Hacettepe University Graduate School of Social Sciences

Department of Business Administration

Production Management and Quantitative Methods Programme

THE MEASUREMENT OF THE PERCEPTION OF THE RELATIONSHIP BETWEEN CRITICAL SUCCESS FACTORS AND SELECTION CRITERIA OF ENTERPRISE RESOURCE PLANNING

İlknur Sinem SOLER

Master's Thesis

Ankara, 2016

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KABUL VE ONAY

İlknur Sinem Soler tarafından hazırlanan "The Measurement of The Perception of The Relationship Between Critical Success Factors and Selection Criteria of Enterprise Resource Planning" başlıklı bu çalışma, 05/01/2016 tarihinde yapılan savunma sınavı sonucunda başarılı bulunarak jürimiz tarafından yüksek lisans tezi olarak kabul edilmiştir.

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ÖZET

SOLER, İlknur Sinem. *The Measurement of The Perception of The Relationship Between Critical Success Factors and Selection Criteria of Enterprise Resource Planning,* Yüksek Lisans Tezi, Ankara, 2016.

Bu araştırmanın amacı, literatürde en çok atıf alan Kurumsal Kaynak Planlaması seçim kriterleri ile kritik başarı faktörleri arasındaki ilişkinin kullanıcılar tarafından nasıl algılandığını belirlemektir. Literatür taramasının ardından, en çok atıf alan seçim kriterleri ve kritik başarı faktörleri, Dengeli Kurumsal Karne metodolojisi kullanılarak gruplanmıştır. Dengeli Kurumsal Karne metodolojisinin uygulanmasının ardından, seçim kriterleri ile kritik başarı faktörleri birbirleri ile eşleştirilmiş, birbiri ile ilişkili olduğu düşünülen seçim kriterleri ve başarı faktörleri arasındaki algılanan ilişkiyi ölçmek amacıyla, toplamda 16 hipotez oluşturulmuştur. Araştırma için anket yöntemi seçilmiş ve anket soruları, literatürde daha önce kullanılmış hiç bir sorudan örnek alınmaksızın, tamamen bağımsız bir şekilde, yalnızca bu araştırma için oluşturulmuştur. Anket yöntemi sonrasında toplanan veri üzerinde istatistiksel yöntemlerden tanımlayıcı analiz ve korelasyon analizi uygulanmıştır. Araştırmanın sonucunda, seçilen ve sıralanan Kurumsal Kaynak Planlaması seçim kriterleri ve kritik başarı faktörleri arasında algılanan ilişkinin pozitif yönlü olduğu bulunmuştur.

Anahtar Sözcükler

Kurumsal Kaynak Planlaması, ERP Seçim kriterleri, ERP Kritik Başarı Faktörleri, Dengeli Kurumsal Karne, ERP Bulut

ABSTRACT

SOLER, İlknur Sinem. *The Measurement of The Perception of The Relationship Between Critical Success Factors and Selection Criteria of Enterprise Resource Planning,* Yüksek Lisans Tezi, Ankara, 2016.

The purpose of this study is to measure the perception of the relationship between most cited selection criteria and critical success factors of Enterprise Resource Planning. After the literature review has been done, most cited selection criteria and critical success factors have been grouped with the Balanced Scorecard methodology in order to obtain more scientific match of the selection criteria and critical success factors. Following the Balanced Scorecard methodology, the most cited selection criteria and critical success factors have been matched and totally 16 hypothesizes have been formed. The survey questionnaire has been specifically designed for this study. The statistical analyses such as descriptive analyses and correlation analyses have been applied to the collected data. As a result of the research, the perception of the positive relationship has been found between the selected most cited selection criteria and critical success factors of Enterprise Resource Planning.

Keywords

Enterprise Resource Planning, ERP Selection criteria, Critical Success Factors of ERP, Balanced Scorecard, ERP Cloud

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INTRODUCTION

In today's world, with the increase in development of technology and globalization, to keep the business management under control and in order to make more efficient production, the need for computer software began to increase. In order to satisfy the large part of this need, the use of Enterprise Resource Planning (ERP) systems has become widespread. In this research the basis of ERP systems developments and its impacts on business and its benefits to the enterprises have been investigated.

In this research, the definitions, descriptions, application processes, critical success factors and selection criteria of Enterprise Resource Planning system in literature have been discussed. On the other hand, this research mainly investigated the two important parts of Enterprise Resource Planning; selection criteria and critical success factors. These two topics have been investigated in the literature separately. No studies have been found to us in the literature which investigated the selection criteria and critical success factors together although these two were mainly essential for all Enterprise Resource Planning projects. Hence, this research has been done in order to define and show the importance of selection criteria and critical success factors and determine the way and degrees of the relationship between them with the perception of the users.

This research has been divided into three main chapters; ERP Overview, The Determination of Selection Criteria and Critical Success Factors with Balanced Scorecard Methodology, Empirical Analysis.

In the first chapter; general overview of ERP has been done according to literature and industry-specific comments. The definition and the scope of ERP have been discussed with the examples of the industry-specific definitions of ERP system providers, historical development of the ERP has been investigated, latest technology on ERP and the trends such as ERP II and Cloud Computing in ERP has been searched. Major components of ERP have been explained according to the literature review, some of the ERP Software's

of top six providers in Turkey are explained, ERP implementation processes found in literature expanded, reasons and prospects of setting up ERP investigated. Lastly the criticism of ERP according to literature have been discussed.

In the second chapter; with the detailed literature review, the selected selection criteria and critical success factors have been listed according to their number of citations in the literature. Many criteria and factors have been found during the investigation, hence, in order to decrease the number of findings, balanced scorecard methodology has been applied. Information about balanced scorecard methodology also has been given.

In the last chapter; the research has been explained which has been done independently without relying on any other researches, hypotheses of the research have been listed. The target of the research has been determined, preparation process of the questionnaire has been explained which has been prepared without taking any question from any other research. Pilot study, data collection and analysis process have been explained. Statistical analyses have been done such as descriptive analysis and correlation analysis and the results have been transferred.

The results of this research is to expect to measure the perception of the relationship between the selection criteria and critical success factors of ERP from the huge number of criteria and factors. On the other hand, the survey created during this research is expected to be a guide for the future researches not only about the selection criteria and success factors, but also about the future of Enterprise Resource Planning on new technology side with the Cloud based questions.

CHAPTER 1

ERP OVERVIEW

In this chapter, detailed literature review has been done in order to understand the definition and the scope of ERP, with the historical time line of the system and its improvements. Kumar et al. (2003) described the underlying idea of the ERP as using information technology to achieve a capability to plan and integrate enterprise-wide resources, i.e. by integrating the applications and processes of the various functions such as design, production, purchasing, marketing and finance. Some of these functions have been explained under the components of ERP-Modules. Due to the fact that ERP is a software product, the system providers have been listed with the short description and also their determination by the provider perspective have been given. ERP has been investigated with all its aspects, advantages and the criticisms have been also investigated during this research.

1.1. THE DEFINITION AND SCOPE OF ERP

The general definition of Enterprise Resource Planning is; virtualizing all the operational functions of an enterprise, with the data integration which provides an efficient integrated management system.

Aladwani (2001) has made his definition of ERP as, an integrated set of programs that provides support for core organizational activities and listed the activities such as manufacturing and logistics, finance and accounting, sales and marketing and human resources.

According to Jacobs and Weston (2007); ERP is for the businesses to provide external advantages to plan and control the organization effectively, using the internal information to define business processes, organize and standardize the format.

According to Yegül (2002), ERP is a software package for the institutions; providing comprehensive and modular structure from procurement to

distribution of all business processes with the support of integrated data/information management system. It is possible to look into the concept of ERP in three different ways:

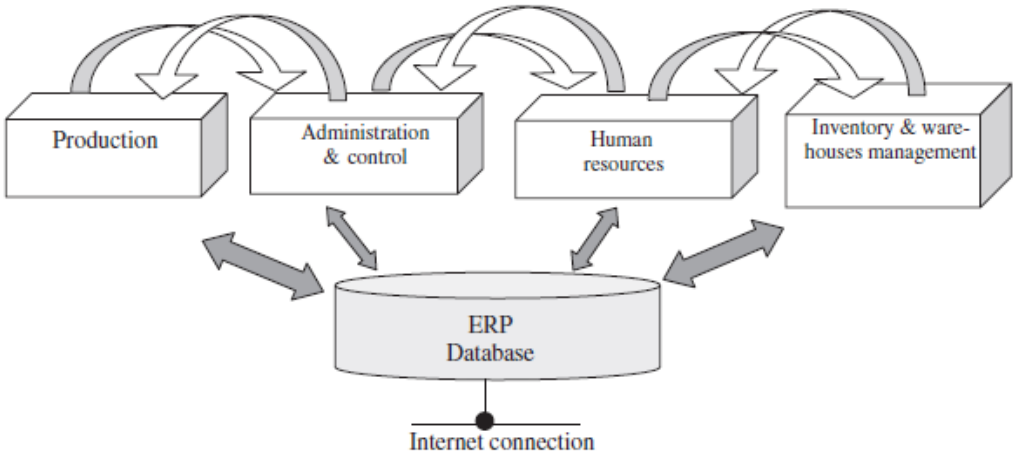
- ERP is a computer software in the form of a commodity that can be bought and sold;
- ERP collects all of the organization's processes and data into a single comprehensive development tool under the integrated structure;
- Offering solutions to business processes is a key element on the infrastructure of ERP (Alican, 2006).

ERP is a set of internal enterprise-wide tools which facilitate better management and integration of production and other back office operations within the enterprise. These tools further provide means for effective interfacing of the aforesaid ‘better managed internal activities’ with front office jobs such as customer/supplier relationship management (Koh et al., 2008).

The Eleventh Edition of the APICS Dictionary (Blackstone and Cox, 2005) defines ERP as a framework for organizing, defining, and standardizing the business processes which are necessary to effectively plan and control an organization so the organization can use its internal knowledge to seek external advantage (Jacobs and Weston, 2007).

According to Wight at the operational level, ERP is a game plan for planning and monitoring the resources of a manufacturing enterprise, including the functions of manufacturing, marketing, finance and engineering which will be seen in the figure 1 (as cited in Loh and Koh, 2004).

Figure 1- ERP- Integrated Architecture



Source: Loh and Koh 2004

ERP concept definitions can be made by different perspective from different angles, ERP can be defined as; for all sectors (telecommunications, retail, media, healthcare, government, etc.) and all operating units (after-sales service, maintenance, human resources, etc.), including companies in all the ongoing flow of information allow for the integration of commercial software (Keçek and Yıldırım, 2009).

ERP's industry specific definitions are mostly made according to the companies' marketing strategies. The definitions according to the leading providers of ERP systems, give an idea on the value of ERP in the sector specified.

SAP's definition is; "ERP is a software that large enterprises and midsize companies trust to manage their business. It achieves real-time insight and enables operational excellence and innovation for the business processes the businesses need – today and tomorrow" (SAP, 2014).

Oracle's ERP definition shows that ERP is developed to the needs of the sector on hand.

"In order to work efficiently companies have to be able to coordinate the

> significant amount of knowledge. Material management (sourcing, inventory holding, logistics), production, accounting and finance, personnel management or sales and marketing, they should be known what to do when and where.
>
> Using the resources and the information of the company to plan efficiently, even in complex companies is possible with suitable software solutions. These solutions serve as the comprehensively control center of the company. In addition to gathering information about the current situation, system generates progress reports relating to different departments and transfers to other departments. Users can update this information in real time, access anytime, anywhere. Such an Enterprise Resource Planning (ERP) solution wraps the company's all business structure.
>
> Every company does not need to the all of these functions. For example, mid-sized companies often will not have integrated controls. Therefore, solutions usually are divided into modules. Specializes in providing solutions such as Oracle, many companies in various industries, in order to respond to the needs of their clients, adapted to specific sectors and also developed modules" (Oracle, 2014).

Microsoft is another ERP software provider. Its place in the ERP sector is a bit narrower than others but the overall product portfolio of the giants of the IT sector is seen according to Microsoft; "Working by connection with your existing technology and providing long-term value when your company grows, Enterprise Resource Planning (ERP) offers a set of easy to use solution. "(Microsoft, 2014).

As a result, ERP software's are providing continuous improvement in performance measures such as; cost, service and speed as well as restructuring business processes, improving customer satisfaction, profitability and productivity through acting and decision support systems which are commercial software that enables effective planning and control (Bayraktaroğlu and Uluköy, 2013).

In the following section, in order to understand ERP deeper, the historical development of ERP and its new technologies are to be discussed.

1.2. THE HISTORICAL DEVELOPMENT OF ERP

The principles of ERP goes back to early 1960's. In those years, classic manual storage method which is based on the concepts of traditional stock was used.

According to Harwood, in this method, each piece in stock ordering and inventory carrying costs were evaluated (as cited in Keçek and Yıldırım, 2009,). After the 1960s, the businesses started to use the computerized systems.

Firstly; inventory control systems, bill of materials and standardized material requirement planning were implemented (Moller, 2005). Developments in 1970s and 1980s continued with the concept of Material Requirements Planning II and Computer Aided Manufacturing.

According to Chung and Synder, the shortcomings of MRP II in managing a production facility's orders, production plans, inventories, and the need to integrate these new techniques led together a necessity to new system (as cited in Al-Mashari et al., 2003). The 1990s moved on with simply increasing the amount of data processed or the speed at which all the processes was done (Edwards, 2001). These processes were not going to significantly help in greater efficiency (Edwards, 2001). However at the end of 1990s, with the need of an integrated structure utilizing all of these systems, ERP systems began to emerge.

Since the 1990s, software developers created ERP/ERP II software, a fuller suite of applications capable of linking all internal processes as well as inter organizational processes such as supplier and customer relations management (Beheshti, 2006).

ERP is combining the basic techniques of Manufacturing Resource Planning (MRP II) systems and Material Requirement Planning (MRP) which is doing the requirement calculations based on bill-of-material for production planning and control (Loh and Koh, 2004). The ERP system differs from the typical MRP II system in technical requirements such as graphical user interface, relational database, use of fourth generation language, and computer-assisted software engineering tools in development, client server architecture, and open-system portability (Koh et al., 2008).

According to Callaway, the biggest development of the ERP system based on

the fear of cyber collapse in 2000 year (as cited in Moller, 2005). Because of this fear, many companies carried the flow of information to ERP systems. With the adaption of "Putting the enterprise system into the enterprise" approach, ERP system has become the new favorite of businesses (Moller, 2005).

Moller (2005) summarized the development of the ERP system functions quite revealingly in table 1;

Table 1- ERP System Functions

Decade	Concept	Function
50	Inventory control system (ICS)	Forecast and inventory management
60	Material requirement planning (MRP)	Requirement calculations based on bill-of-material (BoM)
70	Manufacturing resource planning (MRP II)	Closed-loop planning and capacity constraints
80	Computer-integrated manufacturing (CIM)	Automation, enterprise models
90	Enterprise resource planning (ERP)	Integrated processes

Source: Moller, 2005

The development of ERP continued with ERP II. ERP II is explained in the following section separately as a result of being a new and growing technology.

1.3. ERP II

ERP is a concept still in on-going development process. With the development in the technology; as a next step of ERP, ERP II is getting a place. Although the concept ERP has not completed its development, there are many definitions of ERP II.

The ERP II was a concept originally conceived by GartnerGroup in 2000. GartnerGroup, who also tagged the ERP concept, defines ERP II as: a business strategy and a set of industry-domain-specific applications that build customer and shareholder value by enabling and optimizing enterprise and inter-enterprise, collaborative-operational and financial processes (Moller, 2005).

According to Zrimsek, ERP II is an evolution from ERP that extends business processes, opens application architectures, provides vertical-specific functionality and it is capable of supporting global enterprise-processing requirements (as cited in Koh et al., 2004). Furthermore, ERP II is a business strategy and a set of industry domain-specific applications that build the customer and shareholder value by enabling and optimizing the enterprise and inter-enterprise, collaborative operational and financial processes (Koh et al., 2004).

Moller (2005) defines the conceptual framework of ERP II illustrated in figure 2 which consists of four layers to be elaborated in the following way:

- the core components: the foundation layer;
- the central component: the process layer;
- the corporate components: the analytical layer; and
- the collaborative components: the e-business layer.

These new functions are provided through a combination of best-practice processes and technologies such as product data management, collaboration, visualization, enterprise applications integration, components supplier management, knowledge management, etc. (Huifen and Chiang, 2010).

Figure 2- Conceptual Framework of ERP II and the four layers in ERP II

Layer	Components	
Foundation	Core	Integrated database (DB) Application framework (AF)
Process	Central	Enterprise resource planning (ERP) Business process management (BPM)
Analytical	Corporate	Supply chain management (SCM) Customer relationship management (CRM) Supplier relationship management (SRM) Product lifecycle management (PLM) Employee lifecycle management (ELM) Corporate performance management (CPM)
Portal	Collaborative	Business-to-consumer (B2C) Business-to-business (B2B) Business-to-employee (B2E) Enterprise application integration (EAI)

Source: Moller, 2005

One of the most important reason that ERP II systems are needed in the new economy is the absolute necessity to move data anywhere, at any time, within the company, within the value chain (customers, vendors), with the information that data are up-to-date and accurate, and independent of language, location, and currency (Weston, 2003).

Moller (2005) also emphasize that; ERP II is a new vision that has recently been embraced by ERP vendors, and it will take a while before we are actually able to evaluate the impact of ERP II on industry.

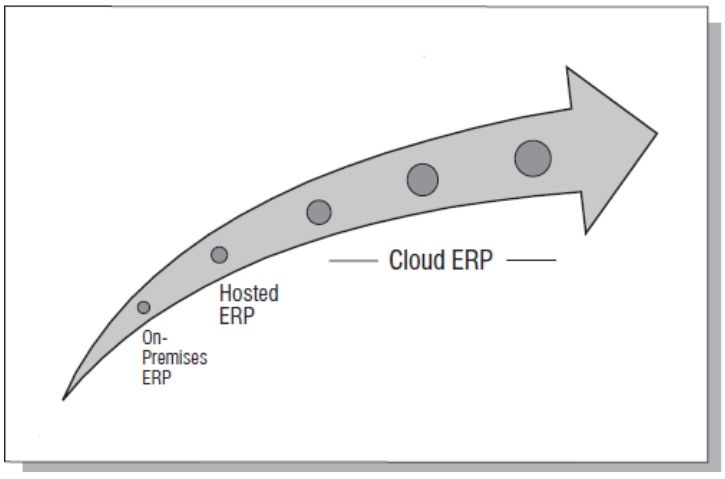
ERP II is the latest and developing version of ERP but not the only one. ERP technology is getting developed on another newest technology which is called

Cloud Computing. In the following section, in order to understand the latest technological development on ERP, Cloud Computing is investigated and transferred.

1.4. ERP IN CLOUD COMPUTING

Technological developments are inevitably effecting the usage way of ERP systems. In the very beginning, there were “working on-promises” ERP which you buy the ERP software license and install it on your in-house hardware. As an another option you buy the software license but the hardware is handled by a third-party company which is called “Hosted ERP”. Nowadays, as an au courant and luminescent technology; Cloud Computing is about to replace physical hardware systems in the companies. Hence, ERP systems are also adapting to popular technology and provide an opportunity to be implemented on Cloud systems.

Figure 3- The Spectrum of ERP Deployment Options



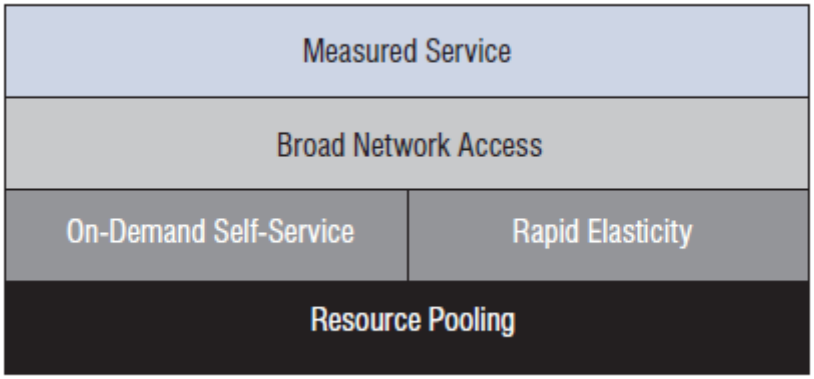
Source: Computer Economics 2012 Report

Before explaining the ERP Cloud, the meaning of the Cloud computing should be defined. There are many definitions of Cloud computing, but it basically refers to delivery of information technology (IT), including software via the public internet or private networks based on Web standards (Symonds, 2012). Cloud

Computing services are delivered in a scalable and secure manner from a remote data center on a “pay as you use” basis, and are categorized into infrastructure services (IaaS), platform services (PaaS) and software services (SaaS) (Singh et al., 2013). ERP Cloud is a member of the SaaS.

SaaS Cloud model is similar to the hosted model except that it has a multitenant scenario. This means that the cloud provider will put many different companies on the same software and servers, with each company’s information separated by software security. The software vendor handles all hardware, maintenance, and upgrades, and the system is accessed through the Internet (Arnesen, 2013).

Figure 4- Five Essential Characteristics of Cloud Computing



Source: Quoted Computer Economics 2012 Report, transfer National Institute of Standards and Technology (NIST), 2011

There are several reasons to use ERP systems in Cloud. On the customer side, it means no upfront investment in servers or software licensing; on the provider side, it means with just one application to maintain, costs are lower compared to conventional hosting (Blauer, 2009). Cloud computing reduces much of the capital expense of equipping a raft of information technologies (IT) for on-site computing (Gould, 2011). Cloud computing can be used to perform proof of concept with new projects without the need to invest in hardware, software and licensing costs by using an existing machine image for the environment you

wish to test (Singh et al., 2013). Also it has scalability, users can be added or reduced as companies needs change, which works especially well for seasonal businesses or companies on a high-growth path (Arnesen, 2013).

Although Cloud is getting popular, there are still some concerns about its disposability for different size companies. According to Kugel (2011), ERP in the Cloud is not for everyone. Larger companies with 1,000 or more full-time employees are unlikely to get a lot of benefit from this kind of deployment for their main system because they are large enough to have an internal IT department that can support on-premises ERP. Smaller companies can have a more sophisticated ERP system in the Cloud even if they do not have the internal IT resources to support it (Kugel, 2011). According to the report of Computer Economics (2012); ERP Cloud market is still immature to extent and confusing. This leads to a situation where both cloud ERP and hosted ERP will continue to have market viability for at least the next several years (Computer Economics Report, 2012).

After ERP, ERP II and Cloud Computing have been discussed, ERP can be investigated deeper with its components in the following section.

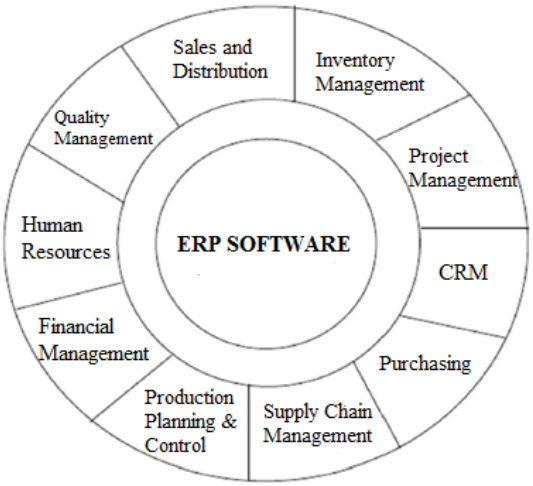
1.5. THE COMPONENTS OF ERP – MODULES

The most basic functions in the ERP system can be considered as; Manufacturing, Finance, Distribution, Human Resources, Sales and Marketing, Inventory Management, Purchasing, Quality and Project Management. In addition to these general corporate transactions, ERP systems support sector-specific functions as well as, patient management in hospitals, student government in universities or high-volume retail store management can be listed (Yegül, 2002).

ERP's modular characteristic enables companies to mount the matched components to their body according to their requirements. In other words, ERP provides a usage at any time the desired functions. Although the components

may be set up independently from each other, all of them fulfill their functions in an integrated structure with each other.

Figure 5- Basic ERP Components



Source: Özgül, 2006

The ERP software providers in the market offers different modules for each user. ERP modules can be sorted in the following way:

1.5.1. Financial Accounting Module

ERP is in the financial departments with its two main parts; Accounting and Finance. Businesses are able to choose separate software packages for accounting and finance.

1.5.2. Production and Logistics Module

Production activities and business processes are kept under control, product supply and product flow records are recorded under this module.

1.5.3. Sales, Purchasing and Distribution Module

Document flow consists of purchase request, offer, order, receipt and invoice. Some of the most important concepts of purchasing implementations are bill verification and pricing.

1.5.4. Human Resources Module

In conjunction with the recent standout of human resources in businesses, Human Resources (HR) modules are incorporated into ERP systems. HR; rather than conventional payroll systems, includes popular concepts such as career planning.

1.5.5. Stock Control and Inventory Management Module

Inventory Control and Inventory Management Module includes all inventory processes from the replenishment of purchased materials to warehouse/store up to the products sold to customers. This component collects all of the information pertaining to inventory, processing and reporting system in the organization.

ERP is explained with its components too in order to understand the system and how it works. In the following section, the market of ERP will be investigated with some of the important ERP vendors and their market shares.

1.6. THE VENDORS OF ENTERPRISE RESOURCE PLANNING

In this section, in order to find out more about the ERP industry, the industry's some of the leading ERP software companies are listed with including brief information.

1.6.1. SAP

SAP is the ERP industry's most developed company which is based in Germany. Established in 1972 and had 24% market share of the ERP worldwide in 2013 (Forbes, 2014), with nearly 50,000 customers in 25 industries, 37 languages and 45 locations (SAP, 2016). SAP ERP can be purchased from SAP directly or via its reselling partners. The core, SAP ERP Foundation, includes functionality for Human Resources and Finance, as well as essential enterprise processes such as Procure-to-Pay, Order-to-Cash, Plan-to-Product, and Request-to-Service. SAP ERP is also available hosted on SAP HANA Enterprise Cloud and through Partner Managed Cloud (SAP, 2016).

1.6.2. Oracle

ORACLE is widely recognized with database solutions and has also an ERP package which is defined as "Oracle E-Business Suite" (Oracle, 2016). Oracle is in the second position of ERP market worldwide with 12% market share (Forbes, 2014). PeopleSoft (JD Edwards) was in the third position, the company and its software are purchased by Oracle in order to make a serious attack against SAP (Erpnedir, 2014). Oracle also offers cloud based ERP systems as Financial Cloud, Project Portfolio Management Cloud and Procurement Cloud, Accounting Hub Reporting Cloud.

1.6.3. Microsoft

Software giant Microsoft has also ERP packages but it is not popular as its competitors in the ERP market with 5% market share (Forbes, 2014). ERP packages are active in Turkey under the Microsoft Dynamics Axapta and Navision names, as a target market Microsoft aims SMB (Small and Medium Size Business) (Microsoft, 2015).

1.6.4. Workcube

Workcube is established in 2001 with providing its customers 100% web-based ERP solution (Workcube, 2016). Completely web-based enterprise software Workcube, offering a platform which is carried out for cooperation and communication activities through a common database from A to Z all business (Erpnedir, 2014). Workcube in past and present, expressed in different categories and definitions of enterprise software solutions can be considered as a complete combination. From this point Workcube's ERP, MRP, CRM, HR, SCM, CMS, LMS, B2B, B2C, Project Management, etc. solution covers all functions in one to one with each other in an integrated manner to the use of corporate needs (Erpnedir, 2014).

1.6.5. Logo

Logo; the leading company in the Turkish software industry, was established in 1984 (Logo, 2016). Logo exported the software abroad and recently launched the java-enabled product "Unity on Demand" (Erpnedir, 2014). Logo ERP has many modules in order to fit the customers' needs such as Accounting and Finance Management, Production Management, Material Management, Budget Management, Project Management, Maintenance Management, Fixed Asset Management, Purchase Management, Demand Management, Supply Chain Management, Customer Relation Management, Foreign Trade, Business Intelligence and Human Resources (Logo, 2016).

Some of the ERP vendors have been identified in order to understand ERP'S competitive market and what is the position of the vendor in ERP software. In order to understand how the ERP Software will be bought and applied, the implementation process is to be explained and discussed in the following section.

1.7. ERP IMPLEMENTATION PROCESS

ERP system is a quite large-scale software which will connect all business functions; hence dealing with ERP is costly and risky business. The company which may need to make changes to its business processes and procedures, customizes the ERP system and becomes dependent on the ERP vendor for support and updates (Velcu, 2010). Therefore, before proceeding with the installation of the ERP system, making a series of analyses to the needs of the company will be appropriate according to the least-cost system selection. After installing the ERP system, expecting quick results would be too optimistic. The system will bring new view to business software, hence, ERP systems that will use the training of staff will have a critical importance in the success of ERP.

In this section, the implementation processes of Enterprise Resource Planning systems are to be discussed.

1.7.1. Necessity Analysis

To think the ERP system will solve all business problems would be a mistake. According to Minahan, the initial stage to begin implementation of the ERP system is to evaluate the percentage of the requirements for that system (as cited in Keçek and Yıldırım, 2009).

Companies should decide which ERP modules they need before choosing the ERP system. ERP system providers have special necessity analysis that they apply for their customers. According to Brunke, some of these analyses are models and configurations which are defined as "best practice" (as cited in Soffer et al., 2005). According to the best proposal, the company as itself or the minimum amendment is adapted to the module. Solutions will be repeated again which is based on the selection criteria applied. This will be according to the character of the business, a detailed questionnaire, and again according to the diversity of issues are addressed. The gap between the system and the company simply ignored the request or the request of the company are shaped by existing solutions (Soffer et al., 2005).

1.7.2 ERP System Selection

During the development process of ERP system, the selection of the appropriate ERP software is critical to be successful. In the selection process, choosing correct criteria will help to make appropriate software selection (Yıldız and Yıldız, 2014).

When implementing ERP modules; the capacity of the system without disrupting business processes within their dimensions, may need to be designed according to the selected ERP system (Soffer et al., 2005). In ERP system selection, implementation and configuration, gap analysis and match analysis which are measuring the necessity of the system should be performed. According to Davenport, these analyses are critical for the success of ERP (as cited in Soffer et al., 2005).

Another method used in ERP system selection is Object-Process Methodology.

According to Dori, with this methodology, modeling language will be selected and suitability for the purpose of system will be evaluated (as cited in Soffer et al., 2005).

1.7.3. ERP System Setup

After deciding to use an ERP system; the capacity of the ERP system will be shaped and company's system integration will be proceeded. The number of module installation steps can vary according to the number of users and amount of data.

In order to have a successful setup in ERP system, there are number of steps that needs to be taken as it was in the selection process. According to Akyol, maximum return on investment aimed at twelve-step system setup and application form are summarized below (as cited in Keçek and Yıldırım 2009);

- Project organization,
- The vision for the new system is based on the identification of performance indicators,
- Meeting organization for detailed initial project plan creation and purification,
- Training of the project team and other key personnel,
- Evaluation of the existing database,
- The establishment of the new hardware,
- Software installation and the establishment of a pilot system,
- Training of users,
- Identification of procedures on new system and arrangements with using pilot system,
- Provision of all data on the business contains accurate information,
- The first component / product / factory operation, making the last setting and to repeat the same process for other components /

products / factories,

- Continuous improvement of the system.

1.7.4. ERP User Training

The phase of a comprehensive education and training is one of the critical success factor, but the success of the system depends on not only education but also the user's position in the system, knowledge and skills (Worley et al., 2005).

As it is mentioned previously, ERP system is costly and requires importance and attention from the beginning of decision making to buy the ERP and its implementation process itself. Hence, the reasons of implementing ERP will be investigated in the following section with the view of literature.

1.8. THE REASONS AND PROSPECTS OF IMPLEMENTING ERP

ERP systems reduce mistakes arising from connection to the same information by different people from different departments to different databases. In addition, ERP standardizes production processes and human resources information and adds financial information to them. Thus, ERP provides information to sales and accounting departments to match and follow each other. ERP software can cover the vital sections of the manufacturing processes and entire business network (Beşkese and Tanyas, 2006).

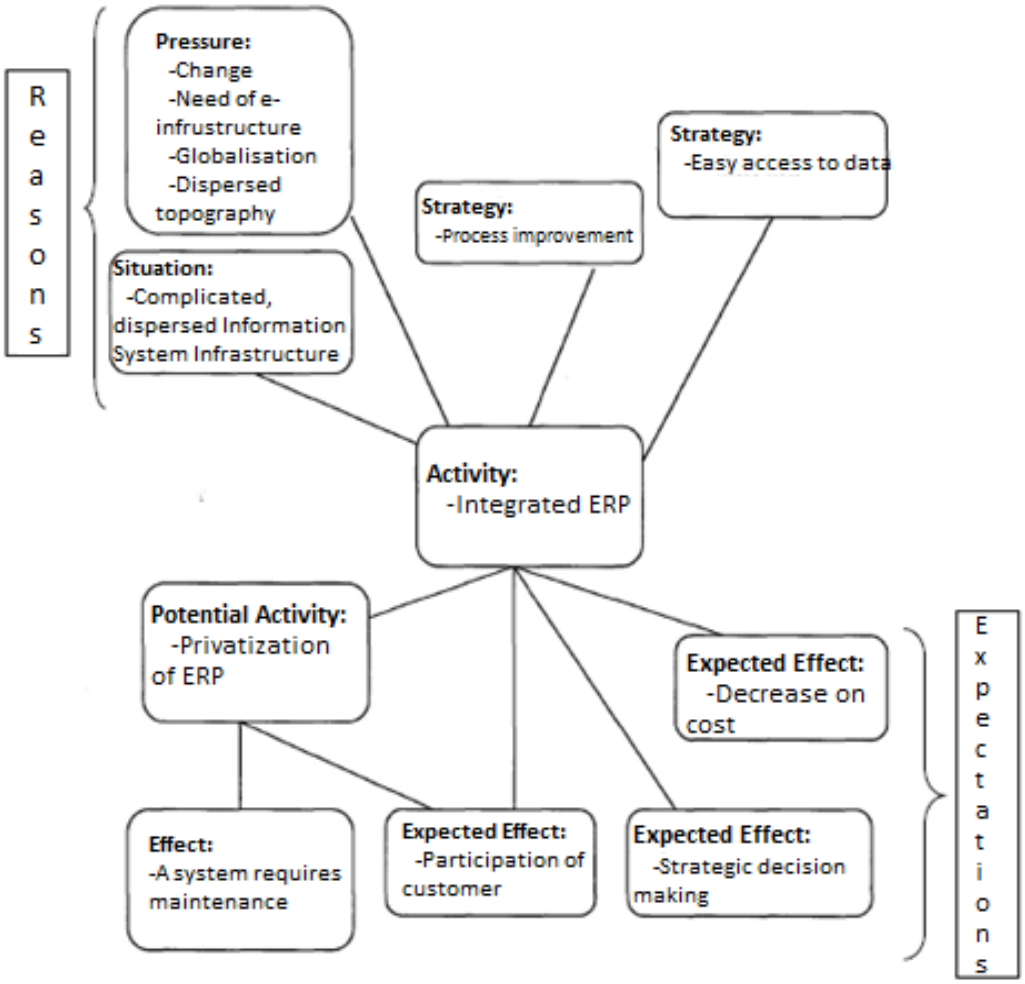
Skok and Legge (2002) attributed to the following reasons as causes of the transition of the company to ERP system:

- Legal systems and Y2K system concerns,
- Globalized business world,
- Increased national and international regulatory environment (e.g. European Monetary Union),
- Reorganization of business processes and the need for

standardization of processes,

- Scalable and flexible client / server operating systems,
- The trend towards cooperation among software vendors, (as cited in Moller, 2005).

Figure 6- The Reasons and Prospects of Set up ERP



Source: Beşkeşe and Tanyas, 2006

The research of Markus et al. (2000) based on the adopters' experiences with ERP, determined the problems and outcomes in ERP projects and also listed the reasons according to the research on 16 companies. Chand et al. (2005)

made a short list in 2005 which divided the reasons into two topics as technical and business:

Table 2: The Reasons for ERP Adoption

Technical Reasons	Business Reasons
Solve Y2K problem	Accommodate business growth
Replace hard-to maintain interfaces	Acquire multi language capability
Reduce software maintenance burden through outsourcing	Acquire multicurrency IT support
Eliminate redundant data entry	Improve inefficient business processes
	Reduce business operating and
Reduce data errors	administrative expenses
	Reduce inventory carrying costs and
Decrease computer operating costs	stock outs
Integrate applications cross-functionally	Eliminate delays and errors in filling customers' orders for merged businesses
Ease technology capacity constraints	Provide integrated IT support
	Standardize procedures across different
Improve IT architecture	locations
Consolidate multiple different systems of the same type	Present a single face to customer
	Acquire worldwide ''available to promise'' capability
	Streamline financial consolidations
	Improve companywide decision support

Source: Chand et al., 2005

1.9. THE PURPOSES AND ADVANTAGES OF ERP

Managing all the business activities with each other in the integration of ERP systems is the primary objective of ERP software (Acar et al., 2004). The purpose of all of today's software systems is the successful results in the financial parameters. Complex and comprehensive structure of ERP systems

are also include the purposes of reducing product costs and increasing profitability (Keçek and Yıldırım, 2009).

According to Holsapple and Sena, some of the objectives in the usage of ERP systems are integration of data and operations, increasing the productivity, standardization of business processes, accurate inventory accounting, and increasing operational flexibility, increasing decision-making speed and supply chain (as cited in Akça and Özer, 2013). ERP software is especially used in the defense, aviation, aerospace, finance, education, insurance, retail, communications, construction industries and capital-intensive activities (Akça and Özer, 2013).

Botta-Genoulaz and Millet's (2005) examinations and compilations conducted on a total of 3,747 small and medium-sized firms in France between 2001-2002. It showed the benefits of ERP systems and process which are listed as bellow:

- Controlling the flow of goods,
- Information flow control,
- Financial flow control,
- Openning services / departments,
- Information reliability,
- The uniqueness of the information,
- Organization description,
- The shared vision within the company,
- Cost control,
- Delivery time control,
- Improvements in customer service,
- Improvement in supplier relationship.

According to Chien and Tsaur (2007); ERP provides features such as real-time information to customers, shorter lead times and on-time completion rate to increase and increases in their performance.

The competition and business life are dominated by speed on all the functions

of an integrated information / data system from procurement to distribution businesses (Keçek and Yıldırım, 2009). Hence ERP is a system which manages the company and it can provide a competitive advantage in the industry.

In various sectors, ERP systems are becoming more widespread applications with the goal of providing integration within the business processes beyond the enterprise to improve the external links and to support the company's value chain activities (Nicolaou, 2004).

Business finance, marketing, production, human resources, organizational departments require a higher level integration in order not to lose their flexibility to work. Organization-wide requirements can be met with ERP system (Keçek and Yıldırım, 2009).

As a result of being that wide software which requires lots of money and time to process, ERP has been criticized with its weaknesses and strengths in the following section.

1.10. THE CRITICISMS OF ERP

One of the biggest criticisms of ERP systems is that the implementation phase of the system requires a long time. Prior requirements of the implementation phase of the integration process are considerably cause delay according to the language used in the program and the compliance with it.

Many applications' module switch process takes more or less six months. Project management problems consistent with the company's large and medium-sized applications and vary according to culture and problems (Jacobs and Weston, 2007).

ERP systems implementation is costly and time consuming. Before implementing the ERP system the management should consider whether it will be successful (Zhang et al., 2005).

According to Stewart, the implementation of the ERP system is still seen as a complex and risky operation because it is a large system in terms of budgeting and delivery time (as cited in Worley et al., 2005).

Enterprise Resource Planning allows enterprises to integrate information from different parts of the business. Despite the high cost of ERP implementation, the probability of failure is high (Ustasüleyman and Perçin, 2010). The cost of ERP systems that have been adapted to the organization and the success rate are low because of the risks have been highlighted in many studies in the literature.

According to Floyd and Zahra, ERP adaptation of information systems in organizations cannot be fully understood the factors affecting the success of the implementation (as cited in Akça and Özer, 2012) and companies do not have appropriate methodology for measuring the ERP systems success (Akça and Özer, 2012).

According to Grabski et al. (2011); culture and people also have an effect on the success of ERP. When people interact with technology and its processes, the results will be unpredictable and not easily described. This will cause a little reduction on the estimations of the success of ERP.

According to Yusuf et al., ERP requires a number of changes in the company's strategical, technological, structural and organizational structure (as cited in Ünğan and Met, 2012). All these are difficult to achieve thus a combination of failures can occur. According to Liang et al., studies indicates the failure rate between %40 and %60 (as cited in Ünğan and Met, 2012).

ERP has been investigated and market information with the vendor perspective is discussed in order to understand how the system works in real life. The modules and implementation process have been explained. In order to see the importance of choosing the right ERP and doing the right implementation, the criticism in the literature is transferred. The next chapter focused on the critical success factors and the selection criteria of ERP.

CHAPTER 2
THE DETERMINATION OF SELECTION CRITERIA AND CRITICAL SUCCESS FACTORS WITH BALANCED SCORECARD METHODOLOGY

In this chapter, Enterprise Resource Planning software's selection criteria and critical success factors have been investigated. The researches that have been found in the literature about ERP, mainly focused either on selection criteria or success factors. No studies have been known to us which measure the perception of the relationship between selection criteria and critical success factors. Balanced Scorecard Methodology has been selected as a scientific methodology in order to group the selection criteria and success factors with a logical and relational way. In this chapter, selection criteria and success factors in the literature have been listed. The implementation of Balanced Scorecard methodology has also been given with the details.

2.1. ERP SELECTION CRITERIA

In the global competitive conditions, ERP raised in strategic significance and choosing the right ERP package has become more important. Choosing the right ERP solution which matches most of the organizational information needs and processes is critical to ensure minimal modification and successful implementation (Baki and Çakar, 2005).

Baki and Çakar (2005) made a research in a Turkish manufacturing company in 2005. According to their literature review and interviews, they identified 17 main selection criteria. In their research; fit with parent/allied organization systems, cross module integration, compatibility with other systems have been identified as the most important selection criteria (Baki and Çakar, 2005).

In the research of Ayağ and Özdemir (2007), they applied to a case study to the analytic network process (ANP) in order to select the best ERP software. For this process, they defined the selection criteria that have been added in the figure 7 and 8.

In Perera and Costa's (2008) research, selection criteria are divided to main and sub-criteria. They determined the main criteria as; business strategy, change management an implement ability, risk, functional fit and flexibility, cost, technology, vendor's position and after sales management (Perra and Costa, 2008). Only the sub-criteria have been added in the figure 7 and 8.

Tsai et al. (2009) explored 13 important selection criteria in their research with top 5000 largest companies in Taiwan. They emphasized that the selection criteria effects the ERP software quality directly and positively.

Kahraman et al. (2010), made a research in order to make the best ERP alternative selection with analytic hierarchy process by using the selection criteria. The criteria that they used have been added in the figure 7 and 8.

Onut and Efendigil's (2010) research divided three selection criteria to sub-criteria. Only sub-criteria have been taken to the research in order to be detailed which have been added in the figure 7 and 8.

In the research of Wieszala et al. (2010) in Poland also examined the ERP system selection process with selection criteria. They divided three clusters of the criteria as functionality features, technical features and vendor factor. Under these clusters, there are fourteen selection criteria which have been added in the figure 7 and 8.

Gürbüz et al. (2012)'s research determines the selection criteria under three title; vendor related, customer related and software related criteria. Sub-criteria have been added in the figure 7 and 8.

Schrödl and Simkin (2014), divided the selection criteria into; functional criteria, non-functional criteria, ecologic criteria. Under these criteria there were different titles, they have been added in the figure 8 and 9.

Figure 7- The Selection Criteria

	Authors											
Selection Criterias	Baki, Çakar, 2005	Ayağ, Özdemir, 2007	Perera, Costa, 2008	Tsai et al., 2009	Kahraman et al., 2010	Onut, Efendigil, 2010	Wieszala et al., 2010	Wachnik, 2012	Gürbüz et al., 2012	Mahara, 2013	Schrödl, Simkin, 2014	
Price - Service Cost	x		x		x		x		x		x	**6**
Functional Requirements - Functionality	x	x				x	x		x		x	**6**
Vendor Reliability		x				x	x		x	x		**5**
System Reliability	x				x	x	x		x			**5**
Service and Support	x	x	x				x		x			**5**
User friendly				x	x		x			x		**4**
Supplier's references	x			x	x			x				**4**
Reduced IT Infrastructure Cost - Set up Cost		x	x		x					x		**4**
Implementation time	x		x				x		x			**4**
Compatibility with other systems	x			x	x				x			**4**
Training Performance		x	x		x							**3**
Technical Aspect	x						x		x			**3**
Purchase cost (implementation service, licence)		x				x		x				**3**
Module completion		x		x					x			**3**
Image of the service provider	x						x				x	**3**
Fit with parent/allied organisation systems	x			x					x			**3**
Easy to maintain		x		x		x						**3**
Domain knowledge of the vendor	x					x			x			**3**
Data Security		x			x					x		**3**
Customization	x								x	x		**3**
Consultancy	x	x		x								**3**
Compliance of client's requirements with functional range of systems					x		x	x				**3**
Better fit with organisational structure	x		x						x			**3**
Vision	x								x			**2**
Upgrade ability		x	x									**2**
Ubiquitous access			x							x		**2**
Stability		x		x								**2**
Scalability on demand								x		x		**2**
Quality					x						x	**2**
Possibility of achieving an indirect economic profit, i.e. process automation, an informing and organising system function.				x				x				**2**
Possibility of achieving a direct economic profit, i.e. profit coming directly from the systems				x				x				**2**
Methodology of software	x								x			**2**
Low Operational Cost					x					x		**2**

Figure 8- The Selection Criteria cont.

	Authors											
Selection Criterias cont.	Baki, Çakar, 2005	Ayağ, Özdemir, 2007	Perera, Costa, 2008	Tsai et al., 2009	Kahraman et al., 2010	Onut, Efendigil, 2010	Wieszala et al., 2010	Wachnik, 2012	Gürbüz et al., 2012	Mahara, 2013	Schrödl, Simkin, 2014	
Innovative Business Processing					x		x					2
Flexibility in adjusting demands according to business requirements				x			x					2
Data backup and Recovery		x								x		2
Consultant Expenses		x				x						2
Competitive Position					x				x			2
With a complete mechanism of internal auditing				x								1
Web application					x							1
Strategic Alignment							x					1
Standardization		x										1
Service Survival										x		1
Service Level Agreement Cost								x				1
Resistance to change										x		1
Real-time online inquiries and reporting functions				x								1
R&D capability		x										1
Providing best practices				x								1
Portability						x						1
Platform Independence										x		1
Performance					x							1
Perceived lack of control										x		1
Multilevel User Flexibility					x							1
Maintenance Cost		x										1
Low IT Manpower										x		1
Interoperability										x		1
Integration of legacy systems		x										1
Flexible Payment										x		1
Financial and Organizational Capabilities							x					1
Efficiency						x						1
Easy of operations		x										1
Easy of learning		x										1
Easy of in-house development		x										1
Ease of integration		x										1
Configuration					x							1
Cloud based services											x	1
Availability										x		1
	16	**22**	**8**	**14**	**17**	**9**	**14**	**7**	**16**	**17**	**5**	**145**

2.2. THE CRITICAL SUCCESS FACTORS OF ERP

In this section, the critical success factors of ERP has been discussed according to the detailed literature review, they have been examined, compiled and listed.

Researches show increase on the success rate of ERP system implementation, despite Buckhout et al. (1999) showed that 70% of the companies' ERP implementation projects failed to reach their goal. This failure rate showed that the critical factors that affect the success of ERP implementation should be evaluated much better (Loh and Koh, 2004).

Somers and Nelson (2001), evaluated the critical success factors in 86 organizations and found 22 factors which have been in other researches. The results have been added in the figure 9, 10 and 11.

In the company which ERP systems implementation will be made, the people involved in the system must be positioned carefully. Unsuccessful operational structure can cause; undone accumulation in the system and using the system in pieces. Using local information systems rather than ERP systems can reduce the efficiency of ERP (Worley et al., 2005).

Zhang et al (2005)'s four case studies on assessment of critical success factors have been added in the figure 9,10 and 11 which were on four different companies in China that were using the same ERP system.

For the success of ERP systems; system adaptation and the system itself as well as users should be considered and planning should be done by considering a combination of both sides. Users should be allowed to ask questions during the installation phase, and their participation should be ensured during system setup (Worley et al., 2005).

Beheshti (2006) determined the most important success factors for ERP implementation which include top management support, effective project management, extensive user training, and viewing ERP as a business solution.

Chien and Tsauri (2007) made a survey in three high-tech companies in Taiwan in 2007, working in over 204 different ERP users. The most important factors affecting the success of the ERP were found to be system quality, service quality and information quality. All these factors which affect the user satisfaction are highlighted that they indirectly affect the net benefits. Hence users' satisfaction can be added among the critical success factors.

In the research of Mexican Enterprises, Garcia-Sanchez and Perez-Bernal (2007) summarized the critical success factors according to the literature research and applied to the 48 enterprises. As a result; they found additional factors and added them into their research. Their results is also imposed to the figure 9, 10 and 11.

According to the case study of Woo (2007) with a company in electronics-manufacturing sector in China, the critical success factors specified. The results of the research have been added in the figure 9, 10 and 11.

According to Ustasüleyman and Perçin's (2010) survey on 114 enterprises in 2006; project management, consulting and planning activities and internal audit activities were found to have an impact on the success of the ERP.

Based on the results of Tsai et al.'s (2011) survey on 207 firms which are using ERP in Taiwan; internal and external factors affecting the success of the ERP are; user satisfaction, top management support, business plan and vision, system quality and information quality respectively.

Upadhyay et al. (2011)'s research with 98 small and medium scale enterprises from Indian manufacturing organizations showed the critical success factors and their impacts.

Based on the results of Akça and Özer's (2012) survey which has been conducted with 236 firms by Technology Acceptance Mode; perceived benefits, perceived ease of use, the success of ERP applications and the perceived impact on organizational performance have been found. In addition, their survey in 2013, as a result of factor analysis on the evaluation; user satisfaction and

perceived usefulness of the critical factors affecting the success of the ERP system was observed.

Norton et al. (2012) ascertain the critical success factors for ERP II, but they emphasize that the critical success factors are also covering ERP. They divided the critical success factors according to people, process and technology related. According to this comment, their research has also been added in the figure 9, 10 and 11.

In 2012, Sahul and Tauber (2012) made a research and explored 94 theoretical critical success factors. According to their interviews and surveys, the eliminated top 10 most important factors have been added in the figure 9, 10 and 11.

Ahmad and Cuenca (2013) made literature review and industrial survey, in addition interviewed with eight people from industry and academia to identify the critical success factors. They examined 33 critical success factors, which have been added in the figure 9, 10 and 11.

According to the analysis of Bayraktaroğlu and Uluköy's (2013) survey showed that senior management, the distance between CEO, information technology expert and the growth in business process were found to have an effect on the success of ERP implementation success.

Figure 9- The Critical Success Factors

	Authors																		
CSFs	Somers, Nelson, 2001	Loh, Koh 2004	Zhang et al. 2005	Beheshti, 2006	Chien, Tsaur 2007	Woo, 2007	Garcia-Sanchez, Perez, 2007	Ustasüleyman, Perçin 2010	Tsai et al, 2011	Upadhyay et al., 2011	Akça, Özer 2012	Norton et al, 2012	Shaul, Tauber, 2012	Akça, Özer 2013	Bayraktaroğlu, Uluköy 2013	Tekbaş, Ömürgönülşen, 2013	Ahmad, Cuenca, 2013	
Top Management Support	x	x	x	x		x	x		x	x		x	x		x	x	x	**13**
Project Management	x	x	x	x		x	x	x		x		x	x			x	x	**12**
Business Plan and Vision		x	x				x		x			x				x		**6**
Effective Communication		x	x			x	x			x					x			**6**
Change Management	x					x	x			x		x	x					**6**
ERP Teamwork - Project Team		x				x	x					x					x	**5**
Selection of ERP - ERP System Selection	x						x			x		x	x					**5**
User training on software	x						x			x			x				x	**5**
User Satisfaction			x		x				x					x				**4**
Software Development, Testing and Repair		x	x				x						x					**4**
Project champion	x						x			x							x	**4**
Perceived Usefulness			x								x			x				**3**
Consulting-Planning Activities								x				x				x		**3**
Training and job redesing				x		x						x						**3**
Implementation strategy and timeframe												x	x				x	**3**
Project team competence	x									x			x					**3**
Clear goals and objectives	x									x							x	**3**
Business Process Reengineering	x						x										x	**3**
Perceived Organizational Performance			x										x					**2**
Changing Business Program and Culture		x										x						**2**
Imaging Performance and Evaluation		x										x						**2**
System Quality					x				x									**2**
Information Quality					x				x									**2**
Software and Hardware Compliance with ERP												x				x		**2**
Empowered decision makers												x					x	**2**
Interdepartmental cooperation	x																x	**2**

Figure 10- The Critical Success Factors cont.

	Authors																					
CSFs cont.	Somers, Nelson, 2001	Loh, Koh 2004	Zhang et al. 2005	Beheshti, 2006	Chien, Tsaur 2007	Woo, 2007	Garcia-Sanchez, Perez, 2007	Ustasüleyman, Perçin 2010	Tsai et al, 2011	Upadhyay et al., 2011	Akça, Özer 2012	Norton et al, 2012	Shaul, Tauber, 2012	Akça, Özer 2013	Bayraktaroğlu, Uluköy 2013	Tekbaş, Ömürgönülşen, 2013	Ahmad, Cuenca, 2013		
Interdepartmental communication	x																x	2	
Management of expectations	x																x	2	
Vendor support	x																x	2	
Data analysis & conversion	x																x	2	
Dedicated resources	x																x	2	
Use of steering committee	x																x	2	
Education on new business processes	x																x	2	
Minimal customization	x									x								2	
Partnership with vendor	x												x					2	
Use of vendors' tools	x																x	2	
Use of consultants	x																x	2	
Having external consultants							x			x								2	
End users involvement							x						x					2	
To facilitate changes in the organizational structure, in the "legacy systems" and in the IT infrastructure							x										x	2	
Project composition - Formalised project plan/schedule										x							x	2	
Monitoring and evaluation progress													x				x	2	
Adequate ERP software selection													x				x	2	
Ease of Use											x							1	
Growth in Business Process															x			1	
Quality of Service					x													1	
Internal Audit Activities								x										1	
Consultant selection and relationship												x						1	
Post-implementation evaluation												x						1	

Figure 11- The Critical Success Factors cont.

	Authors																				
CSFs cont.	Somers, Nelson, 2001	Loh, Koh 2004	Zhang et al. 2005	Beheshti, 2006	Chien, Tsaur 2007	Woo, 2007	Garcia-Sanchez, Perez, 2007	Ustasüleyman, Perçin 2010	Tsai et al, 2011	Upadhyay et al.,, 2011	Akça, Özer 2012	Norton et al, 2012	Shaul, Tauber, 2012	Akça, Özer 2013	Bayraktaroğlu, Uluköy 2013	Tekbaş, Ömürgönülşen, 2013	Ahmad, Cuenca, 2013		
Post-implementation evaluation												x							1
Troubleshooting/crisis management												x							1
Legacy system consideration												x							1
Viewing ERP as a business solution				x															1
Architecture choices	x																		1
User Knowledge										x									1
Project Cost										x									1
Information flow management										x									1
Vendor's staff knowledge										x									1
Good projectscopemanagement																	x		1
Cultural change/political issues																	x		1
Experienced projectmanager-leadership																	x		1
Trust betweenpartners																	x		1
Managing consultants																	x		1
Software customisation																	x		1
Software configuration																	x		1
Appropriate technology																	x		1
Reduced troubleshooting-projectrisk																	x		1
Carefully defined information and system requirements																	x		1
Data management																	x		1
Environment													x						1
	22	**8**	**8**	**4**	**4**	**6**	**14**	**3**	**5**	**16**	**2**	**17**	**14**	**2**	**3**	**5**	**34**	**167**	

2.3. THE DEFINITION OF BALANCED SCORECARD

The concept of a Balanced Scorecard (BSCARD) was developed by Kaplan and Norton to develop performance objectives and measures linked to strategy in 1992 (Kaplan and Norton, 2001). In other words, it is used to include both financial and non-financial measures for the estimation of the state of the organization (Lin et al., 2006). According to Chang et al. (2011), BSCARD is a concept for measuring whether the micro operational activities of a company which are aligned with its macro objectives in terms of vision and strategy.

According to Rosemann and Wiese (1999), the BSCARD is a framework originally developed in order to structure the performance measurement of an enterprise or a department. According to Edwards (2001), BSCARD feeding of ERP provides management with visibility into operations and issues of all business units and enables them to easily monitor and understand how organizations are progressing the plan.

According to Martinsons et al., the BSCARD is grouping the wider range of effects of ERP (as cited in Rosemann and Wiese, 1999) as it originally consists of four perspectives: financial, internal processes, customer, and innovation and learning.

The four perspective are seeing the business in a different way; the financial perspective measures the ultimate results that the business provides to its shareholders. Customer perspective focuses on customer needs and satisfaction as well as market share. Internal perspective focuses attention on the performance of the key internal processes which drive the business. Innovation and learning direct attention to the basis of all future success – the organization’s people and infrastructure (Edwards, 2001). On the other hand according to Fang and Lin (2006); the adoption of measures from the four quadrants are not mandatory, rather it is the need to establish measures that link to an organization’s strategy.

Few researches have been found during the literature review which use the BSCARD methodology in different investigations on ERP, but mostly focus on the success factors and in order to analyze the business performance. Velcu (2010) applied BSCARD methodology into his research in order to analyze business performance during an empirical investigation on ERP implementation process. According to Velcu (2010), BSCARD perspective provided a multidimensional view of performance through the listed four perspectives.

In the research of Mansor and Bahari (2010), BSCARD methodology has also been applied in order to evaluate the benefits of enterprise resource planning with its 4 dimensions.

On the other hand, it has been found in the literature that, during the implementation of BSCARD methodology into ERP, there were few researchers who added the fifth perspective into the Balanced Scorecard, according to the range of their research. There were many examples on different topics but for an example of the research on ERP, Rosemann and Wiese (1999) added ‘project perspective’ as the fifth perspective into the Balance Scorecard implementation in their research which was measuring the performance of ERP software. Also Rosemann and Wiese (1999) advised that, with the both traditional perspectives of evaluation, the Balanced Scorecard can be extended to cover control of ERP software use. Hence this research follow their advice and added “technology perspective” a new perspective into Balanced Scorecard methodology which is explained in the implementation part.

2.4. BALANCED SCORECARD METHODOLOGY IMPLEMENTATION

The purpose of this research is to measure the perception of the relationship between the selection criteria and success factors of ERP, hence, the selection criteria and success factors are chosen from the literature according to the frequency that they have been mentioned in literature. A total of 67 selection criteria and 69 success factors are listed in this research. As the number of selection criteria and success factors were too many and hard to evaluate,

Balanced Scorecard (BSCARD) methodology has been used in order to make a logical group of the mentioned criteria and factors.

According to the BSCARD methodology; the titles of the group of the factors have been listed as Financial, Customer, Internal Processes, Innovation and Learning, and Technology. With the same methodology, the titles of the groups for success factors has been listed as; Cost, Vendor, Internal Processes, Innovation and Learning, and Technology. Technology title has been added additionally to the BSCARD groups for this research. As it is realized some titles of the groups are different for the success factors and selection criteria, on the other hand they have been related to each other as; financial (before the buying process which is related with selection) / cost (after the buying process which is related with the success) and customer (before the buying process, who is the chooser that has been doing the selection) / vendor (after the buying process whose product has been used and which is related with the success), the rest of the group titles are the same.

The relation between the selection criteria and success factors has been built according to their meanings, coverage and the citation numbers in the literature. The criteria and factors with the highest citation numbers were matched with each other in order to measure the perception of the relationship between each other. On the other hand there were factors which have same number of citation and similar name but different coverage such as; system quality and information quality. For doing the match of quality in selection criteria, system quality has been chosen instead of information quality as success factor.

Vision in selection criteria has been matched with business plan and vision in success factors, in order to see the relation of the same ideas in different perspective. Also business plan and vision had high citation in the literature. On the other hand, top management support was not taken into the hypotheses as a result of not being able to make any connection between the listed selection criteria in internal process.

The grouped selection criteria and success factors by the BSCARD

methodology with the number used in the literature have been listed on the table 3, 4, 5, 6 and 7. The marked selection criteria and success factors with star have been related to each other and chosen for the further investigation. In addition, the hypotheses of this research which have been explained in the following chapter, have been built on them.

Table 3- BSCARD Implementation Group Financial/Cost

Selection Criteria		**Success Factors**	
Financial / Cost			
Price - Service Cost *	6	Project Cost *	1
Reduced IT Infrastructure Cost - Set up Cost	4		
Purchase cost (implementation service, license)	3		
Possibility of achieving an indirect economic profit, i.e. process automation, an informing and organizing system function.	2		
Possibility of achieving a direct economic profit, i.e. profit coming directly from the systems	2		
Low Operational Cost	2		
Consultant Expenses	2		
Service Level Agreement Cost	1		
Maintenance Cost	1		
Flexible Payment	1		

Table 4- BSCARD Implementation Group Customer/Vendor

Selection Criteria		**Success Factors**	
Customer / Vendor			
Vendor Reliability	5	Selection of ERP - ERP System	5

		Selection	
Service and Support *	5	Consulting-Planning Activities	3
Supplier's references	4	Vendor support *	2
Image of the service provider	3	Partnership with vendor	2
Domain knowledge of the vendor *	3	Use of vendors' tools	2
Consultancy *	3	Use of consultants *	2
Competitive Position	2	Quality of Service	1
Providing best practices	1	Consultant selection and relationship	1
Availability	1	Vendor's staff knowledge *	1
		Trust between partners	1

Table 5- BSCARD Implementation Group Internal Processes

Selection Criteria		**Success Factors**	
Internal Processes			
User friendly*	4	Top Management Support	13
Compliance of client's requirements with functional range of systems	3	Project Management	12
Better fit with organizational structure	3	Business Plan and Vision*	6
Vision*	2	Effective Communication*	6
Flexibility in adjusting demands according to business requirements*	2	Change Management*	6
With a complete mechanism of internal auditing	1	ERP Teamwork - Project Team	5
Strategic Alignment*	1	User Satisfaction*	4
Resistance to change*	1	Project champion	4
Perceived lack of control	1	Perceived Usefulness	3
Financial and Organizational Capabilities	1	Clear goals and objectives	3

Efficiency	1	Business Process Reengineering*	3
Easy of operations	1	Project team competence	3
		Perceived Organizational Performance	2
		Changing in Business Program and Culture	2
		Imaging Performance and Evaluation	2
		Empowered decision makers	2
		Interdepartmental cooperation	2
		Interdepartmental communication	2
		Management of expectations	2
		Having external consultants	2
		End users involvement	2
		To facilitate changes in the organizational structure, in the “legacy systems” and in the IT infrastructure	2
		Project composition - Formalized project plan/schedule	2
		Monitoring and evaluation progress	2
		Use of steering committee	2
		Ease of Use	1
		Growth in Business Process	1
		Internal Audit Activities	1
		Troubleshooting/crisis management	1
		Information flow management	1
		Good project scope management	1
		Cultural change/political issues	1
		Environment	1

Experienced project manager-leadership	1
Legacy system consideration	1
Managing consultants	1
Reduced troubleshooting-project risk	1
Viewing ERP as a business solution	1
User Knowledge	1

Table 6- BSCARD Implementation Group Innovation & Learning

Selection Criteria		**Success Factors**	
Innovation & Learning			
Training Performance*	3	User training on software*	5
Module completion	3	Training and job redesign*	3
Upgrade ability	2	Education on new business processes	2
Ubiquitous access	2		
Innovative Business Processing*	2		
R&D capability	1		
Multilevel User Flexibility	1		
Low IT Manpower	1		
Interoperability	1		
Integration of legacy systems	1		
Easy of learning	1		
Easy of in-house development	1		

Table 7- BSCARD Implementation Group Technology

Selection Criteria		**Success Factors**	
Technology			
Functional Requirements – Functionality*	6	Software Development, Testing and Repair*	4

System Reliability*	5	Implementation strategy and timeframe*	3
Implementation time*	4	System Quality*	2
Compatibility with other systems	4	Information Quality	2
Technical Aspect	3	Software and Hardware Compliance with ERP*	2
Fit with parent/allied organization systems	3	Data analysis &conversion	2
Easy to maintain	3	Minimal customization	2
Data Security	3	Adequate ERP software selection	2
Customization*	3	Post-implementation evaluation	1
Stability	2	Architecture choices	1
Scalability on demand	2	Software customization*	1
Quality*	2	Software configuration	1
Methodology of software	2	Appropriate technology	1
Data backup and Recovery	2	Carefully defined information and system requirements	1
Web application	1	Data management	1
Standardization	1	Dedicated resources	2
Service Survival	1		
Real-time online inquiries and reporting functions	1		
Portability	1		
Platform Independence	1		
Performance	1		
Ease of integration	1		
Configuration	1		
Cloud based services	1		

After the grouping and matching the related selection criteria and success factors, empirical analysis has been done by using survey methodology.

CHAPTER 3

THE EMPIRICAL ANALYSIS

In the third and last chapter, the main purpose of this research has been stated and the data has been collected via survey methodology. Then, hypotheses of the research have been formed according to the findings during the literature review and balanced scorecard methodology implementation. After the hypotheses were determined, the research questionnaire has been prepared with appropriate questions and cross check questions in order to be able to evaluate and measure the hypotheses. The data collection and analysis process have also been explained in this chapter with details.

3.1. FIELD STUDY

3.1.1 The Purpose of The Research

The data of this research have been collected from all sectors which are using ERP software, not only from Turkey but also all around the world. The initial purpose was to make the comparison between Turkey and Poland. During the collection of data, enough participants from Poland could not be reached. Hence the target sample has been extended to the other countries. The comparison of the results between Turkey and the other countries could not has been done in this research with this limitation. Therefore the results have been given separately for Turkey, where the significant data has been collected.

3.1.2. The Hypotheses of The Research

In order to achieve the purpose of this research, which is to measure the perception of the relationship between the selection criteria and critical success factors of ERP. The selection criteria and success factors which are investigated in this research, have been classified according to the Balanced Scorecard methodology. On the previous part, the implementation of the Balance Scorecard methodology and the chosen selection criteria and success factors have been listed.

As a result of the Balanced Scorecard methodology, the hypotheses have been formed on the related success factors and selection criteria. A total of 16 hypotheses have been tested in this research which are listed as below:

H1: Participants' perception indicate a significant relationship between price-service cost in selection criteria and project cost in success factors.

H2: Participants' perception indicate a significant relationship between service – support in selection criteria and vendor's support in success factors.

H3: Participants' perception indicate a significant relationship between domain knowledge of the vendor in selection criteria and vendor's staff knowledge in success factors.

H4: Participants' perception indicate a significant relationship between consultancy services in selection criteria and using consultancy services in success factors.

H5: Participants' perception indicate a significant relationship between being user friendly in selection criteria and user satisfaction in success factors.

H6: Participants' perception indicate a significant relationship between company vision in selection criteria and business plan – vision in success factors.

H7: Participants' perception indicate a significant relationship between flexibility in adjusting demands according to business requirements in selection criteria and business process reengineering in success factors.

H8: Participants' perception indicate a significant relationship between strategic alignment in selection criteria and effective communication in success factors.

H9: Participants' perception indicate a significant relationship between resistance to change in selection criteria and change management in success factors.

H10: Participants' perception indicate a significant relationship between training

performance in selection criteria and user training in success factors.

H11: Participants' perception indicate a significant relationship between innovative business processing in selection criteria and training and job redesign in success factors.

H12: Participants' perception indicate a significant relationship between functional requirements in selection criteria and software and hardware compliance in success factors.

H13: Participants' perception indicate a significant relationship between system reliability in selection criteria and software development – testing – repair in success factors.

H14: Participants' perception indicate a significant relationship between implementation time in selection criteria and implementation strategy – timeframe in success factors.

H15: Participants' perception indicate a significant relationship between customization in selection criteria and software customization in success factors.

H16: Participants' perception indicate a significant relationship between quality in selection criteria and system quality in success factors.

3.1.3. Preparation of Questionnaire

In this research, the survey method has been used in order to collect the research data as a quantitative analysis method. The questionnaire has been specially designed for this study in order to be directed to ERP users and ERP project team members.

The Survey has four parts; the first part is for the basic information about the participants and the company, the second part is to the evaluate the importance of the decided selection criteria for choosing ERP, the third part is to evaluate the importance of decided success factors for the success of ERP. Lastly the

forth part has been designed for the cross-check questions which are for the first seven success factors and selection criteria which have been cited most in the literature at most.

3.2. THE PILOT STUDY

As an original questionnaire has been prepared in this study, the pilot study has been done in order to evaluate the reliability of this study. Pilot study has been made to 25 people from different sectors; 19 from Turkey, 6 other countries via e-mail. The results of reliability analysis have been given in figure 12, 13 and 14:

Figure 12- Case Processing Summary of Pilot Study

Case Processing Summary

		N	%
Cases	Valid	25	100,0
	Excluded (a)	0	0,0
	Total	25	100,0

(a). Listwise deletion based on all variables in the procedure.

Figure 13- Reliability Statistics of Selection Criteria in Pilot Study

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0,925	0,928	16

Figure 14- Reliability Analysis Results, Cronbach's Alpha Values of Selection Criteria in Pilot Study

Item-Total Statistics

	Scale Mean if Item Delet	Scale Variance if Item Delete	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted

	ed	d			
SP_Project_cost	58,92	97,827	0,469	0,890	0,925
SP_Service_and_support	58,64	95,407	0,686	0,903	0,919
SP_Domain_Knowledge	58,80	94,750	0,713	0,925	0,918
SP_Consultancy	58,68	94,477	0,647	0,906	0,920
SP_User_friendly	59,00	93,333	0,633	0,944	0,920
SP_Company_vision	58,84	97,723	0,687	0,867	0,919
SP_Flexibility	58,72	99,710	0,574	0,894	0,922
SP_Strategic_alignment	59,04	96,123	0,658	0,935	0,919
SP_Resistance_change	59,04	92,373	0,649	0,927	0,920
SP_Training_performance	59,04	98,457	0,437	0,918	0,926
SP_Innovative_business	58,92	98,327	0,523	0,855	0,923
SP_Functional_requirements	58,92	94,910	0,837	0,919	0,916
SP_System_reliability	58,68	93,893	0,713	0,965	0,918
SP_Implementation_time	58,96	95,373	0,589	0,964	0,921
SP_Customization	59,04	92,457	0,726	0,955	0,917
SP_Quality	58,76	94,773	0,733	0,753	0,917

Figure 15- Reliability Statistics of Success Factors in Pilot Study

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0,959	0,960	16

Figure 16- Reliability Analysis Results, Cronbach's Alpha Values of Success Factors in Pilot Study

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
SF_Project_cost	59,16	88,057	0,664	.	0,959
SF_Vendor_support	58,80	88,167	0,805	.	0,956
SF_Vendor_knowledge	58,80	90,083	0,668	.	0,958

SF_Using_consultancy	58,80	91,167	0,643	.	0,958
SF_User_satisfaction	58,84	87,473	0,824	.	0,955
SF_Business_plan_vision	59,00	90,750	0,612	.	0,959
SF_Business_process_reengineering	58,84	87,307	0,836	.	0,955
SF_Effective_com	58,92	87,243	0,791	.	0,956
SF_Change_management	58,76	89,607	0,799	.	0,956
SF_User_training	58,84	86,723	0,774	.	0,956
SF_Training_and_job_redesign	59,04	87,373	0,894	.	0,956
SF_Software_hardware_compliance	59,00	89,917	0,724	.	0,957
SF_Software_development	59,08	88,410	0,744	.	0,957
SF_Implementation_strategy	58,92	89,243	0,828	.	0,955
SF_Software_customization	58,84	90,390	0,731	.	0,957
SF_System_quality	58,96	88,373	0,799	.	0,956

Figure 17- Reliability Statistics of Cross Check Questions in Pilot Study

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0,879	0,882	7

Figure 18- Reliability Analysis Results, Cronbach's Alpha Values of Cross Check Questions in Pilot Study

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Cross_Project_cost	23,72	16,460	0,605	0,573	0,870
Cross_Service_and_support	23,56	17,673	0,536	0,480	0,878
Cross_User_friendly	23,84	15,557	0,685	0,615	0,860
Cross_Business_plan	23,76	15,690	0,565	0,622	0,876
Cross_Training_performance	24,20	13,417	0,758	0,693	0,851

Cross_Functional_requirements	23,68	15,310	0,794	0,726	0,848
Cross_System_reliability	23,80	14,000	0,772	0,672	0,847

In the pilot study, the reliability analysis has been done separately via SPSS 16 for totally 39 questions; 16 from selection criteria, 16 from success factors, 7 from cross check questions. The results gave Cronbach's Alpha multiple as 0,925 for selection criteria, 0,959 for success factors and 0,879 for cross check questions which shows the questionnaire is reliable. In addition, the reliability has been analyzed per question with Corrected Item-Total Correlation multiple values. Any question that has been found less than 0,30 shows the question that needed to be removed from the questionnaire. In parallel, Cronbach's Alpha If Item Deleted values has been between 0,80 and 1, any extraction was necessary.

3.3. ANALYSIS

3.3.1. Data Collection and Analysis

The purpose of the survey was to reach as many companies as possible from different sectors which are using ERP all around the world, but the main target was the companies in Turkey. Therefore, the questionnaire has been prepared on free online research web platform; "Qualtrics" in order to reach many people all around the world with the advantages of the technology. The questionnaire has been spread via e-mail and private message on Linkedin to the personal contacts, user groups such as ERP Committee (which is the biggest ERP user organization in Turkey), brand base user groups (Oracle, Microsoft, SAP, Streamsoft vs.), ERP Community (which is the worldwide ERP user and sales group) via Linkedin, via direct messages to the members of such groups related with ERP on Twitter. As a consequence of having a target as worldwide, the data collection should be done in any way which is possible, especially on the time which everybody have an access to internet and using the social media actively. This method had some conflicts and difficulties, but after doing the pilot test, many comments and messages facilitated the opportunity to get feedback from participants. Not every participant completed the survey. With the

advantage of the online survey platform Qualtrics, the survey did not allow participants to pass the next question or table without filling the existing part totally. As a result, there were no missing data. The questionnaires, which were not completed, were not taken into consideration. The survey has been shared on 28 groups related with ERP through Linkedin has been sent as direct message to more than 1200 people on Twitter who were members of ERP related groups and specifically determined an interest on ERP in their personal profile.

Hence, the questionnaire has been started by 203 people but filled only by 135 participants. Response rate of the survey has been calculated as 67%. The numbers of the participant and response rates have been given on the table below, specified by Turkey and other countries.

Table 8- The Total Number of Participants and Response Rate

Total Participant	203
Total Filled	135
Response Rate	67%

Table 9- The Total Number of Participants and Response Rate by Countries

Total Participant from Turkey	150	Total Participants from Other Countries	53
Total Filled From Turkey	100	Total Filled From Other Countries	35
Response Rate	67%	Response Rate	64%

The analysis of the data, which were collected via survey method, has been made via SPSS Version 16.0 Statistics Program. Reliability analysis has been made finally for 135 questionnaire, gave the Cronbach's Alpha multiple as 0,916 for selection criteria, 0,929 for success factors and 0,829 for cross check questions. Cronbach's Alpha If Item Deleted values have been given on the table below:

Figure 19- Case Processing Summary of The Study

Case Processing Summary

		N	%
Cases	Valid	135	100,0
	Excluded (a)	0	0,0
	Total	135	100,0

(a). Listwise deletion based on all variables in the procedure.

Figure 20- Reliability Statistics of Selection Criteria in The Study

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0,919	0,921	16

Figure 21- Reliability Analysis Results, Cronbach's Alpha Values of Selection Criteria in The Study

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
SP_Project_cost	59,91	89,917	0,440	0,396	0,919
SP_Service_and_support	59,44	87,860	0,648	0,605	0,913
SP_Domain_Knowledge	59,84	87,854	0,621	0,472	0,914
SP_Consultancy	59,61	88,121	0,623	0,562	0,914
SP_User_friendly	59,84	86,257	0,627	0,480	0,913
SP_Company_vision	59,70	88,004	0,608	0,479	0,914
SP_Flexibility	59,60	89,301	0,586	0,508	0,915
SP_Strategic_alignment	59,85	87,903	0,655	0,562	0,913
SP_Resistance_change	60,11	85,786	0,544	0,498	0,917
SP_Training_performance	60,03	87,208	0,620	0,556	0,914
SP_Innovative_business	59,84	86,869	0,656	0,616	0,913
SP_Functional_requirements	59,67	87,878	0,690	0,588	0,912

SP_System_reliability	59,71	87,043	0,698	0,624	0,911
SP_Implementation_time	59,81	87,764	0,586	0,536	0,915
SP_Customization	59,79	86,289	0,643	0,636	0,913
SP_Quality	59,70	86,777	0,689	0,583	0,912

Figure 22- Reliability Statistics of Success Factors in The Study

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0,929	0,931	16

Figure 23- Reliability Analysis Results, Cronbach's Alpha Values of Success Factors in The Study

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
SF_Project_cost	60,10	86,759	0,360	0,234	0,934
SF_Vendor_support	59,67	82,761	0,694	0,603	0,924
SF_Vendor_knowledge	59,70	83,061	0,668	0,601	0,925
SF_Using_consultancy	59,67	83,970	0,651	0,543	0,925
SF_User_satisfaction	59,77	84,268	0,585	0,410	0,927
SF_Business_plan_vision	59,70	83,288	0,688	0,555	0,924
SF_Business_process_reengineering	59,73	82,540	0,694	0,622	0,924
SF_Effective_com	59,63	82,578	0,706	0,633	0,924
SF_Change_management	59,81	83,630	0,636	0,460	0,925
SF_User_training	59,75	82,309	0,688	0,669	0,924
SF_Training_and_job_redesign	59,80	82,684	0,723	0,683	0,923
SF_Software_hardware_compliance	59,90	83,282	0,647	0,541	0,925
SF_Software_development	59,78	84,040	0,640	0,567	0,925
SF_Implementation_strategy	59,69	82,977	0,732	0,640	0,923
SF_Software_customization	59,71	82,968	0,663	0,584	0,925

SF_System_quality	59,70	83,926	0,640	0,532	0,925

Figure 24- Reliability Statistics of Cross Check Questions in The Study

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0,849	0,851	7

Figure 25- Reliability Analysis Results, Cronbach's Alpha Values of Cross Check Questions in The Study

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Cross_Project_cost	24,36	13,589	0,45	0,3	0,851
Cross_Service_and_support	24,01	13,351	0,607	0,453	0,829
Cross_User_friendly	24,33	12,448	0,631	0,468	0,824
Cross_Business_plan	24,2	12,833	0,596	0,427	0,83
Cross_Training_performance	24,42	12,111	0,641	0,514	0,823
Cross_Functional_requirements	24,02	12,708	0,692	0,564	0,816
Cross_System_reliability	24,04	12,588	0,658	0,515	0,82

As a result of the reliability analysis, Cronbach's Alpha If Item Deleted values have been found more than 0,70, between 0,963 – 9,65, which shows the survey questions are relatively reliable.

3.3.2. Descriptive Statistics

The first part of the survey has been built with the questions to describe the general profile such as; which sectors the company is in, the number of the years the company is in the sector, the number of the years the companies using ERP, which vendor and which modules of ERP is the company using. Lastly 3 questions have been added about ERP Cloud usage in order to see the trend of the new technology in ERP. The country data of the participants have been taken from the survey platform “Qualtrics”.

Figure 26- The Country Information

Country

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Turkey	100	74,1	74,1	74,1
	Other	35	25,9	25,9	100,0
	Total	135	100,0	100,0	

The majority of the participants were from Turkey as 74,1% of the total, 25,9% from other countries.

Figure 27- The Information of Years in The Sector

How_many_years

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-5	30	22,2	22,2	22,2
	6-10	25	18,5	18,5	40,7
	11-15	16	11,9	11,9	52,6
	15-...	64	47,4	47,4	100,0
	Total	135	100,0	100,0	

As it is shown on the figure 27, the 47,4% of the participants were in their sector for more than 15 years, followed by 22,2% up to 5 years, 18,5% were in their sector between 6-10 years and lastly 11,9% were in their sector between 11-15 years.

Figure 28- The Information of Number of Workers in The Company

How_many_people

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-10	16	11,9	11,9	11,9
	11-50	27	20,0	20,0	31,9
	51-250	41	30,4	30,4	62,2
	251-...	51	37,8	37,8	100
	Total	135	100	100	

The figure 28 shows that, 37,8% of the participants were from big size companies, 30,4% is medium size, 20% small size and 11,9% micro size companies.

Figure 29- The Sector Information of Participants

Which_sector

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Apparel & Fashion	1	0,7	0,7	0,7
	Automotive	6	4,4	4,4	5,2
	Aviation	2	1,5	1,5	6,7
	Building Railway System	1	0,7	0,7	7,4
	Chemical Industry	1	0,7	0,7	8,1
	Commodities trade	1	0,7	0,7	8,9
	Construction	5	3,7	3,7	12,6
	Consumer Electronics	1	0,7	0,7	13,3
	Consumer Goods	1	0,7	0,7	14,1
	Consumer Goods Production	1	0,7	0,7	14,8
	Cutting Tools Production	1	0,7	0,7	15,6
	E-Commerce	1	0,7	0,7	16,3
	Education and Technology	1	0,7	0,7	17
	Electric	1	0,7	0,7	17,8
	Electromechanic	1	0,7	0,7	18,5
	Electronic	3	2,2	2,2	20,7
	Electronic Card Manufacturing	1	0,7	0,7	21,5
	Electronic Material Production	1	0,7	0,7	22,2

Electronic Security	1	0,7	0,7	23
Energy	5	3,7	3,7	26,7
ERP Consultancy	1	0,7	0,7	27,4
Export - Import	1	0,7	0,7	28,1
Finance	8	5,9	5,9	34,1
Finance & Banking	1	0,7	0,7	34,8
FMCG	1	0,7	0,7	35,6
Furniture	4	3,0	3,0	38,5
Furniture Manifacturing	1	0,7	0,7	39,3
Information Technology	2	1,5	1,5	40,7
IT	20	14,8	14,8	55,6
IT Consulting	1	0,7	0,7	56,3
Label Production	1	0,7	0,7	57
Management Consultancy	6	4,4	4,4	61,5
Management Consulting	5	3,7	3,7	65,2
Management Information Systems	1	0,7	0,7	65,9
Manufacturing	4	3,0	3,0	68,9
Media	1	0,7	0,7	69,6
Medical	1	0,7	0,7	70,4
Mfg, oil and gas	1	0,7	0,7	71,1
Oil-gas	1	0,7	0,7	71,9
Outsourcing	1	0,7	0,7	72,6
Packaging	1	0,7	0,7	73,3
Pipe Manufacturing	1	0,7	0,7	74,1
Plastic Compounding	1	0,7	0,7	74,8
Production	2	1,5	1,5	76,3
Programming	1	0,7	0,7	77
Retail	3	2,2	2,2	79,3
Service	2	1,5	1,5	80,7
Shipyard	1	0,7	0,7	81,5
Software	10	7,4	7,4	88,9
Software Consulting	1	0,7	0,7	89,6
Steel Casting Company	1	0,7	0,7	90,4
Steelworks	1	0,7	0,7	91,1
Technology	1	0,7	0,7	91,9
Telecom	1	0,7	0,7	92,6
Telecommunication	1	0,7	0,7	93,3
Textile	8	5,9	5,9	99,3
Transportation	1	0,7	0,7	100
Total	135	100,0	100,0	

The sectors of the participants are listed on the figure 24.

Figure 30- The number of the years that shows ERP usage

ERP_How_many_years

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	7	5,2	5,2	5,2
	1	5	3,7	3,7	8,9
	2	15	11,1	11,1	20,0
	3	13	9,6	9,6	29,6
	4	12	8,9	8,9	38,5
	5	20	14,8	14,8	53,3
	6	3	2,2	2,2	55,6
	7	5	3,7	3,7	59,3
	8	6	4,4	4,4	63,7
	9	4	3,0	3,0	66,7
	10	22	16,3	16,3	83,0
	11	3	2,2	2,2	85,2
	12	4	3,0	3,0	88,1
	13	2	1,5	1,5	89,6
	15	8	5,9	5,9	95,6
	19	1	0,7	0,7	96,3
	20	3	2,2	2,2	98,5
	25	2	1,5	1,5	100,0
	Total	135	100	100	

The question about ERP usage did not evaluated with a likert scale in order to collect the exact data from the participants, it is found out that the majority of the participants as 16,3% were using ERP for 10 years, followed by 5 years as 14,8% and 2 years as 11,1%.

Figure 31- The Information of ERP Modules Being Used

Which_modules

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Financial Accounting	7	5,2	5,2	5,2
	Sales,Purchasing and Distribution	2	1,5	1,5	6,7
	Human Resources	2	1,5	1,5	8,1

Stock Control and Inventory Management	3	2,2	2,2	10,4
Others	3	2,2	2,2	12,6
12	2	1,5	1,5	14,1
13	2	1,5	1,5	15,6
14	3	2,2	2,2	17,8
25	1	0,7	0,7	18,5
35	2	1,5	1,5	20,0
36	1	0,7	0,7	20,7
123	2	1,5	1,5	22,2
124	2	1,5	1,5	23,7
134	15	11,1	11,1	34,8
135	9	6,7	6,7	41,5
136	1	0,7	0,7	42,2
145	1	0,7	0,7	43,0
235	3	2,2	2,2	45,2
1234	1	0,7	0,7	45,9
1235	15	11,1	11,1	57,0
1245	2	1,5	1,5	58,5
1246	1	0,7	0,7	59,3
1345	5	3,7	3,7	63,0
1346	1	0,7	0,7	63,7
1356	1	0,7	0,7	64,4
2345	1	0,7	0,7	65,2
12345	37	27,4	27,4	92,6
12356	4	3,0	3,0	95,6
123456	6	4,4	4,4	100,0
Total	135	100	100	

The question about ERP modules being used has been asked with multiple choice option. Because the ERP system provides an opportunity to the users to be able to choose the modules as they want. Hence, the majority of the participants as 27,4% were using all the modules of ERP.

Figure 32- The Information of Vendor Usage

Which_vendor

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Oracle	12	8,9	8,9	8,9
	Microsoft	23	17,0	17,0	25,9

	SAP	33	24,4	24,4	50,4
	StreamSoft	1	0,7	0,7	51,1
	Others	66	48,9	48,9	100,0
	Total	135	100	100	

As it is listed on the figure 27; the majority of the participants as 48,9% were using other vendors which are not listed on the questionnaire. On the other hand, only 24,4% of the participants were using SAP which is the one of the biggest ERP vendor in the world.

Figure 33- The Information of Cloud Usage

Cloud_usage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	48	35,6	35,6	35,6
	No	87	64,4	64,4	100,0
	Total	135	100	100	

The figure 28 shows that, the 64,4% of the participants did not use Cloud system on ERP which is the new and growing technology in the market. Only 35,6% were using this new technology.

Figure 34- The Information of Cloud Satisfaction

Cloud_satisfaction

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not answered	87	64,4	64,4	64,4
	Yes	37	27,4	27,4	91,9
	No	6	4,4	4,4	96,3
	Others	5	3,7	3,7	100,0
	Total	135	100	100	

The question about Cloud satisfaction only applied to the participants who gave a “Yes” answer to Cloud usage question. Hence, the 37 people from 48 people were satisfied by ERP Cloud which makes 77% of the ERP Cloud users.

Figure 35- The Information of Cloud Usage Plans in The Future

Cloud_future

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not answered	48	35,6	35,6	35,6
	Yes	52	38,5	38,5	74,1
	No	35	25,9	25,9	100,0
	Total	135	100	100	

The question about Cloud usage in the future has been applied to the participants who were not using ERP, in order to evaluate their opinion about ERP Cloud. However, 52 people from 87 want to use ERP Cloud in the future which makes only 59%.

Figure 36- Mean and Standard Deviation of Selection Process

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Project_cost	3,85	0,981	135
SP_Service_and_support	4,33	0,862	135
SP_Domain_Knowledge	3,93	0,895	135
SP_Consultancy	4,16	0,871	135
SP_User_friendly	3,93	1,012	135
SP_Company_vision	4,07	0,899	135
SP_Flexibility	4,16	0,821	135
SP_Strategic_alignment	3,91	0,851	135
SP_Resistance_change	3,65	1,180	135
SP_Training_performance	3,73	0,948	135
SP_Innovative_business	3,93	0,927	135
SP_Functional_requirements	4,09	0,815	135
SP_System_reliability	4,05	0,867	135
SP_Implementation_time	3,95	0,949	135
SP_Customization	3,98	0,988	135
SP_Quality	4,06	0,896	135

As a descriptive statistical analysis, the mean of the factors has been listed on the table. The questions were general for the selection criteria if it is important

to choose ERP, the answers were from 1 to 5, as strongly disagree to strongly agree. As a result of this research, the participants generally agree of the importance of listed selection criteria while choosing ERP. If the mean of the results were evaluated, service and support have been found as the most important criteria according to the participants' perception, followed by consultancy and flexibility.

Figure 37- Mean and Standard Deviation of Success Factors

Descriptive Statistics

	Mean	Std. Deviation	N
SF_Project_cost	3,64	1,003	135
SF_Vendor_support	4,07	0,869	135
SF_Vendor_knowledge	4,04	0,876	135
SF_Using_consultancy	4,07	0,825	135
SF_User_satisfaction	3,97	0,880	135
SF_Business_plan_vision	4,04	0,836	135
SF_Business_process_reengineering	4,01	0,885	135
SF_Effective_com	4,11	0,870	135
SF_Change_management	3,93	0,869	135
SF_User_training	3,99	0,910	135
SF_Training_and_job_redesign	3,94	0,844	135
SF_Software_hardware_compliance	3,84	0,883	135
SF_Software_development	3,96	0,832	135
SF_Implementation_strategy	4,05	0,813	135
SF_Software_customization	4,03	0,889	135
SF_System_quality	4,04	0,841	135

The same evaluation has been made for success factors; which shows the participants generally agrees of importance of listed success factors on success of ERP Software. In addition, means of the related selection criteria and success factors were in parallel. On the other hand effective communication has been found as the most important success factor of ERP software.

3.3.3. The Correlation Analysis

The correlation analysis has been made in order to determine whether participants' perception indicate significant relationship between selection

criteria and success factors of ERP. Correlation analysis has been made separately between the selection criteria and success factors which are believed to have significant relation and have been determined in hypothesizes of this research.

According to the correlation analysis; correlation coefficient value will be found between -1 +1 values according to the direction of the relation. The Pearson correlation more than 0.6 has been accepted as strong relationship.

H1: Participants' perception indicate a significant relationship between price-service cost in selection criteria and project cost in success factors.

Figure 38- H1 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SF_Project_cost	3,85	0,981	135
SP_Project_cost	3,64	1,003	135
Cross_Project_cost	3,87	0,823	135

Correlation

		SF_Project_cost	SP_Project_cost	Cross_Project_cost
SF_Project_cost	Pearson Correlation	1	0,499**	0,512**
	Sig. (2-tailed)		0,000	0,000
	N	135	135	135
SP_Project_cost	Pearson Correlation	0,499**	1	0,505**
	Sig. (2-tailed)	0,000		0,000
	N	135	135	135
Cross_Project_cost	Pearson Correlation	0,512**	0,505**	1
	Sig. (2-tailed)	0,000	0,000	
	N	135	135	135

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,499 Pearson correlation.

H2: Participants' perception indicate a significant relationship between service – support in selection criteria and vendor's support in success factors.

Figure 39- H2 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Service_and_support	4,33	0,862	135
SF_Vendor_support	4,07	0,869	135
Cross_Service_and_support	4,22	0,709	135

Correlation

		SP_Service_and_support	SF_Vendor_support	Cross_Service_and_support
SP_Service_and_support	Pearson Correlation	1	0,644**	0,613**
	Sig. (2-tailed)		0,000	0,000
	N	135	135	135
SF_Vendor_support	Pearson Correlation	0,644**	1	0,506**
	Sig. (2-tailed)	0,000		0,000
	N	135	135	135
Cross_Service_and_support	Pearson Correlation	0,613**	0,506**	1
	Sig. (2-tailed)	0,000	0,000	
	N	135	135	135

**.Correlation is significant at the 0.01 level (2-tailed).

Significant and strong relationship has been found with 0,644 Pearson correlation.

H3: Participants' perception indicate a significant relationship between domain knowledge of the vendor in selection criteria and vendor's staff knowledge in success factors.

Figure 40- H3 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Domain_Knowledge	3,93	0,895	135
SF_Vendor_knowledge	4,04	0,876	135

Correlations

		SP_Domain_Knowledge	SF_Vendor_knowledge
SP_Domain_Knowledge	Pearson Correlation	1	0,356**
	Sig. (2-tailed)		0
	N	135	135
SF_Vendor_knowledge	Pearson Correlation	0,356**	1
	Sig. (2-tailed)	0	
	N	135	135

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,356 Pearson correlation.

H4: Participants' perception indicate a significant relationship between consultancy services in selection criteria and using consultancy services in success factors.

Figure 41- H4 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Consultancy	4,16	0,871	135
SF_Using_consultancy	4,07	0,825	135

Correlations

		SP_Consultancy	SF_Using_consultancy
SP_Consultancy	Pearson Correlation	1	0,596**

	Sig. (2-tailed)		0
	N	135	135
SF_Using_consultancy	Pearson Correlation	0,596**	1
	Sig. (2-tailed)	0	
	N	135	135

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,596 Pearson correlation.

H5: Participants' perception indicate a significant relationship between being user friendly in selection criteria and user satisfaction in success factors.

Figure 42- H5 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_User_friendly	3,93	1,012	135
SF_User_satisfaction	3,97	0,880	135
Cross_User_friendly	3,90	0,858	135

Correlations

		SP_User_friendly	SF_User_satisfaction	Cross_User_friendly
SP_User_friendly	Pearson Correlation	1	0,425**	0,679**
	Sig. (2-tailed)		0	0
	N	135	135	135
SF_User_satisfaction	Pearson Correlation	0,425**	1	0,441**
	Sig. (2-tailed)	0		0
	N	135	135	135
Cross_User_friendly	Pearson Correlation	0,679**	0,441**	1

Sig. (2-tailed)	0	0	
N	135	135	135

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,425 Pearson correlation.

H6: Participants' perception indicate a significant relationship between company vision in selection criteria and business plan – vision in success factors.

Figure 43- H6 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Company_vision	4,07	0,899	135
SF_Business_plan_vision	4,04	0,836	135
Cross_Business_plan	4,03	0,819	135

Correlations

		SP_Company_vision	SF_Business_plan_vision	Cross_Business_plan
SP_Company_vision	Pearson Correlation	1	0,462**	0,514**
	Sig. (2-tailed)		0	0
	N	135	135	135
SF_Business_plan_vision	Pearson Correlation	0,462**	1	0,684**
	Sig. (2-tailed)	0		0
	N	135	135	135
Cross_Business_plan	Pearson Correlation	0,514**	0,684**	1
	Sig. (2-tailed)	0	0	
	N	135	135	135

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,462 Pearson correlation.

H7: Participants' perception indicate a significant relationship between flexibility in adjusting demands according to business requirements in selection criteria and business process reengineering in success factors.

Figure 44- H7 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Flexibility	4,16	0,821	135
SF_Business_process_reengineering	4,01	0,885	135

Correlations

		SP_Flexibility	SF_Business_process_reengineering
SP_Flexibility	Pearson Correlation	1	0,409**
	Sig. (2-tailed)		0
	N	135	135
SF_Business_process_reengineering	Pearson Correlation	0,409**	1
	Sig. (2-tailed)	0	
	N	135	135

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,409 Pearson correlation.

H8: Participants' perception indicate a significant relationship between strategic alignment in selection criteria and effective communication in success factors.

Figure 45- H8 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Strategic_alignment	3,91	0,851	135
SF_Effective_com	4,11	0,870	135

Correlations

		SP_Strategic_alignment	SF_Effective_com
SP_Strategic_alignment	Pearson Correlation	1	0,478**
	Sig. (2-tailed)		0
	N	135	135
SF_Effective_com	Pearson Correlation	0,478**	1
	Sig. (2-tailed)	0	
	N	135	135

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,478 Pearson correlation.

H9: Participants' perception indicate a significant relationship between resistance to change in selection criteria and change management in success factors.

Figure 46- H9 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Resistance_change	3,65	1,180	135
SF_Change_management	3,93	0,869	135

Correlations

		SP_Resistance_change	SF_Change_management
SP_Resistance_change	Pearson Correlation	1	0,367**
	Sig. (2-tailed)		0
	N	135	135
SF_Change_management	Pearson Correlation	0,367**	1
	Sig. (2-tailed)	0	
	N	135	135

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,367 Pearson correlation.

H10: Participants' perception indicate a significant relationship between training performance in selection criteria and user training in success factors.

Figure 47- H10 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Training_performance	3,73	0,948	135
SF_User_training	3,99	0,910	135
Cross_Training_performance	3,81	0,910	135

Correlations

		SP_Training_performance	SF_User_training	Cross_Training_performance
SP_Training_performance	Pearson Correlation	1	0,473**	0,580**
	Sig. (2-tailed)		0	0
	N	135	135	135
SF_User_training	Pearson Correlation	0,473**	1	0,503**
	Sig. (2-tailed)	0		0
	N	135	135	135
Cross_Training_performance	Pearson Correlation	0,580**	0,503**	1
	Sig. (2-tailed)	0	0	
	N	135	135	135

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,473 Pearson correlation.

H11: Participants' perception indicate a significant relationship between innovative business processing in selection criteria and training and job redesign in success factors.

Figure 48- H11 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Innovative_business	3,93	0,927	135
SF_Training_and_job_redesign	3,94	0,844	135

Correlations

		SP_Innovative_business	SF_Training_and_job_redesign
SP_Innovative_business	Pearson Correlation	1	0,528**
	Sig. (2-tailed)		0
	N	135	135
SF_Training_and_job_redesign	Pearson Correlation	0,528**	1
	Sig. (2-tailed)	0	
	N	135	135

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,528 Pearson correlation.

H12: Participants' perception indicate a significant relationship between functional requirements in selection criteria and software and hardware compliance in success factors.

Figure 49- H12 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Functional_requirements	4,09	0,815	135
SF_Software_hardware_compliance	3,84	0,883	135
Cross_Functional_requirements	4,21	0,754	135

Correlations

		SP_Functional_requirements	SF_Software_hardware_compliance	Cross_Functional_requirements
SP_Functional_requirements	Pearson Correlation	1	0,446**	0,529**
	Sig. (2-tailed)		0	0
	N	135	135	135
SF_Software_hardware_compliance	Pearson Correlation	0,446**	1	0,365**
	Sig. (2-tailed)	0		0
	N	135	135	135
Cross_Functional_requirements	Pearson Correlation	0,529**	0,365**	1
	Sig. (2-tailed)	0	0	
	N	135	135	135

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,446 Pearson correlation.

H13: Participants' perception indicate a significant relationship between system reliability in selection criteria and software development – testing – repair in success factors.

Figure 50- H13 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_System_reliability	4,05	0,867	135
SF_Software_development	3,96	0,832	135
Cross_System_reliability	4,19	0,806	135

Correlations

		SP_System_reliability	SF_Software_development	Cross_Functional_requirements
SP_System_reliability	Pearson Correlation	1	0,458**	0,619**
	Sig. (2-tailed)		0	0
	N	135	135	135
SF_Software_development	Pearson Correlation	0,458**	1	0,478**
	Sig. (2-tailed)	0		0
	N	135	135	135
Cross_Functional_requirements	Pearson Correlation	0,619**	0,478**	1
	Sig. (2-tailed)	0	0	
	N	135	135	135

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,458 Pearson correlation.

H14: Participants' perception indicate a significant relationship between implementation time in selection criteria and implementation strategy – timeframe in success factors.

Figure 51- H14 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Implementation_time	3,95	0,949	135
SF_Implementation_strategy	4,05	0,813	135

Correlations

		SP_Implementation_time	SF_Implementation_strategy
SP_Implementation_time	Pearson Correlation	1	0,497**
	Sig. (2-tailed)		0
	N	135	135
SF_Implementation_	Pearson	0,497**	1

strategy	Correlation		
	Sig. (2-tailed)	0	
	N	135	135

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,497 Pearson correlation.

H15: Participants' perception indicate a significant relationship between customization in selection criteria and software customization in success factors.

Figure 52- H15 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Customization	3,98	0,988	135
SF_Software_customization	4,03	0,889	135

Correlations

		SP_Customization	SF_Software_customization
SP_Customization	Pearson Correlation	1	0,587**
	Sig. (2-tailed)		0
	N	135	135
SF_Software_customization	Pearson Correlation	0,587**	1
	Sig. (2-tailed)	0	
	N	135	135

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,587 Pearson correlation.

H16: Participants' perception indicate a significant relationship between quality in selection criteria and system quality in success factors.

Figure 53- H16 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Quality	4,06	0,896	135
SF_System_quality	4,04	0,841	135

Correlations

		SP_Quality	SF_System_quality
SP_Quality	Pearson Correlation	1	0,611**
	Sig. (2-tailed)		0
	N	135	135
SF_System_quality	Pearson Correlation	0,611**	1
	Sig. (2-tailed)	0	
	N	135	135

**.Correlation is significant at the 0.01 level (2-tailed).

Significant and strong relationship has been found with 0,611 Pearson correlation.

3.3.4. The Analysis For Turkey

Descriptive analysis and correlation analysis have been done separately only for Turkey in order to transfer the country base results.

3.3.4.1. Descriptive Analysis

Descriptive analysis has been done in order to determine the general profile of the participants such as; which sector is the company working in, for how many years in the sector, for how many years the company is using ERP, which vendor and which modules is the company using, lastly 3 questions have been added about ERP Cloud usage in order to see the trend of the new technology in ERP especially in Turkey.

Figure 54- The Information of Years in The Sector

How_many_years

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-5	22	22,2	22,0	22,2
	6-10	19	19,0	19,0	41,0
	11-15	12	12,0	12,0	53,0
	15-...	47	47,0	47,0	100,0
	Total	100	100,0	100,0	

As it is shown on the table, the 47% of the participants were in their sector for more than 15 years, followed by 22% up to 5 years, 19% were in their sector between 6-10 years and lastly 12% were in their sector between 11-15 years. This results are parallel with the global results which have been given in the previous section.

Figure 55- The Information of How Many People Work in The Company

How_many_people

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-10	11	11,0	11,0	11,0
	11-50	21	21,0	21,0	32,0
	51-250	38	38,0	38,0	70,0
	251-...	30	30,0	30,0	100,0
	Total	100	100,0	100,0	

The table shows that, 38% of the participants were from medium size companies, 30% big size, 21% small size and 11% micro size companies. According to the global results, the majority was in the big size companies by 37,8%.

Figure 56- The Information of The Sectors of The Participants

Which_sector

		Frequency	Percent	Valid Percent	Cumulative Percent
Vali	Apparel & Fashion	1	1	1	1,0

d				
Automobile	1	1	1	2,0
Automotive	2	2	2	4,0
Aviation	2	2	2	6,0
Construction	5	5	5	11,0
Cutting Tools Production	1	1	1	12,0
Education and Technology	1	1	1	13,0
Electric	1	1	1	14,0
Electromechanic	1	1	1	15,0
Electronic	2	2	2	17,0
Electronic Card Manufacturing	1	1	1	18,0
Electronic Material Production	1	1	1	19,0
Electronic Security	1	1	1	20,0
Energy	4	4	4	24,0
Enerji	1	1	1	25,0
ERP Consultancy	1	1	1	26,0
Export - Import	1	1	1	27,0
Finance	7	7	7	34,0
Finance & Banking	1	1	1	35,0
Forniture	1	1	1	36,0
Furniture	3	3	3	39,0
Furniture Manifacturing	1	1	1	40,0
Information Technologies	1	1	1	41,0
Information Technology	1	1	1	42,0
IT	13	13	13	55,0
Label Production	1	1	1	56,0
Management Consultancy	6	6	6	62,0
Management Consulting	3	3	3	65,0
Management Information Systems	1	1	1	66,0
Manufacturing	3	3	3	69,0
Medical	1	1	1	70,0
Pipe Manufacturing	1	1	1	71,0
Plastic Compounding	1	1	1	72,0
Production	2	2	2	74,0
Programming	1	1	1	75,0
Retail	2	2	2	77,0
Service	2	2	2	79,0
Shipyard	1	1	1	80,0
Software	9	9	9	89,0
Software Consulting	1	1	1	90,0
Technology	1	1	1	91,0

Telecom	1	1	1	92,0
Textile	7	7	7	99,0
Transportation	1	1	1	100,0
Total	100	100	100	

The sectors of the participants are listed on the table as above. The majority is on the Information Technology sector.

Figure 57- The Information of How Many Years The Company Use ERP

ERP_How_many_years

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	3	3	3	3
	1	3	3	3	6
	2	13	13	13	19
	3	11	11	11	30
	4	9	9	9	39
	5	19	19	19	58
	6	1	1	1	59
	7	3	3	3	62
	8	5	5	5	67
	9	3	3	3	70
	10	15	15	15	85
	11	3	3	3	88
	12	3	3	3	91
	13	2	2	2	93
	15	6	6	6	99
	19	1	1	1	100
	Total	100	100	100	

The question about ERP usage was not evaluated with a likert scale in order to collect the exact data from the participants, it is found out that the majority of the participants as 19% were using ERP for 5 years, followed by 10 years as 15% and 2 years as 13%. In the global analysis, the majority was in 10 years by 16,3%, followed by 5 years as 14,8%.

Figure 58- The Information of The Modules Used in ERP

Which_modules					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Financial Accounting	5	5	5	5
	Sales,Purchasing and Distribution	2	2	2	7
	Human Resources	1	1	1	8
	Stock Control and Inventory Management	3	3	3	11
	Others	2	2	2	13
	13	2	2	2	15
	14	3	3	3	18
	25	1	1	1	19
	35	1	1	1	20
	124	2	2	2	22
	134	13	13	13	35
	135	8	8	8	43
	235	3	3	3	46
	1234	1	1	1	47
	1235	7	7	7	54
	1245	1	1	1	55
	1345	4	4	4	59
	1346	1	1	1	60
	2345	1	1	1	61
	12345	31	31	31	92
	12356	3	3	3	95
	123456	5	5	5	100
	Total	100	100	100	

31% of the participants were using all the modules of ERP as; financial accounting, sales, purchasing and distribution, human resources, stock control and inventory management and others. The results have been found parallel with the global analysis.

Figure 59: The Type of The Vendor in ERP System

Which_vendor

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Oracle	6	6,0	6,0	6,0
	Microsoft	18	18,0	18,0	24,0
	SAP	26	26,0	26,0	50,0
	Others	50	50,0	50,0	100,0
	Total	135	100	100	

As it is listed on the table; the majority of the participants as 50% were using other vendors which is not listed on the questionnaire, on the other hand, only 26% of the participants were using SAP which is one of the biggest ERP vendor in the world. The results are parallel with the global analysis.

Figure 60- The Information of ERP Cloud Usage

Cloud_usage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	32	32,0	32,0	32,0
	No	68	68,0	68,0	100,0
	Total	100	100	100	

The table shows that, the 68% of the participants did not use Cloud system on ERP which is the new and growing technology in the market. Only 32% were using this new technology. The results are parallel with the global analysis.

Figure 61- The Information of Cloud Usage Satisfaction

Cloud_satisfaction

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not answered	68	68,0	68,0	68,0
	Yes	26	26,0	26,0	94,0
	No	3	3,0	3,0	97,0
	Others	3	3,0	3,0	100,0
	Total	100	100	100	

The question about Cloud satisfaction only applied to the participants who gave

a “Yes” answer to Cloud usage question. Hence, the 26 people from 32 people were satisfied by ERP Cloud which makes 81,2%. The satisfaction ratio was 77% in the global analysis.

Figure 62- The Information of Cloud Usage In The Future

Cloud_future

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not answered	32	32,0	32,0	32,0
	Yes	40	40,0	40,0	72,0
	No	28	28,0	28,0	100,0
	Total	100	100	100	

The question about Cloud usage in the future was asked to the participants who were not using ERP, in order to evaluate their opinion about ERP Cloud. However, 40 people from 68 want to use ERP Cloud in the future which makes only 58,8%. This results are parallel with the global analysis.

Figure 63- Selection Process Descriptive Statistics

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Project_cost	3,89	0,942	100
SP_Service_and_support	4,43	0,807	100
SP_Domain_Knowledge	3,91	0,877	100
SP_Consultancy	4,29	0,808	100
SP_User_friendly	3,97	1,029	100
SP_Company_vision	4,06	0,908	100
SP_Flexibility	4,20	0,804	100
SP_Strategic_alignment	3,94	0,827	100
SP_Resistance_change	3,84	1,098	100
SP_Training_performance	3,82	0,914	100
SP_Innovative_business	4,02	0,876	100
SP_Functional_requirements	4,10	0,876	100
SP_System_reliability	4,06	0,798	100
SP_Implementation_time	3,97	0,897	100
SP_Customization	4,02	1,000	100
SP_Quality	4,07	0,879	100

As a descriptive statistical analysis, the mean of the factors has been listed on the table. The questions were general for the selection criteria if it is important to choose ERP. The answers were from 1 to 5, from strongly disagree to strongly agree. The results research shows that the participants agree with the importance of listed the selection criteria while choosing ERP.

Figure 64- Success Factors Descriptive Statistics

Descriptive Statistics

	Mean	Std. Deviation	N
SF_Project_cost	3,67	1,006	100
SF_Vendor_support	4,11	0,803	100
SF_Vendor_knowledge	4,08	0,884	100
SF_Using_consultancy	4,17	0,817	100
SF_User_satisfaction	3,97	0,870	100
SF_Business_plan_vision	4,13	0,825	100
SF_Business_process_reengineering	4,06	0,897	100
SF_Effective_com	4,21	0,782	100
SF_Change_management	4,03	0,784	100
SF_User_training	4,06	0,862	100
SF_Training_and_job_redesign	4,03	0,810	100
SF_Software_hardware_compliance	3,88	0,902	100
SF_Software_development	4,06	0,827	100
SF_Implementation_strategy	4,11	0,815	100
SF_Software_customization	4,11	0,852	100
SF_System_quality	3,99	0,859	100

The same evaluation has been made for the success factors; which shows that the participants generally agree that the listed success factors are important on the success of ERP Software.

3.3.4.2. Correlation Analysis for Turkey

The correlation analysis for the data collected only from Turkey has been done separately and the results have been given below.

H1: Participants' perception indicate a significant relationship between price-service cost in selection criteria and project cost in success factors.

Figure 65- H1 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SF_Project_cost	3,89	0,942	100
SP_Project_cost	3,67	1,006	100
Cross_Project_cost	3,87	0,861	100

Correlation

		SF_Project_cost	SP_Project_cost	Cross_Project_cost
SF_Project_cost	Pearson Correlation	1	0,516**	0,568**
	Sig. (2-tailed)		0,000	0,000
	N	100	100	100
SP_Project_cost	Pearson Correlation	0,516**	1	0,499**
	Sig. (2-tailed)	0,000		0,000
	N	100	100	100
Cross_Project_cost	Pearson Correlation	0,568**	0,499**	1
	Sig. (2-tailed)	0,000	0,000	
	N	100	100	100

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,516 Pearson correlation, which was 0,499 in global data.

H2: Participants' perception indicate a significant relationship between service – support in selection criteria and vendor's support in success factors.

Figure 66- H2 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Service_and_support	4,43	0,807	100
SF_Vendor_support	4,11	0,803	100

Cross_Service_and_support	4,26	0,676	100

Correlation

		SP_Service_and_support	SF_Vendor_support	Cross_Service_and_support
SP_Service_and_support	Pearson Correlation	1	0,597**	0,589**
	Sig. (2-tailed)		0,000	0,000
	N	100	100	100
SF_Vendor_support	Pearson Correlation	0,597**	1	0,468**
	Sig. (2-tailed)	0,000		0,000
	N	100	100	100
Cross_Service_and_support	Pearson Correlation	0,589**	0,468**	1
	Sig. (2-tailed)	0,000	0,000	
	N	100	100	100

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,597 Pearson correlation, which was 0,644 in global data.

H3: Participants' perception indicate a significant relationship between domain knowledge of the vendor in selection criteria and vendor's staff knowledge in success factors.

Figure 67- H3 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Domain_Knowledge	3,91	0,877	100
SF_Vendor_knowledge	4,08	0,844	100

Correlations

		SP_Domain_Knowledge	SF_Vendor_knowledge
SP_Domain_Knowledge	Pearson Correlation	1	0,309**
	Sig. (2-tailed)		0
	N	100	100
SF_Vendor_knowledge	Pearson Correlation	0,309**	1
	Sig. (2-tailed)	0	
	N	100	100

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,309 Pearson correlation, which was 0,356 in global data.

H4: Participants' perception indicate a significant relationship between consultancy services in selection criteria and using consultancy services in success factors.

Figure 68- H4 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Consultancy	4,29	0,808	100
SF_Using_consultancy	4,17	0,817	100

Correlations

		SP_Consultancy	SF_Using_consultancy
SP_Consultancy	Pearson Correlation	1	0,583**
	Sig. (2-tailed)		0
	N	100	100
SF_Using_consultancy	Pearson Correlation	0,583**	1
	Sig. (2-tailed)	0	
	N	100	100

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,583 Pearson correlation, which was 0,596 in global data.

H5: Participants' perception indicate a significant relationship between being user friendly in selection criteria and user satisfaction in success factors.

Figure 69- H5 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_User_friendly	3,97	1,029	100
SF_User_satisfaction	3,97	0,870	100
Cross_User_friendly	3,90	0,859	100

Correlations

		SP_User_friendly	SF_User_satisfaction	Cross_User_friendly
SP_User_friendly	Pearson Correlation	1	0,371**	0,694**
	Sig. (2-tailed)		0	0
	N	100	100	100
SF_User_satisfaction	Pearson Correlation	0,371**	1	0,496**
	Sig. (2-tailed)	0		0
	N	100	100	100
Cross_User_friendly	Pearson Correlation	0,694**	0,496**	1
	Sig. (2-tailed)	0	0	
	N	100	100	100

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,371 Pearson correlation, which was 0,425 in global data.

H6: Participants' perception indicate a significant relationship between company vision in selection criteria and business plan – vision in success

factors.

Figure 70- H6 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Company_vision	4,06	0,908	100
SF_Business_plan_vision	4,13	0,825	100
Cross_Business_plan	4,09	0,830	100

Correlations

		SP_Company_vision	SF_Business_plan_vision	Cross_Business_plan
SP_Company_vision	Pearson Correlation	1	0,475**	0,556**
	Sig. (2-tailed)		0	0
	N	100	100	100
SF_Business_plan_vision	Pearson Correlation	0,475**	1	0,706**
	Sig. (2-tailed)	0		0
	N	100	100	100
Cross_Business_plan	Pearson Correlation	0,556**	0,706**	1
	Sig. (2-tailed)	0	0	
	N	100	100	100

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,475 Pearson correlation, which was 0,462 in global data.

H7: Participants' perception indicate a significant relationship between flexibility in adjusting demands according to business requirements in selection criteria and business process reengineering in success factors.

Figure 71- H7 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Flexibility	4,2	0,804	100
SF_Business_process_reengineering	4,06	0,897	100

Correlations

		SP_Flexibility	SF_Business_process_reengineering
SP_Flexibility	Pearson Correlation	1	0,389**
	Sig. (2-tailed)		0
	N	100	100
SF_Business_process_reengineering	Pearson Correlation	0,389**	1
	Sig. (2-tailed)	0	
	N	100	100

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,389 Pearson correlation, which was 0,409 in global data.

H8: Participants' perception indicate a significant relationship between strategic alignment in selection criteria and effective communication in success factors.

Figure 72- H8 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Strategic_alignment	3,94	0,827	100
SF_Effective_com	4,21	0,782	100

Correlations

		SP_Strategic_alignment	SF_Effective_com
SP_Strategic_alignment	Pearson Correlation	1	0,504**
	Sig. (2-tailed)		0
	N	100	100
SF_Effective_com	Pearson Correlation	0,504**	1
	Sig. (2-tailed)	0	
	N	100	100

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,504 Pearson correlation, which was 0,478 in global data.

H9: Participants' perception indicate a significant relationship between resistance to change in selection criteria and change management in success factors.

Figure 73- H9 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Resistance_change	3,84	1,098	100
SF_Change_management	4,03	0,784	100

Correlations

		SP_Resistance_change	SF_Change_management
SP_Resistance_change	Pearson Correlation	1	0,439**
	Sig. (2-tailed)		,000
	N	100	100
SF_Change_management	Pearson Correlation	0,439**	1
	Sig. (2-tailed)	,000	
	N	100	100

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,439 Pearson correlation, which was 0,367 in global data.

H10: Participants' perception indicate a significant relationship between training performance in selection criteria and user training in success factors.

Figure 74- H10 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Training_performance	3,82	0,914	100
SF_User_training	4,06	0,862	100
Cross_Training_performance	3,84	0,929	100

Correlations

		SP_Training_performance	SF_User_training	Cross_Training_performance
SP_Training_performance	Pearson Correlation	1	0,385**	0,608**
	Sig. (2-tailed)		0	0
	N	100	100	100
SF_User_training	Pearson Correlation	0,385**	1	0,466**
	Sig. (2-tailed)	0		0
	N	100	100	100
Cross_Training_performance	Pearson Correlation	0,608**	0,466**	1
	Sig. (2-tailed)	0	0	
	N	100	100	100

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,385 Pearson correlation, which was 0,473 in global data.

H11: Participants' perception indicate a significant relationship between innovative business processing in selection criteria and training and job redesign in success factors.

Figure 75- H11 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Innovative_business	4,02	0,876	100
SF_Training_and_job_redesign	4,03	0,810	100

Correlations

		SP_Innovative_business	SF_Training_and_job_redesign
SP_Innovative_business	Pearson Correlation	1	0,540**
	Sig. (2-tailed)		0
	N	100	100
SF_Training_and_job_redesign	Pearson Correlation	0,540**	1
	Sig. (2-tailed)	0	
	N	100	100

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,540 Pearson correlation, which was 0,528 in global data.

H12: Participants' perception indicate a significant relationship between functional requirements in selection criteria and software and hardware compliance in success factors.

Figure 76- H12 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Functional_requirements	4,1	0,798	100
SF_Software_hardware_compliance	3,88	0,902	100

Cross_Functional_requirements	4,21	0,743	100

Correlations

		SP_Functional_requirements	SF_Software_hardware_compliance	Cross_Functional_requirements
SP_Functional_requirements	Pearson Correlation	1	0,396**	0,527**
	Sig. (2-tailed)		0	0
	N	135	135	135
SF_Software_hardware_compliance	Pearson Correlation	0,396**	1	0,370**
	Sig. (2-tailed)	0		0
	N	135	135	135
Cross_Functional_requirements	Pearson Correlation	0,527**	0,370**	1
	Sig. (2-tailed)	0	0	
	N	135	135	135

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,396 Pearson correlation, which was 0,446 in global data.

H13: Participants' perception indicate a significant relationship between system reliability in selection criteria and software development – testing – repair in success factors.

Figure 77- H13 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_System_reliability	4,06	0,897	100
SF_Software_development	4,06	0,827	100
Cross_System_reliability	4,17	0,792	100

Correlations

		SP_System_reliability	SF_Software_development	Cross_Functional_requirements
SP_System_reliability	Pearson Correlation	1	0,472**	0,668**
	Sig. (2-tailed)		0	0
	N	100	100	100
SF_Software_development	Pearson Correlation	0,472**	1	0,571**
	Sig. (2-tailed)	0		0
	N	100	100	100
Cross_Functional_requirements	Pearson Correlation	0,668**	0,571**	1
	Sig. (2-tailed)	0	0	
	N	100	100	100

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,472 Pearson correlation, which was 0,458 in global data.

H14: Participants' perception indicate a significant relationship between implementation time in selection criteria and implementation strategy – timeframe in success factors.

Figure 78- H14 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Implementation_time	3,97	1,000	100
SF_Implementation_strategy	4,11	0,815	100

Correlations

		SP_Implementation_time	SF_Implementation_strategy
SP_Implementation_time	Pearson Correlation	1	0,562**

	Sig. (2-tailed)		0
	N	100	100
SF_Implementation_strategy	Pearson Correlation	0,562**	1
	Sig. (2-tailed)	0	
	N	100	100

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,562 Pearson correlation, which was 0,497 in global data.

H15: Participants' perception indicate a significant relationship between customization in selection criteria and software customization in success factors.

Figure 79- H15 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Customization	4,02	1,015	100
SF_Software_customization	4,11	0,852	100

Correlations

		SP_Customization	SF_Software_customization
SP_Customization	Pearson Correlation	1	0,582**
	Sig. (2-tailed)		0
	N	100	100
SF_Software_customization	Pearson Correlation	0,582**	1
	Sig. (2-tailed)	0	
	N	100	100

**.Correlation is significant at the 0.01 level (2-tailed).

A significant relationship has been found with 0,582 Pearson correlation, which was 0,587 in global data.

H16: Participants' perception indicate a significant relationship between

quality in selection criteria and system quality in success factors.

Figure 80- H16 Correlation Analysis

Descriptive Statistics

	Mean	Std. Deviation	N
SP_Quality	4,07	0,879	100
SF_System_quality	3,99	0,859	100

Correlations

		SP_Quality	SF_System_quality
SP_Quality	Pearson Correlation	1	0,576**
	Sig. (2-tailed)		0
	N	100	100
SF_System_quality	Pearson Correlation	0,576**	1
	Sig. (2-tailed)	0	
	N	100	100

**.Correlation is significant at the 0.01 level (2-tailed).

Significant and strong relationship has been found with 0,576 Pearson correlation, which was 0,611 in global data.

3.4. THE RESULTS OF THE RESEARCH

After the long data collection and analysis process, the results of the research based on the data collected only from Turkey showed that all the hypotheses have been built for this research have been accepted. The summary of the correlation analysis and results of the study has been listed on the table 10:

Table 10- The Results of The Research

Selection Criterias	**Correlation**	**Success Factors**	**Hypothesis**	**Results**
Financial / Cost				
Price - Service Cost	**0,516**	Project Cost	**H1**	**Accepted**
Customer / Vendor				
Service and Support	**0,597**	Vendor support	**H2**	**Accepted**
Domain knowledge of the vendor	**0,309**	Vendor's staff knowledge	**H3**	**Accepted**

Consultancy	**0,583**	Use of consultants	**H4**	**Accepted**
Internal Processess				
User friendly	**0,371**	User Satisfaction	**H5**	**Accepted**
Vision	**0,475**	Business Plan and Vision	**H6**	**Accepted**
Flexibility in adjusting demands according to business requirements	**0,389**	Business Process Reengineering	**H7**	**Accepted**
Strategic Alignment	**0,504**	Effective Communication	**H8**	**Accepted**
Resistance to change	**0,439**	Change Management	**H9**	**Accepted**
Innovation & Learning				
Training Performance	**0,385**	User training on software	**H10**	**Accepted**
Innovative Business Processing	**0,540**	Training and job redesing	**H11**	**Accepted**
Technology				
Functional Requirements - Functionality	**0,396**	Software and Hardware Compliance with ERP	**H12**	**Accepted**
System Reliability	**0,472**	Software Development, Testing and Repair	**H13**	**Accepted**
Implementation time	**0,562**	Implementation strategy and timeframe	**H14**	**Accepted**
Customization	**0,582**	Software customisation	**H15**	**Accepted**
Quality	**0,576**	System Quality	**H16**	**Accepted**

As a result of the correlation analysis, the perceived positive relationship has been found between the critical success factors and selection criteria. The results show that all listed selection criteria and success factors have between -1 and 1 and positive correlation which proves they have positive relations. On the other hand, strong relations (p>0,6) could not be observed but the highest relation has been found between Service and support – Vendor support (p=0,597 - H2), the lowest relation has been found between Domain knowledge of the vendor – Vendor's staff knowledge (p=0,309 – H3).

The results on Turkey were parallel with the global analysis which was not

surprising because the majority of the data was from Turkey which was 74%. On the other hand, in the correlation analysis on global data, strong relation has been observed on Service and support – Vendor support (p=0,644 –H2), Quality –System quality (p=0,611 – H16).

The comparison between the global data and the data from Turkey cannot be reliable because the sample from other countries were not enough to make a comparison. There were 100 participants from Turkey and 35 participants from other countries.

CONCLUSION

In this research; Enterprise Resource Planning's existing definitions in the literature, characteristics, historical development, new technologies, selection criteria, critical success factors, advantages and criticisms of the system have been discussed. In addition, the new technologies on ERP system have been investigated and the questions about Cloud have been applied to the participants in order to see the reaction of the participants to the new technology on ERP.

The main objective of the research was to determine the measurement of the perception of the relationship between most cited selection criteria and critical success factors of Enterprise Resource Planning. No studies have been known to us in the literature to evaluate the relationships between selection criteria and success factors. Mainly researchers focused only on one of them, but as it can be seen on this research, the terms are mostly same in selection criteria and success factors although one is related with the process before using the ERP software and the other is related with the results after using ERP Software. Hence, to measure the perception of the relationships between selection criteria and success factors has been chosen as a research topic.

As ERP is a worldwide software program which is appealing to every sector and size of businesses in every country, the target of the research is not limited only with manufacturing as a sector and Turkey as a country. As a result, the data have been collected from many different countries such as; Algeria, Australia, Azerbaijan, Colombia, England, Germany, India, Ireland, Israel, Italy, Kenya, Luxemburg, Mexico, Netherland, New Zealand, Poland, Romania, Russia, Spain, Turkey and United States of America. Also the participants were from different sectors such as; automobile, aviation, chemical industry, construction, production, electric, energy, finance, manufacturing, information technologies, consulting, media, retail, service, telecommunication, textile and transportation. These are the ones who joined the survey and completed. There were other participants from other countries and sectors that could not be taken into consideration because they did not complete the questionnaire. Many reasons

can be because of leaving the questionnaire without filling such as, not being related with the topic, not able to give the right and proper answer, lack of information about the implementation process, internet connection problems or application problems. At the end of seven months data collection period, the response rate was 67%.

The selection criteria and critical success factors have been found from the literature and the most cited ones have been selected and grouped by using Balanced Scorecard methodology. The grouping has been used because of the many different criteria and success factors have been found in the literature which focused on ERP with different business perspective such as cost, customer, process, innovation. Technology perspective has been added to the Balanced Scorecard methodology only for this research. The examples of adding a new perspective could been found in the literature for different implementation on different topics, for the ERP research there were an example of Rosemann and Wiese (1999) who added ‘project perspective’ into their research.

With the implementation of BSCARD methodology the criteria and factors are separated under the 5 main groups in order to see either the differentiation of the selection criteria and success factors of ERP and it has been found that for the selection process of ERP. The selection criteria’s about technology may be considered more important as it has the most selection criteria (24) under the technology group which is not surprising because ERP is a program using the technology. On the other hand surprisingly, internal processes has the most success criteria (39) under the group, which shows that internal processes may affect the success of ERP more than cost, vendor, innovation & learning and technology. On the other hand cost has the least impact on success of ERP.

The structure of the selection criteria and success factors has been done in order to make a logical relation between the criteria and factors. It has been found that, technology group has the most selection criteria which may be related with nature of ERP as being a software, on the other hand internal processes group has the most success factors, the reasons will be investigated

in the future research.

Totally 16 selection criteria and 16 success factors have been chosen according to their balanced scorecard group and the number of citations in the literature. The criteria and factors in the same group have been matched according to the similarities, especially the most cited ones have been chosen and matched. While doing the relation, there were few factors which have similarity and same number of citations, but the matching has been done according to the general view of the research, however, the matching shall be done differently in the future researches.

Factor analysis could not be done for the questions of the survey due to the limited number of participants on the study (n=135), in order to make a factor analysis the number of participants should be more than 300 (Hatcher 1994, Tabachnik and Fidell 1996).

After the Balanced Scorecard methodology implementation, 16 hypothesis have been created and the data collection they have been evaluated. In the end, all the hypothesis have been accepted according to the correlation analysis.

As a result of correlation analysis on global data, perceived strong relations have been determined between service and support – vendor support, quality – system quality. The terms seem to refer the same meaning therefore the high correlation seems not to be surprising but this represents different perspectives. This research shows that, although they have been under selection criteria or success factors, they have strong relations. On the other hand, the correlation between Domain knowledge of the vendor and Vendor's staff knowledge has been found significant but not strong, even though they have the same meaning, which shows that having the same meaning will not have same effect on selection criteria and success factors.

On the other hand, lowest relations have been found in the correlation analysis on global data were between domain knowledge of the vendor – vendor's staff knowledge and resistance to change – change management. The probable

reasons can be the understanding of the criteria and factors separately in the selection process and the evaluation of the success. Domain knowledge of the vendor has been cited more in the literature as selection criteria which shows that this criteria will have an important impact on selection process. On the other hand, vendor's staff knowledge has been found in the literature only once which will be the reason of having less correlation between each other but this result and the reasons will be investigated in the future researches, same as the relation between resistance to change – change management. Resistance to change has been found in the literature only once, but change management has been found more than 5 researches. When we look into deeper the reasons, change will be hard to be evaluated in the selection process on the other hand, after the implementation and using the ERP system, the effects of change will be seen more widely and physically hence it has more importance. As it is mentioned before, the reasons of the relations will be investigated deeper in the future researches and the matched criteria and factors will be changed.

On the other hand when the data from Turkey have been analyzed, any perceived strong relation has been found between the critical success factors and selection criteria of ERP. All of the Pearson's correlation coefficient of the hypotheses have been found bigger than 0,3 hence implying that there are a positive relation between selection criteria and success factors. The highest relation has been found between Service and support – Vendor support (p=0,597 - H2), the lowest relation has been found between Domain knowledge of the vendor – Vendor's staff knowledge (p=0,309 – H3).

The comparison between the results of Turkey and other countries could not be done because of the limitations on the sample size of other countries which was not enough to make a reliable comparison. In the future researches, more data can be collected more homogeneous from other countries.

Similarities between literature and this research have been investigated and it has been found that, Chand et al. (2005) used Balanced scorecard methodology in their research and divided the ERP success outcomes into 4 dimensions of Balanced Scorecard. Although their grouping was only on

success outcomes, they put the customer satisfaction under customer dimension, in this research user satisfaction has been evaluated under internal processes. On the other hand, they put the training method satisfaction under learning and innovation, in this research also training performance has been evaluated under innovation and learning group.

Future researches can focus to match different selection criteria and success factors. On the other hand the balanced scorecard methodology can be used in selecting different groups, without adding the technology group or adding different group. Also the companies which would like to choose an ERP software can focus on these selection criteria and success factors in order to choose and implement the best ERP software and get the most benefit from the system.

On the other hand, the research had some limitations such as data collection. The data of the survey is sent to the participants via e-mail to user groups and social media which caused many unrelated people to start to the survey. As a result, the response rate of the survey was 67%. The majority of the data has been collected from Turkey, the data from other countries was limited with the limitation of the time and difficulty of reaching the right target. Using an online survey program also caused some problems such as internet connection problems, some bugs on the website, not to have an access via mobile devices. In any problem on the website, participants quitted the survey without filling it totally.

For the future researches, the survey will be applied country or sector specific, or will be applied globally to more people. The survey can also include questions about Cloud usage in ERP system. Hence the results can give a direction for the future research on ERP Cloud.

REFERENCES

Acar, D., Ömürbek, N. and Ömürbek, V. (2004). Gıda sektöründe kurumsal kaynak planlaması (ERP) üzerine bir araştırma" *Süleyman Demirel Üniversitesi İktisadi ve İdari Bilimler Fakültesi*, Cilt: 9, Sayı: 1, 1-24.

Ahmad, M.M. and Cuenca, R.P. (2013). Critical success factors for ERP implementation in SMEs, *Robotics and Computer-Integrated Manufacturing*. Vol. 29, 104-111.

Akça, Y. and Özer, G. (2013). Kullanıcı Özelliklerinin Kurumsal Kaynak Planlaması Uygulama Başarısına ve Algılanan Organizasyonel Performansa Etkisi, *Journal of Yaşar University*, 30, 4966-4984.

Akça, Y. and Özer, G. (2012). Teknoloji Kabul Modeli'nin Kurumsal Kaynak Planlaması Uygulamalarında Kullanılması, *Business and Economics Research Journal*, Vol.3, No.2, 79-96.

Aladwani, A. M. (2001). Change management strategies for successful ERP implementation, *Business Process Management Journal*, Vol. 7, No. 3, 266-275.

Al-Mashari, M., Al-Mudimigh, A. and Zairi, M. (2003) Enterprise resource planning: A taxonomy of critical factors, *European Journal of Operational Research*, Vol. 146, 352-364.

Alican, F. (2006). Ekonomik ve Sosyal Boyutlarıyla Dünyada ve Türkiye'de Yazılım Sektörü, İstanbul.

Arnesen, S. (2013). Is Cloud ERP solutions right for you?, Strategic Finance Magazine, *Institute of Management Accountants*, February, 45-50.

Ayağ, Z. and Özdemir, R. G. (2007). An intelligent approach to ERP software selection through fuzzy ANP, *International Journal of Production Research*, Vol. 45, No. 10, 2169-2194.

Baki, B. and Çakar, K. (2005). Determining the ERP package-selecting criteria: The case of Turkish manufacturing companies, *Business Process Management Journal*, Vol. 11, No. 1, 75-86.

Bayraktaroğlu, S. and Uluköy, M. (2013). Örgütsel Faktörlerin Kurumsal Kaynak Planlaması ve Örgütsel Performans Üzerindeki Etkisi: İMKB Şirketleri Üzerine Bir Araştırma, *Süleyman Demirel Üniversitesi İİBF Dergisi*, c.18, s.1, 1-16.

Beheshti, H. M. (2006). What managers should know about ERP/ERP II, *Management Research News*, Vol. 29, No. 4, 184-193.

Beşkeşe, B. and Tanyaş, M. (2006). Bilişim teknolojisi yatırımlarının değerlendirilmesine yönelik uygun yöntemin seçilmesi modeli – ERP yazılımı seçimi uygulaması, *İTÜ Dergisi, Mühendisli*, Cilt: 5, Sayı: 1, Kısım: 2, 217-227.

Blauer, F. (2009). Cloud Computing, *Canadian Institute of Chartered Accountants CA Magazine*, March, 44-46.

Botta-Genoulaz, V. and Millet, P.A. (2005). A classification for better use of ERP systems, *Computers in Industry*, 56, 573-587.

Chand, D., Hackey, G., Hunton, J, Owhoso, V. and Vasudevan, S. (2005). A balanced scorecard based framework for assessing the strategic impacts of ERP systems, *Computers in Industry*, Vol. 56, 558 – 572.

Chang, S., Yen, D. C., Pui, N. C. S, Chang, I. C. and Yu, S. Y. (2011). An ERP system performance assessment model development based on the balanced scorecard approach, *Inf Syst Front*, 13, 429-450.

Chien, S.W. and Tsaur, S.H. (2007). Investigating the success of ERP systems: Case studies in three Taiwanese high-tech industries, *Computers in Industry*, 58, 783-793.

Computer Economics (2012). Choosing between Cloud and hosted ERP and why it matters, Vol. 34, Number 8, August.

Edwards, J.B. (2001). ERP, Balanced Scorecard, and IT: How do they fit together?, *Journal of Corporate Accounting & Finance*, July/August, 4-12.

Fang, M. Y. and Lin, F. (2006). Measuring the performance of ERP system – from the Balanced Scorecard Perspective, *The Journal of American Academy of Business*, Vol. 10, Num. 1, 256-263.

Garcia-Sanchez, N. and Perez-Bernal, L.E. (2007). Determination of critical success factors in implementing an ERP system: A field study in Mexican Enterprises, *Information Technology for Development*, Vol. 13, 293-309.

Gould, L. S. (2011). ERP goes to the Cloud and other developments, *Automotive Design & Production*, September/October, 34-35.

Grabski, S.V., Leech, S.A. and Schmidt, P.J. (2011). A review of ERP research: A future agenda for accounting information systems, *Journal of Information Systems*, v. 25, n. 1, 37-78.

Gürbüz, T., Alptekin, S.E. and Alptekin, G.I. (2012). A hybrid MCDM methodology for ERP selection problem with interacting criteria*, Decision Support System*, Vol. 54, 206-214.

Hatcher, L. (1994). A step-by-step approach to using the SAS System for factor analysis and structural equation modeling. *Cary, NC: SAS Institute*.

Huifen, W. and Chiang, D. (2010). Evaluation ERP II application performance from institutional theory view, *2010 Second WRI World Congress on Software Engineering*, 89-93.

Jacobs, F. R. and Weston, T. (2007). Enterprise resource planning (ERP) - A brief history, *Journal of Operations Management.* 25, 357-363.

Kahraman, C., Beskese, A. and Kaya, I. (2010). Selection among ERP outsourcing alternatives using a fuzzy multi-criteria decision making methodology, *International Journal of Production Research*, Vol. 48, No. 2, 547-566.

Kaplan, R. S. and Norton, D. P. (2001). Transforming the Balanced Scorecard from Performance Measurement to Strategic Management: Part II. *Accounting Horizons*: June, Vol. 15, No. 2,147-160.

Keçek, G. and Yıldırım, E. (2009). Kurumsal Kaynak Planlaması (ERP) ve İşletme Açısından Önemi, *Electronic Journal of Social Sciences*, v. 8, n. 29.

Koh, S.C.L., Gunasekaran, A. and Rajkumar, D. (2008). ERP II: The involvement, benefits and impediments of collaborative information sharing, *International Journal of Production Economics*, Vol 113, 245-268.

Kugel, R. (2011). Is ERP's future in Cloud?, *Business Finance Magazine*, Penton Media, spring.

Kumar, V., Maheshwari, B. and Kumar, U. (2003). An investigation of critical management issues in ERP implementation: empirical evidence from Canadian organizations, *Technovation*. 23, 793-807.

Lin, H. Y., Hsu, P. H. and Ting, P. H. (2006). ERP Systems success: An integration of IS success model and Balanced Scorecard, *Journal of Research and Practice in Information Technology*, Vol. 38, No. 3, 215-228.

Loh, T. C. and Koh, S. C. L. (2004). Critical elements for a successful enterprise resource planning implementation in small and medium sized enterprises, *International Journal of Production Research*, vol. 42, no. 17, 3433-3455.

Mahara, N. T. (2013). Indians SMEs perspective for election of ERP in Cloud, *Journal of International Technology and Information Management*, Vol. 22, Number 1, 85-94.

Mansor, N. and Bahari, A. (2010). Enterprise Resource Planning Benefits and Managerial Decision Levels, *The International Journal of Technology, Knowledge and Society*, Vol. 6, No:1, 1832-3669.

Markus, M. L., Axline, S., Petrie, D. and Tanis, C. (2000). Learning from adopters' experiences with ERP: problems encountered and success achieved, *Journal of Information Technology*, Vol. 15, 245-265.

Moller, C. (2005). ERP II: a conceptual framework for next-generation enterprise systems?, *Journal of Enterprise Information Management*, v. 18, n. 4.

Nicolaou, A.I. (2004). Quality of postimplementation review for enterprise resource planning systems, *International Journal of Accounting Information Systems*, 5, 25-49.

Norton, A. L., Thomas, Y. M. C., Thomas, C. J. C. and Ashurst, C. (2013). Ensuring benefits realization from ERP II: the CSF phasing model, *Journal of Enterprise Information Management*, Vol. 26, No. 3, 218-234.

Onut, S. and Efendigil, T. (2010). A theorical model design for ERP software selection process under the constraints of cost and quality: A fuzzy approach, *Journal of Intelligent & Fuzzy Systems*, Vol. 21, 365-378.

Perera, H.S.C. and Costa, W.K.R. (2008). Analytic Hierarchy Process for selection of ERP Software for manufacturing companies, *The Journal of Business Perspective*, Vo. 12, No.4.

Rosemann, M. and Wiese, J. (1999). Measuring the Performance of ERP Software – a Balanced Scorecard Approach, *Proc. 10th Australasian Conference on Information Systems*, 773-784.

Sahul, L. and Tauber, D. (2012). CSFs along ERP life-cycle in SMEs: a field study, *Industrial Management & Data Systems*, Vol. 112, No. 3, 360-384.

Schrödl, H. and Simkin, P. (2014). Greening the service selection in Cloud Computing: the case of federated ERP solutions, *47th Hawaai International Conference on System Science*, 4200-4209.

Singh, G., Manna, M. S. and Bhasin, G. S. (2013). A Study of Impact of ERP and Cloud Computing In Business Enterprises, *World Congress on Engineering and Computer Science*, Vol. I, October.

Soffer, P., Golany, B. and Dori, D. (2005). Aligning an ERP system with enterprise requirements: An object-process based approach, *Computers in Industry,* 56, 639-662.

Somers, T.M. and Nelson, K. (2001). The impact of critical success factors across the stages of enterprise resource planning implementations, *International Conference on System Sciences*.

Symonds, M. (2012). Cloud ERP meets manufacturing, *Quality Magazine*, BNP Media, April, 40-43.

Tabachnick, B.G. & Fidell, L.S. (1996). Using Multivariate Statistics. *New York: HarperCollins College Publishers*.

Tekbaş, A.A. and Ömürgönülşen, M. (2014). Otelcilik sektöründe Kurumsal Kaynak Planlaması (KKP) Uygulamalarındaki Algılanan Kritik Başarı Faktörlerinin KKP Sisteminin Algılanan Başarısı Üzerindeki Etkileri: Ankara'daki İş Otellerinde Bir Araştırma, *Ekonomik ve Sosyal Araştırmalar Dergisi*, c.10, s.1, 293-336.

Tsai, W.H., Shaw, M.J., Fan, Y.W., Liu, J.Y., Lee, K.C. and Chen, H.C. (2011). An empirical investigation of the impacts of internal/external facilitators on the project success of ERP: A structural equation model, *Decision Support System.* 50, 480-490.

Tsai, W.H., Lee, P.L., Shen, Y.S. and Yang, C.C. (2009). The relationship between ERP software selection criteria and ERP success, *IEEE IEEM*.

Upadhyay, P., Jahanyan, S. and Dan, P.K. (2011). Factors influencing ERP implementation in Indian manufacturing organizations, *Journal of Enterprise Information Management*, Vol. 24, No.2, 130-145.

Ustasüleyman, T. and Perçin, S. (2010). Kurumsal Kaynak Planlaması (ERP) uygulamalarında kritik kontrol (başarı) faktörlerinin etkisine yönelik yapısal bir model önerisi, *Marmara Üniversitesi İİBF Dergisi*, s. 1, 293-312.

Ünğan, M.C. and Met, M. (2012). Bir imalat işletmesinde Kurumsal Kaynak Planlaması kurulum süreci ve bir vaka çalışması, *C.Ü. İktisadi ve İdari Bilimler Dergisi*, c.13, s.2.

Velcu, O. (2010). Strategic alignment of ERP implementation stages: An empirical investigation, *Information & Management*, Vol. 47, 158-166.

Wachnik, B. (2012). An analysis of the problems linked to Economic Evaluation of Management Support Information Systems in Poland on the Example of ERP/CRM Class Applications - Problem Analysis, *European Conference on Information Management & Evaluation,* 325-333.

Weston, T. F. C. (2003). ERP II: The extended enterprise system, *Business Horizons*, November –December, 49-55.

Wieszala, P., Trzaskalik, T. and Targiel, K. (2010). Analytic Network Process in ERP system selection, *International Workshop on Multiple Criteria Decision Making*, 261-286.

Woo, H.S. (2007). Critical success factors for implementing ERP: the case of a Chinese electronics manufacturer, *Journal of Manufacturing Technology Management,* Vol. 18, No. 4, 431-442.

Worley, J. H., Chatha, K.A., Weston, R.H., Aguirre, O. and Grabot, B. (2005). Implementation and optimization of ERP systems: A better integration of processes, roles, knowledge and user competencies, *Computers in Industry*, 620-638.

Yıldız, A. and Yıldız, D. (2014). Bulanık TOPSIS Yöntemiyle Kurumsal Kaynak Planlaması Yazılım Seçimi, *Business and Economics Research Journal*, v.5, n.1.

Zhang, Z., Lee, M.K.O., Huang, P., Zhang, L. and Huang, X. (2005). A framework of ERP systems implementation success in China: An empirical study, *International Journal of Production Economics*, 99, 56-80.

SAP (2014). Retrieved from http://www.sap.com/pc/bp/erp/software/overview.html

SAP (2016). Retrieved from http://go.sap.com/product/enterprise-management/erp.html

Oracle (2014). Retrieved from http://www.oracle.com/tr/solutions/midsize/business-solutions/erp/index.html

Oracle (2016) Retrieved from https://www.oracle.com/applications/enterprise-resource-planning/index.html

Microsoft (2014). Retrieved from http://www.microsoft.com/turkiye/dynamics/erp/

Microsoft (2015). Retrieved from https://www.microsoft.com/en-us/dynamics/erp-small-midsize-business.aspx

Workcube (2016) Retrieved from http://www.workcube.com/urunler/erp-kurumsal-kaynak-planlamasi/

Logo (2016) Retrieved from http://www.logo.com.tr/en/solutions/erp-solutions

Erpnedir (2014). Retrieved from http://www.erpnedir.com/index.php?option=com_content&view=article&id=914:ureticiler&Item

Columbus, L. (12 May 2014). Shows the future of Clous ERP is now, *Forbes,* Retrieved from http://www.forbes.com/sites/louiscolumbus/2014/05/12/gartners-erp-market-share-update-shows-the-future-of-cloud-erp-is-now/

APPENDIX 1: Survey Questions

This survey is about the ERP (Enterprise Resource Planning) Software Selection Process and Success Factors with a purpose of academic research.

Please fill the questionnaire honestly and be sure that the results are going to be used only for the academic research.

If you would like to be informed by the results of the research, you can write your e-mail at the end of the survey.

The survey takes at most 10 minutes to fill.

Thank you in advance.

1) Which sector is your company working in?

2) For how many years is your company in the sector?
   - 0-5
   - 6-10
   - 11-15
   - 15-...

3) How many people is working in the company?
   - 0-10
   - 11-50
   - 51-250
   - 251-...

4) What is your position in the company?

5) For how many years does your company use ERP Software?

6) Which vendor's ERP Software does your company use?
   - Oracle

- ○ Microsoft
- ○ SAP
- ○ StreamSoft
- ○ Others ____

7) Which modules of the ERP do your company use?
   - □ Financial Accounting
   - □ Production and Logistics
   - □ Sales, Purchasing and Distribution
   - □ Human Resources
   - □ Stock Control and Inventory Management
   - □ Others ____

8) Do you use ERP Cloud?
   - ○ Yes
   - ○ No

9) Are you satisfied with ERP Cloud?
   - ○ Yes
   - ○ No
   - ○ Others ____

10) Are you planning to use ERP Cloud in the future?
   - ○ Yes
   - ○ No

11) Following sentences are about the selection process of the ERP Software. Please choose the expression which is closer to define your opinion.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
The project cost was important for choosing the ERP.	○	○	○	○	○

Service and Support opportunities were important to choose the ERP.	○	○	○	○	○
Domain knowledge of the vendor was important to choose the ERP.	○	○	○	○	○
Consultancy services were important for choosing the ERP.	○	○	○	○	○
Being user friendly was important for choosing the ERP.	○	○	○	○	○
Company vision was important for choosing the ERP.	○	○	○	○	○
Flexibility in adjusting demands according to business requirements was important for choosing the ERP.	○	○	○	○	○
Strategic Alignment was important for choosing the ERP.	○	○	○	○	○
Resistance to change was important for choosing the ERP.	○	○	○	○	○
Training performance was important for choosing the ERP.	○	○	○	○	○
Innovative Business Processing was important for choosing the ERP.	○	○	○	○	○
Functional Requirements were important for choosing the	○	○	○	○	○

ERP.					
System reliability was important for choosing the ERP.	○	○	○	○	○
Implementation time was important for choosing the ERP.	○	○	○	○	○
Customization was important for choosing the ERP.	○	○	○	○	○
Quality was important for choosing the ERP.	○	○	○	○	○

12) Following sentences are about the success factors of the ERP Software. Please choose the expression which is closer to define your opinion.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
ERP project cost is important for the success of ERP Software.	○	○	○	○	○
Vendor's support is important for the success of ERP Software.	○	○	○	○	○
Vendor's staff knowledge is important for the success of ERP Software.	○	○	○	○	○
Using consultancy services are effective for the success of	○	○	○	○	○

ERP Software.					
User satisfaction is important for the success of ERP Software.	○	○	○	○	○
Business plan and vision are important for the success of ERP Software.	○	○	○	○	○
Business Process Reengineering is effective for the success of ERP Software.	○	○	○	○	○
Effective Communication is important for the success of ERP Software.	○	○	○	○	○
Change Management is important for the success of ERP Software.	○	○	○	○	○
User training on software is important for the success of ERP Software.	○	○	○	○	○
Training and job redesign is important for the success of ERP Software.	○	○	○	○	○
Software and Hardware Compliance with ERP is important for the success of ERP Software.	○	○	○	○	○
Software Development, testing and repair are important for the success of ERP Software.	○	○	○	○	○
Implementation strategy and time-frame are important for the	○	○	○	○	○

success of ERP Software.					
Software customization is important for the success of ERP Software.	○	○	○	○	○
System quality is important for the success of ERP Software.	○	○	○	○	○

13) Lastly, following sentences are the summation of the questionnaire. Please mark the most expressive definition of the statements for both Selection Process and Success Factors.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Project Cost is effective on both...	○	○	○	○	○
Service and support are effective on both...	○	○	○	○	○
Being user friendly is effective on both...	○	○	○	○	○
Business plan and vision are effective on both...	○	○	○	○	○
Training performance is effective on both...	○	○	○	○	○
Functional Requirements are effective on both...	○	○	○	○	○
System reliability is effective on both...	○	○	○	○	○

14) Do you want to be informed by the results of the survey?

- Yes
- No

15) Please write your e-mail address to inform you about the results.

APPENDIX 2: Originality Report

HACETTEPE UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
THESIS/DISSERTATION ORIGINALITY REPORT

HACETTEPE UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
TO THE DEPARTMENT OF BUSINESS ADMINISTRATION

Date: 01/02/2016

Thesis Title / Topic: The Measurement of The Perception of The Relationship Between Critical Success Factors and Selection Criteria of Enterprise Resource Planning

According to the originality report obtained by my thesis advisor by using the Turnitin plagiarism detection software and by applying the filtering options stated below on 31/01/2016 for the total of 116 pages including the a) Title Page, b) Introduction, c) Main Chapters, and d) Conclusion sections of my thesis entitled as above, the similarity index of my thesis is 2 %.

Filtering options applied:

1. Approval and Decleration sections excluded
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I declare that I have carefully read Hacettepe University Graduate School of Social Sciences Guidelines for Obtaining and Using Thesis Originality Reports; that according to the maximum similarity index values specified in the Guidelines, my thesis does not include any form of plagiarism; that in any future detection of possible infringement of the regulations I accept all legal responsibility; and that all the information I have provided is correct to the best of my knowledge.

I respectfully submit this for approval.

Date and Signature
01.02.2016

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Status: X☐ Masters ☐ Ph.D. ☐ Integrated Ph.D.

ADVISOR APPROVAL

APPROVED.

Asst. Prof. Mine Ömürgönülşen

APPENDIX 3. Orijinallik Raporu

HACETTEPE ÜNİVERSİTESİ
SOSYAL BİLİMLER ENSTİTÜSÜ
YÜKSEK LİSANS/DOKTORA TEZ ÇALIŞMASI ORJİNALLİK RAPORU

HACETTEPE ÜNİVERSİTESİ
SOSYAL BİLİMLER ENSTİTÜSÜ
İŞLETME ANABİLİM DALI BAŞKANLIĞI'NA

Tarih: 01/02/2016

Tez Başlığı / Konusu: Kurumsal Kaynak Planlaması Kritik Başarı Faktörleri ve Seçim Kriterleri Arasındaki Algılanan İlişkinin Ölçülmesi

Yukarıda başlığı/konusu gösterilen tez çalışmamın a) Kapak sayfası, b) Giriş, c) Ana bölümler ve d) Sonuç kısımlarından oluşan toplam 116 sayfalık kısmına ilişkin, 31/01/2016 tarihinde tez danışmanım tarafından Turnitin adlı intihal tespit programından aşağıda belirtilen filtrelemeler uygulanarak alınmış olan orijinallik raporuna göre, tezimin benzerlik oranı % 2 'dir.

Uygulanan filtrelemeler:
1- Kabul/Onay ve Bildirim sayfaları hariç,
2- Kaynakça hariç
3- Alıntılar hariç
4- 5 kelimeden daha az örtüşme içeren metin kısımları hariç

Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü Tez Çalışması Orjinallik Raporu Alınması ve Kullanılması Uygulama Esasları'nı inceledim ve bu Uygulama Esasları'nda belirtilen azami benzerlik oranlarına göre tez çalışmamın herhangi bir intihal içermediğini; aksinin tespit edileceği muhtemel durumda doğabilecek her türlü hukuki sorumluluğu kabul ettiğimi ve yukarıda vermiş olduğum bilgilerin doğru olduğunu beyan ederim.

Gereğini saygılarımla arz ederim.

Tarih ve İmza
01.02.2016

Adı Soyadı: İlknur Sinem Soler
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DANIŞMAN ONAYI

UYGUNDUR.

Yrd. Doç. Dr. Mine Ömürgönülşen

APPENDIX 4. Etik Kurul İzni

GİZLİ

T.C.
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Sayı : 35853172/ 433-2678 11 Ağustos 2015

SOSYAL BİLİMLER ENSTİTÜSÜ MÜDÜRLÜĞÜNE

İlgi: 23.07.2015 tarih ve 3361 sayılı yazınız.

Enstitünüz İşletme Anabilim Dalı Üretim Yönetimi ve Sayısal Yöntemler Bilim Dalı Yüksek Lisans programı öğrencilerinden **İlknur Sinem SOLER**'in öğretim üyesi **Yrd. Doç. Dr. Mine ÖMÜRGÖNÜLŞEN** danışmanlığında yürüttüğü **"Üretim İşletmelerinde Kurumsal Kaynak Planlaması Kritik Başarı Faktörleri ve Seçim Kriterleri Arasındaki İlişkinin Ölçülmesi"** başlıklı tez çalışması, Üniversitemiz Senatosu Etik Komisyonunun **04 Ağustos 2015** tarihinde yapmış olduğu toplantıda incelenmiş olup, etik açıdan uygun bulunmuştur.

Bilgilerinizi rica ederim.

Prof. Dr. Ömer UĞUR
Rektör V.

Ek: Tutanak

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