QUALITY MANAGEMENT FOR
IMPLEMENTATION OF INFORMATION SYSTEMS

M.Sc. Thesis by
Sedef UNCU
No:503981112

Date of submission: 11 June 2001

Date of defence examination: 29 June 2001

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JUNE 2001
ACKNOWLEDGEMENTS

I would like to thank Dr. Cevza Candan for all of her guidance, support and patience throughout this process. I would also like to thank my parents Serpil and Suat Uncu, my brother Başar Uncu and my grandmother Servet Arol who believe in me and encourage me to pursue this degree.

I also would like to thank Serhan Akı for his persuasion of me about starting this degree and for his support throughout the process. In addition, I would like to thank all of my friends for their belief in me, and for their support.

I dedicate this thesis to my beloved grandfather, Sıtkı Arol. Grandpa, I wish you were here.

11.06.2001

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ABSTRACT

Failure stories about information systems implementations have created suspicion about the benefits of the systems. However, success depends on a network of various factors when the failures are inspected. In this thesis, information systems project failures with a concentration on Turkish Textile and Apparel Companies have been analyzed and a model has been developed to overcome the failures. First, definition of information and information systems were made to clarify the topic that would be analyzed. Second, problems of Turkish textile and apparel industry and possible solutions to these problems by information systems were discussed. After this preliminary analysis, specific factors, which could cause project failures, were exposed and categorized according to the different levels in the organization. These different levels allow organizations to pursue appropriate strategies for project implementations according to their evolutionary stage at information systems. After failure analysis, a model with quality management approach has been developed based on the Malcolm Baldrige National Quality Award (MBNQA) to ensure successful implementations of information systems. The proposed model is based on critical issues such as leadership, strategic planning, customer and market focus, team development, project management, human resource management and performance measurement for different steps of implementation. Overall, this research offers an effective implementation guide for information systems to diminish the failure risk down to zero.
BİLİŞİM SİSTEMLERİ UYGULAMALARINDA KALİTE YÖNETİMİ

ÖZET

1 INTRODUCTION

The dynamics in the world is changing so rapidly that organizations have to modify their way of thinking to sustain their competitive advantage. The mode of this change is towards the way that brings flexibility to the organization. The organization, its processes and individuals in the organization constitute the scope of the change. Based on these levels, the direction is summarized in Table 1-1.

Table 1-1 Turbulence and Transition (Boar, 1997)

<table>
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<th>FROM</th>
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<td>Expediency</td>
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<td>Lip Service</td>
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<td>Centralized</td>
<td>Decentralized</td>
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<td>Task Orientation</td>
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<td>Hierarchy</td>
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<td>Episodic Learning</td>
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<td>National</td>
<td>Global</td>
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<td>Mass Production</td>
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<td>Long Cycle Times</td>
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The basic driving force for the change is globalization. Business can be conducted anywhere around the world.

To keep pace with ongoing change, companies have to act according to the new rules. There is a severe competition in the world market, and all firms are subject to the following issues while conducting their businesses (Mcleod and Schell, 2001):

- International Economic Influences
- Worldwide Competition
- Increasing Complexity of Technology
- Shrinking Time Frames
- Social Constraints

Economic characteristics of the countries influence the pattern of the firms’ doing business both locally or internationally. Currency changes, as one of the characteristics of the economy, have a significant effect on decision about where to conduct business. Buyers prefer the countries which currency has the greatest value. “When Mexico devalued its peso during the late 1980s, tourists decided to take their vacations there, rather than in places like Hawaii” (Mcleod and Schell, 2001).

As a significant issue, worldwide competition affects the trade pattern among countries. The flow of imports and exports are determined by current circumstances in the overall competition. “The decision by General Motors in the early 1990s to close many of its plants indicates that even industry giants are not insulated from the effects of competition, which can originate anywhere in the world” (Mcleod and Schell, 2001).

Continuous technologic improvement is another issue that firms should keep up with. Nowadays, one can encounter technology in everywhere-bar code scanners in supermarkets, computer-based airline reservation systems, automated teller machines, and closed-circuit television in parking garages. In manufacturing, the technologic applications appear as factory robots and automated merchandise storage-and-handling equipment. Although new technology is perceived as a
complicated issue by the organizations, advancements in the technology forces companies to use the recent technology available (Mcleod and Schell, 2001).

Due to the improvement in communications and technology, time frames for any specific processes has been shrunk. All phases of business operations are performed more rapidly than ever before. Sales representatives engage in telemarketing to contact their customers within seconds by telephone, sales orders are transmitted electronically from one computer to another, and manufacturers schedule raw material deliveries to arrive "just in time" (Mcleod and Schell, 2001).

Economic factors play an important role in business decisions. However, social costs and payoffs must be considered in decision making as well. Plant expansion, new products, new sales outlets, and similar actions must all be weighed in terms of their environmental impact (Mcleod and Schell, 2001).

Under the circumstances described above, companies should pursue strategic ways to survive and to gain a competitive advantage. Information possesses a critical role in this process. Indeed, every business is an Information Business today (Earl, 1999).

Information is captured, transmitted, stored, retrieved and manipulated by Information Systems. These systems enhance the capability of organization in handling the increasingly complex business activities and in creating an advantage (Alter, 1996). Business processes are increasingly information systems dependent and are being reengineered, partly by asking what can Information Technology allow us to do, which was not possible before, in terms of time compression, coordination, integration, automation and communication?

Information systems offer full control on the operations and besides, connectivity within the company and for outside relations of the company. This connectivity represents a natural response to the situations, which occur as a result of globalization. Besides, companies perform leaner and faster processes with the aid of Information Systems and can deal with constant change more easily (Davenport, 2000).

However, information systems bring big change to the organization both in the technical and organizational level. This change might turn out to be failure at the
end. Even, companies might not reach to the end of the project and cancel the implementation. Since the projects usually require a huge effort and a big sponsor to be implemented, those failures damage the company profoundly.

This research analyzes the root causes of the IS project failures with a concentration on Turkish Textile and Apparel Companies and offers a method to overcome the factors which lead failures at the end. A quality management approach has been developed to ensure successful implementations of information systems. To gain a better understanding of the scope of the work, a preliminary study is conducted in the following four chapters.
2 DEFINITION OF INFORMATION

Information is a tangible or intangible entity that reduces uncertainty about some state or event (Lucas, 1994). Information should be distinguished from data. Data are facts and figures that are not currently being used in a decision process, and they are usually historical records that are recorded and filed without concerning the action of decision-making. An example would be supporting documents, ledgers and so on that constitute the source material for profit-loss statement. Such material would only be of historical interest to an external auditor.

Understanding relations in data leads one to information. In other words, Information consists of data that have been retrieved, processed, or otherwise used for informative or inference purposes, arguments, or as a basis for forecasting or decision-making. An example would be any one of the supporting documents mentioned above, but in this case, the data could be used by an internal auditor, or by internal management for decision-making purposes such as profit planning and control (Shim, 2000).

Lucas, 1994, has characterized information according to the following:

- Time Frame: Historical vs. Predictive
- Expectation: Anticipated vs. Unanticipated
- Source: Largely Internal vs. Largely External
- Scope: Detailed vs. Summarized
- Frequency: Real Time vs. Periodic
- Organization: Highly structured vs. Loosely structured
- Precision: Highly precise vs. Not overly precise
Time frame for information can be historical or predictive. Historical Information can be used to design alternative solutions and to monitor performance. Information may be expected or it may be unanticipated. Information that confirms something also reduces uncertainty. Unanticipated information often alerts people to the existence of a problem; but this type of information is also important in developing and evaluating different alternatives. Information may come sources from internal to the organization or from external sources, such as government agencies. Information may be presented in summary form or in detail. Summary information is often sufficient for problem finding; however, detailed information may be needed as a second step to solve the problem. Information can be frequently updated or relatively old. It can also be loosely organized or highly structured. An example of highly structured information is a report with clear categories to classify all the information it contains. Loosely organized information might be a report composed of different forms of information from multiple sources. Information also varies in its accuracy (Lucas, 1994).

According to those characteristics, one has to decide which type of information is expected from Information Systems. Systems should be design to meet the expectations of the organization. Different types of information that can be captured with the aid of information systems are examined in the next chapter.
3 INFORMATION SYSTEMS

Information Systems capture, transmit, store, retrieve, and manipulate data to provide information for the organization. The high pace of improvement in the information systems field allows data to be captured from the processes and also from the external resources. New technologies are revealed out for the use of information systems in that sense.

3.1 Evolution of Information Systems

Evolution of computer technology and the demands of complex environment are the driving forces of the evolution of Information Systems. As the demands of the environment changes, new solutions are revealed with the aid of computer technology. The initial focus on data then turned into an emphasis on information and decision-making. Today, communication and consultation are receiving the most attention (Mcleod and Schell, 2001).

3.1.1 Focus on Data

During the first half of the twentieth century, computers were used for accounting applications. Information creation did not have high emphasis on those days. "The name given to these early computer-based accounting applications was electronic data processing (EDP). The term EDP is no longer popular, having been shortened to data processing (DP). We use the term accounting information system (AIS) to describe the system that processes the firm's data. The AIS produces some information as a byproduct of the accounting processes" (Mcleod and Schell, 2001).
3.1.2 Focus on Information

In 1964, a new generation of computing equipment was introduced that exerted a strong influence on the manner in which computers were employed. Silicon chip circuitry were used in the new computers, and they offered opportunities for more processing power per dollar. As the pace of improvements in the computer technology kept increasing, the computer manufacturers promoted a different concept of using the computer as a management information system, or MIS. It was the evidence of the shift in the emphasis from data to information. The primary purpose of MIS was to produce management information. The concept was quickly adopted by many of the larger firms. However, some organizations faced with failure in their MIS implementation. “There were several reasons for this failure: a general lack of computer literacy among users, a general lack of business literacy and an ignorance of the management role on the part of information specialists, computing equipment that was both expensive and limited by today's standards, and so on. However, one error in particular characterized the early systems. They were too ambitious. Some firms stuck it out, invested more resources, and eventually developed workable systems - although more modest in size than originally projected. Other firms decided to scrap the entire MIS idea and retreated to DP” (Mcleod and Schell, 2001).

3.1.3 Focus on Decision Support

Systems were producing information but as time passed this information that organizations gained with the aid of MIS was insufficient in solving problems. “Information scientists at the Massachusetts Institute of Technology (MIT) formulated a different approach. These scientists were Michael S. Scott Morton, G. Anthony Gorry, and Peter G. W. Keen, and their concept was named the decision support system (DSS).” A DSS is an information-producing system aimed at a particular problem that a manager must solve and at decisions that the manager must make (Mcleod and Schell, 2001).

Mcleod and Schell, 2001 says that the MIS is an organizational resource. The MIS is intended to provide problem-solving information to a group of managers in a
general way, whereas the DSS is intended to support a single manager in a specific way.

3.1.4 Focus on Communication

During the time that the DSS evolved, interest was also focused on another computer application-office automation (OA)-which facilitates communication and increases productivity among managers and office workers using electronic devices (Mcleod and Schell, 2001).

After the improvement of word processing by IBM, office automation grew to include a wide variety of such applications as video conferencing, voice mail, electronic mail, electronic calendaring, facsimile transmission, and desktop publishing.

3.1.5 Focus on Consultation

The attempt to use human logic in computers revealed out the application called Artificial Intelligence (AI). A special subclass of AI, expert systems' is receiving much attention in business. An expert system (ES) is one that functions as a specialist in an area. This subject will be discussed in detail in section 3.4.

3.2 Steps in Information Systems Development

Information systems development is evolved as organizations passed through specific steps with information systems tool. At the beginning of Information Systems concept, the emphasis was on the internal applications only, whereas it shifted through external environment as the dynamics of the market changed.

3.2.1 Internal efficiency

Initial application in most organizations (typically about 30 years ago for the 'early adopters') concentrated on developing systems for improving internal efficiency. Tasks that were already undertaken by clerks were computerized and staffing level decreased because of this application. Tasks such as invoicing, accounting and order
processing were developed to mimic the manual activities replaced. In essence, efficiency meant doing business with a decreased number of employees in those days (Mcleod and Schell, 2001).

3.2.2 Internal effectiveness

As time passed, attention turned towards using the vast quantities of information stored in the computer for the purpose of management information. This type of information related to the internal workings of the organization, and thus the phrase 'management information systems' had been originated. The invention of microcomputers solved the problem of inflexibility in the current systems.

However, another problem revealed. Sharing data between departments slowed the development of the system and hence each department tended to develop systems independently - yet using similar data. Additionally, some of the issues solved by the data processing professionals in the first stage tended to surface again, for example documentation of personally developed systems can be a little inadequate. Even considering these problems many hundreds of systems were developed by some organizations (Mcleod and Schell, 2001).

3.2.3 Internal integration

Many hundreds of systems developed in the internal effectiveness stage brought inflexibility and job duplication to the system since the same data was entered several times to the system from different departments. This stage involved sharing of data by different functions of the organization.

Generally, organizations are beginning to realize that in some instances value is to be gained from integrating the information available to the business rather than fragmenting it into functional subsystems. Interestingly such systems can cause the business to change its form of organization: departments can amalgamate and responsibilities can be reallocated in line with information movement (Mcleod and Schell, 2001).
3.2.4 External efficiency

As the boundaries of the business are widening, organizations have realized that it is slow and inefficient to print out an order on paper and to post it to the supplier, just so that they can retype it into their computer. Networks are formed to overcome these inefficiencies by connecting the computers owned by different organizations. Orders, invoices, product specifications and many other documents are being transferred electronically. Efficiency is the main concern in this stage as in the first stage. However, it has an external and not internal focus. The term *electronic data interchange (EDI)* is used to describe such systems (Mcleod and Schell, 2001).

3.2.5 External effectiveness

At this stage, the emphasis has shifted towards creating an external effectiveness. Electronic information interchange among the parties involved in business is realized to share the information. This is not just moving the electronic equivalent of paper between suppliers and customers, but the true sharing of information between different parties to the mutual advantage of all (Mcleod and Schell, 2001).

3.2.6 External integration

Sharing information can lead to a change in the form of who does what in an industry. As in Internal integration stage, when it was said the internal form of the organization could be changed by information systems, so in this stage the form of the industry can be altered (Mcleod and Schell, 2001). For example:

- Customers can take on tasks traditionally undertaken by suppliers - such as raising the invoice on themselves; and

- Suppliers can take on tasks traditionally carried out by their customers - such as raising purchase orders on behalf of the customer.
3.3 Characterization of Information Systems

Information flow within the organization and with the external systems can be performed in two ways. Preparing the paper work and transferring it manually, without using the computer technology is one way of creating information. On the other hand, one can use the computer technology, the main breakthrough, to create information. Considering these two folds of the information systems, classifications can also be varied. Edwards et al. 1995, classified systems as follows considering both sides of the application

- By the degree of formality;
- By the degree or extent of automation applied to them;
- By their relation to decision making;
- By the nature of input and output;
- By the source and degree of tailoring;
- By the value to the organization.

3.3.1 Informal and formal systems

The first classification is based on the difference between informal and formal information systems. The formalization of the informal is a resource to create information for the organization. Going out for dinner with organization members is an example for this attempt. Although, information systems uses formal information only, sight must never be lost of the existence of the informal and the superb way in which it can operate (Edwards et al, 1995).

Associated with the formal/informal classification is the notion of routine and non-routine information. Routine implies that the information is produced to some timetable, for example the periodic international sales report. Non-routine information is produced as it is required and may not ever be produced again. Routine/formal activity is ripe for automation, whereas the non-routine/informal activity is nearly impossible to plan and hence generic systems like electronic mail
are the limit of the activity. Interestingly routine/formal information is usually associated with junior and middle management whereas non-routine/informal is associated with senior management (Edwards et al, 1995).

3.3.2 Automation

A second important classification is based on the automation of the process. There exist manual systems (for example the hand written comments on public relations' letter) and computer-based systems (for example the electronic mail system) in the course of work. The boundary between the two is less clear as more software is used in what were once entirely manual or electro-mechanical systems.

3.3.3 Relationship with decision making

Required Information for different levels in decision-making differs.

Figure 3-1 illustrates the process by dividing the decisions by management into three types.

![Figure 3-1 Mapping by Decision Making](image)
3.3.3.1 Strategic Decisions

Strategic Decisions are complex and unstructured decisions due to the uncertainty in the environment. Senior management has the authority to give those kinds of decisions. "Information for such decisions is often ill defined, required on a non-recurrent basis, originates from sources external to the organization, gathered in an informal way, and highly summarized" (Edwards et al, 1995). Executive Information Systems (EIS) are the systems to supply such information to senior management.

3.3.3.2 Management control decisions

Middle managers give the management control decisions. These often result from comparing some information to a standard budget and any difference forces the consideration of alternative courses of action. Information for such decisions is often internally focused, short term, historical, relatively easily predefined, and required on a routine basis (Edwards et al, 1995).

3.3.3.3 Operational decisions

The third type of decisions is operational decisions. For these decisions, the rules for taking the decision are well understood, to the extent that they can be programmed with computer system. Information for such decisions is well understood, internally focused, pre-definable and precise. "Given that such decisions are made frequently (possibly many thousands of times per day within an organization), it would appear sensible to consider the use of a computer" (Edwards et al, 1995).

On the other hand, there exists a need to generate and manage the operating data of the business: for example, accounting data, payroll data, order processing and invoicing data. These data are not required for decision-making but must exist for the business to continue operating. Such data can be predefined, tend not to change very much through time and need to be very precise. The automatic production of invoices would be an example of such data.
Data at this level are not produced for management purposes but will comprise the basis of management information when analyzed at a later point in time (Edwards et al, 1995).

3.3.4 Input and output

A fourth important classification of the systems is that all of the systems have an input element, a process element and an output element—the process element may have some aspect of storage contained within it. The value to its user of any particular system will arise from one or a number of these elements being automated or otherwise supported by an automated system. The degree of complexity of these elements generates the difference in information systems (Edwards et al, 1995).

3.3.5 Source and degree of tailoring

A fifth classification of information systems could consist of the source and degree of tailoring of the system. Some systems are produced especially for a single organization (Edwards et al, 1995). However, customization may be necessary for some systems to meet the organizational needs.

3.3.6 Value to the organization

The sixth and final classification of information systems is based on the value generation of the systems for the organization. The evolution of Information Systems shows how thinking has migrated from systems providing purely internal (and relatively limited) benefits to much more ambitious systems which stretch beyond the boundaries of one organization, and may involve whole industries (Edwards et al, 1995). Value generation has increased throughout the evolution of information systems.
3.4 Classification of Information Systems

Information Systems differs according to functionality of the system in the organization. The following classification is based on the value addition of the information systems to related functions/departments of the organization.

3.4.1 Accounting Information Systems

A company's data processing tasks are performed by Accounting Information Systems (AIS) that gathers data describing the firm's activities, transforms the data into information, and makes the information available to users (Schell, 2001). There are several software applications for the use of the accountants. Accounting information systems includes the following systems:

- Accounting Software
- Write-up Software
- Tax Preparation Software
- Audit Software
- Spreadsheets
- Activity-Based Costing Software

3.4.1.1 Accounting Software

Accounting software automates the routine chore of entering and posting accounting transactions. This information is organized in an electronic format so as to produce financial statements and can be accessed immediately to assist in the management of the firm (Shim, 2000).

An accounting software package encompasses a series of highly integrated modules. Each module corresponds to a specific accounting function (e.g., payroll, accounts receivable, and accounts payable). In an integrated system, after the details of the transaction are entered in one of the modules, the chart of accounts from the general ledger is "read." The transaction is then automatically posted to the accounts in the general ledger (Shim, 2000).
General ledger, accounts receivable and invoicing accounts payable and purchase order processing, inventory, payroll, job costing, and fixed assets are the basic features that are integrated in an accounting software package (Shim, 2000).

3.4.1.2 Write-Up Software

Nowadays, the easy-to-use and inexpensive accounting software took the place of Certified Public Accountants (CPAs) in keeping companies' books. CPA firms can counter this trend with dedicated write-up software that is easy-to-use and provides more features so as to add value to their write-up services.

Write-up software should allow you to do more than just record transactions. One of the biggest features of this software to look for is the ability to easily create an array of printouts and reports that a client might need. This process includes being able to link and transfer data from other software packages and applications (Shim, 2000).

3.4.1.3 Tax Preparation Software

Tax preparation software package lets the user prepare a return quickly and accurately, and it allows the user to quickly analyze different tax planning strategies. Some software packages have built-in tools for tax research and allow for the electronic filing of tax returns. This software also lets the user easily do "what-if" planning and then quickly makes all the necessary changes. Furthermore, data can be imported directly from accounting packages or electronic spreadsheets into tax preparation software (Shim, 2000).

3.4.1.4 Audit Software

Accountants use audit software to perform audits efficiently and effectively. Software audit tools include automated work papers, data extraction software, and trial balance software (Shim, 2000).

3.4.1.5 Spreadsheet

An electronic spreadsheet allows the user to work with data in a huge number of rows and columns. The user works with this data in a columnar spreadsheet, a format
familiar to accountants. A big advantage of spreadsheets is that it eliminates the need to perform the manual calculations and can perform powerful computer-aided operations (Shim, 2000).

3.4.1.6 Activity-based Costing Software

In activity-based costing (ABC) system costs are accumulated based on production or service activities at a firm. Basically, the system assigns costs by activity and links them to specific products. The resulting cost data would be much more realistic and precise as compared to the data obtained from a traditional costing system. With the aid of the computer software designed for ABC, the management accountant can more easily and accurately accumulate cost information and perform "what-if" testing. With this data, management is in a better position to evaluate and make decisions regarding its operations and products (Shim, 2000).

3.4.2 Financial Management Information Systems

Finance department is in charge of cash flow and profitability. This responsibility makes the department an important functional area for virtually all types of organizations. Well conceived financial information systems are capable of providing financial managers with timely information, which is vital to success in today's competitive global economy.

Financial Management Information Systems (FMIS) assist the financial manager in performing required responsibilities, which include the following (Shim, 2000):

- Financial analysis and planning-analyzing historical and current financial activity and determining the proper amount of funds to employ in the firm; that is, designating the size of the firm and its rate of growth.

- Investment decisions- allocating funds to specific assets (things owned). The financial manager makes decisions regarding the mix and type of assets acquired as well as modification or replacement of assets.
• Financing and capital structure decisions—projecting future financial needs and raising funds on favorable terms; that is, determining the nature of the company's liabilities.

• Management of financial resources—monitoring and controlling the use of funds over time and managing cash, receivables, and inventory to accomplish higher returns without undue risk.

Table 3-1 shows the inputs, function-specific subsystems, and outputs of a financial MIS.

Table 3-1 Overview of a Financial MIS (Shim, 2000)

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Subsystems</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic goals</td>
<td>Financial forecasting</td>
<td>Financial forecasts</td>
</tr>
<tr>
<td>Transaction processing</td>
<td>Financial data from departments (profit/loss and costing)</td>
<td>Funds management</td>
</tr>
<tr>
<td>Internal Accounting</td>
<td></td>
<td>Financial budget planning and control</td>
</tr>
<tr>
<td>External sources</td>
<td>Financial Intelligence</td>
<td></td>
</tr>
</tbody>
</table>

3.4.3 Manufacturing Information Systems and Packages

Manufacturing information systems improve the quality and speed of the processes and the efficiency of a manufacturing system. Thus, the quality of products will be raised and the manufacturing costs will be lowered as a result. In other words, a manufacturing system is a system that takes material, equipment, data, management, and information systems technology as the input and uses manufacturing and information process to generate better final products as output (Shim, 2000).

Manufacturing consists of many different disciplinary areas including product engineering, facility design and scheduling, fabrication, and quality control.
management. In each area, information systems can create a significant difference in the course of work. These areas are examined in detail below.

3.4.3.1 Product Engineering

Product design and engineering are becoming more computerized through computer software packages such as computer aided design (CAD) and computer-aided manufacturing (CAM). With CAD, product designers use technologies to design a prototype of the product, test the product, and modify the design on the computer before the product goes into production. The initial design can be input to the CAD system in various ways, including drawing sketches on a digital tablet, using a digital camera, or even using a scanner to digitize photographs or pictures into the system. After the product is digitized, the design can then be simulated and tested under real-world conditions predefined by the designer. As changes are suggested, the original design can be modified similar to editing a letter on a word processor. In addition, Artificial Intelligence (AI) has also been used in CAD system. Artificial intelligence agents can help human designers make changes, offer suggestions, or perform tests based on different circumstances (Shim, 2000).

Designing step is critical for the total cost of the product, since assembly often accounts for over half of the total manufacturing costs. “For example, by reducing the number of components by 30%, a manufacturer can drastically cut manual assembly times and manufacturing costs” (Shim, 2000).

3.4.3.2 Facility Design and Scheduling

After the designing stage, the facility or equipment for the production of designed article should be arranged. This decision may be as simple as changing several tools or as complex as redesigning the entire plant. Some computer software packages can also arrange the plant layout based on the production information of the designed product (Shim, 2000).

3.4.3.3 Fabrication

Fabrication, or manufacturing, is the process of making new products from raw materials. There are different types of production methods. Various computer
software packages are on the scene for these different types. For example, mathematical programming or artificial intelligence are used in the software packages to generate a job shop schedule, or, expert systems with the rule base retrieved from many manufacturing experts are utilized as the basis of software packages for the layout of the assembly line and the flow rate determination (Shim, 2000).

3.4.3.4 Quality Control

Quality control provides the confidence that the final product is of satisfactory quality. The quality control function is concerned with detecting existing quality deficiencies and preventing future problems. If the quantity produced is small and the final product is expensive, all products are inspected for quality control. However, if the units produced is in a large quantity and inexpensive a statistical sample will be used to deter if the quality of a particular lot of products is acceptable (Shim, 2000). Information systems at this stage helps one to determine the tolerance level for quality control. The most important role of IS is to allow the user to do an analysis with the historical data stored. Future strategies could be designated based on these analyses.

3.4.3.5 Manufacturing Intelligence

Expert systems are used in manufacturing to create manufacturing intelligence. These systems use a rule base approach to generate decision suggestions. Users can input facts and preconditions so that the rules will be triggered to provide results.

Expert systems have been applied in many aspects of manufacturing. In organizations, emphasis has shifted to knowledge intensive operations (such as planning, design, and quality assurance) from labor-intensive operations (such as machining, assembly, and handling). “As the matter of fact, knowledge based operations accounts for about two-thirds of total manufacturing cost” (Shim, 2000).

Robotics, expert systems, and other information systems can improve the productivity of labor-intensive operations.
3.4.3.6 Production Planning and Control

Planning encompasses defining the organization's objectives or goals and establishing an overall strategy for achieving these goals.

Production scheduling is designed inline with the organization’s goals. For example, if the organization pursues a ‘Quick Response’ strategy, production planning and control is accomplished to meet the expectations of this strategy.

Computer software packages for master production scheduling are an integral part of a large manufacturing information system-cost analysis, inventory information, and scheduling. Many computer programs also perform "what-if" (or sensitivity) analysis, which allows a production planner to determine how the production schedule would change with different assumptions concerning demand forecasts or cost figures (Shim, 2000).

On the other hand, production planning consists of four key decisions- capacity, location, process, and layout.

Capacity planning deals with determining the proper size of your plant to satisfy the demand of the market. Capacity planning begins with making a forecast of sale demand and converting it into capacity requirements. This model can be easily entered into a spreadsheet to generate results (Shim, 2000).

The location of the facility depends on which variables have the greatest impact on total production and distribution costs. The number of possible layout designs could be evaluated with the aid of computer software packages (Shim, 2000).

In process planning, management determines how a product or service will be produced. Process planning encompasses evaluating the available production methods and selecting the set that will best achieve the operating objectives.

Layout planning deals with the access of and selection among alternative layout options for equipment and workstations. The objective of layout planning is to find the physical arrangement that will best facilitate production efficiency. Several computer software packages are available for developing and analyzing process layouts (Shim, 2000).
Production Control consists of three steps (Shim, 2000);

- Measuring actual performance
- Comparing actual performance against a standard
- Taking managerial action to correct deviations or inadequate standards

In determining the performance of the process, information systems are very effective since various factors can be analyzed with the aid of computers to reach an accurate result. After determining the performance, the system can run an analysis to reach the result according to the pre-set tolerances for managers. System behaves as a decision support system at this level.

3.4.3.7 Inventory Planning and Control

A manufacturing company has three types of inventory.

- Raw material
- Work in process
- Final products

To reach the goals of inventory control, two objects must be achieved: (1) to minimize costs due to out-of-stock situations and (2) to minimize inventory-carrying costs. Computers are very effective at meeting these expectations. Inventory planning, control, and management are done routinely by computers. These processes are performed based on MRP and MRP II requirements.

MRP refers to Material Requirement Planning. This planning standard differs from its expanded version, Manufacturing Resources Planning II (MRP II). MRP II is designed to satisfy the requirements of supplying materials to shop operations. In MRP II, the MIS is used to sequence materials inputs in accordance with chronological need. The evolution of MRP II from MRP is the logical outgrowth of the maturing of the use of computer application in manufacturing (Shim, 2000).
3.4.4 Marketing Management Information Systems

Marketing information systems generates two basic types of information: information generated from processing of sales orders and cost report and analyses. The internal accounting information system is the primary source of marketing information in most business organizations. Profitability analysis is generated from sales data records along with product cost data. Analysis of sales trends also generated from the sales data. In addition to the accounting and marketing departments, other departments within the company may contribute to the flow of information to marketing personnel. For example, the production or engineering department may provide information relating to product quality or design, which is useful to product planning or to salesmen. The economics department may provide useful analysis of the economy or of the particular field within which the firm operates (Shim, 2000).

<table>
<thead>
<tr>
<th>Main Information Needs</th>
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</thead>
<tbody>
<tr>
<td>1. Improving new product development</td>
</tr>
<tr>
<td>2. Improving the use of market information</td>
</tr>
<tr>
<td>3. Measuring and managing brand equity</td>
</tr>
<tr>
<td>4. Market orientation and bottom line</td>
</tr>
<tr>
<td>5. Market segmentation and implementation</td>
</tr>
<tr>
<td>6. Identifying, anticipating, and responding to</td>
</tr>
<tr>
<td>7. Studying buyer behavior</td>
</tr>
<tr>
<td>8. Strategic new product issues</td>
</tr>
<tr>
<td>9. Integrating marketing mix</td>
</tr>
<tr>
<td>10. Service quality/performance links</td>
</tr>
</tbody>
</table>

The information needs for marketers are listed in Table 3-2.

Table 3-2 Information Needs for Marketing Managers (Shim, 2000)

A marketing information system supports managerial activity in the areas of product development, marketing mix, distribution, pricing decisions, promotional effectiveness, and sales forecasting. An information system is made up of three sets of activities: information collection, information analysis, and information dissemination. A marketing information system is certainly no exception. Table 3-3 shows the inputs, subsystems and outputs of a typical Marketing information system.
<table>
<thead>
<tr>
<th>Inputs</th>
<th>Subsystems</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic Planning</td>
<td>Product Development</td>
<td>Product Development Reports</td>
</tr>
<tr>
<td>Transaction Processing</td>
<td>Marketing Research</td>
<td>Marketing Research Reports</td>
</tr>
<tr>
<td>System</td>
<td>Internal Sources</td>
<td>Promotion and Location Analysis</td>
</tr>
<tr>
<td></td>
<td>Advertising Systems</td>
<td></td>
</tr>
<tr>
<td>External Sources Competition</td>
<td>Pricing System</td>
<td>Supply and Demand Analysis</td>
</tr>
<tr>
<td></td>
<td>The market</td>
<td>Place Planning System</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sales Analysis</td>
</tr>
</tbody>
</table>

### 3.4.5 Decision Support Systems (DSS) & Executive Information Systems (EIS)

Information systems are distinguished by the type of decisions they support, the operator who uses the system, the management control level of the system, the function of the system, and the attributes of the system (Shim, 2000). Information systems can support structured decisions, unstructured decisions and anything in between. The characteristics of Decision Support systems are stated in Table 3-4. At the strategic level of management, decisions are unstructured, and decision styles may differ significantly among managers. Thus, information systems developed for
this level often are decision specific. Once the decision is made, the information system used for it is no longer applicable in its current form. For subsequent decisions, the system must be modified or discarded, a development that has major implications for the design of information systems. Whereas executive information systems and decision support systems aid in decisions that are unstructured, transaction processing systems and expert systems aid in decisions that are structured (Shim, 2000).

Table 3-4 Characteristics of Decision Support Systems (DSS), (Shim, 2000)

<table>
<thead>
<tr>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graphical</td>
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<tr>
<td>Large database</td>
</tr>
<tr>
<td>Integrate many sources of data</td>
</tr>
<tr>
<td>Report and presentation flexibility</td>
</tr>
<tr>
<td>Geared toward individual decision-making styles Modular format</td>
</tr>
<tr>
<td>Optimization and heuristic approach &quot;What-if&quot; and simulation</td>
</tr>
<tr>
<td>Goal-seeking and impact analysis</td>
</tr>
<tr>
<td>Perform statistical and analytical analysis</td>
</tr>
</tbody>
</table>

Transaction processing systems (TPSs) are used at the operational level of an organization, such as by clerks or secretaries. Executive information systems (EISs) are used specifically by personnel at the senior management level, such as vice presidents or presidents of an organization. Decision support systems (DSSs) are used by middle management, such as managers of the accounting department. Expert systems (ESs) are used by personnel at all levels of an organization (Shim, 2000).

Another factor in distinguishing information systems is the function of the systems. Transaction processing systems were established to computerize manual systems.
Executive information systems (EISs) were designed to aid senior managers in decision-making. Decision support systems were designed to aid middle managers in decision-making. Expert systems (ESs) were designed to aid all personnel in decision-making (Shim, 2000).

The attribute of the system is the final distinguishing factor of information systems. Transaction processing systems are used to handle day-to-day transactions, such as the accounts payable system of an organization. Executive information systems attributes include visual summaries of forecasts and budgets of an organization. Decision support system attributes include visual displays of the sales, income, or interest estimates for the day, month, or year (Shim, 2000).

3.4.6 Artificial Intelligence and Expert Systems

Artificial intelligence (AI) is the application of human logic to machines. Artificial intelligence systems use sophisticated computer hardware and software to simulate the functions of the human mind. Expert systems (ESs) are the most promising applications of artificial intelligence and have received the most attention. Expert systems are computer programs exhibiting behavior characteristics of experts. Expert systems involve the creation of computer software that emulates the way people solve problems. Like a human expert, an expert system gives advice by drawing on its own store of knowledge and by requesting information specific to the problem at hand. Expert systems are not exactly the same thing as decision support systems (Shim, 2000).

A DSS is computer-based software that assists decision makers by providing data and models. It performs primarily semi-structured tasks, whereas an expert system is more appropriate for unstructured tasks. A decision support system can be interactive, just like an expert system. However, because of the way decision support systems process information, they typically cannot be used for unstructured decisions that involve non-quantitative data.
3.4.7 Enterprise Resource Planning (ERP) Systems

An enterprise resource planning system (ERP) enables management of all the firm's resources on an organization wide basis. It is an extension of the term *manufacturing resource planning* that originated in the manufacturing area. Popularity of the ERP then can be credited to a large degree to the vendors of application software for enterprise information systems (Schell, 2001).

Enterprise Resource Planning (ERP) is a set of applications that manage six primary business functions (Callaway, 2000).

- Accounting and controlling
- Human Resource Management
- Production and Materials Management
- Project Management
- Quality Management and plant maintenance
- Sales and distribution

The word *enterprise* is used because these systems encompass the entire set of processes performed by the organization (Mcleord and Schell, 2001).

ERP packages can include as many as 12 different modules encompassing 40 or 50 applications. Some of them are stated below (Callaway, 2000).

- Benefits Administration: Managing flexible benefit plans, executive benefits, pension plans, and stock options
- Employee Development: Tracking employee development, reviewing recruits, managing recruitment and training, planning salary and succession, and complying with regulations.
- Environmental health and safety management: Product safety and regulatory compliance

- Financial accounting: General ledger, accounts receivable and payable, fixed asset accounting and management, legal consolidation software and travel expenses reporting

- Investment Management: Corporate wide budgeting and depreciation forecasting

- Materials Management: Materials purchasing, bill of materials (BOM), inventory management and controlling, supplier scheduling, warehouse management, and invoicing

- Payroll: Payroll management

- Plant Maintenance: Maintenance planning, maintenance resource planning, and maintenance cost accounting

- Product Data Management: Master data and documents management, engineering change management, bill of materials management and project management.

- Production Planning and Control: Sales and operations planning, material resource planning, demand management, production control, work in progress management and capacity planning

- Project Management: Project management based on work breakdown structures, project planning, scheduling and tracking, cost collection and calculation, capitalization of project costs and assets.

- Quality Management: Quality planning, quality inspections, quality control and quality notification and certificates

- Sales and Distribution: Sales order management, sales order entry, product configuration, billing and invoicing, sales force management, shipping management, and sales analysis
• Service Management: Service contract management, call management, service billing and invoicing, managing customer service and call centers, maintenance, repair and overhaul management

• Time Management: Managing time and leave information, and time and absence analysis

• Treasury: Cash management, treasury management, deal management, funds management, risk management, bank relationships management, bank statement processing

Not all of the ERP software packages have the same modules. Modules can also differ in their names but their functions can be the same.

Current Enterprise Information Systems accumulate all accounting transaction data from manufacturing, sales, purchasing, human resources, and various other business functions. The data corresponds to the resources of the organization, and planning cannot occur unless there is an understanding of how each sale, each unit produced, and other discrete actions affect the whole organization. Figure 3-2 shows how the Enterprise Information Systems provide the foundation upon which such business area systems as marketing information systems, manufacturing information systems, and so on are built (Mcleod and Schell, 2001).
3.4.8 Supply Chain Management (SCM) Systems

Supply Chain Management (SCM) has become one of the most debated computer technology topics of the late 1990s. ERP software vendors include themselves among the software providers critical to successful SCM (Callaway, 2000). Supply Chain Management software has the modules that support the operation and flow of information in the supply chain. Most SCM products fall into one of three categories: planning, optimization, and execution (Callaway, 2000).

According to the authors of *Supply Chain Management Tools: Minimizing the Risks, Maximizing the Benefits*, Ann Burns, Jay Mabe, Linda Nuthall, Bruce Richmond, and Rick Toole, effective SCM depends on fast, accurate business processes and the reliable capture and retrieval of information—functions that are all conducted by ERP systems. The authors believe that both SCM and ERP software vendors must manage gaps in functionality by providing decision support, demand planning, and warehouse management. As a result, the lines between ERP systems and traditional
SCM become increasingly ambiguous. Changing relationship between ERP and SCM is stated in Figure 3-3.

![Diagram showing the relationship between SCM and ERP](image)

Figure 3-3 Relationship between SCM and ERP (Callaway, 2000)

### 3.4.9 Customer Relationship Management (CRM) Systems

Customer Relationship Management (CRM) addresses managing relationships—specifically, any interaction that occurs between a company and its customers or business partners (Callaway, 2000).

CRM encompasses all events from the first point of contact with a customer or partner. CRM comprises functions and products. Any application that manages interactions with a person outside the company can be construed as CRM software. As a result, CRM products are often referred to as *front-office applications*. ERP systems are generally referred to as *back-office systems* because they automate basic, internal business functions such as accounting, payroll, and inventory management (Callaway, 2000).

A typical CRM application performs these functions:

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• **Customer lead generation.** Identifies new customers or clients and manages the pipeline of prospects.

• **Marketing.** Develops and manages marketing encyclopedias that contain information about products and pricing, competitors, decision issues, objection-handling tools, and complete sales tools, including brochures, data sheets, presentations, and videos. Analyzes customer data. Creates, executes, and manages multimedia and multi channel product marketing campaigns targeted at certain customer segments-

• **Sales and product configuration.** Creates and manages customer profiles and accounts. Generates quotes, customized proposals, and sales presentations. Accesses marketing encyclopedias. Configures products to meet customer specifications. Supports geographically dispersed sales teams and telemarketing.

• **Order entry and status tracking.** Accepts and processes customer orders and provides customers with access to order information.

• **Invoicing, bill payment, and bill status tracking.** Generates invoices and manages the payment cycle. Provides the customer with payment history and current bill status.

• **Shipping schedule and status tracking.** Generates a plan for shipping products or issuing service. Gives the customer information about the status of an order or request.

• **Contract and warranty management.** Sells contracts and warranties in conjunction with product sales. Manages the life cycle of a contract or warranty and renews agreements based on elapsed time or events, including replacement of an existing part and purchase of a new product.

• **In-house service.** Manages service requests and profiles service needs. Applies multiple methods of resolving problems, such as providing information about related cases. Diagnoses problems through question- and-answer sessions and decision trees. Consults databases of technical
documents, product specifications, operating procedures, and previously used solutions. Intelligently routes customer calls to the appropriate CSR based on the customer's profile, request, and service level agreements (SLAB). Cross-sells {sells the customer a related product} and up-sells {sells the customer a higher-level product based on the service request).

- **Field service management.** Manages preventative maintenance schedules, return materials authorizations, break/repair service events, and advanced parts exchange. Manages the service providers' tools, skills, and parts to complete a field service call. Manages service requests, accounts, parts usage, inventory, and the dispatch of field service workers. Manages databases of information about problems and problem resolution.

- **Call center management.** Gives customer service agents, universal access to customer profiles, account status, payment history, service records, outstanding quotes, and SLAB. Provides automated scripts to guide agents through calls. Integrates with telephony units such as interactive voice response (IVR) systems, dialed number identification services (DNIS), and automated number identification (ANI).

- **Self-service.** Gives customers and partners access to any front-office application via the Internet. Enables activities such as self-service applications to place orders, obtain post-sales support, place requests for field service, pay bills, and track the status of orders.

These different types of CRM applications offer typical enterprise software benefits. They automate and help streamline internal processes. A combination of all parts as a whole theoretically offer companies a complete view of their interactions with customers or partners, regardless of how they interact with each other.
4 TURKISH TEXTILE AND APPAREL INDUSTRY PROBLEMS

Turkish Textile and Apparel industry is the driving industry of Turkish Economy. The industry has a 37.1% share in the total exports of Turkey, in 2000. Apparel industry has a 23.8% share with $6,533 million exports, whereas textile industry owns a 13.3% with $3,672 million export.

However, increasing competition in Textile and Apparel Industry all over the world increases the complexity in the global environment. Dynamics in markets are changing so rapidly. Turkey virtually lost its labor cost advantage. This advantage still exists over developed countries but developing countries like Asia are more competitive than Turkey when labor cost is concerned. There still exist strategic advantages of Turkey over its competitors such as the geographic closeness of Turkey to Western Economies. However, nowadays, the effects of these strategic advantages couldn't create a significant competitive value addition to the business. Companies should create their own competitive advantages to survive in this global village.

Supply chain of the textile and apparel industry is illustrated in Error! Reference source not found. and . These figures are exported from the DAMA Textile Industry Supply Chain Business Model.

Turkish Textile and Apparel Industry faces different problems at various levels of its supply chain. Most of the time, problems affect the whole workflow. These problems are classified and are discussed below (Manenti, 1998).
Figure 4-1 Textile Supply Chain (Dama, 1998)
Figure 4-2 Apparel Industry Supply Chain (Dama, 1998)
4.1 Sales and Marketing

Pricing is the most important problem for sales and marketing department. Sales price of a product depends on the basic cost of the goods and manufacturing costs. However, distribution costs, sales expenses to promote (if any) and profit are other factors that one should concern in pricing. On the other hand, external factors such as exchange rates in foreign countries, financial difficulties in collecting the credit and many other factors contribute to pricing (Manenti, 1998). To keep track of every component and to determine components’ weighted averages on the overall price are the big challenges for the company. This problem is delicate since the result of pricing determines the overall income of the company.

One of the affects of pricing problem to the organization is the late response to the customer. After customer calls for an order, there exists a period to prepare the offer. The shorter the period for the preparation, the better will be the customer satisfaction. The quality of communication among production, planning and marketing influences the art of response to the customer. Since there can emerge other orders than ongoing orders like emergency orders and returned orders, a careful and fast determination of data about the ongoing situation is essential. The quality of this determination is always a problem for textile and apparel industry.

Companies want to increase their market share via finding new customers. As boundaries begin to blur between countries, accessible customer database keeps growing. To keep up with that pace and to find new customers are also other problems for textile and apparel companies.

Since family-owned, small and medium size enterprises (SMEs) are dominant in the Turkish textile and apparel companies, top management, in other words, family members give the decisions most of the time. An important decision is the customer selection and relationships. Meetings with customers are held by these managers without having exact information about the available capacity of the factory. At that level, sometimes it is not important to consider the current capacity for the sake of not losing an important customer. Consequently, orders, accepted by different resources without considering the current situation harden the position for sales and marketing department.
4.2 Design

The life cycles of the products are getting shorter in this rapidly changing environment. New product development is the key for gaining competitive advantage. However, the new product development phase in the overall cycle acquires a significant amount of time. Most of the time, companies cannot launch new products that quickly to gain a competitive advantage. This problem hinders companies' quick response to the environment.

Besides, as of today, the dominant characteristic of Turkish textile and apparel companies is to produce commission orders. Design education for the new generation is still limited and this situation affects the designing capacity in the organizations. When commission orders are concerned, there exit problems in the way design is done. For instance, most of the time, customers present small samples as references to specify the characteristics of the product in weaving. Design department experiences difficulties in determining the exact characteristics of the related order by using the small piece. Delivery times can be expanded since the duration for design takes more than an expected time because of this hard determination process.

4.3 Planning and Scheduling

The department performs planning and scheduling according to the orders that come from marketing department and to the shop floor conditions come from production department. When an order comes, this department has to determine the Bill of Materials (BOM) and workflow of the order. BOM is a rational list of the components, whereas workflow is the combination of the processes and sequences of these processes that should be accomplished.
The most important problem encountered during BOM preparation is the variety in the size, color, and the material that textile products require. The variety increases simultaneously when the order passes to the next step. Figure 4-3 shows these process steps.

![Diagram showing the variety in textiles and apparel industry](image)

Figure 4-3 Varieties In Textiles and Apparel Industry (Intex GmbH, 1998)

One specific fiber turns to different yarns according to the draw ratio and yarn count applied. After dyeing, the likelihood of variety increases. The pace of variety increase speeds up when the article proceeds through different steps. The planning of the order that includes different articles turns out to be a tough process.

Exact match on each property is required for an accurate order. Furthermore, if the customer wants a variety in only one property such as color, this requires a separate bill. The complexity of BOMs at the end is a significant problem for companies to manage. Fadil Sivri, Deba, has stated that one of the biggest problems in textile and apparel industry is the action of not able to be planning because of the uncertainty and complexity in the orders.

The next challenge at this step is to collect data accurately from other departments. If the communication is not appropriate with the other departments, there exists a risk for the late deliveries of the orders.

On the other hand, most of the time, the schedule is subject to change due to urgent order entries, delay in receiving components, workloads, etc. These abrupt changes
affect the whole schedule. Delivery times, in other words, response rates to customers increase. This problem in planning and scheduling affects both customer satisfaction and the productivity of the factory.

Planning department has to know every detail about inventory levels for each item. These data are inputs for planning and scheduling for the upcoming order. Determination of the current situation in the warehouses and the updates as new items arrive stands for another problem in textile and apparel industry.

### 4.4 Purchasing

Purchasing department is responsible for supplying items for different processes. As order comes from customer, according to the BOM and the stock levels in the warehouse, required items are ordered. Communication with suppliers appears as another important problem since manufacturing cannot begin before the required items arrive. There is always a chance that the items supplied are not the exact items that is ordered or they have some defective parts in the batch.

On the other hand, the system does not encompass an effective decision making tool for supplier selection. This selection also requires a significant amount of time. Moreover, not all the concerns could be taken into account so effectively. To give an effective and quick decision on supplier selection is an important challenge when gaining competitive advantage is concerned in this global village.

### 4.5 Production

Shop floor requires exact tracking of operations so that one can be able to answer the question of where the order is. The answer of this question eases the guess about when the product will be available for delivery. Lack of shop floor control leads to inevitable unanswered questions for both inside and outside of the company.

Identification of processes and workflows forms the backbone of the production. However, in Turkish textile and apparel industry, this is not defined so clearly. Fadil Sivri, DEBA, Sevket Celikkanat, Zorlu Holding and Serkan Ozturk, Visecon stated that the lack of the identification of the processes in textile production is an
important problem since the efficient and the quality of both the work and the production would be better if the contrary happened.

The precise determination of the efficiency of production enables the company to judge the investment made. Efficiency is the key to figure out the current production level of the company. This information has another importance in that it leads to overall profit of the organization. Besides, the snapshot of the company by determining the efficiency can allow decision makers to manipulate their strategy according to the current situation.

Furthermore, performance of the machinery line should be tracked. Companies already know data about the machine capacity and its production after they purchased it. The challenge is to do the performance analysis of the machinery to determine the exact amount it produced. The causes of the breakdowns should be analyzed in order to find out both the performance of the machinery and of the employee who is responsible from that machinery. Performance analysis is essential for the organization to improve itself to compete in this volatile environment.

Besides the determination of machinery performance, it is important to control the quality of the outcome, in other words the product. Products are valued not only by their aesthetic appearance but also for the quality of the production cycle or the service level they delivered (Manenti, 1998). Quality should be diffused through the organization and be adopted as a part of the organizational culture. As an implementation, quality control practices require control in a large scale including all of the parties, such as suppliers, service providers, etc. Control of different parties to reach the required quality is another challenge in the production.

4.6 Finance

Cost analysis stems for an important issue for financial successes of the organization. Appropriate allocation of parameters and conducting accurate cost calculation allows companies to make an accurate pricing. Since Turkey is facing an instable inflation nowadays, it is hard to make a precise cost analysis. Most of the companies conduct their cost calculation at the end of the month, which is a long period to reflect
changes to pricing. Standard cost calculations should be updated according to the actual cost within a short period.

Direct and indirect costs should be allocated using appropriate keys. Direct cost especially, plays an important role in investment decisions and pricing since it has a high percentage in the total cost. Accurate calculation of direct costs depends on appropriate inventory and production tracking.

As a result, organizations have a big challenge in cost analysis since it designates the overall profit of the company.

4.7 Human Resource

Most of the textile and apparel companies in Turkey conduct strategic business with key people in the organization. The dependency on people in decision-making is critical for a company. Experienced people such as old foremen, engineers and even CEOs, can be a risk rather than an asset to the organization. Tacit knowledge should be captured from these people to minimize the dependency since the flow can be damaged with unexpected retirement or layoff of these people. Organization would lose its knowledge asset with a retirement case. It is an important challenge to manage the tacit and explicit knowledge that the organization has through qualified people.

4.8 Corporate Decision Making

The organization faces different challenges in different departments. These challenges affect the decision-making behavior of the organization. Moreover, some of the challenges affect more than one department.

Each challenge hinders the corporate decision making to some extent. However, accurate and efficient decision-making is essential in today’s highly changing environment. If companies fail to respond to market needs in the required amount of time, they will lose their market share eventually.
Accurate forecasting for market dynamics is essential to decrease the uncertainty in the environment to some extent. Since companies are not that efficient to forecast the future, it becomes tough to take action in advance.

Consequently, companies have to handle these challenges to give decisions rapidly, to act rapidly, and to support rapidly. Speed is the key attribute to differentiate the companies in the market.
5 SOLUTIONS TO THE PROBLEMS BY IS IMPLEMENTATION

A technology as pervasive as information systems has a wide range of effects on an organization, many of which represents significant advantages. It appears as a solution tool to the challenges stated in Chapter 4.

In general, information systems enable the internal and external connection of the organization. Excess Inventory and waste does not exist. Demand and supply is perfectly coordinated. Customers have perfect information about not only the products and services, but also the how every aspect of the company's business affect theirs. Managers understand any aspect of a company's operations and performance with a few clicks of the mouse (Davenport, 2000). However, to some extent these benefits can be perceived as hypothetical.

Integration of information systems to textile and apparel companies is considered as extensive and sophisticated due to the variety and complexity of manufacturing processes in textile and apparel companies (Bohringer, 1999). New versions of information systems are developed specifically for Textile and Apparel Industry to hinder the consideration. However, every software package has its own strengths and weaknesses (KSA, 1998). An accurate analysis is necessary before deciding which software to implement. Most of the companies in textiles and apparel industry in Turkey prefer to develop information systems in-house. It provides a purely customized solution for specific organization. This approach also has pros and cons when time spent and workforce allocated to this development are concerned.

Information Systems are expensive and require long implementation periods. Long implementation periods incur extra charge to the total price. Nevertheless, Information systems deliver effective solutions to the above stated challenges. Since these challenges have multiple effects over different departments in the organization
as illustrated in Figure 5-1, solutions would attune the companies to high-speed change in the market dynamics.

5.1 Sales and Marketing

Information Systems decrease the time required for a series of processes needed for taking an order, pricing and other responsibilities that a sales representative has. Besides, the error rate of the sales representative will be lowered by the use of IS. Since documentation, and data acquisition will be realized via computers, administrative and personnel expenses will be reduced also.

Customer satisfaction will increase due to quick responses that s/he will get from the sales representative. Information systems make all data such as the status of finished goods in the warehouse, the position of the orders in the factory, etc. available for the
use of sales representative. This availability of data will quicken the proposal preparation for the customer. Customers will be informed about any expansion in the due dates of the orders in advance. Since all of the records are stored in a database, a decision support system will be able to capture data to use from the databases.

Accurate pricing of the order depends on the information that comes from finance department of the company. Using information systems in finance department will ease to determine the updated cost structures of the orders. Sales representative will be able to see the updated information related to pricing and be able to update the price lists that s/he uses rapidly. Using the updated table will allow him/her to respond to the customer response in an easy and quick way.

5.2 Design

New product development requires a significant amount of time in the overall product cycle. Any decrease in this period will lead the company to respond better to the rapid changes in the environment. Seasons in the textile and apparel industry are getting shorter because of dynamic markets. Information systems allow companies to design in a fast manner with the aid of computers. Computer aided Design systems provide a quick design environment. Historical databases will be used as a guide to create new designs. When an order comes to the design department, one can create a search whether there exists a product that resembles to the new order in the database. This search will decrease the time to configure the way to produce the order significantly.

5.3 Planning and Scheduling

Textile and Apparel industry, by its nature, embodies a high rate of variety in its product lines. The variety increases simultaneously when the order passes to the next step. Information Systems, especially configured for textile and apparel applications, handle huge numbers of different articles very well. After the preparation of BOM, a rough planning is prepared according to the capacities and to the available space on the machinery line. Buffering time is placed in the schedule for the exceptional situations such as orders from important customers. Since the
exceptional situations occur in Textile and apparel industry, to have a meaningful flexibility in planning avoids late deliveries. This improves customer satisfaction. Some software packages offer a simulation choice to the user so that different scenarios can be observed in advance. The user selects the most appropriate choice according to the organization's production policy.

Updated data about the warehouse status is important for planning and scheduling department. The availability of raw material and other inputs for manufacturing determines the production period of the order. Scheduling is performed considering the time for supplying the required materials. Information systems perform an efficient inventory tracking via bar coding. The user can allocate an item in the inventory to a specific order. By this way, inventory levels will be under control. Excess inventory will be eliminated.

5.4 Purchasing

Most purchasing departments have several buyers who specialize procuring certain classes of materials. Selection of the best supplier is a key element in achieving production efficiency and quality (Mcleod and Schell, 2001). Information systems provide a media for analysis of suppliers with the aid of the data stored in the database. Supplier inputs such as financial strength, delivery performance, etc., quality control inputs of the suppliers such as units rejected, and customer services such as units replaced or repaired because of defective parts are entered to the systems during the transactions.

Textile and apparel industry faces important problems because of the payment attitudes of suppliers and quality policies that they pursue. Most of the time companies encounters high amount of reclamations because of the defective parts in the procured material. Information systems enhance the analysis to select the best supplier for specific raw materials in an accurate way.
5.5 Production

Information systems enable a smooth workflow and significant analysis at the manufacturing level. Production employees enter data into the terminals using a combination of machine-readable media, the keyboard, and pointing devices. The media most often take the form of documents with bar codes that can be read optically (Mcleod and Schell, 2001).

System provides data that describes the production job. In addition to reporting on the material flow, system also reports on machine utilization. Management knows which machines are being used and for how long. Terminals also record the use of personnel resources. Attendance reporting is accomplished when workers insert their plastic badges into the terminals (Mcleod and Schell, 2001).

Industrial Engineers set the production standards in the factory. The actual performance captured by the system can be compared with the standards and performance of the department can be obtained. Textiles and apparel industry is most of the time too busy to do this performance analysis. However, the system enhances the performance analysis process since the actual performance is captured via information systems. Analysis also is performed by the system after appropriate standards and their tolerance limits are entered. Since the time required for this process is decreased by information systems, the challenge of not knowing the actual performance is diminished with the use of IS.

On the other hand, information systems keep manufacturing management current on the sources of labor, material and machines.

Production is responsible for raw materials and work in process inventories. Since the level of the inventory represents a substantial investment, it is very important for the company. Besides the main cost paid to the supplier, there also exist maintenance cost of inventory, or purchasing cost of the inventory as an additional cost. Information system warns the user for inventory management. This feature diminishes the excess inventory.
5.6 Finance

Information systems for finance have order entry, inventory billing, and accounts receivable subsystems to process the customer orders (Mcleod and Schell, 2001). The system allows the user to analyze the customer based on the accounts receivable that it owns. This process diminishes the risk of not collecting the accounts receivable from the customers. In today's volatile economy in Turkey, to analyze the customers, based on the tolerances that suit to the company's policies, would create a good advantage in strengthening the financial indicators of the company.

The purchasing, receiving and accounts payable subsystems in the information system obtain replenishment stock (Mcleod and Schell, 2001). Selecting suppliers, obtaining verbal commitments, preparation of purchase orders and closing the purchase orders are the processes that is performed by the purchasing subsystem of the IS. Receiving subsystem conducts the processing of receipts and the notification process of other systems about the updates. Supplier payable records are set up with accounts payable subsystem. Besides, payments to suppliers and deletion of regarding payables are conducted by this system. It also provides general ledger data.

Using an information system basically eases the transactions and allows the user to decide on strategic issues as selection of suppliers and analysis of customers.

5.7 Human Resource

Companies can manage their human resource activities through information systems. Personal and financial information of personnel, success stories, job analysis and evaluations are stored in the human resource database. The database contains the application information-non-employee data- besides the current employee data.

The knowledge asset of the organization can be tracked by using the HR database. Textile and apparel companies in Turkey have an over dependency on people. As they detect the knowledge assets in the organization, companies can apply knowledge management tools to capture the tacit knowledge in the people. Once it is captured, these knowledge assets can be used generally inside the company. This can
be realized when the company uses an information system to load the knowledge in databases and presents to the use of authorized people in the organization.

Besides, performance analysis can be done by using the HR Information System.

These analyses will constitute the HR strategy of the company.

5.8 Success Stories

Different success stories with the use of information systems at different levels of the organization are stated below:

"IBM's System Storage (disk drive) division achieved a reduction in the time to enter pricing information from five days minimum to five minutes, replacement part shipping went from twenty two days to three, and credit checks that previously took twenty minutes are now accomplished in three seconds. Creditting a customer from a returned disk drive used to take three weeks; it now happens immediately. The division once spent thousands of hours reconciling management reporting data, this now happens automatically. IBM in general has 21 SAP Projects underway, covering 80% of its core business, eight projects are up and running" (Davenport, 2000).

"Cisco Systems put in an IS to structure and rationalize its back office business transaction systems, which were previously unable to support the company's rapid growth. Without the system, Cisco also would not able to offer customers' Web based access to product ordering, tracking, and delivery processes. Cisco's system cost is over $15 million and the company spent another $100 million connecting it to the Internet. Today, however, Cisco believes that the combination of its IS and its Internet applications yields more than $500 million in annual operating cost savings" (Davenport, 2000).

"Autodesk, a leading manufacturer of computer aided design software, has achieved substantial benefits in terms of cost and time reductions in key business processes. Whereas, the company used to require two weeks on average to ship to customers, 98 percent of products are now shipped within 24 hours. Financial closing times were cut in half, from twelve days to six. Autodesk calculates that it has saved more on reduced inventory alone than its SAP system cost to install" (Davenport, 2000).
"Microsoft is installing an IS to bring about common financial and procurement systems worldwide. The fast-growing software company has already saved $2 million in equipment depreciation (it previously took three months to start the depreciation schedule for a new asset; now it can begin immediately). The company's IS has allowed to receive $14 million per year in early payment discounts from vendors. Microsoft's managers also report substantial benefits in improved management and reporting systems, and the financial closing cycle has been reduced from twelve days to four" (Davenport, 2000).
6  IS PROJECT FAILURES

Information systems project success depends on various factors. Managing these factors is the challenge in information systems implementation. This management capability has been not very well performed in the history. There have always been IS project failures, and some of these have been spectacular. "In the United Kingdom alone, the London Ambulance System, the Wessex Health Service, Taurus Financial Services are well documented as suffering substantial failures costing huge amounts of money. However, there are many more instances that have not been brought to the public's attention and consequently have not been 'celebrated'. It is difficult to obtain accurate statistics, but various sources suggest that a significant percent of IS project fail" (Remenyi, 1999).

The definition of failure for IS projects is ambiguous. It is hard to establish a consensus of exactly what constitutes IS failure. It is an evaluation that can be applied to a system or project in respect of the expectations of one or many stakeholders (Sauer, 1999). However, this explanation is too simple as the real problem lies in deciding when, and to what extent, those expectations and objectives have been met (Remenyi, 1999).

The information systems project failures are classified into the following types (The Standish Group, 1995 and Remenyi, 1999):

- The project is completed and the system is operational but over-budget, over the time estimate.

- The system has not been fully developed as originally envisaged, but substantially downscaled until it no longer provides the originally envisaged functionality.

- The project is commenced, but abandoned before completion.
• The system has been fully developed but never used.

• The system has been fully developed and commissioned, but abandoned within a very short period.

When an organization encounters failure of any kind defined above, this encounter is a significant problem since the project is especially costly, not only because of the resources invested, or rather spent on the failed system but also because such failure frequently causes disruption to the organization’s mode of business. Furthermore, failure can sometimes have serious adverse effects on the morale of the information systems staff and other individuals in the organization (Remenyi, 1999).

6.1 History of IS Project Failures

There exists an evolution in the approaches to the IS project failures. The perception of the failures varies at different periods in the history. In the late 1960s and 1970s, failures were a critical issue. Sauer (1999) said, “The term 'software crisis' was common currency”. Mowshowitz (1976) estimated that 40 percent of all projects were failures. Subsequent data have not denied him. However, IS project failure was less discussed by the 1980s. Information systems developed and started to offer various modules that would ease the life for the organization. Regarding this situation, failures were disregarded or hid by the organization. However, the ubiquity and magnitude of the problem of IS failure have become more openly apparent in the 1990s.

Figure 6-1 shows the changing focus of the failure studies against the changing dynamics of practices through the history of information systems.
Figure 6-1 The changing focus of failure studies against the changing dynamics of practice (Sauer, 1999)

The dynamic of capability has changed as technology improved with a high speed. "The attention has shifted from hardware issues, which until the diffusion of integrated circuitry were the critical component of any IS, to software development through the period of the 'software crisis', and on into the late 1970s and early 1980s when attention turned to the individuals' IS use in terms of decision support and expert systems, and human computer interaction. Since then, with the development of technologies such as client server, attention has turned to the organizations. And, arguably, with electronic data interchange (EDI) and other boundary-spanning technologies, it has now moved even further to inter-organizational relationships." (Sauer, 1999)

The opportunities in the environment have also been modified inline with the capabilities in information systems. At the beginning, the concentration was only in automation for a long period of time. In 1970s, the importance of information has been discerned, and the emphasis has shifted towards 'informating'. Transforming
the information into value for the organization was the following step for the
dynamics of opportunity. This transformation effort is still dominant in information
systems developments.

As the dynamics of capabilities and opportunities have developed, so the focus of
failures has changed. IS failure studies originated at the end of the 1960s focused
principally on process failures. Building the right system was the biggest concern.
So, if there experienced a failure during the process or in correspondence of the
system to the organization, it was argued that organizations had failures in IS
projects. The focus for analysis and prescription was therefore on the systems
development process (Sauer, 1999).

The late 1970s represents the user-centered phase for the dynamic of capabilities.
When users are concerned the biggest problem is the adoption of the system by users.
As a result, in those days, the problem of resistance began to surface regularly, so the
focus for analysis turned to users because however good the software development
process, if users, for whatever reason, did not like an IS they might resist and cause
an interaction failure (Sauer, 1999).

By the mid-1980s practice had embraced the competitive potential for information
systems. The emphasis shifted to Strategic Information Systems (SIS). “The
opportunity they represented suppressed practical awareness of, or at least open
admission of, the difficulty of realizing them. As they took many years to create, SIS
failures were not noticeable. The risks of SIS failure were scarcely discussed or
evaluated. Following this development in the dynamics of practice, failures research
went quiet. Until the early 1990s, apart from continuing implementation research on
user adoption, IS failure studies were virtually suspended” (Sauer, 1999).

History of information systems development, discussed above, represents the
evolution in highly developed countries. Turkey, as a developing country embodies a
different scene in this evolution. Since all the different steps has been experienced
and documented by the developed countries, it would be expected from the
organizations in Turkish Industries to analyze the history and to improve a strategy in
order not to fall into the same flaws. However, real life experiences diverge from the
ideal situation. Large corporations’ implementation practices concern these
developments to some extent. However, SMEs are far away from these experiences. Since SMEs are dominant organizations for textile and apparel industry in Turkey, it is not the practice to analyze the previous project failures and develop an action plan according to the analysis.

Considering the fact stated above, the project failures are analyzed and factors that cause to fail are revealed. This analysis constitutes an efficient platform to develop an action plan for information systems implementations. The factors are categorized and discussed in the following section.

6.2 Factors of IS Project Failure

Information Systems project failures depends on various factors. The analysis of these factors is very important in that it will provide an insight before starting implementation. If one can detect what causes failure, the planning, implementation and application processes can be enhanced in the light of the developed analysis. This action would lead to form a successful information system, which could be customized according to the organization.

Factors of failure can be characterized by their priorities in the overall project implementation as the first level and the second level factors. First level factors are crucial factors. They are the root causes of the failure if interpreted wrongly or even not taken into account. If something wrong is performed at this level, the project will definitely end up with a failure. Second level factors have a secondary priority in the course of implementation. However, it does not mean that they have a low importance in the overall process. The required success of the project will be fulfilled if one can also consider the second level factors. The reason to divide the factors as first and second levels is to emphasis the right approach for the beginners that are not that much accustomed to information systems. Since most of the textile and apparel companies in Turkey are at the beginning level for the information systems implementation, the first level factors are essential factors that they should consider carefully.

Factors are discussed in four categories. According to the categorization, factors appear as:
• Strategic Factors

• Organizational Factors

• Operational Factors

• Technical Factors

6.2.1 Strategic Factors

Strategic factors are the factors that must be considered before the implementation of information systems. At the pre-implementation stage, a comprehensive analysis is essential to reveal the needs of the organization. According to these needs, the expectations from information systems must be determined so that the needs of the organization could be fulfilled with the appropriate software applications. Besides, a strategic plan should be set for the oncoming implementation. If the objectives are not appropriate or determined unrealistically, the implementation of the system appears to be in danger. An understanding between the designer firm and the organization is also crucial. KSA (1996), has emphasized in apparel industry magazine, the importance of selecting a software package as a corporate undertaking. The organization, first, should define itself very clearly and should find a near-perfect match with the software firm. If these factors are not determined properly, the project will be ruined definitely. Information systems are so John Henderson and N. Venkatraman (1993) demonstrated in their research that the inability to realize value from IT investments is, in part, due to the lack of alignment between the business and IT strategies of organizations” IT planning must be totally integrated to the enterprise-wide planning (Cortada, 1995).

Table 6-1 illustrates the important factor at strategic level that should be considered before implementation.
Table 6-1 Strategic Factors

<table>
<thead>
<tr>
<th>Factor Class</th>
<th>First Level Factors</th>
<th>Second Level Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic Planning</td>
<td>Relatively wrong set of objectives</td>
<td>Too much concentration on the uniqueness of the organization</td>
</tr>
<tr>
<td></td>
<td>Unrealistic Expectations</td>
<td>Lack of planning for the future</td>
</tr>
<tr>
<td></td>
<td>Benefit designation</td>
<td></td>
</tr>
<tr>
<td>Understanding</td>
<td>Designer Self Image</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lack of understanding of business needs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Choosing inadequate software package</td>
<td></td>
</tr>
</tbody>
</table>

6.2.2 Organizational Factors

Users are the key people in the information systems projects. Organizational factors that lead to failure if not set properly are related to people working in or for the organization. If the system does not fit the users' preferences and makes the processes harder than the previous methods, users would reject to use the information system. Inherently, this result would eliminate the need for information systems. If there exists no user to use the system, then the system would be useless. In the organizational level, user involvement, user acceptance the system, and communication are most important first level factors. Early user commitment indicates the next required step after user involvement since there would be no need for early user commitment if users does not accept the system. On the other hand, there is a training step for users before expecting early user commitment. Thus, early user commitment appears as a second level factor. For the situational stability, especially for the beginners to information systems, loss of critical personnel stands for an important factor that can lead to a failure. However, change in the requirements is inherent for the beginners since it is very difficult to set the accurate requirements for beginners. It is a critic factor after a while if the requirements change so frequently. Table 6-2 illustrates the organizational factors critical for the information systems implementations.
### Table 6-2 Organizational Factors

<table>
<thead>
<tr>
<th>Factor Class</th>
<th>First Level Factors</th>
<th>Second Level Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Involvement</td>
<td>User Involvement</td>
<td>User Consultation/communication</td>
</tr>
<tr>
<td></td>
<td>User Acceptance</td>
<td>Early User Commitment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conscious user involvement</td>
</tr>
<tr>
<td>Value Basis</td>
<td>Relevance of Output</td>
<td>User has felt need</td>
</tr>
<tr>
<td>Understanding</td>
<td>User-Developer Understanding</td>
<td>Technical and economic orientation of designers</td>
</tr>
<tr>
<td></td>
<td>Lack of Communication</td>
<td>Designer lack of understanding of human aspects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conservatism</td>
</tr>
<tr>
<td>Situational Stability</td>
<td>Complex, informal user organization</td>
<td>Industrial Relations Problems</td>
</tr>
<tr>
<td></td>
<td>Loss of Critical Personnel</td>
<td>Change in Requirements</td>
</tr>
<tr>
<td>Individual Differences</td>
<td>Personal Factors</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cognitive Style</td>
</tr>
</tbody>
</table>

### 6.2.3 Operational Factors

Management understanding of operational level is the most important factor in the result of the project. It can easily turn out to be a failure if the project is lack of management understanding. This understanding enhances the management behavior to the funding and control processes.

Determination of the objectives, the scope, and the priorities of the project is essential for an effective project management. If it is not performed properly, failure is inevitable. Other factors that affect the course of the project is stated in Table 6-3 for the operational level.
Table 6-3 Operational Factors

<table>
<thead>
<tr>
<th>Factor Class</th>
<th>First Level Factors</th>
<th>Second Level Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management Commitment</td>
<td>Management Understanding</td>
<td>Management Style</td>
</tr>
<tr>
<td></td>
<td>Funding Processes</td>
<td></td>
</tr>
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<td>Management Processes</td>
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<td>Scope Change</td>
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<td>Task Priorities</td>
<td>Evaluation Difficulties</td>
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<td>Project Management</td>
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<td>Resource Adequacy</td>
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<td>Implementation Process</td>
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<td>User Requirements not known</td>
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<td>Specifications not Complete</td>
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<td>Implementation Processes</td>
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6.2.4 Technical Factors

Technical factors encompass the capability and quality of the system. Lack of designing the system without considering the factors stated in Table 6-4 will cause a big failure in the implementation.

Table 6-4 Technical Factors

<table>
<thead>
<tr>
<th>Factor Class</th>
<th>First Level Factors</th>
<th>Second Level Factors</th>
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<tbody>
<tr>
<td>Value Basis</td>
<td>Output Accuracy</td>
<td>Technical and economic orientation of designers</td>
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<tr>
<td>Understanding</td>
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<td>Technical Quality</td>
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<td>Design Quality</td>
<td>Technical Quality</td>
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<td>Performance Level</td>
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<td>Project Performance</td>
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7 QUALITY MANAGEMENT FOR IMPLEMENTATION OF INFORMATION SYSTEMS

Information Systems implementation requires an integrated approach considering all facets of the organization. However, success occurs when quality management is applied during the course of integration. Quality Management is a popular buzzword nowadays. Some organizations try to imitate the quality management applications for the sake of using this buzzword. However, a considerable payoff can be obtained if implementations of information systems are accomplished with quality management approach.

Many models are being developed on how to implement quality. Among the models, Malcolm Baldrige National Quality Award (MBNQA)\(^1\) is selected as a tool to apply quality management concept for information systems in this thesis since this approach represents a good perspective considering both the operational and strategic levels in the organization. Besides, MBNQA can be used as a performance measurement tool even if organizations are not planning to gain the award. In his book, Cortada (1995) said, “The design that is becoming the standard of choice in the United States is Baldrige approach. Many organizations are finding that this approach serves as an effective tool to measure the performance of IS organizations”.

7.1 Quality Management Model for IS Implementations

Based on the concept of MBNQA, a model is developed for information systems implementations. Figure 7-1 illustrates the developed model.

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Leadership stands for as a driver for the implementation and application of the information system to the organization. System refers to the organization itself in the model. For the sake of the implementation & application, three stages must be executed very intensively in the system. These steps are:

1. Pre-implementation
2. Implementation
3. Post-implementation

These different steps are identified with a color code in the figure. Boxes having the same colors are at the same step.

Figure 7-1 Quality Management Model for IS Implementations

Pre-implementation step encompasses strategic planning and customer & market focus. Strategic planning of information systems implementation inline with the business strategy of the organization is essential to acquire the highest performance
from information systems. How to align the business strategy and information systems strategy will be discussed in detail in the below section.

Assessment of internal and external customers and target markets is crucial before deciding the appropriate information system. These preparations will reveal out needs of the organization so that information systems can appear as a solution tool to these needs. It is very critical to decide on the right system for the organization.

After doing the preliminary work, ways to implement the system to the organization should be discussed. Team development and project management afterwards are the backbones for the implementation period. During implementation, teams should be developed to handle all of the issues related to the implementation. Besides, a good project management should be pursued to be successful. These processes enhance the implementation period and increase the performance.

Post-implementation includes human resource management and performance measurement. There is also a human resource management during implementation but it is discussed under the project management. In the post implementation, human resource management discusses the effective management of human resources after implementation. On the other hand, performance measurement should be performed to analyze the effectiveness of the system. Measurement includes both the systems and users performance. These will be discussed in detail in the following sections.

7.1.1 Leadership

In Turkish Textile and Apparel companies, traditional vertical organization model is dominant. Recently, there is a changing attitude towards a horizontal model, but hierarchy among the organizational layers is still profound. Considering this fact, leaders’ support to information systems implementation at every level is very critical. Fadil Sivri, Deba, said, “The likelihood of failure is directly dependent on the management support. Moreover, middle managers also play a key role in implementation. Most of the middle managers in Turkish Textile and Apparel Companies are textile or chemistry engineers. For them, Information technology always comes after the routine processes, they perform throughout the day.”
Not only the executive officers but also middle management must provide full support to information systems implementation. Serkan Ozturk, an expert of SAP production planning module said, “The management in the factory behaved us as if we were only a computer programmer. SAP was not different than a simple Microsoft Office program for them. In the first month, we only tried to explain our real mission to the management without doing any other thing.” If the support is not gained, the course of the implementation will be in danger.

Textile and Apparel Companies are always in a rush to deliver the orders on time to the customer. This rush can blind the organization so that the organization can hardly take an action for an implementation of information systems. However, it is a need nowadays to be proactive in this highly volatile environment. Managers should realize the new necessities to gain a competitive advantage and give a full support for the realization of the projects. The approach of the management will affect the behaviors of the employees towards the project. Support from every level can create a commitment for the implementation. Employees can give the required importance to the tasks of the project while doing their daily tasks.

Full commitment at every level of the organization will create the appropriate circumstances to actualize an efficient project implementation. After all, efficient business results will provide a feedback for managers. They will take an action according to these feedbacks. Continuous improvement will be obtained by this continuous loop between the results and the managers at every level.

7.1.2 Strategic Planning

Strategic planning is the preparation of the organization for the future by understanding the current business activities, strengths & weaknesses of the company and opportunities & threats in the environment. Information Systems in this big picture is a tool to cope with the challenges inside and outside of the organization. A strategic planning for both the organization and the information systems implementation must be realized to generate the quality in information systems implementations.
There are key inputs to the strategic planning process. The external business environment is the first input. The economics of the industry, its structure and competitive basis and within that the particular issues and pressures facing the business should be examined to find out the opportunities and threats in the environment. For example, the phase-out period of MFA (Multifibre Agreement) under GATT will end in January 2005. Turkish textile and apparel companies need to consider the emerging opportunities and/or threats that will come out after the quotas are eliminated by then and business plans need to be prepared in advance.

Besides the business environment, IS environment should also be investigated. New technologies and how others use these technologies are critical points that require an investigation. Edwards et al. (1995) said, “The organization needs to appreciate and interpret the developments in information technology, and the trends in both the economics of its use and practicalities of applying new technologies to its business needs. An understanding of the different sources of new technology and the available products will enable new application opportunities to be identified which may be appropriate to business needs.” Turkish textile and apparel companies should analyze the best practices and try to benchmark with their current applications. These best practices involve not only the Turkish practices but the foreign practices as well. Since highly developed countries have significant experiences in information systems implementations, it will be worth analyzing their applications.

The applications of other companies in the same industry also determine the boundaries to exceed. If the competitors for example are using EDI (Electronic Data Interchange) to ease the communication between customers/suppliers and the organization, and if this application gives a quick response advantage to the organizations, then one should consider, its own information systems applications to cope with its competitors.

Another input for strategic planning is the internal environment of the organization. The mission and objectives of the business must be expressed carefully. The critical success factors must be determined to create strategies after analyzing these factors. If organizations’ objectives and strategies are vaguely expressed, IS strategies will be equally vague and become subject to changes which will continually disrupt the planning and implementations of key systems (Edwards et al, 1995).
Business activities, processes must also be defined clearly so that a business information architecture could be apparent as needed. "Once this activity model is established, it provides a basis for economic analysis, especially of the way in which business activity drives costs and generates added value. From this it is possible to identify areas of high potential benefit, by using new systems to reduce costs and increase value added" (Edwards et al, 1995).

Exploring strengths and weaknesses allow the organization to take actions in order to strengthen the weaknesses and control the strengths of the organization. Besides, before planning an information systems implementation, it is also important to understand how the organization functions and how decisions are made in both the formal structure and informal network of interpersonal relationships. This understanding will determine the type of information needed, who will need it and how it is presented and used. The types of information systems could then be analyzed according to this input.

From IS point of view the analysis of the business systems and information resources must be performed according to their contribution to the business. The strengths and weaknesses of the system should be determined before giving an investment decision. Otherwise, the selected information system can impose an extremely different way of doing business to the organization. For instance, if the company pursues a quick response strategy, and the information system is incompatible for this strategy, the organization will encounter a failure at the end. Whether the systems implementation will be abandoned or the competitive strategy for the organization will be changed. Both of the possible results would give a severe damage to the organization.

On the other hand, there exists a corporate or general management responsibility to balance the demand and supply issues to ensure that the business plans are achievable. This will require continuous reconciliation based on business priorities and supply constraints. In order to accomplish this, the organization must establish a process that brings together business and IS planning activity and the products that they produce.
Consequently, information systems strategy must be integrated to the business strategies to implement the appropriate systems for the organization. Strategic planning will be the initial step at the pre-implementation period for information systems implementation. The integration of IS strategies and business strategies will lead to quality in implementation in advance.

7.1.3 Customer and Market Focus

In today’s world, customers judge the quality and performance of the organization. Requirements of customers determine the standards for the organizations. They must take into account all product and service features and characteristics and all modes of customer to gain customer acquisition, satisfaction, preference, referral, and loyalty. Customer-driven excellence requires awareness of developments in technology and competitors’ offerings, as well as rapid and flexible response to customer and market requirements. The approach also demands anticipating changes in the marketplace. Hence, organizations should focus on their current and potential customers, besides, their target markets in the pre-implementation stage of information systems to provide the requirements of customers and even to exceed the requirements depending on the circumstances. This approach will lead to quality during and after the implementation of the systems.

There are two types of customers for the organization when information systems are concerned. These are:

- Internal Customers
- External Customers

Fadil Sivri, Deba, said, “Employees suppose that they are performing the business only for themselves. However, they have both internal and external customers.”

7.1.3.1 Internal Customer

Internal customers are the users of the information systems in the organization. Satisfaction of the end users must be the focus during implementation of the new
system. It is extremely important for the new-implemented system to be accepted by
the users since they are accustomed to one way of doing business.

Most of the time, a standard software package is chosen for the organization. This
standard software needs customization to fit to the needs and wants of the internal
users. For instance, appropriate fields in the forms and reports should be adjusted for
the use of the employees. Different reports should be generated according to the
directions of the managers. Can Kobaner, an engineer in weaving department in
Bossa, said “One of the outputs of Loomdata is a weekly report for the efficiency,
information of the machinery etc. After one week, system resets its memory and
generates the report for the following week. However, it is more useful for me to see
the efficiency of the month. An additional program is generated to customize the
program according to this need.” All of the customization is for to adapt the standard
system to the specific organization.

Customer satisfaction refers to the quality in the implementation. This satisfaction
also increases the performance of the information systems.

7.1.3.2 External Customer

In the case of information systems, customers are more than just end users. They
include suppliers linked to your company via EDI, customers who buy goods to
whom you bill, and government agencies to which you send electronic data on taxes
and workers’ compensation (Cortada, 1995). Stakeholders of the organization other
than employees constitute the external customers. Organization’s relationship with
external customers has a significant role in providing an efficient system. Their
requirements should be taken into consideration while implementing the project.

Besides meeting the basic customer requirements, organizations should also
concentrate on differentiations of the products and services from competing
offerings. Such differentiation may be based upon new or modified offerings,
combinations of product and service offerings, customization of offerings, multiple
access mechanisms, rapid response, or special relationships. Information systems are
tools to realize these offerings.
Consequently, software packages should be selected according to the customer and market focus of the company. By this way, the organization can provide customer excellence.

7.1.4 Team Development

In the pre-implementation period, there exists a team for the preliminary research. The team is a high level team that consists of top management, key process managers to map the organization activities clearly, and information systems manager to select the right software package, which is appropriate for the organization. Fadil Sivri, Deba, said, “It is impossible for executive officers to analyze all of the departments in the organization such as sales and marketing, inventory, quality control, and finance as required for information systems implementation. On the other hand, they have blindness in the organization so that it is hard to determine the bottlenecks, etc. for them. Besides, for operational managers, temporary solutions for daily problems are always important than a systematic solution. That’s the way, the steering committee should include the information systems manager, the quality manager and planning manager in addition to top management.”

After the preliminary research is performed, the first team turns out to be a lead project team during the implementation period. Lead team is not enough for implementation since managers do not have a profound knowledge for the specific processes. Three other types of teams are essential to effectively implement information systems. Teams that will handle the project are as follows:

- Lead Project Team
- Cross Functional Team
- Functional Team
- Task Team

Lead team, also known as Steering Committee, leads the project. It set policies, establishes guidelines, and handles overall communication for the other three types of teams. The other teams operate under the lead project team (Woodall J. et al.,
Management selects members of this team. Membership depends on the expertise and the background in the company. Project team members consist of cross-functional representation from each business function, including Information Systems. The levels of membership depend on the size of the project. If the company is going to implement an ERP system or any of similar kind, the team usually composed of presidents and vice-presidents since it is a critical company-wide project. If the project is for a specific activity that does not affect the entire company, managers, vice presidents and directors will be involved to the team. For region-specific projects, directors, functional managers and chief managers of the location will be in the lead team project. A project team leader, as a mediator should be selected to coordinate the activity, to develop project plans, to enhance communication and to ensure that project objectives are being met (Woodall et al, 1997).

As a second step cross-functional teams are developed. If an executive level team is active in the project, a cross-functional team is crucial, since communication, analysis and research among the business processes are inevitable. Usually, directors and managers from each business function form the team.

For further detail specific processes, functional teams should be formed. A functional team has an eclectic membership and concentrates its efforts on specific functional processes. Numerous functional teams can be generated for a specific process. A representative provides communication with the cross-functional team and the lead team.

As the smallest group, task teams are formed to complete a specific task or problem.

Bechtold (1999) said, “When building complex software intensive systems, well managed teams typically accomplish more work in less time than do unmanaged or poorly managed teams.” This understanding, once more, emphasizes the importance of team development. A sound composition of teams for different levels of the project is crucial for an implementation of good quality since teams designate the fate of the implementation.
After examining the team development structure for information systems implementation, the next step is designing the project plan and starting to implement it.

7.1.5 Project Management

Information systems projects require a sensitive approach since human factor is effective at every level of the project. The proper use of project management techniques helps avoid problems and lead to high quality information systems since it provides a means of detecting and resolving many of the issues earlier than would otherwise be possible (Edwards et al, 1995). At the simplest and more abstract level, the goals of the project, the obstacles for the project, and the resources and techniques available to overcome the obstacles should be managed effectively.

Project manager will be assigned to provide the central coordination and audit of the project. S/he must also coordinate the sources necessary for the implementation. The manager is responsible from informing the steering committee about the course of the work. The ability of project managers of understanding the strategic and technical issues is an important factor for success.

According to the organizational culture and the immediate environment, different approaches can be pursued for the management of projects. “Any project manager can approach management responsibilities with varying degrees of:

- Flexible management discipline versus more strict discipline
- Sparse management direction or guidance versus detailed direction

Kurt Salmon Associate (1996) stated another way to differentiate the approaches to project management in its article. The associate has discussed three common approaches and their relationships with time, cost and functionality in the article. The approaches are as follows:

- Off-the-shelf: Saving cost and time has priority over the ideal solution
- Joint Development: a very good solution has priority over time
• Building Block: the ideal solution has priority over cost and time

7.1.5.1 Off-the-shelf Approach

This strategy typically is used when a speedy implementation is critical, and minimum cost is required. With this approach, there is little or no modification to the software package. The company assumes the package supports a workable process, and therefore, if the company’s process is different, it must re-engineer the business around the package.

This approach requires a very strong “gatekeeper,” or a person or team to filter all requests for modifications for the software. It is the gatekeeper’s responsibility to ensure that only critical modifications—those required to run the business—are made.

Benefits of implementing this approach are stated below:

• Project time and cost savings: Designing, programming, testing and implementing changes takes time and money. Since minimum changes will be made to the software, the organization will spend less time and money.

• Ongoing cost savings: When very few modifications are made to the software, vendor can easily apply the usual maintenance to the software. In addition to periodic upgrades, such maintenance allows the company to keep internal information systems resources low, and therefore, ongoing costs low.

• Opportunity to challenge institutionalized processes: Rather than reengineering business processes from scratch, the off-the-shelf package, which most likely has been designed for others in your industry, can be used as the baseline. Existing business processes can be challenged against it.

Whereas, this approach has some risks:

• Stressful change: Since the software package is not customized for the organization, a significant change will occur in the way of doing business. If heavy emphasis is not placed on managing the stress of change during the implementation process, the user community may not accept the system.
• Crucial selection process: Because there will be minimal modifications and re-engineering around the package, the overall package fit is of great importance. If the package selection process is not thorough, significant modifications may be necessary.
• Lack of leading edge technology: Vendor software development is driven by customers' needs. Industry needs tend to pull the vendor along, rather than the vendor staying one step ahead of the industry. This tendency often results in solutions, which just meet industry needs, and are not state-of-the-art solutions.

7.1.5.2 The Joint Development Approach

The joint development approach commonly is used when a company views information technology as a competitive weapon and wants to be on the leading edge. For example, some apparel companies desire implementation of a hard goods package rather than a package designed for the soft goods industry, like SAP. Serkan Ozturk, Visecon, said, “Programs like SAP, do not have a textile-specific solution. They are insufficient for most of the processes in textiles and apparel industry.” (Hard goods industry packages tend to be more functionally robust and more advanced, for instance, in master production scheduling (MPS) and material requirements planning (MRP).

With joint development, the package vendor and the organization work together to develop modifications and additions to a package. Whereas the off-the-shelf approach required a “gatekeeper” to keep implementation in line, joint development usually requires a committee of industry specialists, including key people from the organization, the package vendor and any participating consultants.

This committee reviews all modifications and determines if they are industry requirements or requirements specific to the organization. Typically, the cost of making modifications to meet industry requirements is shared between the vendor and the organization.

Benefits of implementing this approach are stated below:

• Some cost savings: A vendor typically will share the cost of modifications with the organization, which can mean significant savings.
• A state-of-the-art system: This approach provides the opportunity to develop leading edge solutions, and can involve adapting a hard goods package. While such packages usually have not been designed to handle style/color/size data and product ID codes, and modifying them is a significant undertaking, the return can be several very efficient, unique applications.

• Opportunity to challenge institutionalized processes: Longtime processes can be compared with the baseline package and the committee’s industry requirements.

Risks of implementing this approach are stated below:

• Significant time requirement from individual resources: Although this approach can provide a significant cost savings, the dollar cost typically is more than made up for in internal resource time because the vendor must use the organization’s resources and expertise to help define, document and test enhancements.

• Significant calendar time requirement: More calendar time is required. Significant software changes take time to design, program, test and implement.

• Expectations may not be met: With this approach, the vendor and organization are agreeing to a vision or a concept, not something that was viewed in a demonstration. Therefore, there always is the risk that the result may not work as expected.

7.1.5.3 The Building Block Approach

The building block approach typically is used if the organization’s business processes are the competitive advantage, and require a system to specifically support these processes. It often is popular with organizations that recently have completed re-engineering efforts.

Companies choosing this approach use the software package as a framework to build on, and typically “take over” the package and make heavy modifications. Typically, this approach requires that the company have in-house resources to support the package on an ongoing basis.

Benefits of implementing this approach are stated below:
• Competitive advantage: Because this approach starts with excellent business processes, the resulting systems often are state-of-the-art, giving an organization the competitive advantage.

• Control of programming schedule: Rather than having to put a request to the vendor, and wait in a queue with all other accounts for the change to be made, your organization supports the package internally. Your only constraints are your internal or contracted resources.

• Efficiency: The resulting system is tailored to meet the needs of the organization. The need for manual “work arounds” or cumbersome procedures, which often accompany an off-the-shelf installation, is eliminated.

Risks of implementing this approach are stated below:

• Significant time and cost requirement to define and implement system changes: The more modifications required to fit the package to an organization’s business needs, the longer the process will take and the more expensive it will be. In addition, there is a much higher risk of exceeding cost and time budgets.

• Larger in-house programming staff: Internal resources must be available to support the package on an ongoing basis.

• Paving the cow path: There is the risk of automating a process, not because it is leading edge, but because it is the way you always have done things.

In conclusion, there is no wrong or right strategy. Depending on an organization’s unique situation, each approach can work. In some cases, a combination of approaches may be the best solution. The key to success is to understand and define the organization’s objectives and select the approach that makes sense for the organization.

After determining the strategic approach for the organization and selected information system, management of the project starts. Project management encompasses three basic steps: planning, tracking and controlling.

7.1.5.4 Project Planning

In project management, there exist different ways of implementation of the project. These different ways of activities are called lifecycles. The purpose of a lifecycle is
to organize the activities in a meaningful, efficient and effective way and to help ensure that all-important activities are performed. Before deciding the appropriate lifecycle, a strength analysis of the project should be performed.

The strength analysis reveals the strong parts of the infrastructure of the project. These parts can include, the capitalization, requirements stability, team cohesiveness, team expertise, etc. Different lifecycle approaches are stated as follows (Bechtold, 1999):

* Waterfall
* Throw-away Prototype
* Incremental Build
* Multiple Build
* Spiral
* Legacy Hybrid

Waterfall lifecycle is essentially a linear ordering of the major development activities. The general assumption behind this lifecycle is that events affecting the project are predictable, and tools and activities are well understood. The waterfall lifecycle is highly effective for short duration well understood projects with extremely stable requirements. For example, creating a report as a decision support tool, which shows the total sales and costs and inventory levels for cotton and PET can suit waterfall lifecycle.

If the requirements are vague and highly uncertain, the throw-away prototype approach can be used. This application is truly appropriate for in-house production of information systems. After the prototype is produced, it provides sufficient insight to all interested parties, including customers, developers and managers, so that requirements can be clearly defined and understood. This lifecycle has no additional phases.

Incremental build lifecycle allows you to develop the system a piece at a time, and test each piece as it is developed. This lifecycle is an excellent way to decompose the development of a large, high-risk system into the development of a succession of smaller, lower risk subsystems.
Project plans will continuously be revised, adjusted, and revisited various sections as more of the project details are discussed, documented, and communicated to others. Richard Bechtold (1999) said, “Your software project plan is a living document.”

Project plan must cover the following:

- Purpose and Scope of the project
- Goals and objectives of the project
- Listing of all acronyms used in the project plan, and explanation of those acronyms
- Listing of all supporting documentation or published works referenced in the plan, and a brief description of their content
- Summary description of the products’ customer characteristics and needs
- External or internal standards with which the project must comply
- Description of the lifecycles selected of the project and a rationale for the selection
- Any documented procedures, methods, and techniques for managing, developing, maintaining, or supporting the information system. The following processes can be described:

  a. Size estimation
  b. Effort estimation
  c. Planning
  d. Project Tracking
  e. Quality assurance
  f. Reporting
  g. Technical documentation development
h. Training material development

- Tools that will be used to support these techniques
- Detailed listing and supporting descriptions of all modules to be implemented
- Work breakdown structure
- Resource breakdown structure
- Estimates of the project resource requirements
- Estimates of the project costs
- Project schedule including major milestones and reviews, resource requirements, and critical path analysis
- Identification, evaluation, and management of the project's risks
- Documentation of the systems engineering facilities and any additional support tool

After the preliminary preparation, intermediate plans will be developed. The plan needs to be highly flexible at this point. If one puts an excessive effort in any part of the plan, it will be difficult for him/her to change it as new information appears. A work breakdown and a resource breakdown structure must be developed at the intermediate stage. Besides, detailed requirements analysis must be performed as the planning progresses, detailed plans commence to be developed.

7.1.5.5 Risk Management

Risk Management is critical for the success of the project. When you develop a plan to manage risk, it will be easy to track and mitigate. The first objective in a risk management plan is to prevent undesirable situations from occurring. The second objective is to reduce any negative consequences when something undesirable occurs.
A simple way to plan for risk is to develop a house of risk management. This technique is identical to house of quality that is developed for quality function deployment in Total Quality Management. The first step is to identify any significant risk that can occur. Then, potential ways that risks can be reduced or eliminated must be listed.

In

Figure 7-2, an example for house of quality is illustrated. Three risks are chosen for the example. They are:

- Real time performance shortfalls
- Volatile requirements
- Staff lack of expertise

The possible solutions for these risks are stated as:

- Efficient low-level code
- Object oriented techniques
- Information hiding
- Iterative development
- Staff training
- Global data access

Inside the house, where the columns and rows intersect, one can place a marker indicating the degree to which the solutions help reduce the risk. In this example, the black circles indicate that the solution is likely to be highly effective and the gray circles indicate moderately effective solutions. The roof of the house is used to intersect all the options for solutions with each other. Combination of some solutions can give an effective result whereas, it cannot be applied to all combinations.
sign shows highly compatible solutions, a minus is to indicate highly incompatible solutions. A blank space is for the solutions that have little effect on each other.

![Diagram of House of Risk Management]

Figure 7-2 House of Risk Management

Finally, to the side of the house, values to indicate the estimate of risk exposure are added. It is difficult to put an estimate most of the times but it is very useful.

The purpose of the house is to analyze the risk exposure and to make better decisions about the actions.

A simple risk management plan contains at minimum, the following items:

- Top ten risks, in priority order (that is ranked by exposure)
- Potential solutions for reducing risk exposure
• Contingency actions to be taken in the event that the undesirable event occurs.

The risk plan must be updated regularly.

7.1.5.6 Project Tracking & Control

Several different areas must be in control during and after the implementation. The first area is managing the information system according to the organization. Information systems developed are standard products. They should be customized according to the organization's way of doing. This should be controlled very effectively. Otherwise, the failure of the project is inevitable.

Managing requirements is another important area. This is related with the above argument. Since the requirements are internal and/or external customer requirements that should be implemented project must be controlled with that insight.

According to the requirements, the configuration and the complexity of the system should be managed very well. Shortcomings of the system should be enhanced to ensure quality.

7.1.6 Human Resource Management

Information systems cause big changes in the organization. The living part of the organization, the employees, inherently shows reaction to information systems. Serkan Ozturk, Visecon, said, "The employees could not understand what we were doing. They behaved as if we were inspectors. They were anxious about the questions that we have asked, thinking that there could be a downsizing because of these questions in the organization. Therefore, we could not gain the support of the employees."

Human resource management is very critical in the post implementation period. Fadil Sivri, Deba, said, "The biggest difficulty in this level is to ensure the acceptance of the modified way of doing business. Since the employees like foremen have a history in the processes, newly developed or processes is hard to be accepted for them." Leaders should manage the change, with support of information technology
personnel, the way of doing business should be revealed and required changes should be implemented in advance. Fadil Sivri, Deba, has also stated that after the data entry to the system, there appeared a huge amount of transactions. For a 100-user system, 10 million to 15 million transactions occurred in a year. Next step would be creating a decision support system for managers. The challenge in this step was to teach the sales and production managers how to use the system. It was difficult to diminish the effect of habits in the organization.

As a solution, senior leaders should teach the managers to delegate, to enhance the skills of their own people and their in managing process improvement, and then link them directly to the end users who they support (Cortada, 1995).

1. All employees must understand and support the overall vision and business plan for information systems because they need to make decisions within that frame of reference.

2. These employees should be trained in process improvement techniques. These tools will help them improve the day-to-day functions of their departments and give them the confidence to make new changes.

3. Performance plans, rewards and recognition, compensation must be aligned to support this new world.

4. Employees must want to accept responsibility, authority and management support for their new roles.

5. Management has to facilitate the exchange of the ideas and dialogue between their staffs and those of other end user departments, customers of the firm or agency, and with peers outside the enterprise.

Human resource management should make the network available to all employees so that system could be used effectively. Systems that attached to this network that facilitate dialogue and communications should be constituted. E-mail usage is the common practice among the employees. An environment in which information is shared openly should be encouraged.
Turkish textile and apparel industry has a significant problem in terms of human resources. It is hard to find qualified people in information systems area. Serkan Ozturk, Visecon and Sevket Celikkanat, Zorlu Holding stated that the education level for textile and apparel companies were very low since textile and apparel industry was a labor-intensive sector, which required cheap labor in that sense. It is hard to find ambitious people who want to learn and to use new systems.

Besides, the current human resource in the organizations is not accustomed to a written format of information transfer. Mehmet Kutlu Inanc, KIPAS, has stated that the habits and personalities of employees were severe obstacles to implement and to use an information system. Organizations in Turkey should pursue an efficient strategy in terms of organizational and personal learning. Otherwise, modifications can be necessary in the employee profile.

Organizational and personal learning have a significant importance in information systems implementation. Achieving the highest levels of business performance requires a well-executed approach to organizational and personal learning. Organizational learning includes both continuous improvement of existing approaches and adaptation to change, leading to new goals and/or approaches.

Learning needs to be embedded in the way the organization operates. This means that learning,

- is a regular part of daily work;
- is practiced at personal, work unit, and organizational levels;
- results in solving problems at their source;
- is focused on sharing knowledge throughout the organization;
- is driven by opportunities to effect significant change and to do better.

Sources for learning include employees’ ideas, research and development (R&D), customers’ input, best practice sharing, and benchmarking.

Employees’ success depends increasingly on having opportunities for personal learning and practicing new skills. Organizations should invest in employees’
personal learning through education, training, and other opportunities for continuing growth. Since information systems are unfamiliar to the employees, organizations should provide a great attention to training and encourage an environment for continuous learning. Such opportunities might include job rotation and increased pay for demonstrated knowledge and skills. On-the-job training offers a cost-effective way to train and to better link training to your organizational needs and priorities.

Personal learning can result in (1) more satisfied and versatile employees who adopt information systems, (2) organizational cross-functional learning, and (3) an improved environment for innovation.

Thus, learning is directed not only toward better understanding of information systems but also toward being more responsive, adaptive, and efficient. This will improve the marketplace sustainability and performance of the organization.

7.1.7 Performance Measurement

Performance measurement is a significant step in the post-implementation period in that the application can be enhanced according to the results of the performance measurements. The measurement system in an enterprise should support the vision, goals and objectives in terms that are quality driven (Cortada, 1995).

Information system department should survey the users routinely and use that information to improve the performance (Cortada, 1995). Traditional IS measurements do not usually tell how end users feel about the services. IS department should create new ways to determine the satisfaction level of the end-users. Ideal things to ask about are overall performance, availability, response time and quality of IS tools provided. One can add to these core questions. These would include questions about specific pieces of hardware (PCs, Printers, etc.), applications (billing and expenses reporting, etc.), and about the people.
### Table 7-1 Sources of Customer Opinion Data (Cortada, 1995)

<table>
<thead>
<tr>
<th>Type</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>End-user Survey</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Employee-opinion Survey</td>
<td>Annual</td>
</tr>
<tr>
<td>End-user Feedback Sessions</td>
<td>Ongoing</td>
</tr>
<tr>
<td>End-user Help Contacts</td>
<td>Ongoing</td>
</tr>
<tr>
<td>On-line Comments</td>
<td>Daily</td>
</tr>
<tr>
<td>Project Surveys</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Project Status Meetings</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Problem Determination Meetings</td>
<td>As needed</td>
</tr>
<tr>
<td>End-user Suggestions</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Advisory Council</td>
<td>Quarterly</td>
</tr>
</tbody>
</table>

By using these tools, organizations must measure their performance. Not only the information systems but also the business performance can be determined. The effects of information systems on business applications can reveal out. Performance measurement will allow organizations to take actions for continuous improvement.
8 CONCLUSION

In this thesis, information systems project failures with a concentration on Turkish Textile and Apparel Companies have been analyzed and a model has been developed to overcome the failures. First, definitions of information and information systems were made to clarify the topic that would be analyzed. Second, problems of Turkish textile and apparel industry and possible solutions to these problems by information systems were discussed. After this preliminary analysis, information systems project failures were exposed and categorized according to the different levels in the organization. A quality management approach has been developed based on the Malcolm Baldrige National Quality Award (MBNQA) to ensure successful implementations of information systems.

Specific implementation recommendations for Turkish Textile and Apparel Industry and general recommendations for information systems implementations can be made using the model developed. The specific ones appear in details of the general recommendations.

Leadership support to the project represents the heart of the information systems implementation in every level. For Turkish Textile and Apparel Industry, this support requires an additional attention unlike the developed countries because of the hierarchy in the organizations and the profile of the employees.

In the pre-implementation step, strategic planning and customer & market focus appears as two important points to be analyzed. Strategic planning of information systems implementation requires a total integration to the strategic plans of the organization. The inputs should be examined very effectively. For Turkish Textile and Apparel Industry, an historical analysis could be very useful as a preliminary search before determining the strategies, since all the different steps has been experienced and documented by the developed countries. After examining the history, today’s conditions both locally and globally should be analyzed and the
appropriate software package should be selected based on the critical success factors of the organization. The strategic plan for the implementation should support the current strategies of the organization.

For customer driven excellence, internal and external customers of the organization should be satisfied with both in practice of the system and with the results generated by the system. Turkish Textile and Apparel Industry, specifically, should learn the importance of the customer much better while implementing and using the information systems.

Team development appears at the beginning of the implementation stage. Diversity in team formation hinders the organizational blindness and ensures an effective study at every level of the processes.

Project management has critical role in implementation. Determining the right implementation strategy, planning the implementation based on that strategy and tracking & controlling the results ensures an effective platform for implementation. During implementation, risk management is also essential to take action in advance for the possible problems.

In the post-implementation step, human resource management represents the biggest difficulty for the project: human resistance. Since there exists no meaning in implementation of a system unless employees will use it, human resistance requires high attention while implementation. Turkish textile and apparel industry has a specific situation since the education level of the employees in the industry is low. A thorough training in every level of the organization is essential for the success of the project. Organizational and personal learning should be enhanced for a good quality implementation.

Performance measurement is a required step for quality management practices. The measurement system in an enterprise should support the vision, goals and objectives in terms that are quality driven. Measuring the performance and enhancing the plans for the future applications of information systems lead to continuous improvement.

Consequently, organizations can experience a quality driven information systems implementation with the proposed multi-step model. Hence, information systems can
act as a tool to improve the competitiveness of the organizations in today’s highly volatile environment.
9 RECOMMENDATIONS FOR FUTURE RESEARCH

The first recommendation for future study is to develop a detailed questionnaire as in Malcolm Baldrige National Quality Award. Using the proposed framework, detailed questions for each step in each level can be prepared for information systems implementation. Hence, a concrete self-assessment tool would be developed for information systems implementation to ensure highest quality.

As a second step, real life studies can be implemented as a case study using the above questionnaire. Analysis of the results can constitute an interesting work for the sake of information systems implementations of the good quality.
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BIOGRAPHY

Sedef Uncu was born on January 01, 1977 in Samsun, Turkey. She graduated from Samsun Anatolian High School in 1994 and began to her major in textile engineering at Istanbul Technical University. She earned her Bsc degree in 1998 and after that she started to an MBA in Bogazici University and an MSc in textile engineering at Istanbul Technical University. She earned her MBA degree in June 2000. That fall, she gained a scholarship and an assistantship from North Carolina State University to pursue her PhD degree. Sedef Uncu is now a research assistant in Textile and Apparel Technology and Management at NC State. Sedef also worked for two years (1998-2000) as an expert for Textile Consulting Services Inc. Her research interests include information flow design, decision support systems, business intelligence, E-commerce, market entry strategies and restructuring of companies.