploitation of IT strategic opportunities.¹

The corporate strategy should be the driving force behind all activities within the firm. Whether it is a one line mission statement such as Alcan's to "maximize its participation in the aluminum market" or a document such as Johnson and Johnson's page-long credo emphasizing quality, the corporate strategy should encapsulate the bane of the company's existence.

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¹ Madnick.
Federal Express’s corporate strategy is three words:  

**PEOPLE / SERVICE / PROFIT**

which is explained by COO James L. Barksdale as "putting the people first, and they’ll take care of the service. The service will take care of the profit with funds, better wages, and benefits, and more tools to help the people do their job more productively. That will provide even a higher level of service. And that produces greater profit."¹ This strategy is further broken down into five corporate goals, the fourth and fifth being:

- Get closer to the customer in every way, recognizing the pervasive requirement for high-priority logistic systems in this fast paced economy²

- Base its strategy on substantial use of computer technology³

It is crystal clear from this strategy and set goals why, at Federal Express, there is an IT focus.

UPS’ corporate strategy is:

To fulfill a useful economic purpose - satisfying the need for prompt, dependable delivery of small packages, serving

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² The Federal Express Manager’s Guide.

³ Ibid.
within our service areas - with the best possible service at
the lowest possible cost to the public.\(^1\)

There is not a single reference to information, systems, or technology in the
eight point objective summary presented in the UPS Policy Book. Therefore
it is as obvious why UPS doesn't place an emphasis on IT as it is why
Federal Express does.

UPS has made a reactive investment in IT but until there is a formal strategic
objective incorporating IT, it will be almost impossible for UPS to take full
advantage of their information systems as a strategic weapon.

5.4 Corporate Culture

'Culture' is a term that has become quite the rave recently within modern
age business circles ever since, in their best selling, \textit{In Search of}
\textit{Excellence}, Peters and Waterman espoused:

\begin{quote}
Without exception, the dominance and coherence of culture
proved to be an essential quality of the excellent companies.\(^2\)
\end{quote}

It is a term often used rather ambiguously, probably because it cannot be
distinctly defined. Yet it can definitely be distinctly felt. A corporate culture is
the 'feeling' of the corporate environment; it could referred to metaphysically

\(^1\) The UPS Policy Book.

\(^2\) Peters, T. J. and R. H. Waterman, Jr. "In Search of Excellence".
as the company aura. It is the shared values of the employees that have evolved throughout the company's history.

Cultures can be strong or they can be weak or somewhere in between. Strong cultures are exemplified by: a sense of company oneness, multiple tales (both actual and mythical) of corporate lore, loyal employees who bundle their personal values with the company's shared values and who aggressively defend these values, reacting strongly toward anti-corporate attitudes. Weak cultures, in contrast, lack the above characteristics; the company is not viewed as an entity as much as a means to an end, where the end is the accumulation of salary and experience. Both Federal Express and UPS have strong corporate cultures.

Federal Express has corporate culture that is omoles a sense of leading-edge everything, from promotional activities to advanced technologies. The row of high-tech mirrored corporate office buildings in Memphis (including Smith's office building which hosts a suspended model of a Falcon - the original airplane chosen to build Federal Express fleet - in the lobby), the elaborate semi-automated Memphis hub - complete with its own power plant, the sophisticated weather forecasting center - which is said to be the third best in the world, all support this leading-edge culture which may best be described by the adjective, 'pizzazz'. This is the culture that is clearly evident from talking to any FedEx employee, from the couriers who brag about being high-tech with their Super Tracker hand held computers to the hub tour guides (tours of the Memphis hub are open to the public every night between 12:00 midnight and 3:00 AM) who excitedly describe the
automated features of this huge sorting facility. This is a culture that is completely supportive of IS and innovation through sophisticated IT.

UPS has even a stronger culture than Federal Express but it is not one that is supportive of IT. It is a corporate culture that has been described by one former chairman as "half Marine Corps and half Quaker meeting."¹ It's a culture that dates back to 1907, when Jim Casey founded the company and placed an emphasis on cheap dependable message delivery. It's a culture that, in 1919, was heavily influenced by the incorporation of the Teamsters as a representative union for UPS employees. It's a culture that becomes formalized in 1929 when the policy book was created to standardize the corporate ideals throughout all branches of the business.

The core of this culture is socialistic in nature with enforced egalitarian policies. It is a culture of humility perhaps best reflected in the physical appearance of its facilities:

The buildings were stark, contemporary, and simple. UPSers scrupulously emphasized cleanliness but also discouraged elaborate decor. Chairs and tables were functional. Walls, if not barren, displayed folksy, Norman Rockwell type images of UPS package cars serving small communities. Carpets, where they existed, were thin and laid for convenience of cleaning, not comfort. Offices were comparably sized.²

¹ Labich, K. *Big Changes at Big Brown.* 1/18/88. pp. 56-64.

It is an environment in which being different is bad, in which people driving flashy sports cars are subject to peer teasing\(^1\), in which the adjective 'pizzazz' is probably unknown.

Yet this stark culture is a strong one. UPSers are proud of their company, proud of their history and believe that they can offer the same dependable cheap service today on a global scale as they did to the small Seattle community back in 1907. This is culture opposed to now concepts, a culture in which innovation though sophisticated IT is difficult to promote.

Recently, UPS has been trying to infuse a spirit of innovation into this stodgy culture but, as mentioned in section 5.1, there is really no top level commitment to this effort. Unless the culture of UPS is gradually molded to encourage the strategic use of IT, there will continue to be problems developing and implementing strategic information systems. Within this scenario, UPS' IT strategy will be that of a follower strategy, waiting for the competing innovators to invent strategic information systems and then adapting those systems for UPS.

5.5 Corporate Structure

Some corporate structures are more accommodating to IT integration than others. It is always important to design information systems with the existing corporate structure in mind or to realize that a successful implementation

\(^1\) ibid.
may require some structural adjustments. Three main qualities of the
corporate structure affect the facilitation of an IS implementation:

- degree of top level autocratic decision making
- degree of centralization
- degree of flexibility

First, it is much easier to implement a information system when there is an
autocrat at the helm who can make fast decisions for the entire company.
Fast authoritative decisions allow consistent, compatible, and connected
(three very important attributes of an information system) systems to be
implemented in a timely fashion. Companies with slow, less autocratic,
disaggregate decision processes risk incompatible system development
efforts due to miscommunication of interim decisions at different levels of the
decision process. Or there is a risk of an extremely slow development effort
due to the unproductive waiting period during the decision process.

Second, it is much easier to develop a connected information system for a
centralized environment because information systems design has
historically mimicked the human brain which is a centralized system. Most IT
research has been within this central framework, so it is much easier to
design such a system then to attack a decentralized environments where IT
problems involving data integrity, security, reliability are difficult to resolve.
Also, in a decentralized environment, especially if accompanied by
decentralized decision making processes and decentralized development,
there exist the potential compatibility problems.
Finally, structural flexibility is important. A flexible company is one that has no structural maxims, a company that will create different environments for different functional areas of the firm. The company will try to optimize conditions best suited for productivity within that functional area. Such companies usually welcome change so are not threatened by a lack of consistent structure. An inflexible company is one that values stability and mandates a single corporate structure that is imposed on every functional area within the firm.

With respect to these three structural qualities, Federal Express is definitely more prone to IT innovations than UPS.

Fred Smith is an autocrat; his word is law at Federal Express. And he has delegated similar IS authority to Ray Ponder, Senior President Vice President for Information Systems. Ponder, who is well known for his IS leadership and has received many prestigious awards such as the AMS/Carnegie Melon Award for Achievement in Management Information Technology\(^1\), makes all of the final decisions concerning IS policies (unless, of course, Fred decides to have a say in the matter).

The organizational information needs, simply because of the FedEx central hub and spokes strategy, is a centralized need. Furthermore, the decision to incorporate a central order-entry system based in Memphis in addition to its

\(^1\) Flynn, M. K. *Business Focus is the Key to Success*. Datamation. 7/15/87.
'78 reorganization toward more centralization reinforced this need for centralized IS. As Federal Express has grown, additional hubs have been added to this central framework and consequently a need for IS to support these operations but a centralized approach to IS still dominates the environment.

Federal express has also been flexible in support of an open environment beneficial for IS development. The decision to build the Technology Center in Colorado Springs was made specifically to create an environment ripe for IS development that would attract talented IS people to the company.

UPS, on the other hand, has very long convoluted decision processes. The organizational structure is decentralized to support the network necessary for nationwide ground transportation. And although, there is a Paramus, NJ site specifically dedicated to IS development, UPS, as described above in section 5.1, has not been flexible enough to allow the open, liberal environment critical to innovative IS development.

Therefore the corporate structure of Federal Express is more suited to innovative IS development than that of UPS. The autocratic decision making process, centralized informational needs, and openness to the informal requirements of IS personnel have created an IS environment at Federal Express that encourages innovation.
5.6 Personnel Policies

The last quality of this chapter is that of specific organizational personnel policies. It is not a topic that gets a lot of literature mileage with regards to IS development but it is a topic that is of critical concern to top management in both Federal Express and JPS. Both companies take their personnel policies very seriously and both believe strongly that the success of their respective companies is due to these policies.

It takes people to develop information systems and it takes personnel policies to manage people. What policies work best to promote innovation? Most academics would argue that hiring experienced people and providing individual incentives to innovate would work best. What about teamwork? Information Systems are usually complex networks that involve the integrated efforts of several people. Teamwork in such a development process is definitely important and incentives should be provided to support a team spirit but team spirit alone cannot replace experience and creativity.

A confidant of Fred Smith says, "Go in and tell Fred that while you were waiting in the lobby to see him, you were sitting next to Norman Greene, director of the Airline Division of the Teamsters. Watch Fred come apart!" Smith is strictly opposed to the unionization of the Federal Express work force because he feels unions serve no purpose. He believes that company should create internal personnel policies to keep the employees happy.

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1 Sigafoos.
The Federal Express personnel philosophy is that of hiring in the best and providing incentives for motivation. Smith backs up this philosophy by spending a significant portion of his work week on employee motivation grievances, operating similar to the Japanese Kaizen philosophy for ongoing quality improvements in work and personal life.¹ There are also an array of individual rewards throughout the company that range from dinner vouchers for two to the "Five Star" awards - checks between $5000 and $25,000 annually awarded to the five people in the company who have been the most innovative and creative.² This is all a part of Smith's renowned Bravo Zulu program, named after the naval signal that means "well done and thank you."³

Recently Smith has also been promoting teamwork as well as individual performance. To instill this team-think, Smith sends many of his managers to the Colorado Rockies for Outward Bound training which involves teams rappelling down the side of cliffs.⁴

The personnel policies at UPS are very close to being exactly opposite to those at Federal Express. Since 1919, the UPS labor force has been

³ Ibid.
⁴ Sigafoos.
governed by the Teamsters. All personnel policies must be ratified by the union representatives. This unionization has fit well with the corporate strategy that dictates promotion from within and employee ownership of the company but there have been problems. Union incentive efforts seem only to focus on compensation which have pushed labor costs up so high, UPS has been prevented from incorporating competitive services like setting up a separate pickup/delivery system for its air delivery service.\(^1\) Also when UPS wanted to hire part-time drivers for air shipments, the Teamsters wouldn't hear of it.\(^2\)

Therefore although the unionization has created a definite team spirit among the UPS employees, it has constrained the organization to a point where "to compete with (Federal Express) takes every bit of the economies of scale in the UPS-system and every bit of ingenuity the company can muster."\(^3\)

Finally UPS' personnel policies lack flexibility both because of union regulation and Policy Book edicts. The corporate-wide policies of no-beards, no long hair, and strict dress codes apply to all departments from Finance to IS. As discussed in section 5.1, innovative IS employees usually require a more informal environment than corporate types and consequently


\(^{2}\) Ibid.

\(^{3}\) Ibid.
the most talented IS people will not be attracted to such a formal environment (even if outside hires are allowed).

It seems as though the personnel policies of Federal Express are much better suited than UPS from an IS innovation standpoint. The model IS innovator is usually a individually-motivated person who has gained expertise outside of the firm and who requires flexible personnel policies. Federal Express is in a position to recruit and satisfy such an individual, whereas UPS is constrained from outside recruiting in the first place and doesn't provide the environment to retain these people if they are hired.

5.7 Conclusion

Fred Smith has always been highly committed to the value of information and has developed a company with a strategy, structure, and personnel policies to exploit information to his advantage. Each successful FedEx IS implementation, from the centralized telephonic system to COSMOS to DADS, has further evoked more commitment to IT as well as defined a culture incorporating IT lore.

Conversely, UPS has existed from 1907 to 1985 using IT only as a support tool within the data processing department. Sophisticated information systems are not a critical tool of a corporate strategy to offer a cheap and dependable service on a nationwide level. Likewise the corporate structure and policies are not suitable for an IT-driven firm because they were developed to:
• Support Casey's puritan view of this strategy

• Immortalize the procedures that worked so well in the 1922 common carrier experiment in Southern California

• Appease the Teamsters who represent most of UPS' employees.

Also the corporate culture of "half Marine Corps and half Quaker meeting" that has evolved throughout the years is not a culture that is open to innovation through IT.

Finally since top management are men who have grown up with this UPS culture (managers have all advanced all the way through the ranks of UPS, from courier to manager), they usually are extreme advocates of the UPS philosophy and, find it difficult to commit to expensive automation (unions are typically anti-automation) as a critical component of the package delivery business.

But since 1985, when competitors such as RPS and Federal Express were gaining competitive advantages with sophisticated information systems, UPS has tried to change the corporate view of the IT role by investing heavily in IT and creating a global IS network. Yet none of the above 5K factors have been significantly adjusted and therefore incorporating IT has been difficult for UPS.

The diagram on the next page shows both Federal Express's and UPS evolution with respect to the corporate view of the IT role.
Federal Express has developed a corporate commitment to IT as a strategic weapon through an incremental evolution of the 5K factors that drive the corporate view of the IT role: top management commitment, corporate strategy, corporate culture, corporate structure, and personnel policies.
Within UPS these five factors have evolved in a deep-seeded view of IT solely as a support function. If UPS really wants to change the corporate view of IT, there must be a significant change in one or more of these influencing factors.

**CHAPTER 6: The Development of an IT Infrastructure**

6.1 Introduction

The IT infrastructure of a firm consists of the basic installations and facilities that permit electronic information transfer. This includes the existing hardware that provides a medium for such communication, the software packages and existing systems that have been developed to facilitate information flow, and the personnel devoted the development and maintenance of both the hardware and the software. The company's IS gamut from the telephone system to complex process systems are all a part of the IT Infrastructure.

There are many different possible IT configurations for any one firm, depending on the informational needs of the company and corporate view of the IS role as determined by the five factors discussed in Chapter five. There could be a decentralized infrastructure with each division responsible for its own IT needs or a highly concentrated environment where a central IT infrastructure is developed to support the entire organization. Whatever the configuration, the existing IS infrastructure should be a reflection of the corporate view of the IT role within the firm.
In this chapter, an analysis of this linkage between the five factors of chapter five and the corporate IT infrastructure will be presented. The argument will be presented that IT infrastructure change should be consistent with the corporate view and that change should be effected by changing one or more of the 5K factors so that the corporate view of the IT role is altered to support this infrastructural change. An IT infrastructure change without this corresponding change in the corporate viewpoint will cause confusion, frustration and propagate inefficient IS development and implementation efforts with long lead times.

Again there will be the supporting examples of Federal Express, a company that has developed a sophisticated IT infrastructure by paralleling its corporate view of the IT role, and UPS, a company who, in reaction to the competitive threat of Federal Express and other innovative couriers, has tried to create a similar FedEx-like IT infrastructure, an infrastructure that is inconsistent with the corporate view of the IT role at UPS. In citing these examples, an analysis of the corporate IT infrastructures will be detailed along with their historical evolutions.

This infrastructure analysis is based upon a five-level framework developed by N. Venkatraman, Professor at the MIT Sloan School of Management. This framework is a hierarchical representation of five levels of IT-induced reconfigurations that companies can establish for reasons of exploiting IT to gain a competitive advantage.
6.2 About the Framework

N. Venkatraman has developed a five-level framework that categorizes strategies for IT exploitation and subsequent infrastructures into five different levels\(^1\). He then analyzes these different categories along two dimensions - the degree of business transformation and the range of potential benefits from IT. The resulting matrix is depicted on the following page.

These five reconfiguration levels are defined as follows:

1. **Localized Exploitation** - exploiting IT within business functions such as manufacturing or marketing or even isolated business activities within the functions.

2. **Internal Integration** - extending the first level in the sense of exploiting IT capabilities in all possible areas within the business process.

3. **Business Process Redesign** - reconfiguring IT as central lever, i.e. redesigning the business process itself to
maximally exploit the available IT capabilities

4 Business Network Redesign - reconfiguring the scope and tasks of the business network involved in the creation and delivery of products and services

5 Business Scope Redefinition - enlarging the business mission and scope through related products and services as well as shifting the business scope through the substitution of traditional capabilities with IT-enabled skills

As detailed in the above matrix, Venkatraman presented this framework in an evolutionary/revolutionary context asserting that the first two levels are natural evolutions (from an IT infrastructure where IT is viewed as a support function) and the latter three are revolutionary requiring changes in the nature of business operations. A more detailed analysis of this framework is presented in Venkatraman's working paper "IT-Induced Business Reconfiguration: The New Strategic Management Challenge", published for the Management in the 1990's program at the MIT Sloan School of Management.

For the purposes of this thesis, the evolutionary/revolutionary context is unimportant due to the assertion that it is the corporate viewpoint of IT that should drive the corporate IT infrastructure and therefore a sophisticated level-5 IT infrastructure should not be revolutionary but simply a reflection of this corporate viewpoint. For example, the IT infrastructure at Federal Express has evolved through all five levels without any major changes in

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1 Ibid.
the nature of business operations simply because the 5K factors evolved as well to support these infrastructure changes. Conversely, UPS’ attempt at an IT infrastructure transformation from that of a support function to level 2 is completely revolutionary for UPS since the corporate view of IT does not support this transformation.

Another point of distinction between this thesis and the Venkatraman paper concerns the definition of the five different levels as discrete levels. Venkatraman seems to imply, probably for the sake of simplicity, that the five different levels are separate stages of an IT infrastructure evolution, with each stage depending on the complete incorporation of the previous stages. While this incremental development is logical, it may not always be the case. For example Federal Express tried a level-5 business scope enlargement with ZapMail before fully investigating level-4 activities such as providing major accounts with the ability for on-line service (an activity which Federal Express has just recently incorporated). This distinction is not of major importance for in actuality, certain advanced level functions do depend on environments developed in previous levels (it would be difficult to incorporate IT as level-3 central lever without the IS backbone developed in level-2), but was only introduced to point out that the basic argument of this thesis is not dependent upon this framework but, instead uses it as an illustrative tool.
6.3 The Evolution of an IT Infrastructure

An IT infrastructure should reflect the corporate view of IT. If the corporate view of IT is that of a support function, then IT infrastructure should be such that it efficiently supports the current business activities. All IS development should focus on systems that provide this support more effectively. If the corporate view of IT is that of IT as a strategic weapon, then the IT Infrastructure should be more advanced: there should be a central IS backbone developed that supports the organization and, in addition, IS development should focus on ways to differentiate the company and/or its products through innovative systems.

This is not to say that a company infrastructure should not evolve; efficient support systems could change top management commitment to IT which would, in turn, drive the need for a more advanced infrastructure; such is the case with a natural infrastructural evolution. Or a crisis may arise that requires advanced IT development. In this case, the crisis should evoke a real change in one of the 5K factors discussed in chapter five (most importantly top management commitment to IT) to drive an IT infrastructure change. This 5K factor changed will be difficult in light of the fact that other 5K factors will remain opposed to the change but with the absence of at least one 5K factor change, this infrastructure change will be almost impossible, generating long system development cycles for ineffective systems and resulting in corporate-wide confusion, frustration, and general discontent.
Federal Express

Fred Smith, from day one, has perceived information as critical to his service. His commitment to IT has played a critical role in the development of a corporate strategy, corporate culture, corporate structure, and personnel policies that promote the usage of IT as a strategic weapon. Even before there was money to spend on paying the employees, there were information systems in the works. In 1974, a little more than a year after the first delivery, Smith hired Vince Fagan to handle the marketing strategy for Federal Express. Fagan known as a "crusader in fighting for the dollar and personnel resources to launch his programs"1 was a firm believer extensive information was needed to develop the company's marketing plan. Fagan's heavy emphasis on quantitative modeling created a level 1 infrastructure at Federal Express where the marketing function was heavily supported by IS. These marketing policies, referred to as 'Faganomics', not only reflected additional top management commitment to IT but began to create a culture where IT was highly valued.

The advance from a level-1 organization to a level-2 organization came with Project "Sydney" conducted in 1976. This project was a feasibility study done by Tucker Taylor (whose first name was Sydney) to analyze the issue of a centralized telephone system.2 This system was a big investment for Federal Express because it involved a reorganization plan and would cost many millions of dollars at a time when the company did not have much

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1 Sigatooos
2 Ibid.
cash to spare. When this announcement at a dinner meeting was met with a
great deal of resistance, Smith shouted across the restaurant, "A decision
has been made and I am never going to hear another question about the
centralized telephone system. Never! Period! I don't want to hear anymore
backbiting on this."¹ This is an example of the degree of commitment Smith
devoted to IT.

Next came the a level-3 infrastructure with the development of COSMOS
(Customers, Operations, and Service Master On-line System), FAMIS (Field
Activities Management Information System), ORBIT (On-line Revenue Billing
& Invoicing Technology) during the time period from 1977 to 1981.² This
systems were developed to add value to the FedEx delivery service and
substantially differentiate this service from competing services. Federal
Express was indeed using IT as a central lever for its business processes.

In 1982, the DADS (Digitally Assisted Dispatch System) system reformed
FedEx courier dispatching. Now, instead of radio transmission, a dispatcher
would confirm which route should receive the request and would then
forward the request to a computer mounted in the van. This provided a real
time link between the courier and COSMOS. Now a customer could place a
phone call at 9:55 for a pick-up and have the FedEx van pull up to their door
at 10:00. This system significantly affected the manner in which Federal
Express did business and brought them to a level-4 infrastructure.

¹ ibid.
² Nehls.
Then in 1985 came ZapMail - a 2-hour door-to-door facsimile product that was an effort to enlarge the business operations though the innovative use of IT. ZapMail evidenced Federal Express level-5 commitment to IT. It is truly remarkable that a company within an industry that, less than a decade earlier, had been commonly acknowledge as offering a commodity service could make such a name for itself by using IT to differentiate that service. And even though ZapMail was a financial failure, FedEx is still committed to this level-5 market expansion though other activities like its newest IT venture to be "America's Warehouse" where FedEx's hubs become warehouses, storing parts until a corporation's customer calls for them. This service will drastically reduce inventory and shipping costs for large volume customers.

A timeline evolution of FedEx's IT infrastructural change is presented on the following page.

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IT Infrastructure Level

Level 5
Level 4
Level 3
Level 2
Level 1

IT Infrastructure Evolution

FedEx Timeline

1973 - IT as support
1974 - Fagan's Quantitative Marketing
1976 - Project Sydney
1977 - COSMOS
1982 - DADS
1984 - ZapMail

* Based on Venkatraman's framework

Federal Express IT Infrastructure Timeline
UPS

Founder Jim Casey created UPS to be offer a dependable package delivery service at the lowest price possible. As the company and its ground network grew, top management, to achieve this inexpensive, dependable service, focused on streamlining operational aspects of the business such as trimming van to door delivery times. Of course streamlining did not allow for increased IT expenditures. So IT continued to be ignored and used information systems only as a support function. Even when Federal Express began promoting advanced tracking capabilities for its overnight delivery service, UPS failed to react, maintaining that ground delivery was a commodity service which could not be differentiated by using IT.

UPS did not become concerned with IT until 1985, when Roadway Package Systems (RPS) entered the small package ground service arena with a toll-free number that enabled shippers to call and find out the location of their packages. The fact that industry specialists predicted this small company to grow to 7% of UPS' market share by 1991, partly due to its sophisticated billing and tracking systems, worried UPS. So in 1985, UPS decided it needed to revamp its IT infrastructure; it changed the name of the data processing department to the information services department and ordered an array of new hardware. This new IS department began focusing on information technologies like package scanning, radio dispatched pickups, package tracking, and data acquisition devices. Then in 1986, UPS

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acquired Roadnet Technologies and II Morrow, Inc. in an effort bring on board technical expertise (without breaking the company hire-from-within policy) and get hold of a vehicle tracking system that II Morrow had been developing.\(^1\) With these efforts, UPS was hoping to develop an IS backbone and consequently establish a level-2 IT infrastructure.

There was just one problem; there was no change in the real corporate view of the IT role. There were no accommodations made for this new IT focus. The Paramus IS facility operated under the same policies as the rest of UPS - IS vacancies were to be filled, if at all possible, with existing employees (with little IS experience), appearance codes remained in effect, and individualism was discouraged. UPS even enforced this anti-innovative culture onto Roadnet, one of the newly acquired companies which had been accustomed to a much more liberal atmosphere.\(^2\)

These mixed signals transmitted by top management to focus on IT without providing accommodations for an IT focus were met with mixed reactions. Some thought that UPS was too accommodating. One 35 year old Customer Service area manager commented:

I was over in Paramus on special assignment last year. It was very different. It's not like the districts at all. I don't

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\(^2\) Ibid.
think we are doing a very good job of making them a part of UPS. UPS is one of the most efficiently run companies around. Why should IS want to be any different?¹

Some couldn't make heads or tails out of the situation. For example, many IS new hires didn't know what was expected of them or what they could expect in the way of career development. One 24-year-old systems programmer said,

I am motivated by the opportunity to excel, to move into a higher level of management or a senior engineering position. Yet, no one is quite sure in IS what steps you must take to obtain these positions.²

There was definite confusion and frustration among the UPS employees. Although UPS continues to make heavy investments in IT and has established a global IT network, this discontent could end up being the demise of this effort.

Today, UPS boasts that they have overcome these initial problems and have developed an IT infrastructure that outclasses that of Federal Express (insert quote of MIT conference last semester). Top management is desperately trying to send a public signal that UPS is committed to IT. Quotes like "We believe UPS is going to be the leader in technology in the very near future"³


² Ibid.

are becoming familiar from managers who, until very recently, were closed-lipped concerning corporate strategy (UPS has traditionally been very secretive; company policy prohibited disclosure of company related information).

But there is cause for doubt. When asked about the recent heavy investments in IT, OZ Nelson, UPS senior vice-president, responded that the only reason that UPS was investing in IT was that Federal Express and RPS had created the perception in the market place that package tracking was an important feature for a delivery service to offer. He went on to say that, although UPS still did not think this feature (he bragged of 99.6% on time package delivery without a tracking system - a figure which seems to conflict with published statistical data) was important, they had been forced by lost market share to invest in IT. This viewpoint seems slightly contrary to the public image some UPS executives try to promote.

A time line evolution of UPS' IT infrastructural change (or lack thereof) is presented on the following page.

1 Interview of Oz Nelson by David Seward, 1989.
* Based on Venkatraman's framework

**UPS IT Infrastructure Timeline**

- **1907**: IT as support
- **1985**: Heavy IT investment

IT Infrastructure Level

- Level 5
- Level 4
- Level 3
- Level 2
- Level 1

IT Infrastructure drastic change; Level-2 success not yet certain
6.4 Conclusion

A corporate IT infrastructure should reflect the corporate view of the IT role. If there is to be any change in this view, it should be made one of two ways. The corporate view could be changed incrementally with effective systems at the corporate-view level influencing at least one of the 5K factors discussed in chapter five (usually top management commitment). This will then alter the corporate view, and possibly some of the other 5K factors, in favor of the IT role and this new corporate view will support a more advanced IT infrastructure. For a drastic change in the corporate view, there must be a significant change in one or more of these five factors (usually either top management commitment or a structural change). A significant change in any of the corporate factors will be difficult because it will mean that disruption of an established environment. But this change must be made and it must be real or else there will be even more frustration due to the ambiguity of the environment. Furthermore a lack of a clear IT direction will probably lead to long system development cycles of inefficient systems.

Federal Express has incrementally advanced through all five of the Venkatraman IT infrastructure levels. Each advancement brought about new systems development which encourage Smith to commit even more to IT. Smith's commitment has evoked strategy changes, cultural changes, structural changes, policy changes that all favored IT as a strategic weapon. Through this incremental evolution, Federal Express has managed to build one of the most sophisticated information systems networks in the nation.
UPS has evolved as a company that views the role of IT as a support role but it has been forced to invest in IT to defend its current market leadership. This investment has not yet been accompanied by any significant change in the corporate view of the role. There has been some indication of top management commitment, but this commitment has not been strong enough to alter any of the other five corporate factors to encourage IT development. Therefore the IT environment at UPS is a little nebulous with top management publicly supporting IT, old-timers trying to force IS into the traditional UPS mold, and new IS employees wondering how they are going to promote innovative systems in such an environment.

The future is unclear. UPS, with its huge capital base, could even develop an IT network comparable to that of Federal Express. Who knows? But even if UPS does achieve such a network, its IS department will not be as dynamic as that of Federal Express. With its current IT infrastructure, UPS will always be an IS follower, not an innovator. Any new concepts for using IT as a differentiation or market expansion vehicle in the package delivery industry will probably come from companies like Federal Express or RPS.

**CHAPTER 7: Are IT Competitive Advantages Sustainable?**

There is much controversy on this issue of the sustainability of the competitive advantage created using IT. One reason for this argument is that information systems, because they are usually developed to facilitate information flows, are difficult to maintain as proprietary. Therefore, they can
be easily copied by competitors and often more cheaply because of the
elimination of certain up-front costs associated with research, design, and
debugging. For example, companies in the causality insurance business
have invested hundreds of millions of dollars in automating their back offices
to derive cost savings. But all competition casualty insurers implemented
similar systems. Therefore, no competitive advantage was gained, and, in
addition, each competitor was forced to lower prices in an effort to maintain
market share.¹

So why are companies investing these millions into IT? For many
companies, such as UPS, this investment is made to defend against
competitors who are investing in IT. But what about the Federal Expresses
of the world - those companies which are the first in their industry to invest in
IT? Do the decision makers in these companies feel that they can create a
sustainable competitive advantage through IT or do they accept the
competitive advantage achieved as short term but still worth the investment?
What is the definition of 'sustainable competitive advantage' anyway?

COSMOS has been in place at Federal Express now for 12 years and is still
the most advanced customer service system in the industry (of course
COSMOS has gone through several upgrades in those 12 years). Has
COSMOS given Federal Express a competitive advantage and if so, is 12
years sustainable? And what if UPS developed a package tracking and

¹ Bradicich, K. and G. Hall.
customer service system equal to COSMOS, would Federal Express lose all
of its competitive advantage that it has gained through IT?

There are several competitive edges that Federal Express has achieved by
being the first package delivery service to exploit IT as a strategic weapon.
First, FedEx's innovative style, both in technology and in advertising, placed
the company in the national limelight. Seven Harvard Business School
cases (two on the development of COSMOS) have been written about the
16 year old company in contrast with two written about UPS, a 82 year old
company with substantially greater revenues. It is a company that is
frequently cited as one of the most creative users of IT. Even the
abbreviated version of the company name - FedEx - has almost become
synonymous with the verb 'ship' (i.e. Many people will say, "... FedEx a
package...") when they want to ship a package). This brand awareness has
created a loyal customer base that will be hard to convert, even if UPS can
offer the same customer service as Federal Express.

Also the complex systems network that Federal Express has developed is a
tremendous barrier to entry for firms that don't have capital to gamble. For
huge companies like UPS, this barrier may not be prohibitive but it certainly
is for firms not yet established in the industry. In a sense, Federal Express
has elevated the overhead costs of competing in this industry.

Third, FedEx has created customer switching costs associated with
converting to a different service. The FedEx quality service, from the ease of
the centralized toll-free telephone order process to the simplicity of the
automated delivery forms (one customer noted, "My secretaries won't fill out a UPS order form if I pay them extra. Those forms are such a hassle. The FedEx forms are simple, can be completed in no time; this service alone is worth paying extra for.") have become routinized into many customers' organizations. The switching costs associated with breaking this routine may be perceived by the customer as greater than the cost savings of using an alternate service. These switching costs increase tenfold if the customer uses FedEx's new on-line order system. Supplying an on-line service links to its frequent customers has created tightly coupled supplier/customer relationships (similar to those developed by American Hospital Supply, though its famed on-line ASAP system) which are difficult to sever.

Another possibly sustainable advantage can be derived from the databases of accumulated data retrieved from the corporate information systems network. Historical transaction data can be very useful for customer analyses or forecast modeling useful to the marketing department. This data can be used to target certain frequent customers with promotional campaigns or to prepare appropriate staffing for seasonal/regional differences in buying behavior (UPS ground service delivers an average of 5 million packages a day but near Christmas this number can swell to as much as 10 million).

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The most significant sustainable advantage achieved through IT, one that cannot be easily duplicated by competitors, is the organizational changes involved in establishing an advanced IT infrastructure.

Competitors can duplicate the technology and information employed, since they are publicly available, but they cannot easily duplicate the real source of its advantage: its tremendous experience in adapting virtually all of its operations to the new business environment. Nor can they duplicate the learning embodied in the hundreds of refinements and enhancements made to the system since its inception.¹

These organizational changes are the changes in the 5K factors of chapter five that drive the IT infrastructure evolution. Cultural changes, structural changes, coupled with the internal expertise gained through this evolutionary process are necessary side effects which differentiate an organization from one who develops a me-too IT infrastructure.

Therefore a sustainable competitive advantage can be achieved by a first mover in an industry to develop a sophisticated IT infrastructure. Even if its information systems can be exactly duplicated, a first moving firm can create a brand awareness, barriers to entry, customer switching costs, historical data bases, and overall organizational changes which differentiate it from copycat competitors.

¹ Bradicich, K. and G. Hall.
CHAPTER 8: UPS & FedEx post '89 - What role will IT play?

The futures of Federal Express and UPS is by no means well defined, although both will probably be financially stable for some time to come. But there are changes in the wind.

Many variables, most exogenous to the FedEx and UPS, will affect the future of the small package delivery. Downturns in economies could induce customers to choose their courier based primarily on price (a big win for UPS). Many companies are already starting to cut back on overnight deliveries, using this service only when necessary and encouraging second-day delivery as a viable alternative.

Also new technologies may have a drastic effect on the document delivery service (a significant piece of Federal Express's business). Electronic mail has replaced the need for some need for overnight document delivery and facsimile machines, which have become cheap enough for almost any business to buy, have encroached even further into this market. Furthermore if legislation is passed certifying that facsimile documents can be used as legally binding documents, then the overnight document delivery market may just fade into the sunset.

So it looks as if Federal Express could be in trouble unless it reacts fast to these market changes. And so it has; Federal Express is trying to expand its market though many vehicles. First FedEx is aggressively pursuing global presence competing with UPS and additional international players like DHL.

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and TNT to establish global networks and a reputation for dependable delivery to and from anywhere in the world. As neophytes in this marketplace, where familiarity with foreign regulations and country cultures is requisite, both Federal Express and UPS are eagerly trying to beat the other up the experience curve.

Second, Federal Express is trying innovative strategies like supplying certain customers with systems that provide on-site, on-line ordering capabilities to large volume customers. These systems are enticing to large-volume customers because they greatly facilitate the order and billing processes. These systems are lucrative to Federal Express because they create significant switching costs for these customers who become dependent on them. Also Federal Express is creating 'electronic warehousing' - systems that allow large-volume shippers to use the Memphis hub as a warehouse and have inventory shipped straight from the hub to its destination, therefore reducing inventory and shipping costs.

UPS in response to market changes, has reacted also. First the company is expanding into new global markets every day. John Rogers, the current CEO, states that "satisfying the needs of shippers with the best possible international service at generally the lowest price"1 is the new corporate mission. Second, UPS is trying to, as stated in chapter three, create an IT network that will rival that of Federal Express and RPS. By 1988, the heavy

investments in IT had produced a system in that could electronically control packages in and out of 100 countries.¹

What about 1989 and beyond? Federal Express will probably lose some of its traditional document delivery market share to facsimile machines and some of its overnight package delivery to UPS due an increased economical focus of many companies. UPS' profit/package shipped will probably decline due to increased overhead of its IT investments and its inability to adjust union wages. Both companies will become reputable global players competing primarily with DHL and TNT for the global market.

As for IT, Federal Express will continue innovative usage of IT possibly even selling or leasing out some of its internally developed systems (like its advanced weather forecasting system). This IT-edge may give FedEx an advantage in the global arena where information flows are even more difficult to manage than within a domestic market. In any event, FedEx will continue to try and differentiate its services based on IT-derived value.

UPS will maintain its IT network expanding it to include a wider geography but will not create any competitive advantages with these systems, only erode competitor's advantages. UPS' strategy will continue to be what it has always been - to provide cheap, dependable service.

¹ King.
CONCLUSION

The purpose of this thesis is to examine the possibility of gaining a sustainable competitive advantage through the development of a sophisticated IT infrastructure and if such an advantage is possible, how best to develop such an infrastructure. First, the fact is established, through historical reference, that a competitive advantage can be achieved, even in a commodity industry like package delivery, through using IT. This competitive advantage is derived from either streamlining internal operations to more efficiently develop, market, and support a product/service or providing valuable product/service information for which consumers, in many cases, are willing to pay.

Next, developing an IT infrastructure is analyzed. Five organizational factors are presented as playing critical roles in this infrastructure development. These factors - top management commitment, corporate strategy, corporate culture, corporate structure, and personnel policies - together form the overall corporate view of the IT role and the organization IT infrastructure should be a reflection of this view. The argument presented in this thesis stresses that any change in an organizational IT infrastructure must be supported by a real change in one or more of these five factors.

This scenarios of both evolutionary and drastic IT infrastructures are dissected using this argument. An evolutionary IT infrastructure change, that usually starts with the corporate view of the IT role as one of support, happens when IS development supports the current view and, if effective,
incrementally changes one or of the five factors (usually top management support) and this change then affects the remaining factors. These factor changes then alter the overall corporate view of the IT role subsequently, this viewpoint change drives the IT infrastructure change. This cycle is repeated until the corporate view of the IT role becomes static (due to the further inflexibility or more of the organizational factors) or can continue to influence the organization to keep searching for innovative ways to use IT for strategic advantages.

A drastic change in IT infrastructure should also reflect organizational factor changes. These changes are more difficult than evolutionary changes because they may conflict substantially with other organizational aspects and may therefore encourage much resistance. Yet factor (especially top management commitment or corporate structure) changes must be made to alter the corporate view of the IT role and thus drive this drastic IT infrastructure change. Although these factor changes may be difficult to incorporate, an attempt at an IT infrastructure advancement without such changes will be even more difficult due to the ambiguity of the environment (i.e. IT infrastructure advancement without supporting top management, strategic direction, culture, structure, and personnel policies will cause organizational frustration and confusion).

Federal Express is presented as an example of a successful evolutionary IT infrastructural process and UPS as an example of a company attempting a drastic IT infrastructure change without the appropriate factor changes. The conclusion drawn from these examples is not that Federal Express is
superior company to UPS for there are several factors affecting superiority as well as several definitions of 'superior.' The only conclusions from this organizational comparison concern each company’s use of IT. Federal Express, from its evolutionary progression through various IT infrastructure levels, has positioned itself with a sophisticated IT network and a corporate view of the IT role supporting the use of IT as a strategic weapon while UPS still has a corporate view of IT as a support function and is thus facing corporate-wide dissent during its development of a FedEx-like network. UPS, due to its substantial resources, may just succeed with this network but without the subsequent change in the corporate viewpoint, UPS will remain an unsophisticated IT user and will be constrained to copying other industry IT innovators like Federal Express or Roadway Package System.

Finally, the sustainability of the competitive advantage achieved through IT is discussed. The conclusion that brand awareness, barriers to entry, customer switching costs, historical data bases, and overall organizational changes which differentiate it from copycat competitors could very well translate into a sustainable competitive advantage.

In the last chapter, the author describes the package delivery environment, how it is currently changing, and what these changes will mean for Federal Express and UPS. Both companies are predicted to be major players in the global market place with UPS competing on the basis of price and Federal Express attempting innovative IT strategies to differentiate its services.
IT can provide a sustainable competitive advantage for many organizations. It is important to achieve this advantage, an organization first analyze effective use it could use information, either operationally or as added value to its customers. Then the organization needs to analyze the competitive reaction to its IS development and evaluate whether benefits achieved through this development are greater than costs incurred through competitive reaction. Throughout this analysis, the corporate view of the IT role should be clarified so that the IT infrastructure is developed to reflect this corporate viewpoint. Finally, the organization should allow this infrastructure to evolve as the corporate view of the IT role evolves and if a drastic infrastructure change is necessary, the organization must change the appropriate organizational factors so that the corporate viewpoint supports this change. Through this process, IT can provide a sustainable competitive advantage... with a little luck.


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