NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

THE IMPACT OF INFORMATION TECHNOLOGY ON ORGANIZATIONS: IMPLICATIONS FOR ORGANIZATIONAL INTEGRATION AND THE MANAGEMENT OF INFORMATION TECHNOLOGY

by

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March 1998

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REPORT DOCUMENTATION PAGE

Form Approved OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	March 1998	Master's Thesis

4. TITLE AND SUBTITLE
The Impact of Information Technology on Organizations: Implications for Organizational Integration and the Management of Information Technology

5. FUNDING NUMBERS

6. AUTHOR(S)
Stanley G. Burlingame

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Naval Postgraduate School
Monterey, CA 93943-5000

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSORING / MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES
The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

12a. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for public release; distribution is unlimited.

12b. DISTRIBUTION CODE

13. ABSTRACT *(maximum 200 words)*

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14. SUBJECT TERMS	15. NUMBER OF PAGES
Information technology, integration, information technology management	98
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFI- CATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	UL

NSN 7540-01-280-5500 (Rev. 2-89) Standard Form 298

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THE IMPACT OF INFORMATION TECHNOLOGY ON ORGANIZATIONS: IMPLICATIONS FOR ORGANIZATIONAL INTEGRATION AND THE MANAGEMENT OF INFORMATION TECHNOLOGY

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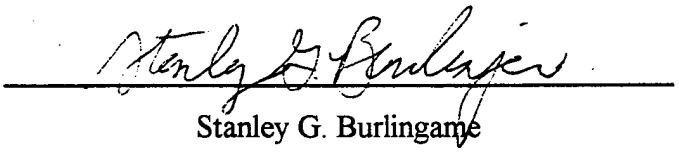
requirements for the degree of

MASTER OF SCIENCE IN INFORMATION TECHNOLOGY MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL
March 1998

Author: 

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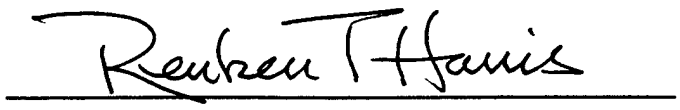

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ABSTRACT

The goal of this thesis is two-fold. First, the paper explores and discusses how information technology (IT) is used as an integrative mechanism in organizations. Second, the paper suggests why organizations have experienced increased IT management requirements.

The paper examines how Internet technology is used by companies to integrate operations. Supporting case studies of Wal-Mart and Calyx & Corolla are examined to determine the effectiveness of using IT as an integrative tool. Next, this research discusses how a buying versus building strategy has led to increased demands on IT management. Supporting case studies of SAP (Systems, Applications and Products) and British Petroleum are reviewed to determine if IT management will increase.

This research concluded that IT is used as an integrative tool in organizations. Companies are using Internet technology to electronically link to other companies to form virtual organizations. In addition, IT is used as an effective means of collaborating and sharing information and knowledge in order to make decisions and innovate faster.

Finally, although companies have achieved clear benefits of using IT for integration, there also have been negative repercussions. Using IT and adopting a buying strategy results in greater IT management requirements.

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I. INTRODUCTION

A. PURPOSE

The goal of this thesis is two-fold. First, the paper explores and discusses how information technology (IT) is used as an integrative mechanism in organizations. Second, the paper suggests why organizations have experienced increased IT management requirements. The following questions are addressed in two specific areas:

IT as an Integrative Mechanism

- How is IT used to integrate operations and work in organizations?
- How is the Internet and intranet technology used to coordinate and control work?
- How is Internet technology creating a culture that collaborates and shares information?
- How are Wal-Mart and Calyx & Corolla using IT as an integrative mechanism?

Information Technology Management

- Why does a buying versus building strategy lead to increased demands on managing information technology?
- Why are large corporations buying and using enterprise applications such as SAP's R/3 product and what are the management implications?
- Why did the management of IT significantly increase at British Petroleum?

In addition to answering the above questions, the thesis findings are addressed and applied to DoD. The paper concludes with recommendations for future research that could benefit DoD in the areas of IT integration and management.

The following section suggests how and why IT is a key ingredient in the success of corporate America. In addition, the background information suggests why the two issues of this paper are reasonable questions. Namely, why organizations are using IT as an integrative mechanism and why the management of information technology has increased significantly.

B. BACKGROUND

Why is it important to understand the increased use of IT as a means of coordinating and controlling work? The following background suggests the answer to that question.

In the early 1980s, Japan dominated global business markets. Since the early 1990s, American businesses have gained significant ground on their Asian counterparts.

David Moschella (1997) states,

> In sector after sector, American business has restored its competitiveness, and the U.S. economy has become the envy of the world. Why? There are many factors, but the use of technology ranks high on just about every serious analyst's list. By almost any statistical measure, the use of computers in the U.S. is more intensive than in its economic rivals. (p. 122)

Moschella further states that the reason for the apparent climb in competitiveness is tied into the explosion of the Internet. The use and integration of information technology is contributing to the revitalization of many American businesses. Evidence appears to support the assertion that IT investments in the early 1990s are leading to the serious transformation of organizations (Moschella, 1997).

If the U.S. is starting to see the benefits of IT investments, what is the impact on organizations? Why is it important to understand the organizational implications?

Norton and Lester (1996) discuss the dilemma in the following way,

> Digital accessibility is impacting organizational structure and the ways in which organizations gather, use and value information in ways that are not yet fully understood. In the present climate of rapid change in the extent and means of accessibility, determining both the nature of the changes and their impact is a challenge. The differing approaches to infusion of information technology provide a fertile field for examination of how information value changes in relation to differing structures and the extent to which those structures are a result of changes in digital accessibility. Research needs to be undertaken to determine how much flattening of the organizational hierarchy has occurred and how much of it has to do with IT versus just changes in the social structure. Continued review and evaluation of the impact of information technology in organizations and in all aspects of society need to be conducted. (p. 25)

Rebecca Sykes (1997) suggests that the use of Internet technology is becoming critical for corporate success and competitiveness. Results from a survey of 1,000 executives from Fortune 500 companies revealed the following information:

- Nine out of ten respondents say having a web site is important to stay in the game, but only 34 percent indicated an increase in product sales by using web sites.
- Most important benefits of web sites are improved communications as cited by 68 percent of Fortune 500 executives.
- The poll stated that 47 percent achieved improved customer service.
- Intranets yielded a greater return on investment as cited by 34 percent of the respondents.
- Organizations experienced a dramatic improvement in communications with suppliers by using extranets.

Clearly, Internet and intranet technology has practical integrative applications for organizations. In addition to the practical use of IT as an integrative mechanism, the management of technology also has increased.

Henry Lucas (1996) makes a strong argument that companies use IT to structure organizations. In addition, he argues that he and many others consider the management of IT as the biggest challenge. The research from this thesis addresses both of these two issues; namely, the use of IT for integration and the implications associated with the management of information technology itself.

C. BENEFITS OF THE STUDY

The research from this thesis supports strong evidence that organizations are experiencing tangible benefits by using IT to coordinate, control, and communicate. Although the research focused on business organizations, there are clear applications for DoD. This research lays the groundwork for further study of Internet and intranet technology in DoD. The benefits of using Internet technology discovered in commercial businesses can be applied to DoD.

Another outcome of this research resulted in the development of a management theory and applications website located at "web.nps.navy.mil/~mgmthry."

The website was designed to supplement teaching and learning of management theory, specifically within the Naval Postgraduate School's Systems Management Department. The goal is to pursue other means of teaching through Internet technology. The research in the appendix of this thesis is included in the website. The website is designed to be used as a tutorial information-based system. Students are presented management theory principles which include interactive testing. Students can complete the tutorials and answer questions that are automatically sent to the instructor via electronic mail. The teacher can then grade the student's answers and send back appropriate feedback, all accomplished through the use of the Internet. Feedback surveys also were developed. The surveys are used to continually improve the website's effectiveness.

The following section describes the organization of the paper to answer the questions of this thesis.

D. ORGANIZATION OF THESIS

Chapter I states the two-fold purpose of this thesis. The primary purpose of this paper is to identify how and why organizations are using IT as an integrative mechanism. The secondary purpose of this paper is to discuss why the management of information technology has increased. Background information also is provided to show how the purpose of the thesis was developed. Lastly, the chapter suggests recommendations for future research for applying the findings to DoD applications.

Chapter II provides evidence about the use of IT to coordinate and control work. The chapter specifically examines and discusses how the Internet and intranet technology is used for integrating work. In addition, the chapter addresses how Internet technology provides users enhanced means of collaborating and sharing information with each other. Later in the chapter, the impact and success of IT integration at Wal-Mart and Calyx & Corolla are described. The research from this chapter indicates that IT integration is a valuable and viable means of coordinating, controlling, and communicating within organizations.

Chapter III provides research to suggest that organizations are faced with increasing demands for managing IT. The primary reason for the new focus on management is the growing trend of organizations to buy versus build IT systems. The buying strategy adopted by most organizations has resulted in increased roles and

responsibilities of IT management. Many large corporations that have adopted a buying strategy have purchased and invested in enterprise applications. Chapter III discusses why large companies are choosing to use enterprise systems and what are the management implications of this investment. Lastly, a discussion is presented on how IT transformed the management function at British Petroleum. The evidence and findings from this chapter support and answer the second part of this thesis, namely the increased IT management requirements.

Chapter IV presents the conclusions and recommendations of this research. Two major conclusions are suggested. First, IT is and will continue to be the means by which organizations coordinate, control, and communicate with each other. Internet and intranet technology does more than integrate work. Intranet technology provides the environment for users to collaborate and share knowledge to make decisions and innovate faster. Second, the research suggests that the greatest challenge for organizations is to manage IT itself. The chapter concludes by showing how the findings of this research can be applied to DoD and how the results can be used as a basis for future research.

The appendix provides detailed information on organizational design elements. Although the research involved in learning organizational design theory did not have a direct bearing on the findings of this thesis, they did provide a framework for understanding the impact and problems associated with IT. One element in organization design theory is integration. The concept of integration is the idea that work in organizations is integrated or coordinated and controlled. Today, IT is the integrative

mechanism in many organizations. Other elements such as "technology," "management structure," and "culture" had an indirect impact on the findings of this research. Before continuing on into the support and evidence in the following chapters, it may be advisable to review the concepts presented in the appendix.

II. INFORMATION TECHNOLOGY AS AN INTEGRATIVE MECHANISM

Integration, as defined in the appendix, is the concept of coordinating and controlling work in organizations. Once an organization decides how work is divided, mechanisms are put into place to ensure all divisions, units, or departments communicate effectively with each other.

Today, IT and the Internet are the primary coordinating and controlling tools for organizations. The impact of Internet technology is addressed in three areas in this chapter. First, the chapter discusses how Internet technology serves as an integrative mechanism and creates a culture that shares and collaborates information. In addition, Internet technology requires personnel who can process information themselves. Second, a case study is presented to illustrate how Wal-Mart uses IT to integrate operations with its suppliers. Third and last, a case study on Calyx & Corolla is presented to illustrate how IT is used to coordinate and control business operations in a virtual organization.

A. IT INTEGRATION THROUGH INTERNET TECHNOLOGY

This section focuses on three major areas. First, the paper presents a discussion on how Internet technology is used to create virtual organizations. Second, an argument is presented to illustrate how Internet technology is serving as a catalyst for shaping a culture that collaborates and shares information. Third, the paper suggests why individuals that use Internet technology need to be trained to filter and use information.

One can not ignore the profound affect the Internet has on our society and commercial businesses. Consider the early history of the Internet and its original purpose. The Internet originally was established in the 1970s for use by the U.S. military. The goal was to ensure network connectivity in case of a nuclear attack. The Internet's use expanded in the 1980s when the National Science Foundation (NSF) created Internet communication tools to link scientists with super computers. The Internet network was designed to be used by government and universities for research purposes. In the early 1990s, NSF pulled back from its funding of the Internet backbone and allowed private business to take over. Any graph of Internet growth reveals its exponential growth from thousands of users in 1989 to millions of users today (Hills, 1996).

Mary Cronin (1995) argues that,

> ...the Internet and other networks will totally redefine today's corporation within a few decades. Internally, Saffo observes, the traditional corporate hierarchy will have to evolve into a more flexible organization that emphasizes teamwork, collaboration with business partners, and distributes decision-making. This in turn will require more active participation by technically sophisticated, highly motivated employees at all levels of the organization. (p. 8)

Internet technology provides the capability of creating and establishing virtual organizations. The open systems architecture of the Internet further enhances the ease of connecting firms to other companies and to customers. Not only does the Internet provide a means of expanding traditional boundaries, but also organizations can establish partnerships with other companies. The Internet provides a flexible infrastructure for

electronically linking companies with each other. Virtual organizations of the future can be nothing more than electronic links to other companies (virtual components) who provide required services and products. Virtual organizations will focus on managing information, rather than on making products.

Amazon.com is an example of a company that has created a virtual organization by using Internet technology. Amazon.com is the top-selling Internet bookstore (Bianco, 1997). Sales in the first 6 months of 1996 were $3.1 million and increased to $43.9 million in the same period in 1997. Amazon.com is a virtual organization with virtual components that uses the Internet as a means of coordinating and controlling operations with suppliers, distributors, and carriers to make their business possible and successful.

Virtual organizations, such as Amazon.com, hope to take advantage of the Internet by achieving "disintermediation." Disintermediation is the concept of removing the middleman. The Internet provides a viable means of cutting out the middleman of routine activities, such as supply of goods to customers. By communicating directly with customers, Internet companies can reduce the number of intermediaries between the vendor and the customer (Cayne, 1997).

Cronin (1995) supports the argument that the Internet will be instrumental in forming virtual organizations. She commented,

> Management analysts have suggested that businesses must evolve into 'virtual corporations' or groupings of separate enterprises linked through high-speed networks. As more companies link up with business partners to collaborate on a particular project or to produce and market a product jointly, the virtual corporation will become the norm. Networks are the glue that can make such arrangements work. Virtual corporations, as a product of the age of connectivity, need direct, reliable communication links to develop and prosper. The Internet provides a standard for companies with diverse internal communication systems to exchange information quickly and efficiently. Even if the public Internet is not used by closely interconnected business partners, the Internet protocols are frequently the basis of inter-enterprise communication in the United States. (p. 11)

Internet technology is not only creating virtual organizations, but also it is creating a culture that collaborates and shares information. Cronin provides insight on how the use of the Internet can change the thinking and culture of individuals in organizations. She argues that users of the Internet will see the benefits of working in a networked environment. Cronin (1995) suggests,

> A networked environment encourages employees to take the initiative by gathering information, consulting with experts, and solving problems collaboratively. It transcends the traditional barriers of departments, management hierarchies, and even company boundaries. (p. 11)

Employees with access to the Internet will gradually see how they can use the abundant information from the Internet for helping them solve every day tasks. As the Internet matures, there will be even greater opportunities to collaborate and work with others to solve problems. The Internet can become the catalyst that changes how people work together. By experiencing the multitude of uses of the Internet, users may change

their views on collaboration. Westerners, by nature are competitive and normally careful to not divulge or share information (Coleman, 1997). Cronin argues that the Internet may have an impact on changing the user's negative perspective of collaborating information. As employees continue to use the Internet, they will see the benefits of working, sharing, and collaborating with others to solve problems.

Thomas Davenport argues that although information technology, such as the Internet, has provided potential for major improvements in communications within organizations, just the opposite has occurred in many others. The predominant emphasis is putting IT into place and expecting users to automatically use and embrace the new technology. Top management believes that implementing IT will naturally lead to more information sharing and an overall more effective organization. Davenport (1994) states,

> But such technocratic solutions often specify the minutiae of machinery while disregarding how people in organizations actually go about acquiring, sharing, and making use of information. In short, they glorify information technology and ignore human psychology. (p. 119)

He agrees that changing or adding IT will not necessarily succeed if other elements of organizational design are ignored, specifically if the information culture does not change.

The challenge for management is to change the culture such that information sharing will actually occur. In one successful case cited by Davenport, a company implemented a system which had a central database of client documents. The system was capable of monitoring and measuring how often each document was accessed. This

information became an input into performance evaluations for the authors of these documents. The company effectively took strides to create a culture or environment that encouraged the sharing of information. (Davenport, 1994)

The sharing of information is even more involved in intranets. An intranet is a small-scale version of the Internet within an organization. Intranets use the same technology as the Internet. Organizations with intranets protect themselves from outsiders with a firewall which prevents information from inadvertently entering or leaving the company. (Hills, 1996)

Some of the earliest organizations to test and use intranets were Lockheed and Hughes. These organizations found the intranet environment to be helpful to their companies and as word of their success spread, other companies adopted similar intranets. Ian Campbell, Director of Collaborative Technologies for International Data Corporation (IDC), estimated that there were 100,000 web servers in 1995 and would be 4.7 million by the year 2000 (Hills, 1996). One thing is certain: as the Internet grows, so will intranets, because they are a natural extension of the information highway.

Users in an intranet environment have a multitude of information at their fingertips. Individuals no longer have to make phone calls and walk down the hall to find answers to their questions. The Internet browser interface makes the process even easier to find and retrieve information. Point and click and users can view organizational charts, directories, company newsletters, job postings, sales reports, and customer information to name a few.

Hills (1996) argues that innovation is the key to gaining a competitive advantage. Innovation will come by "...empowering your employees through learning, sharing knowledge, and collaboration" (p. 51). Intranets hold the key to unlocking the potential for greater sharing of information within an organization.

Intranets also hold promise as an avenue to not only share information, but also to share knowledge. Groupware is the means in which knowledge can be saved and shared. The pioneer in groupware is Lotus Notes. Notes and other groupware technology do more than just provide E-mail capability. Most groupware has some form of central database that holds and stores information. Groupware has the potential to promote collaboration within an organization. Many companies believe that the sharing of knowledge through intranets and groupware provide a competitive advantage. The sharing of knowledge can serve as a catalyst to propel the learning organization and can ultimately lead to faster innovation (Hills, 1996).

In order for IT-based organizations to be effective, users must become capable of processing information themselves. Although the Internet environment provides users with a network medium for gathering and sharing data, there is considerable concern of how users interpret and use information. The problem of course is the abundance of information.

The real challenge is to sift out the noise from the real information needed to make decisions. Cronin (1995) states,

> The amount of external information relevant to any company is exponentially larger than the employee's ability to absorb and process it. This makes the traditional, hierarchical approach to external information highly dysfunctional. Those at the top are bombarded with more information than they can possibly handle, while people at other levels of the company have only limited access to external resources that could improve their decision-making and their overall contribution to company goals. (p. 15)

Davenport argues that companies need to take a human-centered approach to information management. A human-centered approach takes into account the complexity of information. Raw data is not information. Users take general information and synthesize, filter, and format the data such that it is useful for making decisions. IT systems, such as E-mail, do not substitute this process. In research conducted since the mid-1960s, it was discovered that managers did not rely on computer-based information to make decisions. What was found was that two-thirds of all decisions were accomplished by face-to-face meetings. The other third were achieved by interpreting documents usually outside the organization. In both cases, IT systems were not used to make final decisions (Davenport, 1994).

This raises the question of the required information processing skills of end-users. They must be trained to filter and manipulate information so they can reach meaningful decisions. A worker's experience and decision making is becoming more and more important in the information age. Information in its simplest form is raw data, just like numbers in a spreadsheet. Synthesizing and filtering information is necessary to make decisions. The assumption is everyone who has access to information can use it to make

decisions. Giving employees IT without training them is like handing them a gun without bullets, they cannot use it.

The Internet, intranets, and groupware technology have been used to create virtual organizations. Internet technology is a viable IT system which can be used as an integrative mechanism in organizations. In addition, Internet technology is establishing cultures that share and collaborate information to make decisions. However, IT cultures will not be formed or proven effective unless users are trained to process and use information to make decisions.

The next case shows how IT is used to coordinate operations with a company and its suppliers.

B. IT INTEGRATION AT WAL-MART

To this point, the chapter has focused on a type of IT, namely Internet technology. The paper shifts to the impact IT has at specific companies. The first company examined is Wal-Mart. The case study illustrates how IT is used as a mechanism to electronically link a company with its suppliers. In essence, suppliers are virtual components of Wal-Mart.

Wal-Mart places a strong emphasis on a vision to fully integrate IT within its organization. Initially, like most companies, they focused on integrating internally. However, their goal is to achieve end-to-end integration, from store systems all the way to distribution systems. In Wal-Mart's earlier years, they used Electronic Data Interchange (EDI) technology to provide electronic links inside and outside the organization. Even

though EDI supported initiatives to reduce paperwork and improve efficiency, it did not really lead to the integrative objectives Wal-Mart desired. Business guru, James Martin, stated,

> The true advantage does not lie in cost savings...but in interlinking businesses so they can help each other better...An enterprise no longer battles its suppliers; it joins forces with them to bring products to market faster or to achieve their mutual advantages.
> (Darling and Semich, 1996, p. 50)

Sensing the need to be more integrated with its suppliers, Wal-Mart created an in-house program called, "RetailLink." The system gives suppliers direct dial-up access to Wal-Mart's data warehouse. Suppliers have access to the same information Wal-Mart buyer's use to make forecasts and to make buying decisions. In essence, suppliers are on the same footing as Wal-Mart's buyers and financial analysts. In 1996, roughly 4,000 suppliers ran more than 10,000 queries a day using the RetailLink. In 1996, the data warehouse was 7.5 Tbytes (7.5 trillion bytes). Now, the data warehouse has grown to 24 Tbytes (Stedman, 1997). Back in 1996, the data warehouse was considered to be practically astronomical and then one year later, Wal-Mart triples it. Randy Mott, CIO of Wal-Mart stated, "Sales data needs to be analyzed to a finer and finer level" (Stedman, 1997, p. 8). The 24 Tbyte storage capability of the data warehouse allows Wal-Mart to maintain a database that has every cash register transaction from every store for an entire year. This enormous data aids Wal-Mart buyers and suppliers to make forecasts and

predict customer buying patterns. Since both Wal-Mart buyers and suppliers have access to the data warehouse, they both can initiate purchases.

Although Wal-Mart has had great success with the system, there have been drawbacks. Theoretically, both the supplier and retailer are making forecasts based on information in the data warehouse. However, Wal-Mart buyers may interpret forecasts differently than suppliers, resulting in empty shelves or unsold stock. Suppliers, of course, want to move inventory, and Wal-Mart buyers want to avoid overstocked shelves. Each player, however, can initiate actions to reorder and restock products. Because each party had different interests, this created a problem with the RetailLink system. The goal of Wal-Mart was to create an environment that considered suppliers as partners who were equally concerned with the goals of Wal-Mart.

In response to the potential pitfalls of the RetailLink system, Wal-Mart implemented an initiative called, "Collaborative Forecasting and Replenishment" or CFAR. The goal of the system was to collaborate and agree on one forecast for each product.

> ...because you and your suppliers are both willing to live with the forecast, it suddenly becomes much more than a guess. It's now a plan. Suppliers can allocate capacity rather than inventory. That's building to order rather than building to stock, so inventories can decrease while agility increases. And because you can count on the plan, you can now share it with others, in addition to your suppliers--for example, clueing in your transportation partner to what's coming and when. (Darling and Semich, 1996, p. 52)

This system created a partnership with suppliers which was never fully realized by other means. Suppliers can control their inventories such that they can lower costs and pass the savings on to the retailer. Wal-Mart and suppliers now work jointly to decide what the store carries and how much.

How would a traditional organizational design consultant draw a structure chart of Wal-Mart? Is the supplier external to the company? Henry Lucas (1996) suggests that Wal-Mart suppliers are part of the company's virtual organization. Suppliers are not just integral to the organization, they are a real part of the "internal" virtual organization.

The use of IT in Wal-Mart supports a strong argument about why IT is a necessary tool and strategy for all retailers. Wal-Mart used RetailLink and CFAR to create virtual links to virtual suppliers. Suppliers are not just integrated into Wal-Mart, but they also are viewed as partners. IT allows Wal-Mart and suppliers to jointly decide what will be stocked in every store.

The next case illustrates how a flower company used IT to coordinate and control its operations.

C. IT INTEGRATION AT CALYX & COROLLA

The previous case showed how Wal-Mart uses virtual links to connect to its suppliers by using IT. The next case study illustrates the use of IT to integrate and link several virtual components to a company.

Calyx & Corolla (C&C) is an example of a virtual organization with virtual components electronically linked by IT systems. The founder, Ruth Owades, had success

in establishing a new distribution channel for gardening products. She founded the mail-order company, Gardener's Eden. After 4 years, she sold the company but continued to do research in the area of flower distribution. She observed how inefficient the flower market was in the United States. She noted that the distribution channel to florists was a long process involving many parties. She felt that she could reengineer the process through disintermediation (or cutting out the middleman). Her goal was to negotiate agreements with growers to prepare standardized floral arrangements and to create a partnership with a carrier to deliver the product directly to the consumer. Her vision was to remove all the steps between the grower and the consumer. Owades was a master salesperson. She convinced growers to take on their new role and established a alliance with Federal Express (FedEx) to deliver the floral arrangements. The glue that held the whole concept together was an IT infrastructure. An IT system was used to electronically link customers, C&C, growers, and FedEx (Lucas, 1996).

Owades was successful in creating a virtual organization with virtual components. Her company's primary function was to process information. Her company received orders from customers or retailers and she in turn electronically coordinated with growers and FedEx to deliver floral products to the end customer. The success of C&C demonstrates the possibilities of running an organization strictly as an information processing center using an IT backbone. In her company, FedEx and the growers were virtual components. FedEx and the growers were not external, but rather internal to her virtual organization.

The success of C&C supports the fact that IT can be a major integrative mechanism for companies. The flower company used IT to coordinate and integrate virtual components or partners. The company neither grows flowers nor delivers them. They merely manage the process. C&C is a virtual organization that uses virtual links to virtual components through the use of IT.

D. SUMMARY

The research has shown that IT is a viable means of coordinating and controlling work in organizations. Internet technology is a form of integration for establishing virtual links and virtual organizations. In addition to creating virtual links and virtual organizations, Internet technology is creating a culture that shares and collaborates information in order to make decisions. However, organizations have to contend with users that are inclined to protecting, rather than sharing information. Lastly, management must train and educate users to process information. By doing so, organizations can establish a culture that not only shares, but also understands how to use information.

This chapter focused on how IT is used as an integrative mechanism. The next chapter addresses the increasing demands to manage information technology.

III. INFORMATION TECHNOLOGY MANAGEMENT

In the previous chapter, the research focused on how IT systems are used to integrate or coordinate and control functions in organizations. This chapter approaches the impact of IT from a different perspective. Specifically, the chapter discusses why the management of IT has increased.

Management is faced with the burden of picking and choosing technology that meets the needs of the company. In addition, they must choose technology that provides the greatest return-on-investment within a given period. Rapidly changing and evolving technology complicates the management process of IT.

This chapter discusses why companies are choosing a "buy" rather than "build" strategy. Companies are finding clear advantages for buying IT systems rather than building them in-house. Although this removes the need for programmers, companies are faced with a new challenge: managing the process of buying IT systems.

Next, the chapter discusses the trend of large corporations to use enterprise applications such as SAP's (Systems, Applications, and Products) R/3 product. Buying enterprise applications alleviates the need or requirement of companies to develop their own major IT systems. However, buying enterprise applications like SAP's R/3 flagship product has resulted in increased demands on management. Although companies do not have to develop IT solutions in-house, they must manage the process of building solutions for their company. Lastly, the chapter examines the efforts of British Petroleum (BP) to

implement IT in their organization. The transformation at BP resulted in redefining the management roles of its IT staff.

A. MANAGING A BUYING STRATEGY

Companies that adopt a buying strategy can achieve potential cost savings in the development of IT systems. However, using a buying strategy leads to additional management requirements. So, what are the advantages of buying?

During the period when mainframe computing was king, it was not uncommon for companies to have an army of system programmers to build application software. Many large corporations such as British Petroleum (BP) had large IT staffs dedicated to this very purpose. As BP evolved from a mainframe to a client-server computing environment, its IT staff dropped from 1400 to 150 (Cross, Earl, Sampler, 1996). This was largely due to the fact that system programs no longer were needed and applications that were needed were outsourced. Today, the trend for most companies is to buy business applications.

Gregory Smith (1997) makes a strong case as to why companies should buy rather than build. Smith argues it is cost effective to buy rather than develop software in-house. In today's competitive business environment, companies need application solutions immediately. The decision to buy is not difficult when you consider the options. Companies can either choose to take 3 years to develop an application themselves or shop around and have a potential software solution in a few months. With so many niche markets, it is much easier to shop and find a product that meets a company's needs.

Smith (1997) suggests that companies who are willing to change their internal procedures can find third-party solutions 90 percent of the time. In order to accomplish this, IT managers need to convince their users that it is acceptable to change internal procedures to match third-party software if efficiencies can be gained.

Companies that do decide to buy should not fall into the trap of trying to customize vendor software. Using vendors to assist in customizing products can lead to high costs and potentially lock them into specific products. Rather, a better approach is to extend the product by buying add-ons or other programs to meet the full functionality the company desires.

As companies switch or adopt to a buying strategy, organizations need managers instead of programmers. Buying third-party solutions presents its own set of problems. Managers must be knowledgeable in many areas. They must understand technological trends and the business processes of their company and they must be capable of weighing costs and risks in order to pick the best solution for their organization. Although buying relieves the responsibility of developing systems in-house, it puts new and increased demands on IT management.

The next case study discusses the impact of buying IT infrastructures. The impact of using a buying strategy to build large-scale systems also leads to increased IT management.

B. MANAGING ENTERPRISE APPLICATIONS

In the previous section, the management implications of adopting a buying strategy were discussed. The paper now addresses the escalating management requirements of buying a specific enterprise application called R/3 developed by SAP.

SAP is a German acronym for Systeme, Anwendundgen, Produkte in der Datenverbeitung or Systems, Applications, and Products in Data Processing. SAP's flagship product, R/3, is used in over 11,000 companies worldwide, many in the Fortune 500. SAP, located in Walldorf, Germany, was established in 1972 by five ex-engineers from IBM. Today, the company has 40 offices worldwide with over 10,500 employees. In 1996, its net profits were $365 million (sales $2.4 billion). Some of its major clients include Chevron, Coca-Cola, IBM, and Microsoft. By the end of 1996, SAP had a 28 percent market share of the world's enterprise applications for client-server systems (Cusack, 1997).

R/3 was officially announced in 1992. SAP's integrated software allows many applications to be updated when one change is made in the system. For instance, when a salesperson enters an order in the R/3 system, the transaction ripples through the company appropriately updating inventory lists, parts supplies, accounting entries, and production schedules. The complex package also integrates multiple rules from different countries such as currency and national laws. When a transaction occurs in one country, such as Europe, the appropriate entries are updated automatically in an office in the United States (Seeley, 1997).

The integrated and modular structure of R/3 was designed to allow maximum flexibility and scalability. Once a company installs the basic components of the R/3 system, they can customize and build their specific solution by buying and adding third-party components. SAP provides over 1,000 business process modules from the company itself and from vendors. Core applications include such components as accounting, assets management, sales, and distribution. SAP advertises that its plug and play environment will allow companies to add additional components and expect immediate integration and enterprise functionality (Cusack, 1997).

SAP's goal is to create a "Business Framework" which is an integrated, open, component-based product architecture that encompasses R/3 and all third-party products. SAP's business framework provides the opportunity and promise of simplifying upgrades and maintenance and provides increased connectivity to legacy systems and third-party products--an open and flexible infrastructure desired by all organizations. In theory, components can be upgraded independently of other systems in the R/3 product.

As SAP continues to fortify its hold on the enterprise application market, it continues to provide support to integrate third-party applications. It accomplished this by using BAPIs. BAPI stands for "Business Application Programming Interfaces." Prior to SAP's concept of a business framework, R/3 applications were integrated into a common database. With the framework, more application interface is possible with third-party vendors. BAPI provides links between R/3 and third-party applications. In addition,

BAPIs are a major vehicle for linking Internet and intranet systems. SAP's goal is to create a flexible and open infrastructure by using BAPIs (Cusack, 1997).

SAP is not a one size fits all solution for corporate America. Because of this, SAP actively promotes third-party vendors. SAP's mission is two-fold. First, SAP is committed to providing customers with an infrastructure that will link third-party products. Second, it promotes third-party components to build company-specific solutions.

Assuming a large corporation has determined that SAP or other enterprise application will be its IT architecture, the next and final step is building a company-wide software solution. This is greatly enhanced by the component-based structure of SAP's R/3 system. SAP's R/3 product allows companies to buy and build large-scale systems that are fully integrated.

Once again, enterprise applications such as SAP's R/3 system support a strong argument for a buying strategy. However, the management requirements of building and maintaining the IT system are enormous. Management must be capable of overseeing a system that can potentially cross every business process in their organization in a global environment. Although corporations do not have to develop specific IT systems, they still face the challenge of building and managing the system.

The next case provides another example of why the management of IT significantly increased as a result of using a buying strategy.

C. MANAGEMENT OF IT AT BRITISH PETROLEUM

This section addresses the impact IT had at BP. IT specifically had a significant impact on changing and redefining the management roles and responsibilities of its staff. Many, including Lucas and Davenport suggested that IT can have a significant impact on organizations. In the next case, IT not only changed, but completely transformed the management functions at BP.

The vision of BP Exploration (BPX) changed as the company grew. Between 1986 and 1989, BPX grew by 250 percent largely in part because it acquired Standard Oil, Britoil, and Lear Petroleum. The CEO, John Browne, declared that he wanted BPX to be a regional structure run and operated as a global company. He believed that in order to achieve this, the company would have to have a flatter organization. In addition, he believed that IT was the guiding force for his vision. He was convinced that the current IT function at BPX was wrongfully pursuing their own agenda. He believed BPX was not fully exploiting the true benefits and advantages that IT could offer. Browne selected a new manager, John Cross, to head the effort. Six years later, the IT group known as XIT, achieved phenomenal results. The IT budget was reduced from 360 to 132 million, IT head count decreased from 1400 to 150, and IT applications were reduced from 170 to 75. (Cross, Earl, and Sampler, 1996)

The growth of BPX and its continued dependency on IT resulted in a greater need to manage IT. Cross, Earl, and Sampler suggest that IT implementation went through three stages. In the first generation, companies used IT to automate and were more

concerned with achieving cost-savings and efficiencies. The second generation evolved in the late 1970s and continued through the late 1980s. The focus was to use IT to support the business strategy or to establish a competitive advantage. The third generation involved the management of the IT function. Here is where BPX excelled. In the second generation of IT, some firms succeeded while others did not. The BPX case reveals that the IT function requires significant management. BPX was a pioneer in creating a completely transformed organization that implemented new principles to manage its IT function (Cross, Earl, and Sampler, 1996).

The management and job skills of IT staff changed as the company shifted from a mainframe to a client-server computing environment. In the early years of BPX, it was understandable that the mission of the IT department was to develop systems and application software. Back in the 1980s, there was very little third-party software available for BPX to do its job. Naturally, the IT function was tasked with designing required software. In 1989, most of the 1,400 XIT personnel were involved in designing, optimizing, and maintaining the operating system for their mainframe computers. By 1992, the staff was reduced to 390 personnel as a result of shifting to a client-server environment. Mainframe use had rapidly declined to the point where 85 percent of the computing was accomplished on desktops.

By 1995, the mission transformed completely. BPX changed its mission from being a system provider to being an infrastructure planner. As the company moved to a client-server computing environment, the need for system programmers significantly

diminished. In addition, system applications that were still needed were for the most part outsourced. IT staff's primary role was to architect, plan, and oversee the IT infrastructure. The IT staff are now comprised of mostly managers, rather than programmers. The vision in BPX in 1991 was, "the right information, of the right quality, available to the right people at the right time" (Cross, Earl, and Sampler, 1996, p. 404).

This transformation of the IT function is what can be typically expected to occur in other organizations. Mainframe use has declined since the 1980s. Today, local area networks, the Internet, and client-server systems are becoming more and more popular. This change in computing resulted in redefining the mission and job skills of IT staff, namely to be infrastructure planners. "BPX's IT strategy is to migrate to a client-server model which facilitates information management" (Cross, Earl, and Sampler, 1996, p. 406).

Outsourcing was another factor which significantly changed the management requirements of BPX's staff. Cross, Earl, and Sampler (1996) stated,

> By 1990, however, Brown was skeptical about technology itself yielding a competitive advantage. He observed there is always someone else who 'does it better'; that the key was having the skills and attitudes to locate, purchase, and integrate technologies relevant to the business; that value accrues from use and that technical advances do not stay secret for very long in collaborative, technology industries. He concluded, 'Failure to outsource our commodity information technology will permanently impair the future competitiveness of our business. (p. 405)

This notion of outsourcing IT at BPX fit the company's overall strategy of building the IT infrastructure, rather than developing in-house software for their systems.

As previously mentioned, IT applications declined from 170 in 1989 to 75 by 1995. Their IT direction relied on using third-party software to fill their technical system needs, rather than developing software within their company. IT head count was reduced from 1400 to 150 by 1995, evidence that BPX was using third-party developers to meet their software needs. Today, BPX has IT staff that can manage the process of finding application solutions (Cross, Earl, and Sampler, 1996).

Once again, the management and mission of the IT function changed. No longer were they developing, but rather they were managing. IT staff required more business skills than before. The company relied more on their ability to choose third-party software, rather than their ability to write and develop computer programs. It became imperative for IT personnel to be experts in IT and business management (Cross, Earl, and Sampler, 1996).

The transformation at BPX also lead to changing IT staff from being system analysts to being business consultants. The traditional system analyst was responsible for bridging the gap between IT technologies and the users' information needs. Previously, system analysts were responsible for determining how technological capabilities could be used to solve a given problem. The redefined role of the system analyst included four of the following changes. First, IT staff worked with business managers to understand and prioritize their business needs with the company's overall business requirements. Second, they were responsible for benchmarking performance standards and integrating best practices into current projects. Third, IT staff were involved in redesigning processes with

business managers. Last, they played a major role in ensuring that systems supported the sharing of information throughout BPX. (Cross, Earl, and Sampler, 1996)

What happened at BPX is evidence of what can be expected in IT-driven organizations of the future. IT personnel are not just technically minded, but are business minded as well. As IT becomes more integrated and used by organizations, personnel are required to fully understand the business processes within the company so they can find appropriate application solutions.

The IT transformation at BPX resulted in changing the management roles and responsibilities of its staff. Specifically, the company focused on building an IT infrastructure which was managed by its staff. Clearly, the management requirements significantly changed and increased as a result of its IT initiatives.

D. SUMMARY

The research from this chapter suggests why organizations have adopted a buying versus building strategy. Buying IT systems is much more cost effective and provides immediate solutions for its company's needs. The tradeoff is the increased demands on management. Managers must be knowledgeable and trained to find third-party solutions that most effectively meet the needs of their company.

Buying is even a greater issue when you consider the purchase and investment of large-scale systems such as SAP's R/3 product. Once again, the demands on management significantly are increased. BP reached the same conclusion. As they shifted to a buying strategy, they too redefined the roles of their IT staff, namely to be more business

oriented. As BP integrated more and more IT into their company, their management requirements also increased dramatically.

The next chapter summarizes the conclusions from Chapter II and III and suggests how the findings can be applied to DoD.

IV. CONCLUSIONS AND RECOMMENDATIONS

The direction and focus of this thesis was to explore and examine the impact IT is having on organizations. Specifically, the paper addressed how organizations use IT as an integrative mechanism. In addition, the paper also presented research that suggests a significant increase in the management of IT itself. Chapter II focused on the issue of IT as an integrative tool and Chapter III focused on the issue of the increased requirements to manage IT. Each chapter concluded with a summary of the findings and the implications for the specific questions of this thesis. The last chapter suggests what the common and reoccurring themes are and suggests implications for DoD. The chapter concludes with recommendations for future research.

A. CONCLUSIONS

The findings from the research resulted in two major conclusions. First, IT is fast becoming the means by which organizations coordinate, control, and communicate. IT is a major tool used to integrate work and operations in today's environment of global markets. Second, as companies adopt a buying strategy to acquire their IT needs, the demands on management will increase significantly. In addition, the management of IT is complicated further by the rapid change of technology itself. Managers not only must choose IT solutions for their companies, but also they must act prudently and acquire technologies that potentially have short life spans.

The research suggests that IT has played a significant role in organizational integration. Traditional management theory defined integration as the concept in which work is coordinated and controlled in organizations. Today, IT expands and increases the literal distance that work and operations are coordinated in companies. The Internet and intranets are the most prevalent form of technology used to integrate work and operations both inside and outside organizations.

Internet technology is not only an integrative mechanism for coordinating and controlling work, it is also the means by which people communicate and share information. Intranets and groupware are used for simple functions such as E-mail or are used for more complicated functions such as information and knowledge sharing.

Internet technology is shaping and creating a culture that openly uses and shares information to make everyday decisions. However, traditional American business cultures are not used to sharing information. Most individuals are accustomed to protecting rather than sharing information. Organizations have the dubious task of changing cultures such that information sharing is the norm.

Lastly, if cultures are to be expected to properly use Internet technology, organizations must train users to be information processors. The increasing use of Internet technology has put users in touch with enormous amounts of data. End-users must be trained and conditioned to filter, manipulate, and refine information to reach practical decisions. Technology is growing and evolving faster than users can learn to process information.

In addition to IT being used as an integrative mechanism, organizations have experienced increased demands on the management of IT itself. Many companies are moving away from the strategy of building software and hardware solutions in-house. Building IT systems is cost prohibitive and normally requires long development times. Many are turning to third-party solution providers who can meet almost all of a company's requirements and needs. As companies adopt a buying strategy, new problems arise. Greater demands are placed on organizations to manage IT.

Although companies have escaped the burden of developing IT systems, they face new demands and challenges. Companies no longer need programmers and system developers. Now, their IT staff must be capable managers who can understand the business processes and requirements of their company so they in turn can find appropriate solutions. They must carefully choose solutions that meet the needs of the company and they must ensure IT systems provide the overall best investment for their organization. In addition, managers of IT must continually learn and understand new technologies as they emerge. What do companies do? Should companies hire subject-area experts or hire managers that can learn new technologies as they become available and accepted by business industries? Clearly, the management of IT will become more and more an issue for every organization.

Having explored the implications and impact IT has on private businesses, the next logical consideration is to discuss the impact the findings have on DoD. The next section addresses how the findings from this thesis can be applied to DoD.

B. IMPLICATIONS FOR DOD

IT as an integrative mechanism has specific applications in DoD. Already, DoD is finding more and more uses of the Internet. Almost every major command uses the Internet for information sharing. In addition, commands are developing web-based applications to further extend the practical use of the Internet.

The findings and conclusions from this thesis have direct application to DoD. The research from this thesis explored and examined primarily business case studies. However, every issue and finding from this research can be applied to DoD. Many research papers at the Naval Postgraduate School (NPS) have included web-based applications for DoD. The research at NPS will continue to support the argument that Internet technology is a viable medium for organizational integration.

Although DoD is in the process of using Internet technology as an integrative mechanism and as a tool to share and communicate information, little has been done with intranets and groupware. Intranet technology has the potential to be used by every DoD command, whether aboard ship or at shore-based commands. Collaborating and sharing information and knowledge is equally important in DoD as it is in the private sector. Intranets could be used to collaborate information in a research and development center or could be used to conduct command administration. Every DoD organization has some form of administration that could benefit from intranet technology. In addition, many DoD organizations could also benefit from groupware technology. Military commands

that have a high degree of interdependence could benefit significantly from groupware technology.

Intranets and groupware technology have clear use and benefits in DoD. The use of intranet technology can lead to greater sharing of information and knowledge and speed up the process of innovation: a worthy goal for both DoD and private businesses.

Although DoD is using the Internet for developing information-sharing systems, there is still much to be gained by fully exploiting all forms of intranet and groupware technology. As DoD continues to emphasize a joint military environment, integration and communication will continue to be top priority issues.

The management of IT is as complicated in DoD as it is in the private sector. The management of IT is even more complicated when you consider the unwieldy nature of the acquisition and budgeting process. IT systems that might last three years take five years to get approved. The acquisition process further complicates the management process of acquiring IT systems. Clearly, in order to manage the process of finding, buying, and using IT systems, the acquisition and budgeting process will have to change and be more in line with the expected life spans of any technology system.

Besides the drawbacks and limitations of the acquisition process, the sheer size of managing IT infrastructures throughout DoD is overwhelming. It is one thing to coordinate and integrate operations in a private corporation and a completely different problem when you consider the military. Currently, DoD is building an IT infrastructure that incorporates all IT systems across every branch of service. The task is enormous.

Integrating legacy systems and adding new technologies and trying to simulate seamless connectivity is a major undertaking. No commercial business compares to the complex IT management problem faced by the military.

DoD can benefit from the same advantages of using IT as an integrative mechanism. However, DoD also faces the same dilemma of managing IT as their civilian counterparts. DoD needs personnel trained to make decisions related with IT investments. At some point, DoD must rely on the knowledge of its personnel to choose the right technology for the specific needs of DoD. In order to achieve this goal, DoD needs and must train personnel to be IT managers.

The following section suggests possible solutions or recommendations worth pursuing in future research.

C. RECOMMENDATIONS FOR FUTURE RESEARCH

Much research is conducted on using the Internet for DoD applications. Specifically, web-based applications are developed for information-based systems. Although computational intensive applications have not proven effective or practical for the Internet, information-based web applications are appearing every day.

The research from this thesis suggests the impact and potential use of intranets and groupware technology. Continued research needs to be conducted on the feasibility of using intranet technology within DoD commands. Assuming such studies are accomplished and suggest practical benefits for DoD, it would be advisable to build prototype intranets on shore-based facilities and installations. If intranets prove effective

in shore-based commands, the next step would be to implement intranet and groupware technology aboard ships such as aircraft carriers.

Enterprise applications, such as SAP, are another study worth pursuing. Enterprise applications provide the business world with an open component-based IT infrastructure that, if adopted by DoD, could lead to long-term dividends. A study might suggest DoD also buy an enterprise application such as SAP's R/3 system and build a prototype solution for the Bureau of Naval Personnel (BUPERS). SAP has a human resource component that could be customized to meet the needs and requirements of BUPERS. If the prototype proves successful and practical, DoD could extend the system by adding more components.

The most complex area of this research is the issue of managing IT. The problem of managing IT requires continued research. This thesis only suggested that the management requirements for IT has increased significantly, it did not suggest how or what practical steps can be taken to manage IT. Continued research on how to manage IT would greatly benefit DoD as it attempts to build IT infrastructures for the future.

APPENDIX. ORGANIZATIONAL DESIGN ELEMENTS

The following information is provided as an overview of widely accepted factors involved in organizational design. A discussion is presented on vision, strategy, differentiation, management structure, centralization and decentralization, integration, technology, and culture.

A. VISION

A firm's vision gives direction and guidance and states the overall purpose of the firm (Collins and Porras, 1991). Today, vision is more important as organizations have become more and more decentralized.

Collins and Porras (1991) suggest a framework for developing a corporate vision. Their model starts by defining the firm's guiding philosophy. The guiding philosophy is defined by a firm's core values or beliefs and its purpose. The second part of the model is creating a tangible image. This image is created by defining a mission. Finally, after defining the mission, a vivid description is stated. In essence, a vision profile for a firm starts with abstract values and beliefs that are refined into a vivid and compelling set of goals for the firm. A properly developed vision aids and assists not only long-term company strategies, but also the day-to-day operations of the lowest worker in the organization.

In most firms, vision or mission statements are little more than descriptions of what the company does or purposes to do. Most are not compelling and are usually only known by top management. The following are examples of ineffective mission statements:

- The Corporation is committed to providing innovative engineering solutions to specialized problems where technology and close attention to customer service can differentiate it from commodity of production or job shop operations.
- We provide our customers with retail banking, real estate, finance, and corporate banking products to meet their credit, investment, security and liquidity needs.

What's wrong with these statements? They are only a description of what the firm does. There is no compelling impetus to excite employees in a firm. A properly developed vision for a firm is known and understood by every employee in a company. Each individual knows that what the firm believes is important (core values), how the company fulfills those beliefs (purpose), what its long-term goals are (mission), and how the firm has reaches its goals (It is a vivid description).

The guiding philosophy of a firm is similar to how values or beliefs affects the behavior of human beings. Our behavior or how we interact with the world and our environment is largely affected by what we believe or what we value. A company that develops and promotes its philosophy or values is attempting to create an organization that has similar values by which they will operate and behave. Collins and Porras (1991) stated,

> All companies progress through phases, passing through predictable stages of evolution. One of the most challenging transitions is for a company to progress past excessive dependence on one or a few key individuals. Only when an organization institutionalizes its core philosophy so that the philosophy becomes identified primarily with the organization, rather than with certain individuals running the organization, can it progress to being an enduring, self-renewing institution. (p. 5)

Ultimately, the guiding philosophy of a firm resembles a company with character and purpose. Employees will know what values and beliefs the firm stands for and upholds and what meaningful purpose the firm hopes to achieve.

Core values of a firm are indicative of what the company believes is important, both in business and in life. These core values or beliefs will or should dictate how the company will function and conduct itself. Everything the company does and says it will do will stem from their corporate core values.

An example of a core value comes from Hewlett-Packard, which is known as the "HP Way." In an interview, Bill Hewlett described the HP Way as the following:

> I think fundamentally the HP Way is "respect for the individual." If you give him a chance, the individual will do a lot more than you think he can. So you give him the freedom. Respect for the individual--not just employees [but] customers and the works. (Collins and Porras, 1991, p. 7)

What made HP's core value genuine was that its actions showed what it believed. The stated value of conducting business the HP Way was reflected in its decisions and day-to-day operations. It acted on its beliefs or core values.

Regardless of how many core values a firm has, to be effective its beliefs must be clear and actually acted upon. Companies that live what they believe will have an effective guiding force for the organization. Examples of core values include the following (Collins and Porras, 1991):

- 3M: "I think every employer has a real moral responsibility, to see that employees are able to secure life's necessities during the time of distress." (William McKnight, CEO of 3M, 1931)
- Marriot: "See the good in people, and try to develop those qualities." (Bill Marriot, Sr.)
- Telecare: "We believe in growth and building: we want to personally grow as individuals and we want to grow and build our organization for the long term." (Telcare Statement of Philosophy, 1990)
- L.L. Bean: "Sell good merchandise at a reasonable price; treat your customers like you would your friends, and the business will take care of itself." (Lean Bean, 1947)
- Citicorp: People should be rewarded based on performance, not seniority. (Citicorp Philosophy)
- Motorola: "Everything will turn out all right if we just keep in motion, forever moving forward." (Paul Galvin, CEO, 1945)

The purpose of an organization naturally evolves from the firm's core values and beliefs. The purpose does not contradict, but rather is supported by and defined by its core values. A properly developed purpose statement will not only state what a company does, but also articulates why it does what it purposes to do. In addition, a purpose

statement should be short and succinct and cover a long period of time. The purpose should serve as a guide for the organization for the next 100 years.

Most company purpose or mission statements are not hard hitting descriptions of what the company does. In addition, the purpose statement is not flexible enough to last over a long period of time. An example of a bad purpose statement could be the following: "We exist to make low-cost computers for small businesses." A better example would be Apple's, which was expressed in 1980: "To make a contribution to the world by making tools for the mind that advance humankind." (Collins and Porras, 1991, pp. 12) The second example states in broad terms what the company does and more importantly, why. Developing a purpose statement is not something that can be done in a few moments, but can take many hours. It is easy to state what the company does, but it is hard to state why. Collins and Porras (1991) stated,

> Good purpose statements capture the soul of the organization. Good purpose statements are reached by asking penetrating questions, such as: What would the world lose if our company ceased to exist? Why do we want to dedicate our precious creative energies to this company's efforts? What are the personal purposes we feel for our own lives, and how can our united effort fit with these? (p. 13)

The important aspect to remember and consider is that developing an effective purpose statement takes time and considerable effort. Stating what a company does will come a lot faster than trying to develop a compelling and soul-searching reason for why the company does what it does.

The next step in developing a vision for a company is creating a tangible image. The guiding philosophy, which entailed core values and a purpose, was abstract and represented the motivation, character, and direction of the firm. On the other hand, the tangible image of the firm identifies the company with a specific mission stated by the vivid description (Collins and Porras, 1991).

The mission is an area with which most people can identify. The mission statement articulates what is the over-arching goal of the organization. The mission should set the tone for unifying the whole organization and give the firm a clear sense of direction within a specific time period. The mission should also state a realistic, yet challenging goal. A good example of a powerful mission was stated by President Kennedy in 1961, "...achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to earth." (Collins and Porras, 1991, p. 17) This mission stated by Kennedy had the elements of a powerful mission statement which seemed almost impossible, but was nonetheless possible. In addition, the goal had a specific time frame, "before this decade is out..."

Collins and Porras suggest that firms follow one of four approaches to setting a mission: Targeting, Common Enemy, Role Model, and Internal Transformation.

Targeting is the easiest and most direct approach to setting a mission. Targeting involves identifying a specific goal and aiming directly for it. Target missions are usually precise, but can also be imprecise. President Kennedy's mission statement to land on the

moon was a precise goal within a specific time frame. Below are examples of imprecise, but bold mission statements:

- "To establish Merck as the preeminent drug-maker worldwide in the 1980s." (Set in 1979)
- "To become the dominant lock supplier in the United States by the year 2000." (Set in 1979)
- "To become the first truly great biopharmaceutical company." (Set in 1990)

The common enemy is another powerful external approach to developing a mission statement. Rallying the troops to conquer a common enemy is a powerful way to state a company's mission. Pepsi used the strategy to beat Coke. Honda used the same strategy to compete with Yamaha. Common enemy strategies are appropriate for companies trying to achieve number one status in its competitive market. The motivation to defeat the enemy is similar to the story of David and Goliath. A mission statement that adopts the common enemy approach can easily and effectively unite employees in an organization. Everyone knows that their ultimate goal is to do whatever it takes to defeat the enemy and be number one. Everyone has a sense of contributing to the overall effort, regardless how big or small a job they have in their company. Of course, the disadvantage is what do you do when you are number one? Microsoft has been number one for quite some time. Its mission is to establish a customer base and to increase its customer base.

The role model approach is less popular than targeting and common enemy mission statements. The role model approach is typical of small startup companies

looking to emulate large successful and established corporations. An example is an early mission statement of a small bicycling company which used a combination of targeting and role model for its mission: "To be a great company by the year 2000 -- to be to the cycling industry what Nike is to athletic shoes and Apple is to computers." (Collins and Porras, 1991, pp. 21)

The last approach is internal transformation mission. Targeting, common enemy, and role model approaches are external actions of a company, whereas internal transformation is a method used by older established companies to revitalize or regain a competitive edge. In one example, General Electric attempted to state a mission that would deal with the inefficiencies that had cropped up because of its increased, unwieldy size. In 1986, CEO Jack Welch stated their mission was the following:

> ...in addition to the strength, resources and reach of a big company, which we have already built, we are committed to developing the sensitivity, the leanness, the simplicity and the agility of a small company. We want the best of both ..[a] big-company/small company hybrid. (Collins and Porras, 1991, p. 21)

The vivid description complements the mission of a company by creating a concrete picture of what the company will be when it achieves its goals stated in its mission. Providing a firm with a mission and a vivid description helps it know what the goal is and what the firm will be like when it reaches its goals. Consider Henry Ford's description during his efforts to promote the automobile,

> I will build a motor car for the great multitude. ...it will be so low in price that no man making a good salary will be unable to own one -- and enjoy with his family the blessing of hours of pleasure in God's great open spaces. ...When I'm through everybody will be able to afford one, and everyone will have one. The horse will have disappeared from our highways, the automobile will be taken for granted...[and we will] give a large number of men employment at good wages. (Collins and Porras, 1991, p. 22)

Ultimately, the vivid description should bring a mission statement to life and make it even more tangible to every employee in the organization. Just as emotion is important in sports, so is emotion in commercial enterprise. Sometimes the only difference between two companies with similar skills, talents, and resources is their drive, passion, and emotion to reach their goals.

One last point to consider is to realize the difference between mission and purpose. Many companies make the mistake that their mission is their purpose. This is not the case. The purpose is a much broader direction of a company. A perfect example is NASA which was unclear of its direction and mission once it had successfully achieved landing on the moon. A more defined purpose might have created a greater overall vision for NASA.

Lastly, many companies fall prey to the fact that in order to be a visionary company, they must a have a charismatic leader. Although it significantly helps, it is not required. More importantly, the key is to build an organization with vision and not to rely on the vision of a particular individual.

B. STRATEGY

An organization that has developed objectives has determined what it wants to do. Strategy, on the other hand, delineates how an organization will accomplish those goals. "Definitionally, strategy is the pattern of organizational moves and managerial approaches used to achieve organizational objectives and to pursue the organization's mission." (Thompson and Strickland, 1996, pp. 7)

Strategy is not just an activity performed only by top executives. Strategy making is accomplished at all managerial levels of an organization, from the CEO to the first line managers of a company. Each manager is responsible to determine "how" to reach specific goals. For instance, a store manager at a fast-food restaurant may be given monetary goals from a regional manager, but the store manager decides crew scheduling to maximize profit versus labor costs.

How does strategy affect the building or designing of a company? Most organizations already exist. Periodically, top management reviews and develops corporate strategy which takes into consideration external factors and internal capabilities. Strategy is developed based on the capabilities of the company. Proper corporate strategy is not done in a vacuum. Management carefully considers external threats or restrictions that impact corporate strategy. Having identified a strategy, an organization may need to reorganize or restructure to execute its strategy.

The following issues should be addressed in order to implement and execute a given strategy: (1) build company that is capable of carrying out strategy, (2) develop

budgets that properly allocate resources to the right activities in a company, (3) develop reward systems that aid in successfully executing strategy, (4) create a culture or work environment conducive to desired strategy, (5) design control or information systems that will provide feedback on performance of goals, (6) author and promulgate supportive policies and procedures, (7) select, train, and position leadership to oversee and execute strategy (Thompson and Strickland, 1996).

It is important that strategy flow from the top down to the lowest levels. Problems arise when individual departments develop strategic initiatives that do not coincide with corporate strategy or do not fit or harmonize with other departments. Consensus at each level is necessary to ensure politics or individual department goals ultimately support the common good of the organization, not just the political position of the specific department.

In order to properly craft strategy, a firm must analyze the industry and competition. The macro-environment provides information on the climate a company must work in and compete with. The following issues should be addressed: (1) what are the chief economic characteristics of the industry?; (2) what factors are driving change in the industry, and what impact will they have?; (3) what competitive forces are at work in the industry, and how strong are they?; (4) which companies are in the strongest/weakest competitive positions?, (5) who will likely make what competitive moves next?; (6) what key factors will determine competitive success or failure?; and (7) how attractive is the industry in terms of its prospects for above-average profitability?

Next, a company must examine and determine its position in industry by using three analytical techniques: strength, weaknesses, opportunities, and threats (SWOT) analysis; strategic cost analysis; and competitive strength assessment.

SWOT analysis shows a company's internal and external factors. SWOT analysis provides a quick way for an organization to evaluate its internal strengths and weaknesses and its external opportunities and threats. The analysis provides a quick overview of a company's strategic situation.

The first area to consider is an organization' potential internal strengths. The following are examples of strengths:

- Core competencies in key areas
- Adequate financial resources
- Proprietary technology
- Cost advantages

The second area to examine is the company's weaknesses. The following is a list of potential weaknesses within a company.

- Obsolete facilities
- Lack of managerial depth and talent
- Missing some key skills or competencies
- Too narrow a product line

The third area to examine is the company's external opportunities. The following is a list of potential opportunities.

- Serve additional customer group
- Enter new markets or segments
- Expand product line to meet broader range of customer needs
- Diversify into related products

The fourth and last area to examine is potential external threats.

- Entry of lower-cost foreign competitors
- Rising sales of substitute products
- Slower market growth
- Costly regulatory requirements

Cost advantage is the biggest core competency a firm can have. In order to determine cost competitiveness to rivals, a activity cost-chain analysis must be done. This analysis shows the costs from start to end, namely acquiring raw supplies, manufacturing product, and delivering product to retailers. In addition, the final cost to buyer is important. It is not enough to know what the price is getting to retailer, but what the eventual price will be to the consumer.

One of the best ways to access a company's competitive and strategic position is by comparing itself to rival companies. The results of the assessment can aid in a firm

determining its competitive position and whether change in strategy is necessary and what areas require change to be competitive.

C. DIFFERENTIATION

Once an organization has determined its mission and appropriate strategy to accomplish its mission, the next logical step is to structure or differentiate the tasks or functions within an organization. Five basic forms of structuring are examined (Davis, 1996).

The structure of a firm can and usually determines the ability of a company to effectively serve customers. When structuring an organization, firms should consider the following issues: (1) what employees pay attention to; (2) ease of coordinating activities; (3) speed of delivering/producing goods; (4) cost of running firm; (5) type and extent of supervision required; and (6) with whom employees interact and build relationships.

The most commonly adopted form of structure is functional departments. Consider the following example. The ABC printing company starts out as a small firm providing services in a small city. Its structure probably would be functional. The firm is divided into three departments: Sales, Graphic Design, and Print shop. The departments or units are grouped by the major technical or professional function.

Using organizations with functional structures has several advantages. First, it is easier to manage groups within departments since supervisors and employees share similar knowledge. For example, a supervisor in many cases starts out as an employee within the department. Consequently, he or she understands the subordinates' needs and can set

goals that are reasonable for his department. The second advantage is that employees within the department share similar interests and technical abilities. By working in a department, they nurture and share ideas which further strengthen the department's ability to deliver its intended products or services. The third advantage is that labor costs are generally lower since the work force can be pooled and used to best meet the rise and fall of demand on the department. Customers are best served. For example, if a specific person is not at his desk for whatever reason, others may be skilled enough and cross trained to continue the mission of the department even in the absence of the employee.

Although there are many advantages with functional structures, there are inherent disadvantages as well. Since in most cases many departments may exist, coordination and communication are required between departments that are interdependent. People are more inclined to be committed to their own department and not to other departments losing sight of the ultimate mission of delivering a product to a customer. In the ABC printing shop example, a salesman may promise a customer a delivery date that the print shop cannot meet.

Since the involvement of every department is necessary to deliver a product to a customer, each department head has limited decision-making authority. Once again, coordination and communication are required between department heads.

Another disadvantage is that departments will have different priorities which could ultimately block or prevent maximum effectiveness of the firm to meet the needs of the customer. For example, in the ABC printing case, sales is probably more concerned with

delivering a quality product as soon as possible and the print shop's main priority is keeping costs down and having steady work. Ultimately the customer's needs are not foremost in the whole process.

Another common problem with functionally structured firms is that they tend not to have well rounded managers who are familiar with the overall operations of a firm. They tend to only know their department's requirements.

The challenge in a functionally structured firm is to promote accountability, develop managers that understand other department's functions, and provide an environment that will aid in departments working together for the good of the firm as a whole.

Product or service-based structures are the next most common strategy of differentiation. Divisions or departments are grouped to produce a product or service. All functions necessary to produce the product are located within the division. In the case of the ABC printing company, a division structure would have a stationary division, a brochures division, and a business card division. Each division would have its own sales, graphics design, and printing shop.

As was the case with functional differentiation, product organized structures have strengths and weaknesses as well. One strength of product organized firms is that accountability is easier to trace for a given product in a specific division. Secondly, since employees are dedicated to one product, commitment and quality are potentially greater than with a multi-product division. Thirdly, it is possible to develop team spirit within a

division and constructive competition can occur between divisions. Lastly, managers will acquire greater skills in understanding all functions associated for a product. Consequently, there are more avenues for promotion to higher positions. Lastly, managers will have greater authority to make decisions and can respond quicker to customer needs associated with their products. Coordination is not required with other managers from other divisions.

Although there are many strengths with product-based structures, there are also associated weaknesses. First, there is the potential that resources will not be shared between divisions and potential duplication of efforts resulting in higher costs. Second, career opportunities may be smaller since professionals may only have experience in one particular product line. Third, customers that want more than one product from the same company will have to deal with more than one division. Finally, since each division will support and defend its own division, it is hard to drop, change, or add other products. Consequently, firms will not be flexible enough to meet the ever changing demands of the customer.

The next differentiation strategy to be discussed is customer or geographical based structures. Major units are organized to serve a specific customer, region, or market. In the example of the ABC printing company, if it was to expand, it might have divisions associated with individual accounts, corporate accounts, and overseas accounts. Each division would be capable of performing all functions to deliver products to customers. In essence, each division is a separate, self-functioning organization.

There are several advantages associated with customer-based structures. First, each division can effectively respond to specific customer needs within its division. Secondly, firms that focus on customers or markets are able to be constantly aware of changes to customer's needs and preferences, especially when compared to product-based structures. Finally, it is easier for unprofitable products to be dropped within a division, since a division is responsible for many products (compared to function and product-based divisions which would have a harder time of dropping products).

The following weaknesses can be expected with customer or geographical based structures. First, as was the case with product-based structures, less sharing of resources between divisions and potential higher costs due to duplication of efforts can occur. Second, internal systems may develop within each division to best meet customer needs. Consequently, it will be difficult to manage the firm as a whole. For instance, domestic divisions could have different accounting systems than international division, making metrics and comparisons between the two difficult.

Teams are another form of structuring organizations. Teams are a common tool used by many firms to accomplish special one-time projects or to quickly respond to customer needs that require key people throughout the firm. Teams are similar to the concept of business processes which identify major steps to produce a product or service. The business process team is a group of people capable of completing every step necessary to deliver a product. A horizontal organization is one that structures work around major processes. Horizontal firms tend to be flatter with less management and

more specialized teams capable of working on their own. The following are advantages of using teams: (1) focus of firm is on customer and not boss; (2) time and resources lower since less information is passed and coordinated in a typical vertical management structure. Also, there is no coordination with other departments since each team is able to make a product on its own; (3) teams are self-managed and are more apt to have greater job satisfaction; (4) team members bring different skills to the team and other members will learn and appreciate others skills; (5) faster decision making, reduced cycle time, and faster response to customers; and (6) less levels of management resulting in a flatter firm and lower management costs.

One of the weaknesses associated with team-based firms occurs when a firm desires to change to a business team structure. Redesigning to a business process team structure is costly and time consuming. Another weakness or cost is the training requirement for making effective teams. Groups must have or acquire the necessary skills to function as a team.

Matrix is another form of differentiation which occurs when an employee has two or more bosses. A firm that uses a matrix-based strategy can take advantage of teams and the functional expertise of departments. A firm that uses a matrix strategy can benefit several ways: (1) enables a firm to be dynamic and flexible to temporary requirements. Teams are formed to meet a short term need and are then returned to their original departments; (2) allows firms to take advantage of team concept and permits technical expertise in critical functions; (3) permits employees to work with others with different

skills, while still maintaining their own with their home department; and (4) requires managers to work with other managers and moderates their power over their subordinates.

The disadvantages of matrix organizations can include one of the following: (1) matrix organizations can get out of hand when an employee has more than one boss. Decision making can be slowed down; (2) employees with multiple bosses can have conflicting requirements resulting in stress and more work quality; (3) since resources are allocated in matrix firm and each managers resources change according to work demand, there are often power struggles between managers. This can disrupt work and prevent good customer service; and (4) subordinates may use one boss against another.

In order to make matrix structures work, employees roles, responsibilities, and job descriptions must be clearly defined, preferably in writing. Rewards, compensation, and clear guidelines for performance evaluations must be clearly communicated and understood. Every boss that an employee works for should have an input into their overall evaluation.

Most organizations are hybrid, meaning their structure is usually a combination of several structures. For instance, a large corporation may be geographically based, such as in the US and overseas. Each part can be product or market based. Within each product line they can be further organized by departments. In other cases, a firm can have several departments that are product based and some departments that are function based. For example, a car manufacture may have product-based divisions that make a single line of

car. Other divisions could be function based, such as marketing or sales divisions. (Davis, 1996)

D. MANAGEMENT STRUCTURE

All organizations have levels of supervision. Flat firms have few levels and a tall firm has many levels. Typical organizations have top, middle and first-level managers. All levels form a chain of command or hierarchy. In general, the higher up an individual is in the organization, the greater his power, authority and influence (Davis, 1996).

Many factors influence management hierarchies. One such way is a person's power and authority. Power is based on the position an individual has in a firm, called positional power. Authority involves the right a firm gives to an individual to make decisions, which is called legitimate power. Influence is another factor affecting supervision. Influence is the ability of another to affect what another does regardless if one has the authority.

Despite the normal rules or laws associated with management hierarchies, there are exceptions when traditional principles of supervision are not appropriate. One exception occurs when workers at lower levels have special skills or abilities or contacts outside firm which are critical to the success of a firm. Another exception occurs when a person is in a position to control access to a higher-level position. For instance, an executive's secretary may control who gets to see the boss. That person is exercising power without authority. Lastly, an exception can occur when authority is delegated to lower levels. In this case,

the supervisor and the person given the delegated authority are held accountable. Ultimately, the person giving the authority has overall responsibility.

What is the impact of making an organization flatter or taller? Consider what occurs when a firm goes from a two to a three level firm. The following is an example of a family owned and operated restaurant. A husband and wife run the restaurant and have several cooks and waiters. The husband is at the top of the firm and everyone else is at the next level. As the restaurant becomes bigger, he may hire a manager to assist with scheduling and supervision of all employees, now there are three levels, namely owner, manager, and then all employees. Consider the impact of the new management structure. The owner is freed up to work on more pressing issues such as increasing market share in the surrounding area and working with cooks to develop menus. He is also relieved of the duty of dealing with day-to-day personnel problems, such as scheduling. The manager may have been promoted from waiters and may understand personnel needs of his fellow waiters. Waiters may feel they have faster response to a manager than the owner who may be unavailable. In addition, the manager may be able to buffer information that reaches the owner. This can be good or bad. He can prevent information from reaching owner that the owner way want to know.

Now consider what occurs when levels are removed in an organization. For instance, what would be the impact if a large firm with three levels, corporate, regional, and local offices removes the regional office? The local office would have greater autonomy. Support from regional office would probably not be available unless the

corporate office decides to take on the additional responsibility. Information received from the local office goes directly to the corporate office. This could result in an overload of information to the corporate office. In general, removal of a level means less staff and more work for someone else. The ultimate goal should be to increase responsiveness to customers and/or reduce costs to customer.

In a flatter firm, communication is faster and less distorted and decisions are made faster. Also, employees feel closer to top management. When removing levels, support that could have been provided is gone, meaning workers at lower levels must be self-supporting. The weakness of a flat firm is the available levels to promote a worker.

In a tall firm, the average span of control is smaller resulting in better supervision. There are opportunities for promotion. Adversely, communications and decision making are slower and potentially worse. In general, information remains coherent within the same level, but once it goes up or down, the information can easily be distorted.

Size is a major factor in the structure of an organization. Consider the following stages as a small business evolves into a large corporation:

- Stage 1. Owner does all work and/or contracts outside help to perform desired functions.
- Stage 2. As firm grows, owner hires employees and each individual is assigned a specialized or functional area of responsibility. By hiring, outside contract work is reduced.
- Stage 3. Size increases leading to departments, not individuals, to specialize in functions. New level of management occurs--supervisors of each department.

- Stage 4. As size increases, new levels of middle management appear. Departments may split based on customers served or regions covered to better respond to customer needs. Each new area will have a supervisor who will in turn report to the overall department supervisor. Thus, a new level of supervisors are created.

- Stage 5. As functionally based firm grows, divisions appear to cover product, customer or region area served. Each division will probably have functional departments.

- Stage 6. As firms grow extremely large, they find themselves spending more time on maintaining self rather than customers. In a world where changing and responding to customer needs are paramount, a large unwieldy firm has a hard time competing.

- Stage 7. Large firms make attempts to restructure to better meet the needs for dynamic change and customer needs. Some try to outsource functions, such as secretarial services. Other ways include using autonomous teams to better respond to customers needs (Davis, 1996).

Managers or supervisors have narrow or broad spans of control. Narrow span refers to a small number who report to a supervisor. Narrow spans of control usually result in higher costs since there are more managers per number of workers. However, a manager is able to do more work, rather than just spend his time supervising workers. In addition, a narrow span provides the opportunity to give more attention to fewer workers. Of course the drawback is that supervisors can get in the way and not allow workers to develop autonomy.

Narrow spans of control are likely to have tall structures with many levels and have accompanying problems such as bad communications up and down the chain of command and slow decision-making.

Broad spans of control have their advantages and disadvantages, as well. Organizations with broad spans of control will have lower management costs. Since a broad span of control means flatter organizations, it is natural to expect better communications up and down the chain of command. Another advantage is the opportunity for workers to exercise greater autonomy and achieve higher job satisfaction.

One disadvantage is that supervisors have a harder job since they have to manage more workers. In order to counter this affect, systems must be implemented to assist managers in supervising workers. Another drawback is encountered if workers require close support. A broad span of control might prevent or hamper employees who require more involvement from the supervisors.

Nature of work and skill of workers will tend to dictate broad or narrow spans of control. Another concern is working supervisors who have other critical responsibilities besides supervising. In their cases, a narrow span would be appropriate. At some point in the organizational design process, spans of control must be considered and applied to best meet the supervision requirements of the firm.

E. CENTRALIZATION AND DECENTRALIZATION

Every organization is either centralized or decentralized. A centralized firm makes decisions at the higher levels, whereas a decentralized firm allows personnel at the lower levels to make decisions. Firms normally become centralized when control is an issue. Centralizing will ensure the firm is in compliance with legal or regulatory requirements which may affect firm as a whole and are difficult to interpret. Another reason for

centralizing is when decisions at local/lower level can impact firm as a whole. In this case, centralized decision making will ensure coordinated and coherent policies are made with proper consideration for the whole organization. Lastly, centralized decision making is appropriate when something can affect other parts of the firm, not just the department where the issue is addressed. For instance, if maintenance in a large corporation must turn a computer system down, higher management should approve before action is initiated to shut down the system (Davis, 1996).

Other reasons for centralizing include cost and new technology. Centralized functions can generally reduce cost by consolidating resources. New information technology systems can centralize previously decentralized firms. For instance, many large corporations have regional offices. With new technology, regional offices can be reduced by using systems which will allow previous functions to be handled at the corporate office. Although not as close to the customer as before, new technology allows the same customer responsiveness.

At other times, decentralizing is more appropriate than centralizing decision making. Decentralizing allows organizations to be more responsive to customers by moving decision-making power to the lowest levels. In addition, a decentralized firm will tend to have more creative and innovative workers. Also, quality of promotable workers is more prevalent. Lastly, new systems may assist management and result in decision making to occur at lower levels.

There are many factors to consider when organizations choose to centralize or decentralize decision making. In general, firms should attempt to push decision making to the lowest level possible for best customer responsiveness. Decisions that affect other departments or the firm as a whole should be made higher or more centralized. If a decision has long-term effects or is not easily reversed, higher decision-making is appropriate.

F. INTEGRATION

Previously, dividing up the work and determining who is responsible for what was discussed. Having divided up the work, management must decide how to coordinate and control the work needed to be done (Davis, 1996).

A typical supervisor coordinates workers by making work schedules, prioritizing work, assigning workers to specific tasks, and coordinating with others within supervisor's area of responsibility. In addition, a supervisor coordinates his units work with others outside of his area. A supervisor can control a workers performance by constantly monitoring work or he can examine work after it is completed. In some cases, supervisors coordinate, but do not control work, and in other cases they do both.

In flat organizations with broad spans of control, a supervisor can still coordinate, but control procedures must be considered. In a narrow span of control, a supervisor can do both coordinating and controlling.

Supervision is also appropriate when interdependence is high between positions supervised, when the supervisor has special knowledge that workers do not have, when

timing is critical and close supervision will ensure it, when errors could be costly, and when work is complex/unpredictably and workers lack knowledge to make decisions when exceptions arise.

While supervision is the most common approach to coordinating work, there are associated drawbacks. Supervisors that closely monitor workers will usually prevent worker creativity and initiative. Workers will tend to rely on their supervisor to find errors rather than exercising personal responsibility. In addition, workers may try to please their boss rather than the intended customer. Lastly, if a supervisor has equal or less skill than the workers, the workers may not respect or seriously consider their supervisor's leadership.

Another way to control and coordinate work is to standardize inputs, process to transform inputs, and outputs. By standardizing, processes are given specific rules and guidelines to ensure the desired results without close supervision. Standard operating procedures may or may not be written. Firms can standardize inputs by making sure resources or inputs meet certain prescribed criteria. In highly professional firms, workers are depended upon to complete their work with little or no supervision. In order to control their work or potential for work, careful hiring process is accomplished to ensure the highest and most qualified workers are hired. Employers interview workers and look at their academic and professional experience to filter candidates for jobs. Another way to control inputs is through goods and services acquired by firm. Firms can ensure the success of their firm by careful reviewing and controlling inputs used by the firm before

they are used within the firm. Probably the most common approach to using standardization is through work processes. Many firms use standard operating procedures (SOP) to control work. By using SOP, supervision can be less. Standardizing work processes are appropriate when work performed is routine with little exceptions, demands for product are predictable, alternate means to control work when span of control is broad, and when workers' activities are visible and measurable. Drawbacks for standardizing work processes can be expected when workers feel they have no control over their work and become bored and disinterested in showing initiative or creativity in their work. In addition, if workers are given specific rules to follow, they will be less likely develop or think about ways to improve a process. When others question a process, others may be quick to point out, "this is the way it has always been done." Lastly, it is possible to even standardize a process that leads to waste or inefficiencies.

In some circumstances, it is appropriate or suited for a firm to measure and check outputs produced. It is appropriate to consider standardizing outputs when span of control is broad and supervision is not appropriate, interdependence is low, outcomes/products are visible and measurable, supervisor is less knowledgeable compared to worker, workers are committed to the success of the firm and have the necessary skills to do work or firm desires to promote initiative and creativity.

In an organization where employee commitment is high, workers are dedicated and self-motivated to do whatever it takes for the success of the firm. For optimum effectiveness, workers must see an overlap of company goals and personal goals.

Ultimately, worker commitment based on shared goals and values is manifested in the corporate culture of a firm. High worker commitment usually results in maximum worker involvement, continuous improvement, and high quality effort and products. In addition, process improvement is best accomplished by those closest to the work. Commitment is necessary to have an advantage over competitors.

There are several methods that can increase employee commitment. Some workers are drawn to a company's core values or mission, while others are motivated because of the charisma of visionary leaders. Another effective method is involving workers at all levels in setting goals, planning work, and solving problems. Workers know their inputs are seriously considered and when rejected, they are given reasons. Employees also know that when their ideas and inputs lead to the success of the company, they will be rewarded. Lastly, employees have a great need to see how they fit in an organization. The more they feel they are an integral part of the organization, the more they will be committed to their company.

There are three potential areas where worker commitment can be decreased. First, when an employee's job security is threatened, especially often, they will perceive a lack of commitment of the firm to the employee. Second, an employee's trust will significantly decrease when they have incompetent managers or have supervisors that show evidence of unethical behavior. Lastly, when employees sense that higher management is not acting on their promises and stated principles, workers will most likely respond in kind.

In today's dynamically ever-changing competitive environment, traditional supervision and standardization can not keep up with today's business environment. Faster response to customer needs and staying ahead of competitors require constant and rapid change. The answer for many firms is the use of teams.

A common team is the project team which usually has a team leader who has power or authority to determine required resources, but goals are normally assigned by higher management. A more advanced team would exercise greater control over decisions regarding team resources and goals.

Teams are valuable when input is needed from a cross section of departments within a firm or when interdependence is high between required tasks. In addition, companies may desire to have workers cross-trained. By using teams, others become knowledgeable of other department's work. Also, a team environment allows direct interaction within a group which can be the best way to coordinate work or work processes.

Another issue that impacts integration in an organization is leadership. Leadership style has a big affect on workers. Styles vary from high militaristic control to completely hands off or low control. Management style can affect and be affected by organizational design. Historically, firms have moved from a militaristic or dictating style to one with more employee involvement.

In addition to coordinating and controlling work in a formal environment, much is done through informal channels. This is why it is important to understand the intended

results of organizational design and the unintended actions of workers. If formal procedures appear appropriate, workers may not understand SOPs. If informal methods seem more appropriate, consider getting inputs from workers and develop formal procedures based on their inputs.

G. TECHNOLOGY

Why is technology a major consideration for organizational design? For many companies, technology is the reason they can exist. As far as the impact of information technology on organizational design, the area of technology becomes a major focal point. Technology determines the structure of companies, or at least it should. Technology also has an impact on people. Daft defines technology in the following way,

> Technology is the tools, techniques, and actions used to transform organizational inputs into outputs. (Daft, 1989, pp. 132)

Joan Woodward, the major authority on technology research, states technology is defined in the following way,

> The specific technology of the organization is, then, the collection of plant, machines, tools and recipes available at a given time for the execution of the production task and the rationale underlying their utilization. Thus the technology and the production task of a firm are interdependent, since neither can be defined without reference to the other. (Woodward, 1970, pp. 4)

The basic definition for technology is aptly stated by Daft--the tools used to transform inputs into outputs. In the industrial age, technology had a clear role. Machines

and hardware were the technology used to transform raw supplies into finished products. Daft, Woodward, and many others argue that the structure of the organization should follow and fit the technology of the company. One does not design and implement a structure for an organization and then determine what technology will be used. Rather, a carefully developed organization will consider the technology to be used and then develop a structure to facilitate the technology.

Technology also has a major impact on employees or users of the technology implemented in companies. William Pasmore defined this area as the theory of sociotechnical systems. Pasmore, and many others, believe that the technology employed in organizations will ultimately impact and affect individual behavior which in turn will impact the organization (Pasmore, 1988).

Two aspects of technology will be discussed--organization-level technology and department-level technology. Organizations can be viewed as having an overall technology to transform inputs into outputs. An example of organization-level technology is the transformation of crude oil into gasoline. With today's highly complex organizations, it is not uncommon for each department to have their own distinct technology. In essence, they are a mini-organization which has their own technology for transforming inputs into outputs.

According to Daft, there are two types of organization-level technology, manufacturing and service. Joan Woodward was an influential force in the study of technology in manufacturing. Her studies challenged the widely accepted principles of

management in the 1950s. During that time, mainstream management theory advocated the "one-size fits all" approach to organizational design. Her studies concluded that structures were necessarily different based on the technology of the organization. She suggested there were three basic technology groups: small-batch, large-batch, and continuos process production. Small-batch production firms tended to manufacture and assemble small orders for specific customers. This type of technology relies heavily on human labor and little on mechanical systems. An example would be a company that makes specialized construction equipment. Large-batch production is typically associated with assembly-line systems, such as the automobile industry. Lastly, continuous process production firms use mechanized systems for the entire process. Examples include chemical and nuclear plants. From these groups, Woodward concluded that technical complexity increased as a firm moved from unit production to continuous process. As technology increased, management requirements increased as well. Her research also suggested that span of control, standard operating procedures, and centralization were high in mass production technology and were just the opposite when work was standardized. Woodward concluded that " different technologies imposed different kinds of demands on individuals and organizations, and those demands had to be met through an appropriate structure." (Daft, 1989, pp. 134)

The second type of organization-level technology is service technology. Daft and many experts believe the United States is becoming a service-oriented economy. (Daft, 1989) Service firms are everywhere--overnight delivery firms, brokerage firms, and

consulting firms to name a few. The information age has only accelerated the number of service organizations. Law firms and health care are examples of service, whereas food processing plants and soft drink companies are examples of product firms. Fast food restaurants and banks are examples of firms which are both product and service based.

Service-based organizations have a distinct influence on a firm's structure and controls systems. The amount of employee contact is determined on whether the company is service or product based. The interaction between customer and client should determine the configuration of the organization. As expected, service firms such as health care, require close interaction and communication with both the doctor and the patient. Technical core personnel must deal with greater customer unpredictability than product or manufacturing firms.

Service organizations also have specific internal characteristics. In a service firm, the skills of the technical core must be significantly higher than manufacturing firms. Not only do service personnel require technical skills, they also require strong interpersonal skills to effectively communicate with customers or clients (Daft, 1989). Understanding the difference between service and product-based firms should lead to an appropriate structure. Once again, the structure should support the technology of the organization.

The same argument for organization-level technology can be applied to department-level technology. For the most part, departments can be viewed as smaller organizations. They too have technologies to transform inputs into outputs. In many cases, they receive inputs from other departments and use their department's technology

to transform outputs to be used as inputs for another department. Just as was the case for organization-level technology, once the technology is decided on, the appropriate structure can be implemented in the department.

Perrow suggests there are two dimensions that impact the structure of departments: variety and analyzability. Variety refers to the number of exceptions a worker may encounter during the conversion process. When a worker experiences a large number of unexpected situations, variety is said to be high. If the process has little deviations or problems and the process is highly standardized such as an assembly line, variety is low.

The second dimension is analyzability. When a conversion process is analyzable, the steps can be broken down and reduced to mechanical steps. Workers can follow clearly defined steps in order to complete the process. In this case, analyzability is high. On the other hand, if a process is highly complex and can not be reduced to specific steps, then analyzability is low. In this case, workers can not rely on specific rules or procedures to complete the conversion process. They must rely on their knowledge and experience to complete the process. (Daft, 1989)

Perrow created a framework that uses variety and analyzability to form four categories of technology: routine, craft, engineering, and nonroutine. Routine technologies have low task variety and are normally associated with technologies such as assembly-line companies. Routine technologies are normally formalized or standardized tasks.

Craft technologies are characterized by a stable stream of activities, but the transformation process is not analyzable. The tasks performed by employees are complex and require extensive training and experience. Examples include oil exploration which requires workers to use internal divining rods to determine where drilling will be accomplished.

Engineering technologies tend to be high variety and high analyzability. Tasks are highly complex and have significant variety. However, the process is somewhat methodical since they can rely on predetermined rules or formulas to complete the task. Engineering technologies are normally associated with engineers, accountants, and lawyers to name a few.

Nonroutine technologies have high variety and low analyzability. In this area, tasks are highly complex and can not be completed by following specific or prescribed rules. Highly experienced and trained individuals must rely on their education, experience, and intuition to solve and complete the process at hand. Research and strategic planning are examples of work that involves unexpected problems and are considered nonroutine technologies. (Daft, 1989)

Once the technology of the department is understood, the structure can be implemented. Daft suggests there are six key relationships between the technology and structure of an organization: organic versus mechanistic, formalization, decentralization, worker skill level, span of control, and communication and coordination.

The single most common theme is that routine technologies are associated with mechanistic structures, where as nonroutine technologies tend to have organic structures. Routine work normally has standard operating procedures or specific rules to follow and have centralized management. When firms are predominantly nonroutine, the structure tends to be organic and free flowing and management is usually decentralized.

Formalization is the next key relationship between technology and structure. Routine technology is characterized by standard operating procedures and rules. When tasks are nonroutine, the structure is less formal and has less standard rules to follow.

Decentralization is normally associated with nonroutine technology. Organizations that have routine technology tend to have centralized management. Law firms or hospitals have professionals that are given more control to make their own decisions because of the highly complex and nonroutine technology used to do their work. In a manufacturing environment, workers have specific tasks that are routine and can be centrally managed.

Worker skill level in routine technology tends to require workers with lower education and skill. On the other hand, organizations with nonroutine work require highly skilled and trained workers to complete a task. Nonroutine personnel normally have strong education backgrounds which allow them to cope and deal with the complexity of possible solutions for a given problem, typical of professional firms such as lawyers, doctors, and teachers.

Span of control is the next key relationship between technology and structure. Firms with nonroutine technology tend to have low span of control, where as routine

technology can have greater spans of control. Highly complex and nonroutine technology usually require more involvement of managers and supervisors. Because of the time needed to spend with workers, it is more appropriate to have manager's with smaller spans of control.

The last key relationship between technology and structure suggested by Daft is communication and coordination. In general, communication increases as task variety increases. When frequent problems arise, more information sharing is required. Nonroutine work normally requires more horizontal communication, where as routine work tends to require more vertical communication. Analyzability also affects communication. When analyzability is high, lower forms of communication are required such as memorandums and Email. Low analyzability usually requires more direct communication, such as face-to-face meetings or by phone (Daft, 1989).

Regardless on what relationships are established between technology and structures, the important aspect to realize is that technology does determine the structure of both organizations and departments. By understanding the technology used by an organization, appropriate structures can be developed to best fit the intended technology.

Having discussed the impact of technology on structure of organizations and departments, it is important to discuss the interdependence between departments. James Thompson stated that there are three types of interdependence: pooled, sequential, and reciprocal (Daft, 1989).

Pooled interdependence is the lowest form of interdependence between departments. This dependence is seen when departments work independent of each other, but provide outputs that are combined to produce a final and complete product. Fast food restaurants are an example of pooled interdependence. Each station works independent of the other. One unit makes french fries, another makes hamburgers, and another prepares the drinks. Finally, another worker collects the outputs and delivers the completed package to the customer.

Sequential interdependence tends to be associated with organizations that have serial processes. The outputs of one department become the inputs for another department. Sequential interdependence requires a high degree of coordination between departments. One department relies heavily on the input received from another to do its job effectively. Thompson stated that firms used "long-linked" technology to complete a sequential process. Long-linked technology is common for assembly line environments such as the automobile industry. The management requirement for sequential is greater than pooled, due to the close interaction between departments.

The last interdependence discussed by Thompson is reciprocal. Reciprocal interdependence is typically found in doctor patient relationships in hospitals. The patient provides input or information to the doctor, who in turn provides feedback to the patient in the form of advise or a prescription. The patient takes the prescription and the doctor notes the results and makes further recommendations to the patient. This back and forth exchange of information is typical for reciprocal interdependence between operations or in

this case two parties. Management requirements are greatest for reciprocal interdependence. The structure must allow for open and frequent communication. Constant interaction and adjustment is the norm in this environment (Daft, 1989).

Not only does technology impact technology, but also it impacts people. Pasmore and others support the concept of sociotechnical systems. Sociotechnical systems take into consideration the needs of the people and the needs of technical efficiency. Pasmore argues that it is equally important to consider the impact of implementing the technology with respect to people as it is to structure a unit based on its technology. A technical system which is implemented without considering the impact it may have on people may result in an overall ineffective system (Daft, 1989).

H. CULTURE

Every organization has some form of culture. The culture is found in military commands as much as it is found in major corporations. "Culture is the set of key values, guiding beliefs, and understandings that are shared by members of an organization." (Daft, 1989, pp. 503) Many would argue that top management can influence the culture in a company to support or reinforce a firm's strategy. Every organization has an unwritten set of rules and shared beliefs that give a company its own personality. The culture of a company can provide stability and a sense of identity with its employees. Culture can be seen in the accepted practices or rituals that may or may not be distinct from other firms. One example is the accepted dress code in a company. If one were to walk through different buildings of a corporation, they may find differences in dress. In

the research and development unit it might be typical to find casual dress to encourage freedom of expression and provide a sense of being comfortable. In the corporate office, the dress code would probably be more formal to promote a sense of excellence since there is probably more interaction with clients. Culture can also be seen on how people socialize in the company. Some companies may allow informal interaction inside the company. Apple has some areas that have ping pong tables to allow breaks whenever employees feel like they need to relax. Other companies may use more formal break policies.

Organizations can shape and change the culture of their company. More importantly, they can shape the culture such that it enhances the working environment of its employees (Daft, 1989).

I. SUMMARY

From an organizational design perspective, firms should follow a logical development process. First, the purpose or vision of the organization is defined. The vision of the company provides direction and a purpose for a company. Collins and Porras suggest a framework for developing corporate vision which includes a guiding philosophy. The guiding philosophy is based on a firm's core values and its purpose. Next, a company creates a tangible image. The tangible image is established by defining a firm's mission. Finally, a vivid description is stated which provides a means of defining when a firm has reached its goals.

The second element discussed was strategy. Once an organization defines its vision, purpose, and objectives, it needs to determine how to reach its goals and objectives. Strategy defines "how" an organization accomplishes its goals.

The third element discussed was differentiation. Once an organization determines what strategy to use to accomplish its goals, it must decide how work will be divided up or "differentiated." Many organizations are divided into functional departments, while others are organized by product divisions.

The fourth element discussed was management structure. At some point, management must decide on how many levels an organization will have. Traditionally, many firms have top, middle, and first-level management. Tall organizations have many levels and a flat organization has relatively fewer levels. Another consideration is span of control of managers. Broad span of control means a supervisor has many subordinates, whereas a small span of control involves supervising fewer workers. The span of control of supervisors usually determines the number of levels of management. Broader spans of control usually equate to flatter firms, whereas narrow spans of control usually result in a taller organization with many levels.

The fifth element discussed was centralization and decentralization. A centralized organization requires decision making in the highest levels. Centralized firms tend to have longer communication delays between levels resulting in longer time to make decisions. Decentralized firms allow decision making to occur at the lowest levels, thereby accelerating the process of decision making.

The sixth element discussed was integration. Once an organization has determined how it will divide the work within a firm, it must establish coordination and control mechanisms. Coordination ensures each unit or department works together to accomplish the overall goals of the organization.

The seventh element discussed was technology. Technology was defined as the tools used to transform inputs into outputs. In the industrial age, machines and hardware were the technology used to transform raw supplies into finished products. Today, in the information age, technology is used to transform raw data into usable information for making decisions.

The eighth and last element discussed was culture. Every organization has a culture. The culture can be seen in organizations in the form of rituals and traditions, which may or may not be unique to that firm. Management can use and change the culture of an organization to influence the behavior of workers to enhance the effectiveness of accomplishing company goals.

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