

**THE REPUBLIC OF TURKEY
BAHÇEŞEHİR UNIVERSITY**

**SAP SYSTEM IMPLEMENTATION PROCESS IN A
PUBLIC INSTITUTION**

Master Thesis

ZEYNEP ÇAĞLAR

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**THE GRADUATE SCHOOL OF NATURAL
AND APPLIED SCIENCES INDUSTRIAL
ENGINEERING**

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Supervisor: ASSIST. PROF. ADNAN ÇORUM

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ABSTRACT

SAP SYSTEM IMPLEMENTATION PROCESS IN A PUBLIC INSTITUTION

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In this thesis, a public institution that decides to go ahead with the implementation of Enterprise Resource Planning (ERP), which can be described as the most common solution today has been mentioned. The reason why the institution wants to move to enterprise resource planning, how the application is decided and what is done in the transition process is discussed.

In the introduction section of the thesis, general information is given about the history of enterprise resource planning, firms operating in Turkey market for enterprise resource planning applications, and the planning of the transition process.

In the development section of the thesis, the reasons for the implementation to SAP in the public institution are mentioned. Following the transition to the enterprise resource planning, company selection, consultant selection, and transition process are explained and the methods that the institution used are described.

In the conclusion section, the transition of the institution to enterprise resource planning and the difficulties experienced during the transition process, how it affects the institution after the transition is summarized.

Key Words: ERP, SAP, Implementation, SAP Implementation

ÖZET

BİR KAMU KURUMUNDA SAP SİSTEM KURULUM SÜRECİ

Zeynep Çağlar

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Tez Danışmanı: Dr. Öğrt. Üyesi Adnan ÇORUM

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Bu tez çalışmasında günümüzde en yaygın çözüm olarak nitelendirilebilecek kurumsal kaynak planlaması uygulamasına geçmeye karar veren bir kamu kurumundan bahsedilmiştir. Neden kurumsal kaynak planlamasına geçilmek istendiğinden, hangi uygulamaya nasıl karar verildiğinden ve geçiş sürecinde neler yapıldığından söz edilmektedir.

Giriş bölümünde kurumsal kaynak planlamasının tarihçesi, kurumsal kaynak planlama uygulamaları konusunda Türkiye pazarında olan firmalar ve geçiş sürecinin planlanması hakkında genel bilgi verilmiştir.

Gelişme bölümünde kamu kurumunda, SAP sistemine geçiş sebeplerine değinilmiştir. Geçiş karar verildikten sonra firma seçimi, danışman seçimi ve geçiş süreci anlatılmış ve kurumun hangi yöntemleri kullandığı aktarılmıştır.

Sonuç bölümünde kurumun SAP sistemine geçişi özetlenmiş ve geçiş sürecinde yaşanan zorluklar, geçişten sonra kuruma nasıl etkisi olduğu anlatılmıştır.

Anahtar Kelimeler: SAP, ERP, Uygulama, SAP Uygulamaları

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ABBREVIATIONS

APO	:	Advanced Planner and Optimizer
CRM	:	Customer Relationship Management
EDT	:	Electronic Data Transfer
EIS	:	Enterprise Information Systems
ERM	:	Enterprise Resource Management
ERP	:	Enterprise Resource Planning
ES	:	Enterprise Systems
EWS	:	Enterprise Wide Systems
HYS	:	Harcama Yönetim Sistemi- Expenditure Management System
IKYS	:	Insan Kaynakları Yönetim Sistemi- Human Resources Management System
KBYS	:	Kurumsal Bilgi Yönetim Sistemi- Enterprise Information Management System
MRP	:	Materials Resource Planning
MRP II	:	Manufacturing Resource Planning
MYS	:	Mal Yönetim Sistemi- Property Management System
NATO	:	North Atlantic Treaty Organization
RDMS	:	Relational Database Management Systems
SCM	:	Supply Chain Management
SRM	:	Supply Relationship Management
VYS	:	Veri Yönetim Sistemi- Data Management System

1. INTRODUCTION

The fact that information technology is being used in practice in almost every area of our lives has become both a necessity and a corporate culture. In this thesis study, transition process of a public institution to ready ERP package after its own systems is clarified. How the institution decides to move to the ERP system, what is important for the organization in selecting the firm and how the transition period is managed is explained.

On the other hand, the studies for the acclimatization of institution personnel to the ERP system and whether these studies are effective or not will be transferred with the observations of the project team created for the ERP transition.

In chapter one, the basic academic and theoretical knowledge about ERP is given, and the features, structures, history, and significance of ERP systems is covered widely. Later, the details of what should be considered when an ERP software system is installed is explained in detail. Information on the advantages and disadvantages of installed ERP systems is given and is focused on what should be considered when evaluating companies. Finally, the details of the costing of the system is explained.

In the third section information about the institution is given. The structure of the institution is explained. It is explained why the institution needs the ERP system and how the transition to ERP system is occurred. After being told what to look for in the selection of company and consultant, the transition process is explained.

In the last part, how the transition period has passed in the institution and what has changed in this process is summarized.

2. ERP SYSTEM

2.1 WHAT IS ERP?

ERP represents Enterprise Resource Planning. Other prevalent names used for ERP are: Enterprise Information Systems (EIS), Enterprise Wide Systems (EWS) or Enterprise Systems (ES). Enterprise systems are “business-oriented data and business software packages that enable the integration of business processes in an organization” (Markus and Tanis, 2000). Generally, ERP systems provide cross-organization integration of transaction-based data via engrafted business processes and they include lots of modules, for instance, human resources, sales, finance, and production. These software packages can be adapted to the specific needs of each organization adequate to determined limits (Esteves and Pastor, 1999). As Klaus et al. (2000) report, in the IS literature, we notice some conflict among academics on the features and explanation of ERP. Some authors (Davenport, 2000; Laudon and Laudon, 2000) don't use the term of ERP and propose other options; however other authors (e.g. Pawlowski et al. 1999) put forward that ERP is not a term attributing to a clear object but rather a category (“umbrella term”), implying a series of similar products. Yet others define the ERP term in its historical evolution related to manufacturing and supply chain management. Far and wide it is not possible that an agreed definition can be obtained.

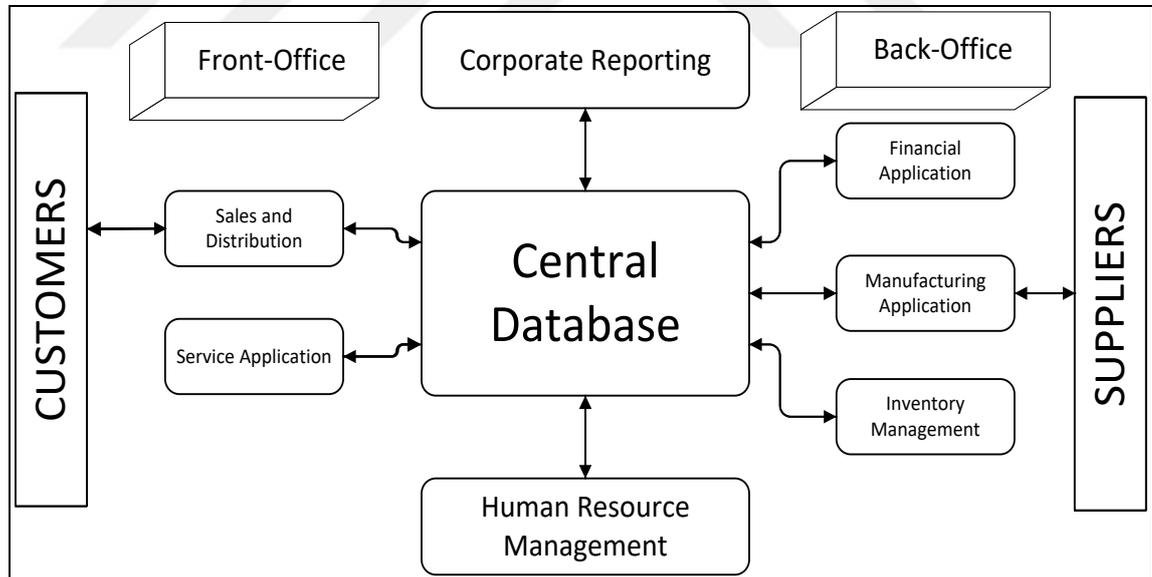
It is expected that ERP will support organization's founding activities and present its various management levels in a highly integrated manner, in the literature. When integrated with business partners' systems beyond the limits of the individual business, such extended ERP systems, creating a value creation process network that goes beyond organizational boundaries. ERP can be an essential platform for an enterprise's information infrastructure. Based on the literature review, Uwizeyemungu and Raymond (2004), have tried to define the features that are generally attributed to ERP systems (Figure 2.1). Today, new terms such as ERP II and Enterprise Resource Management (ERM) have been proposed. The ERP II term was put forward by the Gartner Group, and it is defined as “a business strategy that creates customer and shareholder value and a

range of industry-specific applications that enables institutional and inter-institutional, collaborative operational and financial processes.” (Bond et al. 2000).

There are more than 1000 ERP vendors and solutions that can be chosen (Anderegg, 2000). “However, most of them are very small and escape the detection of companies looking for new ERP systems” (Anderegg, 2000). Oliver and Oliver (2002) discuss how ERP systems shape the IT industry and are addressed in the following comparison: Bruce Richardson, vice president of research for the AMR study says that "twelve years ago, IT people identified their organizations as IBM or Digital shops. Anymore, SAP or PeopleSoft is likely to be higher" (Sweat, 1998).

ERP, Enterprise Resource Planning is the general name given to the united management systems which provide efficient use of sources such as labor, machines, materials etc. necessary for product and service production in the enterprises. (www.nerma.com.tr)

Figure 2.1.1: ERP Systems concept. (Hossain, Patrick and Rashid, 2002)



ERP provides common data share of different departments by collecting all departments of an institution under a single computer system. Thanks to this common information system, the needed information is served to the corporate employees in a database. In the classical systems, each department work with the computer systems in compliance with

their own work flows. ERP unites these differences with a united software architecture and by using a single database and allows multiple departments with different operational features and needs to easily work in communication with each other. (Köstence, 2009)

The progresses of work are completely bond to each other with ERP. All units from the sales orders to the production, production to the purchase, purchase to the stocks, stock to the shipment, shipment to the accounting can transfer works to each other in the system. The management is allowed to centrally monitor all of these movements. (Altunsu, 2014)

ERP systems are in modular structure. If requested by the companies, the modules of the ERP system can be used separately.

2.2 HISTORICAL DEVELOPMENT OF ERP

Materials Resource Planning-MRP has begun to be used in the USA for the first time in 1960s. MRP is used for determining when and in which amount the raw materials will be necessary and calculating the procurement orders backwards from the delivery date by considering the main production plan and the present stocks. In this way, the company can supply health raw materials. In continuation of the concept of MRP, Manufacturing Resource Planning – MRP II has arisen again in the USA in 1970s. MRP II works by considering a company as a whole in addition to Planning of the Material Needs and aims to use all sources (finance, time, capacity etc.) in coordination. (Güz, 2005)

MRPII has turned the main production plan of MRP into a more detailed daily and weekly plans as well as it has become an industrial management system which presents a company's sales, procurement, inventory management, production planning and control, accounting, financing, costing, quality management etc. functions in integration in a single database. (Güz, 2005)

ERP concept has emerged as result of efficient and productive planning of all resources of a company which has more than one facility, factory and warehouse. As a natural result of the globalization, it has been important to manage the work activities in difference

geographical regions with distributed databases and global integration. The need for quick, real and actual information flow in internal departments and external enterprises has made such an integrated system very important for the modern companies. The reports obtained with the information processed in the system direct an organization's plans and programs and eases the stage of decision.

Today, the ERP systems have found their place within the functions of an enterprise as integrated systems which successfully manage the works and create all kinds of reporting and decision support infrastructures. In addition to this, a model which includes the suppliers, carriers, contract manufacturers, distribution channels and customers and the final customers getting the goods and services in the ERP system was developed in order to follow up how healthy the shipment works are done and to decrease their costs within and outside the boundaries of the region in which the goods and services are produced. This model is named as the Supply Chain Management (SCM). The ERP system has taken the name 'ERP II' after including the Supply Chain Management module in it. ERP II includes the concepts of CRM-Customer Relationship Management and BI-Business Intelligence. (see Table 2.1)

Table 2.1 : ERP evolution (Hossain, Patrick and Rashid, 2002)

2000s	Extended ERP
1990s	Enterprise Resource Planning (ERP)
1980s	Manufacturing Resources Planning (MRP II)
1970s	Material Requirements Planning (MRP)
1960s	Inventory Control Packages

2.3 IMPORTANCE OF ERP SYSTEMS

With the spread of the information age and entrance of the software solutions into almost all points of our life with development of internet, ERP systems have also spread with this development. It is inevitable for the enterprises to establish systems which reach to

wider audiences and are quicker, more effective, more productive and more usable for their works. It is possible to diminish problems such as loss of possibilities, increase of costs, delays and problems due to the mistakes of the people with the ERP systems which can be developed independently from the humans. Particularly for the system understanding to provide continuity in the services and the production systems and continuity of the progresses based on systems, the ERP systems have become inevitable.

Many producers use the technology to make product renewal, quicker delivery and more qualified services for meeting the increasing demands. The production progress has become more complex as the technology allowed this kind of developments in the production. Because the enterprises have developed separate computer systems for meeting the needs of each department such as accounting, procurement, stock and planning. Each of these systems are connected to the old main systems and they can make automation in a certain functional unit and allow that unit to work more actively. However, such systems multiply the automation units that are inappropriate to each other and cause integration and coordination deficit by preventing use of all technology and equipment potential of the enterprises. For example, if the sales and order systems of an enterprise are not connected with the production planning systems, that enterprise will not have production efficiency and customer interaction. Similarly, in case that the sales and marketing systems are inappropriate to the financial reporting systems, the upper management will find it difficult to reach the actual information in making emergent and important business decisions, which will make the decisions taken instinctively.

Even if a company has different factories and different production stages, it may be mandatory or economic to keep some functions such as design, central procurement, storage, shipment common. In this case, the ERP system will create an effective and productive working order by providing cooperation between the aforementioned factory and production stages (Şener, 2001).

The requirement on understanding the reasons under application of the ERP system and understanding completely the demands of the companies must be met very clearly by the people supporting the system long time prior to beginning establishment of the system (Karakanian, 1999).

Factors such as obtaining a single institution source to meet the information needs of the company, reaching the same data at once and to integrate the work systems in a single platform as much as possible (Düzakın and Sevinç, 2002) are only some of the main factors (Karakanian, 1999). However, the ERP systems is preferred not due to the ability to integrate the work systems in the enterprise but also the ability to integrate the internal progresses of a company with the partners of the company (Wilson, 2000).

The developments in the technology made a company able to operate in different geographic regions. In global companies, it requires more effort to integrate various production tools due to the differences of technology in the other countries. If a company use different computer systems in different countries, transferring the information through these different systems generally requires expensive interface units and time and effort of the company's employees to make data entry. In addition to this, the number of different computer software and hardware systems increase as the company grows and expands (Palanisvamy and Frank, 2000). This is a complex structure which is hard to manage as well as it delays the decisions of the upper managers with the problems brought by the possibility to reach the information instantly.

All these reasons increase the need to the ERP systems day by day. The main reasons of selecting ERP packages are as follows (Davenport, 2000; Ross and Vitale, 2000; Bayraktar, 2007):

- i. Providing automation in the background works.
- ii. Providing better coordination between work processes.
- iii. Increasing individual and organizational efficiency.
- iv. Providing coordination between locations that geographically are far from each other.
- v. Providing unity of termination in the organization.
- vi. Having consistent application logic, consistent information and interface that allow to understand the information technology's infrastructure and to work in this infrastructure.

- vii. Meeting the need of easy access to the data in order to improve the decisions of strategic planning.
- viii. Meeting the expectation of decrease in the costs of operation.
- ix. Meeting the expectation of increase of the customer contribution in the processes.

2.4 ERP SYSTEM SELECTION CRITERIAS

During the selection of the ERP software, the selection criteria must be considered in three main groups (Köstence, 2009):

- i. Purchase Progress.
- ii. Installation Progress.
- iii. Operation Progress.

2.4.1 Purchase progress

During the Purchase Progress, two sub criteria must be evaluated as purchase costs and status of the supplier company.

2.4.1.1 Purchase cost

As the cost of purchase, the equipment to be used, operating system and the cost of database must be evaluated within the purchase costs together with the ERP's license. In addition, the costs of consulting, training and maintenance must be evaluated in the purchase stage.

2.4.1.2 Situation of the supplier company

During the purchase stage, the previous works of the supplier company in the sector and its status in the ERP market must be considered as well as its financial structure. Before the purchase it is especially required to visit the companies, which are mentioned by the supplier of ERP as reference, if it is not possible, a short research must be made.

2.4.2 Installation progress

During the selection of ERP, the criteria in the installation progress must be considered after completing evaluation of the purchase criteria. At this stage, compliance of the ERP software with the company must be inspected and the duration of installation, and training and consulting services must be inspected in detail. While considering the criteria of compliance of the ERP software with the enterprise, its compliance with the sector and the organization structure must be evaluated. If it is hard to meet these criteria, it must be inspected whether the system is in integration with external systems or the additional software for removal of this deficit. Of course, time and material dimensions of these must also be considered. In the process of installation, it is of utmost importance to find an experienced consulting company that can well organize the adoptions and additional software. If the consulting company has other projects in process, sufficient consulting resource may not be found.

2.4.3 Operation progress

The last stage in selection of the ERP is the evaluation of the criteria during usage. The ERP system to be purchased must be easily learnable, the user must have the ability to design own reports, there must be an infrastructure that can meet local and international needs, the reports to be taken must be consistent, web-based applications must be supported, performance problems must be solved, and the system must be able to give continuous support and the authorizations and safety policies must be created. The software to be purchased must be guaranteed with maintenance agreements.

2.5 ERP MARKET IN TURKEY

2.5.1 SAP ERP

According to the SAP ERP official web site, SAP is the number one ERP software in Turkish market. It is the leader in the world market of ERP in terms of revenue. SAP (Systems, Applications and Products in Data Processing) was founded in 1972 in Walldorf city of Germany by five former IBM employees.

SAP was designed to meet the demands of all kinds of enterprises from small and medium sized enterprises (SMEs) to the global companies and it has a great advantage potential for the enterprises in the competition environment which gets harder day by day. SAP is general in the ERP sector and it is a strong ERP solution. SAP and ERP have the same meaning. In addition, SAP has special solutions for difference industry areas such as hospitals, banks and commercial enterprises.

SAP, which is in Walldorf city of Germany, is the leader client/server business applications solution provider in the world. Today, SAP R/3 client/server and R/2 Mainframe Business Applications have been selected by more than six thousand big enterprise in more than fifty countries to organize their financial, production, distribution and human resources processes. SAP manages 31% of the world's client/server research application software market and it is the world's number one business applications software seller and the world's fifth biggest independent software provider.

"R" ("Realtime") in SAP R/3 symbols the data processing features, and "3" symbols the three-level application architecture which consists of database, application server and client. RDBMS (Relational Database Management System) allows to use the advantages of Oracle, Microsoft SQL, Informix servers. SAP R/3 has an internal EDI (Electronic Data Interchange) which supports the office software. R/3 was developed and released to the market after R/2 in 1992. R/2 software is appropriate for main structure environment system apps and R/3 for open client/server (customer/service provider) system apps.

The other products developed by SAP can be summarized as APO (Advanced Planner and Optimizer)- BW (Business Information Warehouse)- CRM (Customer Relationship Management)- SRM (Supplier Relationship Management) etc.

2.5.2 NETSIS|LOGO SOFTWARE

According to the LOGO official web site, Logo, which has entered the sector in 1984 for developing application software for personal computers, is one of the biggest application organizations of Turkey. It has been the innovative leader of the software sector in Turkey with the solutions, services and innovations it produces. The products of Logo, which is one of the fastest growing companies of the sector with its distribution network and more than 800 agencies, are used actively in more than 85 thousand companies. Logo distributes its products, which are adapted into languages, business practices and legal regulations of many countries in Europe, Middle East, Africa and Asia, to the users via its authorized business partners or fully authorized distributors.

Logo, which has invested in new business models and technologies during its software sector experience of 30 years, added its software products to the scope of Coretech which is one of the leading technology companies in the sector with SaaS applications in the year 2011. In 2013, it merged with WorldBI which develops Business Intelligence software and it gained a great share in the market of Business Intelligence in addition to internet and mobile based technologies. Attendance of Netsis, one of the important players in the local software sector, in September 2013 has strengthened the competitor position of Logo in the Turkish market. The sales activities which will provide strategical contribution continued in 2014 too. In 2014, Logo Electronic (e-Logo) was acquired. e-Logo has product and service portfolio which allows companies to adopt the electronic commerce in the best, fastest and easiest way.

2.5.3 CANIAS ERP (IAS: Industrial Application Software)

According to the CANIAS official web site, this company was founded in Germany in 1989. It has had great success in export of corporate solutions. CANIAS ERP is the only Turkish ERP software which is used in six languages in totally nine countries including Germany, Austria, France in particular. It includes modules such as logistics, production and capacity control, accounting-financing, actual costing, customer relations management, human resource management, document management, maintenance management, EDI (Electronic Data Transfer) and corporate records (Balanced Score Cards). Its infrastructure, which was created by thinking in details, makes it easy to use and diminish the costs of consulting and training.

CANIAS ERP's modular structure gives important advantages for development of the enterprises. Thanks to its flexible modular structure, it is possible to integrate the applications in the system in time. Therefore, you can install the system according to your needs and priorities in the first installation and you can integrate new modules to the system in parallel with your development.

2.5.4 ORACLE

According to the ORACLE official web site, it is one of the first three players in the world market. It also has an important market share in Turkish ERP market (ias.com.tr). ORACLE, which is widely known with its database solutions, has an ERP package identified as "Oracle E-Business Suit". Oracle is the second of the ERP market in the world and it has made a serious attack against SAP by acquiring Peoplesoft (JD Edwards) which is on the third rank. It has approximately 200 installations in Turkey.

Relational Database Management Systems-RDBMS are the programs in which great amount of data are kept safely, the information can be accessed quickly, the information can be kept in integrity and more than one users can access the information at the same time. ORACLE database is also a RDMS.

2.5.5 MICROSOFT DYNAMIX AX

According to the official web site Microsoft, Microsoft Dynamics AX, within the Microsoft Dynamics family of solutions, is a highly effective ERP solution that meets the needs of any large-scale organization. With its many advanced features, powerful architecture, and the advantages it offers, Microsoft Dynamics AX adds value to businesses that see technology as a competitive weapon. One of the key benefits of Microsoft Dynamics AX is that it offers all the functions and features that a agile and competitive organization would need in a "package."

2.6 ERP SYSTEM MODULES

In general, ERP modules are as follows (Hossain, Patrick and Rashid, 2002):

- a. Material (Stock) Management
 - b. Sales and Distribution Management
 - c. Quality Management
 - d. Human Resources Management
 - e. Finance Management
 - f. Production Planning and Control Management
 - g. Supply Chain Management
 - h. Purchasing Management
- a. Production follow up module:** It is a module which generates fast, effective and automatic results in creation of the production plans, storage the realized production data and provision of continuation of the activities in all of these progresses. In particular, comparison of the realized and planned data becomes the only work remaining after processing the production models and entering the main data into the system. The ERP system allows to report the requested data according to any search and ranking criteria when it is programmed. It especially removes the possible human errors in calculations and processes.

- b. Purchase module:** All data about purchases are kept in this module. All activities from the purchase information to the purchase specifications and product features, from the offers to the orders, from the contracts to the applications and the purchase supplies are automatically, quickly, reliably and smoothly made in this module. In addition, the evaluations about the suppliers, supply durations and the factors in the supply chains are followed with this module.
- c. Material management module:** It gives very importance traceability advantages especially in creation of BOM (Bills of Materials) data, obtaining the amount data in the purchase decisions, keeping storage and inventory records and tracking all of these.
- d. Quality control module:** This is the module in which the quality conditions are controlled, all control data are recorded, and the results of the quality data are kept in order to check whether the products meet the determined quality conditions. Especially for producing a product, traceability and the quality data of that product is kept in this module. It gives very important advantages in access to the retrospective data.
- e. Sales and distribution management module:** It gives very importance advantages in especially realization of the sales, tracking the order data, making shipment planning, tracking the distribution channels, realizing the sales in a timely and requested manner, tracking the distributed products and making the recall activities. In particular, it makes very important contributions for automatically accessing all sales data in a recall situation and for providing traceability of the product, although the product does not belong to the enterprise anymore, in terms of time, quality and other factors.
- f. Financial accounting module:** It gives very important advantages in tracking of all financial data of the enterprises regarding the financial infrastructures, keeping continuous and actual records, realizing the activities on the investment

decisions, meeting the short, medium and long financial needs and the payment plans.

g. General accounting module: It covers all of the records about accounting, the information in the customer database, payment plans, receivables and collections, checks and the other financial applications. Receivables of the personnel, payroll transactions and the other financial records are kept in this module.

h. Human resources module: This is a module which can be actively used for determination of the training needs, creation of the training plans, keeping the training records, determining the criteria of employment, keeping the interview results and all resumes. It gives very important advantages in continuous development of the human resources, determination of the abilities and storage of the data regarding all of these processes.

2.7 HOW IS THE ERP SYSTEM INSTALLED AND COMMENCED?

How an ERP system is implemented in an organization occurs in the following steps, respectively (Köstence, 2009). These steps are given below and also explained in detail.

- i. Project preparation stage,
- ii. Determination of the project team,
- iii. Software selection,
- iv. Consulting company selection,
- v. Hardware and infrastructure preparation stage,
- vi. Current system analysis,
- vii. Conceptual design stage,
- viii. Detailed design stage,
- ix. Test stage,
- x. Stage of end user trainings,
- xi. Go-live preparation stage and

- xii. Go-live start and use stage.

2.7.1 Project preparation stage

The first stage of the ERP system installation must be commenced by checking whether the enterprise needs the ERP package. Because passing to the ERP application is a process which is expensive and long. The enterprises act without knowing what to do in this process. Generally, the consultants carry all the load in the application stage. Actually, this is not the consultant company's, but the enterprise's own project. The enterprise must assign a person who is experienced in ERP application as project manager when it decides to pass to the ERP project. The project manager must be fully authorized in the company. When required, the persons who manage the enterprise must act in accordance with the requests of the project manager. For realizing this, regular informational meetings must be made during the project. The project plan and the budget of the project must be reviewed in these meetings.

2.7.2 Determination of the project team

The first job of the project team manager must be to create a project team. The appropriate people in the enterprise must be determined as key users and new staff must be employed for supporting the insufficient departments. The project team to be determined must consist of the people who are experienced in the related departments, have the ability of analytical thinking and follow the technology closely. The most experienced person of the related department being a member of the project team means that the related person will give an important part of his/her time to the project works. This is not a situation desired by the department manager. Although the department manager is right at some point, assigning this person for the works will give great advantages to him/her in the future. The project member is not grown up as key user although the related department has some difficulties during the project. In addition, this key user will make pressure on the consultants for solving the problems of his/her own department as the person who knows the problems the best. In case that the managers want the project members to spend half of their times in the project and the other half in their own jobs, the project member

will not give the required support to the project without solving the instant problems in his/her own department. In this case, the project members generally take part in the project works only when they are free. Instead of this approach, it will be better to transfer their jobs to the senior ones, which will help the senior ones get more experience and lose their fears of being unemployed after passing to ERP and they will support the project. In addition, the key users' attendance to the project will be provided in a more effective way. Therefore, selection of the key users and making them spend all of their times for the project are of great importance to get the best results from the project.

However, it must not be forgotten that "the enterprises which train their employees about ERP applications are under risk of losing their investments because the consulting companies have great interest in the employees who are well trained on ERP." (Ayağ and Danacı, 2007).

2.7.3 Software selection

Selection of Software: selection must be done by considering the criteria given under the heading "ERP System Selection Criteria". In this selection stage, it is better to take the ideas of the project team.

2.7.4 Consulting company selection

As we mentioned above, this project is not the consulting companies, but your own enterprise's project. The consulting company will only be a tool to reach your target. However, this tool is an important one. Therefore, careful selection is an important factor. The consulting company's experiences and status in the market must be inspected. While inspecting the experiences, the applications in similar sectors must be considered and the ideas of this company must be taken. In fact, the experience of the consulting company is the experience of the consultant to be assigned by it for you. The real experience which will determine your success is the experience of the consultant. The ideas of the other companies can be taken on the most experienced consultants. There may be too much work load on the consulting companies. This may cause not being able to take the

necessary support from the consultants. On the contract to be made with the consulting company, it must be clearly mentioned which consultants will come in which days of the week during the project and the support services.

ERP systems are very complex, and they must be based on many different expertise areas, which means that the enterprise may need to get external support. It is very hard to find good and experienced consultants, therefore making an agreement with a consulting company is not the guarantee of success (Ayağ and Danacı, 2007).

2.7.5 Hardware and infrastructure preparation stage

For the system to be used during the project, the appropriate server, operating system and the database must be purchased, and the system must be installed on these machines by taking the views of the consulting company. The needs of wiring must be considered.

2.7.6 Current system analysis

At this stage, all work processes of the enterprise, the reports taken, approval procedures and the structures of the organization must be documented and the relations between the processes must be determined. In the present situation report, the problems and the improvement suggestions must also be included.

2.7.7 Conceptual design stage

The project team must be trained about the new system before passing to the conceptual design stage. The consultants must review the present situation report and check whether the new system is in compliance with the present structure. Additional software must be planned for the parts of the new system which are not in compliance with this structure. The conceptual design must be documented in detail similarly with the present situation. This report must be carefully read by the enterprise managers and it must be checked which progresses can be done in the new system. The document of conceptual design must be approved mutually by the managers and the consultants.

2.7.8 Detailed design stage

The consultant will make adaptation of the system by working in coordination with the project team. A record book must be created for the critical decisions and applications in the adaptation stage. The relations between modules, additional software, integration with the other systems must also be done in this stage. New work processes are also determined in this stage. The reports to be taken and the outputs are determined and written according to the new work processes. The organization structure must be reviewed with the new processes and the suggestions of change must be presented to the upper management. At this stage, main data such as seller, customer, material and product trees must be created for preparation to go-live. If batch programs will be written for these main data to be entered to the system and the processing data during the go-live, they must be started.

2.7.9 Test stage

The new system arising in the detailed design stage must be tested in this stage. The tests must be given the necessary importance and the test results must be carefully analyzed. Every scenario must be separately reviewed with real data and the results of trials must be reported based on scenarios. The processes which fail in the tests must be reconsidered and corrections must be made. After completion of the process tests, the integrations between the modules must be tested in the same way. The tests of integration between modules must be given more importance than the process tests. All units must take part in the integration tests at the same time, however, the focus point must not only be the modules of the tested units. If there is integration with other systems, the tests must be completed at this stage again.

2.7.10 Stage of end user trainings

After completion of all tests and performance of necessary corrections, the system becomes ready for go-live and training. At this stage, the trainings must be given for the end users to use the system. Not only system introduction must be done in the trainings.

These trainings must also include information on how to realize the jobs and the new work processes to the end users.

2.7.11 Go-live preparation stage

Firstly, the server to be used in the live system must be installed during preparation to start go-live. Then the main data are entered to this system. Prior to one week before starting the go-live, the method of entry of data such as open purchase orders, sales orders, account balances must be determined. These data must be entered to the system before passing to go-live.

2.7.12 Go-live start and use stage

Although the users have been given sufficient information as of passage to go-live, there may be some complexities in the enterprise. The consultants must visit the company more at this stage. An agreement must be made with the consulting company on how much and how the consulting support services must be given.

2.8 DIFFICULTIES FACED DURING ERP SYSTEM ADAPTATION STAGE

Passage to the ERP system is realized after inspecting an enterprise's organizational structure, functions, production or service system. There may be some difficulties as there will be a passage to the ERP system from a traditional enterprise, which will change the organizational structure of the enterprise. In short, these difficulties can be listed as not appropriate environment or product, enterprises not having qualified employees, cost and insufficiency of the consulting companies, difficulty in payments, customers not being able to use the electronic environment, infrastructure problems about the information technologies, entry costs, legal problems and uncertainties, safety and damage risks, not taking support from company owners or the upper management members, problems about technologic infrastructure and the cost of computer technologies (Çağıl and Ergün, 2008).

2.9 ADVANTAGES AND DISADVANTAGES OF THE ERP SYSTEM

ERP system have lots of advantages and disadvantages, but according to system number of these advantages and disadvantages can be changed.

The advantages and disadvantages of the ERP system according to (Hossain, Patrick and Rashid, 2002), are given in this section.

2.9.1 Advantages of the ERP systems

Advantages of the ERP systems are as follows:

- Developed business progresses.
- Easy data access for decision support systems.
- Easy tracking of the work progresses by the employees.
- Less paper works.
- Better information planning.
- Provision of better data verification.
- Increase of performance.
- Developed cost tracking.
- Giving response to the customers in shorter time.
- Better cash monitoring.
- Developed data tracking and ranking.
- Easier adoption to market sales.
- Competition advantage.
- Developed supply management.
- Shared customer database.
- Developed international processes.
- Single data entry.
- Service provider.
- Internet based apps.

2.9.2 Disadvantages of the ERP systems

Disadvantages of the ERP systems can be listed as follows:

- Complex use.
- Very expensive installation.
- Hard to solve problems, if any occurs.
- Very expensive to operate the system.
- Fear of users to make mistake.
- Decrease of self-control on your works.

2.10 COST OF THE ERP SYSTEM AND ITS RETURN OF INVESTMENT

ERP system's installation costs are high. However, a well installed ERP system can return the investment. ERP systems' annual maintenances and trainings also have important place in the investment budgets. However, when the additional values are considered, it is seen that the cost of ERP decreases, and the works go faster.

In a study done by Meta Group and including 63 companies, it was seen that the cost of ERP starts from 500 000 USD for small companies and up to 15 000 000 USD for big companies as total cost of ownership including software, hardware, consulting and training costs (Stein, 1999). In addition, ERP projects may require long, and serious adoption progresses according to the application strategies of an enterprise. According to a research, ERP application duration is 23 months in average (Umble et al., 2003). This duration depends on planned time and budget completion. According to the research done by Meta Group, the ERP applications start to give results after 8th month and this duration can extend up to 23 months. The average annual return is estimated as 1 500 000 USD (Bayraktar, 2007).

3. CASE STUDY

3.1 THE INSTITUTION

The institution, which is the subject to ERP implementation process, is a national R&D center that produces innovative and national solutions for the needs of our country with the studies it has carried out in the areas of information, information security and advanced electronics.

With the feature of being Turkey's most competent R&D center, to provide technological independence in the field of informatics and information security in Turkey carries out technological R&D activities that ensure the security, integrity of military and civilian information and transmission and storage thereof. Our center conducts scientific and technological research at international standards with more than 1700 human resources.

The main activities of our center are Research and Development, Testing and Evaluation, Prototype Production and Training. Our Center has five institutes that have signed hundreds of successful projects in the fields of advanced electronics, information technologies, cryptology, cyber security, software technologies, information security, electronic combat and telecommunication. Apart from the institutes, there are four vice presidencies.

In addition to this, it operates with the principle of providing our country's information and information security needs with unique solutions that meet stakeholder needs rather than with uniform solutions. The technological solutions developed by the Institution exceed the borders of the country and used by North Atlantic Treaty Organization (NATO) countries and many European and Asian countries. With this contribution of our center, our country has become a country that exports solutions in the areas of information and information security and compete with world's giants.

3.2 WHY THE INSTITUTION NEEDS ERP SYSTEM?

With the management change in 2012, suggestions were collected for improvement of the institution, eliminate deficiencies and for more efficient study. The recommendations for improvement, which was collected from the Institutes and the Vice-Presidencies and the units under them, were presented as a report. As a result of this report, studies started under three main headings. The transition to the ERP system was one of these headings.

In the report prepared with the opinions and suggestions collected from the managers, include feedbacks on important issues such as "information systems support" in addition to those related to processes and organizational structure. The issues in these two subjects are summarized below.

If we summarize the views on information system support, it can be said that they are gathered in three points.

- (1) The first one of these; is the existence of more than one "information systems" within the institution, employees have to work both in the project environment (such as *UgNet*) and in the "*İdariNet*" environment, which adversely affects productivity and communication. Almost everyone at this point agrees and it is generally accepted that this situation needs to be corrected in a way that does not undermine security.
- (2) The second point is the usage problems of "business application software" and requests for change related to them. Together with complaints about resolution, these problems are tried to be solved by application developers through existing mechanisms.
- (3) The third point is that the view of some applications such as "project management system" and "configuration management system" to be made with generally accepted ready-to-use application software. It has been reported that the business application software currently being used in this regard is continuously improved and enhanced.

The center is an institution with dynamic structure in the sense of administrative affairs besides R&D work. Especially administrative units such as human resources, accounting, and procurement were using different systems. Because these systems operated independently of each other, the same tasks had to be repeated for different jobs. This was the wasted workforce.

İKYS (Human Resources Management System-*İnsan Kaynakları Yönetim Sistemi*), *SAY2000I* and *HYS* (Expenditure Management System-*Harcama Yönetim Sistemi*) were used separately and systems that make it difficult to follow work because of their separate use. It has been decided to use ERP to execute, measure and report these processes and functions managed in multiple platforms under one roof.

3.3 SAP IMPLEMENTATION PROCESS

In this section SAP implementation process are depicted in detail, respectively.

3.3.1 Project preparation stage

The project preparation phase has been planned and carried out as four phases. These phases; determination of the project team, software selection, consulting selection and hardware and infrastructure preparations.

At the beginning of the project, Project plan has been prepared in MS Project. This plan includes every step. The project's main calendar is generally as in Figure 3.1.

Figure 3.0.1: Project plan calendar

	Task Mod	Task Name	Duration	Start	Finish
1		+ Proje Hazırlık	42 days	Mon 29.04.13	Tue 25.06.13
32		+ Üst seviye modelleme	50 days	Mon 27.05.13	Fri 02.08.13
53		+ Analizlerin Gerçekleştirilmesi	115,49 days	Mon 03.06.13	Fri 22.11.13
87		+ Gerçekleştirme (Sprint 1)	60 days	Fri 22.11.13	Fri 14.02.14
141		+ Başkanlık İK(Bordro)Canlı Geçişi	74 days	Thu 02.01.14	Tue 15.04.14
154		+ Gerçekleştirme (Sprint 2)	106 days	Mon 02.12.13	Wed 30.04.14
207		+ Canlı Hazırlık	161 days	Mon 18.11.13	Fri 04.07.14
233		+ Canlı Geçiş ve Kesin Kabul	189 days?	Tue 01.07.14	Tue 31.03.15

3.3.1.1 Determination of the project team

Determination of the project team is one of the most important stages. The team must have a corporate culture. Apart from that, the unit staff members who will use the system actively will know how to use the system and for what to be used. Because they will analyze the deficiencies and needs better the staff members who will support the project team have been selected from the units.

The project team is composed of two parts. The first one is key users. The second one is the PMO team (project management office).

Key users are selected from the departments because they know processes and needs very well. The PMO team is included in the team, provided they are from the relevant software experienced person or from outside. Because, for a live transition stage or after, a structure that the institution can give its own support is considered.

3.3.1.2 Software selection

ERP systems are the main backbone of the institution. In order to find solutions that are compatible with goals and policies, the right software technologies must be selected at the beginning. It is important that the chosen ERP software is compatible with the operator's existing human resources and information resources. The software selection process includes the following general steps:

- a. **Determination of ERP selection team and manager:** For the selection of ERP software, firstly, the institution selected competent personnel for modules from information systems. Later, a selection committee consisting of unit managers and key users, the related number of the users can be seen in Table 3.1, was established. This selection committee has worked more closely with the team in the information systems to help determine the requests. People who are responsible from module, directly contacted the software companies and they transmitted unit requests. Requests collected from the units are the inputs of the specification to be prepared by the institution. The specification will serve as the

basis for the project in terms of both control and operation in the future of the project. Because it determines the functioning of the entire project, whether the requests are fulfilled or not or whether the need for updating and development of the project is needed.

Table 3.1: Number of users

VYS	Operational Number of Users	Employee Number of Users
Project Management Module	50	900
Product Development Module	50	
Production Module	15	
Customer Relations Module	20	
Business Development Module	15	
Purchasing Module	15	
Warehouse and Inventory Management Module	10	
Human Resources Module	25	
Finance Resources Management Module	15	
Customer Service Management Module	5	
Advanced Reporting Module	10	
TOTAL	230	

b. Requirements analysis of the institution: ERP software selection criteria, in fact, this is the need analysis of the institution. It determines the current and future requirements of the institution. At this stage, the institution first defined itself. The

existing business and information infrastructure of the foundation, the duties, requirements and deficiencies of each unit are clearly defined. Targets have been set for this, including what is mentioned above and what needs to be done in the current situation. Meetings with the units were organized and requirements were analyzed by determining all the requirements, what they were doing at the moment, and the deficiencies in those systems.

- c. Development of Request for Proposal (RFP) Lists:** As a result of the needs analysis of the institution, a systematic list has been prepared to state the areas that the new system intends to see and to expand its capabilities. At the same time, the software to be chosen is also considered as the selection criteria to meet. The lists were created by the direct selection committee and by the help of information gathered from suppliers.
- d. Submission of Request for Proposal (RFP) Lists to suppliers:** This stage carries an invitation to the software suppliers, who are determined to be examined more closely because of the preliminary work being done.
- e. Invitation of supplier companies for promotion:** As a result of the preliminary investigations was remained among three companies. Later, a calendar was set up for organizing meetings with these companies. They are invited to make a demo showing how they can respond to the previously submitted request for proposal lists. At this stage, the selection committee will find the opportunity to see the capabilities, abilities, and competencies of different software at first hand.
- f. Visit of other companies that supplier firm has made an installation:** During the meeting with the software companies, information meetings were held about the transition process by going to other public institutions simultaneously. Information on how effectively the ERP System has passed and how effective it is in use has been obtained from the institutions interviewed. During the six-month period, intensive visits were made to select the most accurate software company for the institution.

- g. Software selection:** The top executive of the institution, defended the need for an ERP and then began to negotiate with ERP companies. Because the above-mentioned items are included in the technical specification during the selection process; Oracle, Microsoft and SAP companies competed, and SAP has received the bid.

3.3.1.3 Consulting selection

After SAP decided, requests were transmitted to the consulting companies. According to this request, companies came to the institution together with the team by preparing for what could be done. They listened to the needs of the units from the end users and informed the information systems SAP team end users about what they could do.

The specification was prepared according to the requests collected from the units. These articles were important for the progress of the project. Because satisfying all the requests meant that it would work smoothly. For this reason, the people responsible for the module had meetings with all units. Information was provided about what the existing systems satisfy and what they needed. Reports from institutes/units were requested for the specification but at this point the information systems team could not get back as they wanted. Then they prepared the articles according to the information they received and sent them to the control. At least they would be able to reach the final form of the articles by adding or subtracting articles on the document that sent to control.

Preparing the articles of the specification was one of the most important steps. Because the whole project will be shaped and progressed according to these articles. In light of this information, visits will be made to other public institutions using SAP and analyze how common they are and how much of the desired features can be met.

a) Project manager

Must have at least five years' experience in project leadership or management.

Must have been project manager in the proposed VYS at least in three projects.

b) Module Leader

The module leader should have at least five years of experience. At least three projects should be realized in the proposed VYS application.

The contractor is obliged to assign at least the specified number of module leaders in the following modules as shown in Table 3.2.

- a. Finance Resources Management 2 (two),
- b. Project Management 1 (one),
- c. Production 1 (one),
- d. Customer Relations 1 (one),
- e. Responsible for both Business Development and Customer Services 1 (one),
- f. Human Resources 1 (one),
- g. Advanced Reporting 1 (one),
- h. Responsible for both Warehouse and Stock, Purchasing modules 1 (one),
- i. Responsible for programming 1 (one),
- j. Responsible for integration 1 (one).

Table 3.2: Contractor project team titles and numbers

Personnel Title	Minimum Number of Personnel	Minimum Total Experience (years)
Project manager	1	5
Module Leader	11	5
Functional Consultant, Programmer	4	3
System administrator	1	5

c) Functional Consultant, Programmer

At least two projects should be realized in the proposed VYS implementation.

It is obligatory for the contractor to appoint at least the specified number of functional consultants in the following modules.

- a. Business Development 1 (one),
- b. Warehouse and Inventory Management 1 (one),
- c. Human Resources 1 (one),
- d. Financial Resources 1 (one).

e) System Analyst

Must have worked as a system analyst for at least five years in the proposed VYS implementation.

3.3.1.4 Hardware and infrastructure preparations

Currently, there are two networks, closed network and open network (internet). Due to data confidentiality, it has been decided to install SAP system like closed systems IKYS, Property Management System (*Mal Yönetim Sistemi-MYS*) in the closed network. However, due to the legal obligation, the use of systems such as SAY2000i and Enterprise Information Management System (*Kurumsal Bilgi Yönetim Sistemi-KBYS*) takes place on the internet side. Therefore, the data will be entered in both systems with the parallel run. (Relevant risks and disadvantages with this situation will be mentioned below.)

The SAP system will be decomposed into three levels and will be built as a database over Oracle. Also, these three steps are divided into two in themselves and it is decided to be kept in separate domains due to data security.

3.3.2 Conceptual & Detailed design stage

The conceptual design stage and the detailed design stage has progressed simultaneously. In this process, conceptual design analysis reports have been prepared. These reports are written design documents which are prepared considering the technical specifications and which provide the general framework of the project to be adapted during the realization stage.

These documents demonstrate the requirements for work to be done and form the basis for configuration, testing and development activities where necessary. With project analysis report;

- a. Business process needs, solution proposals, systems and methods to be used are defined.
- b. How to resolve differences between the Data Management System functionality and business process needs are described.
- c. Development needs are determined.

Separate and detailed reports were prepared for each module. Documents have been updated with revision changes when necessary.

The matching of conceptual design with technical specification was the most important part. Already the conceptual design analysis reports have been created with this mapping. Apart from these reports, "Conceptual Design- Matching with Specification" part was opened in the system to follow all the specification items as shown in Figure 3.2. All the requests are made to be fulfilled so that there is no missing item.

3.3.3 Realization preparations stage

In realization preparations, mapping of technical specification and conceptual design document has been completed. As it shows whether they met all the needs gathered from the units and the processes required, this mapping is an important step before starting to

Figure 3.2: Specification matching in the conceptual design stage

VYS » 2.4 Kavramsal Tasarım - Şartname İle Eşleştirme » All Items »

VYS Search this site...

Lists	<input type="checkbox"/> Şartname No	Başlık	Talep İçeriği	MBIS Açıklama	Karşılandığı Doküman Maddesi
Site Content	6.1.1.1	Genel	Uygulamalar üç katmanlı (istemci-uygulama sunucusu-veri tabanı sunucusu) merkezi mimaride, felaket yönetimi merkezi ile birlikte çalışabilecektir.	Yazıldığı gibi kabul edilmiştir.	Yazılımla İlgili Genel Konular Proje Analiz Raporu 2. Yazılım İle İlgili Genel Şartlar
1.0 Proje Yönetimi	6.1.1.2	Genel	Uygulama sunucuları arasında kullanıcı yük dağılımı otomatik olarak yapılabilir.	Yazıldığı gibi kabul edilmiştir.	Yazılımla İlgili Genel Konular Proje Analiz Raporu 2. Yazılım İle İlgili Genel Şartlar
1.1 Proje Yönetimi - Görev Takip	6.1.1.3	Genel	VYS'deki işlemler mevcut kişisel bilgisayarlardaki Internet Explorer (7.0 ve 8.0) ve Firefox'u (3.5) aracılığı ile çalıştırılabilecek, desteklenen tarayıcılar için VYS'deki programlarda değişiklik gerektirmeyecektir.	Yazıldığı gibi kabul edilmiştir.	Yazılımla İlgili Genel Konular Proje Analiz Raporu 2. Yazılım İle İlgili Genel Şartlar
2.0 Kavramsal Tasarım	6.1.1.4	Genel	Teklif edilen yazılım mevcut kişisel bilgisayarlardaki Windows (7, XP, 2000) işletim sistemleri üzerinde çalışabilmelidir.	Yazıldığı gibi kabul edilmiştir.	Yazılımla İlgili Genel Konular Proje Analiz Raporu 2. Yazılım İle İlgili Genel Şartlar
2.1 Kavramsal Tasarım - Analiz Raporları Gözden Geçirme Formu	6.1.1.5	Genel	Teklif edilen VYS hem LAN (Local Area Network - Yerel Ağ Bağlantısı) hem de WAN ortamında çalışabilmelidir.	Yazıldığı gibi kabul edilmiştir.	Yazılımla İlgili Genel Konular Proje Analiz Raporu 2. Yazılım İle İlgili Genel Şartlar
2.4 Kavramsal Tasarım - Şartname İle Eşleştirme	6.1.1.6	Genel	VYS genişletilebilir şekilde; bakım, öğrenimi, kullanımı kolay ve donanımdan bağımsız olarak tasarlanıp geliştirilecektir.	Yazıldığı gibi kabul edilmiştir.	Yazılımla İlgili Genel Konular Proje Analiz Raporu 2. Yazılım İle İlgili Genel Şartlar
3.0 Gerçekleştirme	6.1.1.7	Genel	VYS, modüller arası veri kullanımını sağlayan ilişkisel bir veri tabanı modeline dayanmalıdır.	Yazıldığı gibi kabul edilmiştir.	Yazılımla İlgili Genel Konular Proje Analiz Raporu 2. Yazılım İle İlgili Genel Şartlar
3.1 Gerçekleştirme - Değişiklik	6.1.1.8	Genel	VYS, modüler yapıda olmalı ve modüller tamamen entegre (bütünlük) olarak çalışmalıdır.	Yazıldığı gibi kabul edilmiştir.	Yazılımla İlgili Genel Konular Proje Analiz Raporu 2. Yazılım İle İlgili Genel Şartlar
4.0 Canlı Kullanım Hazırlıkları					
4.1 Canlı Kullanım Hazırlıkları - Canlı Geçiş Aktiviteleri					
4.2 Canlı Kullanım Hazırlıkları - Veri Aktarım Listesi					
5.0 Canlı Kullanım					
5.1 Canlı Kullanım - Kesin Kabul Senaryo Listesi					
6.0 Diğer					
Takvim					

live system. After the comparison, it is ensured that no specification item is missing, and the countdown started to pass to go-live. This comparison was performed by monitoring on the data management system. In the screenshot shown in Figure 3.3, conceptual design document corresponding to each item of the specification is written, feedback from the consultant firm and the latest status were regularly entered. When it comes to the last step, all the specifications have been examined so that there are no missing items and the transition stage of go-live is reached.

The transition to the live system planned in June 2014 is delayed due to the change in management. New management was waited to make assessments and approve whether the system is really needed. In the process, preparations for passing go-live were continued. The key users who changed with management were the biggest handicap for the project.

3.3.4 Stage of the go-live transition preparation

Preparations for go-live transition have been realized in two stages. These stages continued simultaneously. As shown in Figure 3.4, these stages were followed up under five headings in MS Project. This way, there would be no unfinished works and no step will be skipped.

3.3.4.1 Test stage

Implementations and enhancements made in the realization stage have moved to the quality assurance (QA) system. The test scripts (process steps) that key users have prepared are tested here. The failed steps have been reversed. Incorrect adaptations were corrected and transferred back to the QA system. After all the steps in the test script have been successfully completed, a large part of the transition to the live system has been completed. (Figure 3.5)

Figure 3.3: MS project management

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Apr					
							13	14	15	16	17	18
1		Proje Hazırlık	42 days	Mon 29.04.13	Tue 25.06.13							
32		Üst seviye modelleme	50 days	Mon 27.05.13	Fri 02.08.13							
53		Analizlerin Gerçekleştirilmesi	115,49 days	Mon 03.06.13	Fri 22.11.13							
87		Gerçekleştime (Sprint 1)	60 days	Fri 22.11.13	Fri 14.02.14							
88		Konfigürasyon - BİLGEM	60 days	Fri 22.11.13	Fri 14.02.14							
89		Uyarlamaların yapılması	37,5 days	Fri 22.11.13	Wed 15.01.14							
90		FS dokümanlarının yazılması	37,5 days	Fri 22.11.13	Wed 15.01.14							
91		Test akışlarının oluşturulması	37,5 days	Fri 22.11.13	Wed 15.01.14							
92		Rol/yetkilendirme listelerinin oluşturulması	37,5 days	Fri 22.11.13	Wed 15.01.14							
93		Test ana veri tanımlamalarının yapılması	37,5 days	Fri 22.11.13	Wed 15.01.14							
94		Danışman testlerinin gerçekleştirilmesi	37,5 days	Fri 22.11.13	Wed 15.01.14							
95		Canlı sistem soft-config listesinin oluşturulması	37,5 days	Fri 22.11.13	Wed 15.01.14							
96		Konfigürasyon - KSM	60 days	Fri 22.11.13	Fri 14.02.14							
97		Uyarlamaların yapılması	37,5 days	Fri 22.11.13	Wed 15.01.14							
98		FS dokümanlarının yazılması	37,5 days	Fri 22.11.13	Wed 15.01.14							
99		Test akışlarının oluşturulması	37,5 days	Fri 22.11.13	Wed 15.01.14							
100		Rol/yetkilendirme listelerinin oluşturulması	37,5 days	Fri 22.11.13	Wed 15.01.14							
101		Test ana veri tanımlamalarının yapılması	37,5 days	Fri 22.11.13	Wed 15.01.14							
102		Danışman testlerinin gerçekleştirilmesi	37,5 days	Fri 22.11.13	Wed 15.01.14							
103		Canlı sistem soft-config listesinin oluşturulması	37,5 days	Fri 22.11.13	Wed 15.01.14							
104		Konfigürasyon - İK	37,5 days	Fri 22.11.13	Wed 15.01.14							
105		Uyarlamaların yapılması	37,5 days	Fri 22.11.13	Wed 15.01.14							
106		FS dokümanlarının yazılması	37,5 days	Fri 22.11.13	Wed 15.01.14							
107		Test akışlarının oluşturulması	37,5 days	Fri 22.11.13	Wed 15.01.14							
108		Rol/yetkilendirme listelerinin oluşturulması	37,5 days	Fri 22.11.13	Wed 15.01.14							

Project: TÜBİTAK-VYS v1 Date: M <input type="text"/>	Task		External Milestone		Manual Summary Rollup	
	Split		Inactive Task		Manual Summary	
	Milestone		Inactive Milestone		Start-only	
	Summary		Inactive Summary		Finish-only	
	Project Summary		Manual Task		Deadline	
	External Tasks		Duration-only		Progress	
	Page 1					

Figure 3.4: Go-Live transition preparation

	i	Task Mod	Task Name	Duration	Start	Finish
210			Canlı Hazırlık	158 days	Mon 18.11.13	Mon 30.06.14
211			Veri aktarım çalışmaları	152 days	Mon 18.11.13	Fri 20.06.14
212			Veri aktarım şablonlarının hazırlanması	32 days	Mon 18.11.13	Tue 31.12.13
213			Veri toplama ve temizleme faaliyetleri	127 days	Mon 02.12.13	Sat 31.05.14
214			Canlı sisteme verilerin aktarımının gerçekleştirilmesi	15 days	Mon 02.06.14	Fri 20.06.14
215			Konfigürasyon	10 days	Mon 19.05.14	Fri 30.05.14
216			Canlı sistem soft-config listesinin uygulanması	4 days	Mon 19.05.14	Thu 22.05.14
217			Canlı sisteme konfigürasyonun taşınması	5 days	Thu 22.05.14	Wed 28.05.14
218			Canlı sistem hazırlık kontrolleri	5 days	Mon 26.05.14	Fri 30.05.14
219			Proje Yönetimi	31 days	Mon 19.05.14	Mon 30.06.14
220			Aylık takip raporlarının oluşturulması - Mayıs	2 days	Thu 29.05.14	Fri 30.05.14
221			Aylık takip raporlarının oluşturulması -Haziran	2 days	Fri 27.06.14	Mon 30.06.14
222			Canlı geçiş planının yapılması (cut-over)	5 days	Mon 19.05.14	Fri 23.05.14
223			Son kullanıcı eğitim planının yapılması ve onaylanması	5 days	Mon 19.05.14	Fri 23.05.14
224			Canlı destek organizasyonunu oluşturulması	5 days	Mon 19.05.14	Fri 23.05.14
225			Sistem Yönetimi	8 days	Mon 21.04.14	Fri 02.05.14
226			Canlı sistem kontrolleri	8 days	Mon 26.05.14	Wed 04.06.14
227			Kullanıcı rol/yetkilendirme tanımlamaları	15 days	Mon 19.05.14	Sat 07.06.14
228			Eğitimler	36 days	Fri 02.05.14	Fri 20.06.14
229			Eğitim dokümanlarının hazırlanması	10 days	Fri 02.05.14	Thu 15.05.14
230			Eğitici eğitimlerinin verilmesi	5 days	Mon 26.05.14	Fri 30.05.14

3.3.4.2 End user training stage

End-user training was part of the live-use transition stage. It was necessary to minimize the inconveniences and difficulties that could be experienced after passing to go-live. There were key users, but all the staff should have learned to use the system and they should have informed. The related scope and the required durations of module presentation trainings that the staff should take can be seen in Table 3.3.

Table 3.3: Scope of module presentation trainings

Subject of the Training	Time (hours)
VYS General Introduction	4
Project Management Module	16
Product Development Module	16
Production Module	16
Customer Relations Module	16
Business Development Module	16
Purchasing Module	16
Warehouse and Inventory Management Module	16
Human Resources Module	16
Finance Resources Management Module	32
Customer Service Management Module	16

Advanced Reporting Module	16
VYS Programming	16
VYS System Management	16
VYS Integration	16

First, training was planned. Within this planning, the contents of the training in Figure 3.6 were identified. Modular and unit-based training calendar in Figure 3.7 was created for the end users. Responsible for each module informed all staff about the modules and interfaces that they will use so that they had an idea about the operation of the system.

Figure 3.6: Training contents

No	Senaryo Tanımı	Alt Senaryo Adımları	Süre (saat)	İlgili Birimler	Tekrar Sayısı	Toplam Saat
1	Teklif verilmesi - Proje Alınması	Teklif verilmesi	3	İş Geliştirme - Enstitüler - Bütçe	3	9
		Maliyet öngörüm formu				
		Dış Destekli Proje Açılışı				
		Ürün kodu alınması				
		Sözleşme girişi				
2	İç Destekli Proje Açılması	İç Destekli Proje Açılışı	1	Enstitüler - Bütçe	2	2
3	Proje Planlama - İşgücü İşlemleri	Proje İşgücü Planlaması	2	Enstitüler	3	6
		Gerçekleşen İş Gücü girişi				
		Atandığı proje dışında fiiliyatta çalıştığı proje için işgücü girişi				
4	Satınalma İşlemleri	Talep işlemleri	4	Enstitüler - Satınalma - Ayniyat - Muhasebe	3	12
		Teklif-Sipariş aşamalarının izlenmesi				
		Ana depoya malzeme girişi				
		Enstitü depoya malzeme nakli				
		Fatura girişi				
4	Prototip Üretim ve Sevkiyatı	Proje Kapsamında Prototip Üretim	2	Enstitüler - KRUY	3	6
		Prototip Ürün Sevkiyatı				
5	Proje Hakediş-Faturalama İşlemleri	Proje Hakediş İşlemleri	2	Enstitüler - İş Geliştirme-	3	6
		Faturalama				
6	Proje Raporlamaları	Raporlamalar (Nakit Akış, Gelir Gider vb..)	4	Enstitüler	3	12

Figure 3.7: User training calendar

	10.08.2015	11.08.2015	12.08.2015	13.08.2015	14.08.2015	17.08.2015	18.08.2015	19.08.2015	20.08.2015	21.08.2015	24.08.2015	25.08.2015	26.08.2015	27.08.2015	28.08.2015
	Ptesi	Salı	Çarşamba	Perşembe	Cuma	Ptesi	Salı	Çarşamba	Perşembe	Cuma	Ptesi	Salı	Çarşamba	Perşembe	Cuma
09:00-10:30	Teklif verilmesi - Proje alınması	Satınalma İşlemleri	Proje Planlama-İşgücü İşlemleri	Proje Raporlamaları		Endüstriyel ürün üretim ve satışı	Teklif verilmesi - Proje alınması	Satınalma İşlemleri	Proje Planlama-İşgücü İşlemleri	Proje Raporlamaları	Bakım Onanım	Prototip Üretim ve Sevkiyatı	Altyüklenici İşlemleri	Seyahat İşlemleri	Endüstriyel Hizmet Satışı
10:45-12:00			İzin - Demirbaş İşlemleri		İç Destekli Proje açılması				İzin - Demirbaş İşlemleri			Projeler Arası İç Hizmet Alımı / Malzeme Transferi	Yönetici İşlemleri	Proje Hakediş-Faturalama İşlemleri	
13:30-15:00		Projeler Arası İç Hizmet Alımı / Malzeme Transferi	Seyahat İşlemleri	Yönetici İşlemleri			Yönetici İşlemleri		Seyahat İşlemleri		İç Destekli Proje açılması			Proje Planlama-İşgücü İşlemleri	
15:15-16:45	Prototip Üretim ve Sevkiyatı		Proje Hakediş-Faturalama İşlemleri	Endüstriyel Hizmet Satışı	Altyüklenici İşlemleri		Prototip Üretim ve Sevkiyatı	Projeler Arası İç Hizmet Alımı / Malzeme Transferi	Proje Hakediş-Faturalama İşlemleri			Teklif verilmesi - Proje alınması	Satınalma İşlemleri	İzin - Demirbaş İşlemleri	Proje Raporlamaları

3.3.5 Transition to go-live and use stage

A definite acceptance scenario was created for the transition to go-live , see in Figure 3.8. The preparation of these scenarios was completed with the realization, appropriateness and testing of these scenarios.

Figure 3.8: Definite transition scenarios

Type	Name
<input type="checkbox"/>	Birleştirilmiş Senaryo Listesi
<input type="checkbox"/>	Kesin Kabul Senaryo Listesi FI-FM-AA-CO30032015
<input type="checkbox"/>	Kesin Kabul Senaryo Listesi BI
<input type="checkbox"/>	Kesin Kabul Senaryo Listesi CS-SD
<input type="checkbox"/>	Kesin Kabul Senaryo Listesi_Seyahat
<input type="checkbox"/>	Kesin Kabul Senaryo Listesi-PS
<input type="checkbox"/>	kesin_kabul_senaryolar_hr
<input type="checkbox"/>	MM_Kesin_Kabul_Senaryo_Listesi
<input type="checkbox"/>	PP - Kesin Kabul Senaryo Listesi
<input type="checkbox"/>	QM_Kesin_Kabul_Senaryo_Listesi

As shown in Figure 3.9, all the scenarios were assigned in the related personal data management system. The people to whom the items were assigned the key users in the unit concerned. Each scenario was matched to the relevant specification material. With the completion of these tests, the transition to go-live has been successfully accomplished, with all modules, on 01.01.2015.

Figure 3.9 : Scenario steps to be implemented in transition to go-live

ID	Sorumlu Modül	Senaryo Grubu	Senaryo Adımı	Modül	SAP İşlem Kodu	SAP Belge No	Sorumlu Birim	SAP Kullanıcı	Evre Madde No
Count = 1691									
1	MM	Ana Veri-Malzeme	Malzeme Ana verisi Oluşturma/Değiştirme/Görüntüleme	MM	MM01/MM02/MM03	100000434	Enstitüler, Birimler		BGM1.215, BGM 1.216, BGM 2.63, BGM 2.72
2	MM	Ana Veri-Malzeme	Malzeme kartına doküman vs eklenmesi görüntülenmesi	MM	MM01/MM02	100000434	Enstitüler, Birimler		BGM1.215, BGM 1.216, BGM 2.63, BGM 2.72
3	PP	Ana Veri-Malzeme	Malzemenin MİP ve İş planlaması görünümünün yaratılması	PP	MM01	200001244	ÜRETİM		BGM1.213 - BGM1.214
4	SD	Ana Veri-Malzeme	Malzeme Anaverisi Satış Dağıtım Verileri	SD	MM01/MM02/MM03/ LSMW	100000509	Tasarım &Entegrasyon		BGM 1.217 / BGM2.181
5	SD	Ana Veri-Malzeme	Malzeme Seri Numaraları	SD	MM02	100000057	Tasarım &Entegrasyon / Ön Üretim		BGM 1.217
6	FI-CO-AA-FM	Ana Veri-Satıcı	Satıcı Muhasebe Verileri yaratma/değiştirme/görüntüleme	FI	FK01-FK02-FK03	10155	Muhasebe İşlemleri Sorumlusu		
7	MM	Ana Veri-Satıcı	Satıcı Satın Alma Verileri yaratma/değiştirme/görüntüleme	MM	MK01-MK02-MK03	10562	Satın Alma Ana Veri Sorumlusu		BGM1.215, BGM 1.216
8	FI-CO-AA-FM	Ana Veri-Satıcı	Personel satıcı kartının oluşturulması	FI	ZTBF1034	P000099022	Muhasebe İşlemleri Sorumlusu		
9	FI-CO-AA-FM	Ana Veri-Satıcı	Personel Ana Verisinde Mutemetlik tanımlanması	MM	MK02	P000097418	Muhasebe		BGM1.215
10	FI-CO-AA-FM	Ana Veri-Satıcı	Mutemetlik yazısının eklenmesi ve görüntülenmesi	MM	MK01/MK02	P000097418	Muhasebe		BGM1.215
11	SD	Ana Veri-Müşteri	Müşteri Verileri Yaratma/ Değiştirme/ Görüntüleme /Müşteri Bloke Edilmesi /Müşterinin Silmek Üzere İşaretlenmesi /müşteri anaverisinde natostok kodu isteyip istemediği bilgisi girilmesi	SD	XD01/XD02/XD03/XD05/XD06	110440	İGMİ		BGM 1.217 / BGM2.93 / BGM. 1.32

3.4 DIFFICULTIES IN TO SAP IMPLEMENTATION

a. Interruption of management support;

The senior management changes that took place in the enterprise following the SAP transition decision affected the transition period negatively. The new incoming senior management questioned the decisions taken by the previous management and paused the project. After the change of management, the transition to the planned live system has been shifted by six months.

b. Staff resistance;

The staff accustomed to using old systems were prejudiced against the new system. Instead of systems that are familiar to them and familiar to their use, the new system, which has a different interface and function, has led to the resistance of staff in terms of usage and learning.

c. The inefficiency of training, failure of the management to force the staff to take training;

As mentioned above, another example of the resistance of working personnel is participation in trainings. Training of related modules for all institutional personnel who will use SAP has been organized. However, the staff have been reluctant to train, either not trained or have not effectively listened to their training. The fact that senior management does not show adequate support for education and does not oblige the staff to participate in trainings is another reason for the inefficient training.

d. Failure to perform tests or analysis correctly;

During the testing stage, the requests from the units and the redirection of key users were very important. At this stage, staff change became more frequent, and key users were constantly changing.

First, changes in senior management during the testing stage affected key users. These changes cause key users to leave the project. In the ongoing project, the separation of the project personnel who know the critical points from the project caused some important points to be missed during the test and analysis stage.

Another reason is that it is not possible to collect efficiently the requests collected to write the technical specification, which is intended to be collected at the beginning of the project. Here again, the effects of the staff resistance are visible.

e. Inventories are not under control;

Products that are in-house for projects and are in general use have not been systematically controlled. This problem has been continued after passing to the system. This has also affected other modules and units.

f. Too much staff circulation;

The situation that creates the greatest difficulty during and after the transition to SAP is the surplus of personnel circulation. During the project or after passing to the live system, separation of key personnel from work, or separation of project personnel who have knowledge of the modules in transition, causes the questions to remain unanswered when there is a problem with the system.

3.5 ADVANTAGES AND DISADVANTAGES OF SAP SYSTEM

SAP system have various advantages and disadvantages can be changed in terms of institutions systems. In this section, these advantages and disadvantages are depicted.

3.5.1 Contributions of SAP system to the institution

With one software, all operational processes become manageable. In this way, the work that can be performed once was prevented from being done more than once. Work force

gain and overtime earnings are provided. It was possible to elaborate in terms of role and authority which provides vital data confidentiality for the institution. The staff is only able to access the information contained within her/his authority.

Due to the prevalence of the SAP system, trained personnel, consultants can be obtained quickly. When there is a problem in the process or functioning, there is no difficulty in finding some consultant firm or competent personnel.

User friendly screens are designed.

The reports have begun to be made in much more detail. The processes were reconsidered and improved during the project and many processes and project data that have not been done for years have been documented.

3.5.2 Disadvantages of the SAP system in institution

The project has been a very expensive financial asset to the institution. Some processes in the project have been overlooked and some fiction has been made incorrectly.

After the live-use transition, the product has been tried to be kept alive with high consulting costs.

3.6 COST OF SAP SYSTEM IMPLEMENTATION

The choice of software has been decided as SAP, but the terms of technical specifications have been very important here because the tender procedure is carried out. SAP has gained the tender for providing technical specification requirements.

Consulting Single source type for the company Purchase Performed. Agreement with MBIs as consulting firm provided MA. The cost of Institution for SAP, consultancy and support for one year is 5 179 000 USD. Because it is public institution that provides R&D service, there is no decisive mechanism for the cost to be met.

4. DISCUSSION AND CONCLUSIONS

ERP is an enterprise information management system linking all the functions of an enterprise. ERP system that all business processes and automation are realized on the same software, ensures that valuable information from each process is used in the other without errors and time loss. Information gathered under a single roof can be delivered to the right person at the right time and at the right cost. Thanks to the ERP system, entities can provide great benefits.

The establishment of the ERP system requires a major organizational change. Failed installations; besides the investment in the system, also affects the functionality of the organization. Because the return is very difficult in changes in business processes and plans. Therefore, ERP setup is an important stage that needs to be studied carefully and managed well.

In this study, the process of transition to a SAP-ERP system of a public institution that conducts R&D work in Turkey has been examined. The process of granting the decision to pass to the ERP System and all the events that took place in the process of passing to go-live in the organization are explained.

In this study, the factors that have a relationship of pleasure are: the participation and support of senior management, which is called an important factor in the transition period, business process restructuring, project management, the accuracy of data, training given about the system, employee participation and their support, software / hardware suitability and ERP consulting firm support. It has been observed that these conditions have a significant effect on the transition process.

The most important factor that enables the implementation process and the effective maintenance of the ERP system is the participation and support of senior management and the participation and support of employees were observed with positive and negative events.

The support of the ERP consulting firm, which provides installation, support and training services, also has an important place among success factors. However, this support was not enough. It is necessary for the ERP package to be functional in terms of the company. As it can be understood; both the ERP package and the company from which the package is purchased are important.

The training program is an issue that must be settled on the business processes of the enterprises. Training is necessary for effective use of the system and employees should be trained about the system throughout the installation process. However, the training program was not found sufficient by the companies.

In general, the installation process is not efficient in terms of the institution. Therefore, the benefits derived from the ERP system have not been realized as expected.

ERP systems are very large and complex systems. Therefore, the installation of this system must be carried out in a planned manner. Businesses must realize that transition to the ERP system is an important decision and that this critical transition process must be well managed.

They need to pay attention to the factors that affect the success of the installation; while the success of the installation process of the ERP system provides a competitive advantage in operation; failure of the installation may cause the operator to lose its effectiveness. It is understood that to be able to receive the benefits expected from the system, the operator should expend labor and time by giving the necessary attention to this project.

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