

A RESEARCH ON DOES MANAGEMENT ACCOUNTING IN THE CONSTRUCTION
INDUSTRY NEED ENTERPRISE RESOURCE PLANNING PROGRAMS

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BY

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PLAGIARISM

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

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04.10.2022

ABSTRACT

In the business world of the century we are living in, competition has become quite intense with the effect of globalization. For this purpose; the enterprises started to adopt the "Kaizen" methodology, which means continuous betterment or continuous improvement. Businesses that aspire to be successful and survive for a long time in this competitive environment have to use their resources most efficiently, specialize by gaining experience in their activities, and make strategic planning for the future. Information, being a strategic power, is the most important of these resources. If we consider information as a system; the financial unit is the most important part of this system. Developments in the world economy in recent years have transformed the finance function into a source of information not only for implementing non-corporate organizations and operations officers and managers but also for management systems. Therefore, the management accounting function has become an estimator for the enterprises to make strategic decisions in the future for plans and needs by reflecting the current situation.

The developments in management information systems have contributed to the activities of the management accounting functions employed in the enterprises being supported by accurate combined information and healthy communication between functions. In the 20th Century, the information system called Enterprise Resource Planning (ERP) combines the inputs and outputs of all functions located in various points of the enterprise by designing them according to a healthy workflow and the procedures of the enterprise. The finance module, which is the driving module of the ERP system, has critical importance in terms of management accounting and reports. Therefore, management accounting, which works with the correct financial information obtained from the ERP information system, is in constant interaction. For this reason, financial affairs information systems and management accounting are in constant interaction.

The construction sector which has a significant share in the GNP together with over 200 associated sub-industries in the world and our country, interprets the changing global needs according to its challenges and dynamism. The construction sector, similarly to other production sectors that are digitized and need information technologies, started to use information systems to perform project management principles. Therewith, the change and transformation process has been initiated in the business management concept.

In the light of the aforementioned; this thesis is prepared to analyze the approach of the leading enterprises in the construction sector in Turkey to the ERP system, their expectations from the ERP system, and the contribution of the ERP system to the performance of such enterprises, its contribution to its performance, how efficiently it is implemented and its effect on management reports that are the outputs of management (cost) accounting having the nature of effective decision materials. In accordance with this purpose of the thesis, the data of the research were collected through a questionnaire method from 75 employees of various titles and various commissions of 7 leading construction companies which are among the construction companies in the top 50 companies in the FortuneTurkey500 2020 list operating in the construction sector in Turkey according to their turnover. According to the results of the analyzes carried out through the SPSS 26 software, it was found that an ERP was used in the vast majority of the enterprises throughout which the research was conducted. However, only a little more than half of the employees in the enterprise find the use of ERP successful. It has been found that all of the ERP modules are being used in the enterprises, yet, the modules used in more than half of the enterprises are finance, purchasing, cost control, and human resources. It has been revealed that the reasons for not using some of the modules are integration failures between modules and loss of time. It has been found that the reasons for enterprises not to use ERP are in the following order of importance: infrastructure deficiencies, high cost, long

implementation times, system failures and difficulties in use, inability to decide on the appropriate system, and unnecessary investment.

More than 70% of the employees working in the construction sector agree both with the idea of combining big data with an integrated structure and with the idea that ERP must be used for management accounting. It was found that the level of participation in the idea of combining big data with an integrated structure did not differ significantly according to the gender, age, work experience, title, department, number of employees in the enterprise, and the number of ongoing projects in the enterprise. On the other hand, it was found that the level of participation in the idea of combining big data with an integrated structure differed significantly according to the education level of the employees. It was found that the level of agreement with the idea that ERP must be used for management accounting did not differ significantly according to the gender, education level, title, department of the employees, and the number of ongoing projects in the enterprise. On the other hand, it has been found that the level of agreement with the idea that ERP must be used for management accounting differs significantly according to age, work experience, and the number of employees in the enterprise.

No relationship was found between the number of employees in the enterprises and the use of ERP in the enterprises and the successful use of ERP. Similarly, no relationship was found between the number of projects in the enterprises and the use of ERP in the enterprises, and the successful use of ERP.

Key words: *Enterprise Resource Planning Systems, Digital reporting platforms, project management in the construction sector, Management Accounting, Kaizen Approach,, Planning and cost control with Enterprise Resource management, information technologies in the construction sector, SAP*

OZET

İçinde bulunduğumuz yüzyılın iş dünyasında, küreselleşmeyle beraber, rekabet oldukça yoğundur. Bu amaçla; işletmeler; sürekli iyileştirme veya sürekli gelişme anlamına gelen “Kaizen” metodolojisini benimsemeye başlamışlardır. Başarılı olmak ve bu rekabet ortamında uzun süre devam etmek isteyen işletmeler, kaynaklarını en verimli şekilde kullanmak, faaliyetlerinde deneyim biriktirerek, uzmanlaşmak, geleceğe yönelik, stratejik planlama yapmak zorundadırlar. Stratejik güç olan bilgi, bu kaynakların en önemlisidir. Bilgiyi bir sistem olarak düşünürsek; finans birimi bu sistemin en önemli parçasıdır. Son yıllarda dünya ekonomisindeki gelişmeler, finans fonksiyonunu, sadece uygulayıcı kurum dışı kuruluşlar ve operasyon sorumlu ve yöneticileri için değil, yönetim sistemleri için de bilgi kaynağı haline dönüştürmüştür. Bu sebeple, yönetim muhasebesi fonksiyonu; işletmelerin, gelecekteki stratejik kararları için, bugününe ayna tutarak, plan ve ihtiyaçlar için, tahmin aracı haline dönüşmüştür.

Yönetim bilgi sistemlerinde yaşanan gelişmeler; işletmelerde görev yapan ve etkin iş akışları, doğru bütünleşik bilgi ve fonksiyonlar arası sağlıklı iletişimle beslenen, yönetim muhasebesi fonksiyonlarının faaliyetlerine olumlu katkılar sağlamıştır. 20 yüzyılda, Kurumsal Kaynak Planlaması (ERP) adını alan bilgi sistemleri; işletmenin farklı yerleşim noktalarında olan, tüm fonksiyonlarının girdi ve çıktılarını sağlıklı bir iş akışı ve işletmenin prosedürlerine uygun dizayn ederek, aynı çatı altında toplar. ERP sisteminin lokomotif modülü olan finans modülü, yönetim muhasebesi ve raporları açısından kritik öneme sahiptir. Bu nedenle, ERP bilgi sisteminden aldığı doğru finansal bilgi ile hareket eden, yönetim muhasebesi sürekli etkileşim içerisinde. Bu nedenle, mali işler bilgi sistemi ve yönetim muhasebesi sürekli etkileşim halindedir.

Dünya’da ve ülkemizde de ilişkili olduğu 200’den fazla yan sanayi ile birlikte gayrisafi milli hasıla üzerinde ciddi bir orana sahip olan inşaat sektörü, değişen küresel ihtiyaçları, kendi zorlukları ve dinamizmine uygun olarak yorumlamaktadır. Dijitalleşen ve bilgi teknolojilerine

ihtiyaç duyan diğer üretim sektörleri gibi inşaat sektörüne; proje yönetim esaslarını yerine getirmek üzere bilgi sistemlerini kullanmaya başlamıştır. Bununla beraber işletme yönetim anlayışında değişim ve dönüşüm süreci başlamıştır.

Yukarıdaki bilgiler ışığında; bu tezin amacı; Türkiye’de inşaat sektöründe önde gelen işletmelerin, ERP sistemine yaklaşımı, beklentisini, performansına katkısını, ne kadar verimli uygulandığını ve etkin karar malzemesi olan, yönetim (maliyet) muhasebesi çıktısı olan, yönetim raporlarına etkisini analiz etmek için gerçekleştirilmiştir. Tezin bu amacı doğrultusunda araştırmanın verileri FortuneTurkey500 2020 listesinde ilk 50 inşaat firması arasında yer alan 7 lider inşaat firmasının çeşitli unvan ve çeşitli pozisyonlardaki 75 çalışanından anket yöntemi ile toplanmıştır. Araştırmanın SPSS 26 programı üzerinde gerçekleştirilen analizlerin sonuçlarına göre araştırmanın yapıldığı işletmelerin çok büyük çoğunluğunda bir ERP kullanıldığı bulunmuştur. Ancak işletmede çalışanların ancak yarısından biraz fazlası ERP kullanımını başarılı bulmaktadır. İşletmelerde ERP modüllerinin tamamının kullanıldığı, bununla birlikte işletmelerin yarısından fazlasında kullanılan modüllerin finans, satın alma, maliyet kontrol ve insan kaynakları olduğu bulunmuştur. Kullanılmayan modüllerin kullanılmama nedeni olarak ise modüller arası entegrasyon arızası ve zaman kaybı ön plana çıkmıştır. İşletmelerin ERP kullanmamasının nedenlerinin şu önem sırasında olduğu bulunmuştur: alt yapı eksiklikleri, yüksek maliyet, uygulama sürelerinin uzun olması, sistem arızaları ve kullanma zorlukları, uygun sisteme karar verememe ve gereksiz bir yatırım olması.

İnşaat sektöründeki işletmelerde çalışanların %70’i aşan büyük çoğunluğu hem büyük verilerin entegre bir yapı ile birleştirilmesi düşüncesine hem de yönetim muhasebesi için ERP kullanmak gerektiği düşüncesine katılmaktadırlar. Büyük verilerin entegre bir yapı ile birleştirilmesi düşüncesine katılma düzeylerinin çalışanların cinsiyetlerine, yaşlarına, iş tecrübelerine, unvanlarına, departmanlarına, işletmedeki çalışanların sayısına ve işletmede devam eden projelerin sayısına göre anlamlı düzeyde farklılaşmadığı bulunmuştur. Diğer

tarafından büyük verilerin entegre bir yapı ile birleştirilmesi düşüncesine katılma düzeylerinin çalışanların eğitim düzeyine göre anlamlı olarak farklılaştığı bulunmuştur. Yönetim muhasebesi için ERP kullanmak gerektiği düşüncesine katılma düzeylerinin çalışanların cinsiyetlerine, eğitim düzeylerine, unvanlarına, departmanlarına ve işletmede devam eden projelerin sayısına göre anlamlı düzeyde farklılaşmadığı bulunmuştur. Diğer taraftan yönetim muhasebesi için ERP kullanmak gerektiği düşüncesine katılma düzeylerinin çalışanların yaşlarına, iş tecrübelerine ve işletmedeki çalışanların sayısına göre anlamlı olarak farklılaştığı bulunmuştur.

İşletmelerdeki çalışan sayılarıyla işletmelerde ERP kullanılması ve ERP kullanımının başarılı bulunması arasında bir ilişki bulunmamıştır. Benzer olarak işletmelerde devam eden proje sayılarıyla işletmelerde ERP kullanılması ve ERP kullanımının başarılı bulunması arasında bir ilişki bulunmamıştır.

Anahtar kelimeler: Kurumsal Kaynak Planlama Sistemleri, Dijital raporlama platformları, inşaat sektöründe proje yönetimi, Yönetim Muhasebesi, Kaizen Yaklaşımı, Kurumsal Kaynak yönetimi ile planlama ve maliyet kontrol, inşaat sektöründe bilgi teknolojileri, SAP

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1. INTRODUCTION

In this century, the world has become smaller in consequence of globalization and become a dynamic marketplace. In a market environment where competition is raging and economic crises are experienced one after another, enterprises are required to gain competitive advantage by increasing their competitive power, to adapt to rapid changes and to make their commercial activities sustainable. For this reason, they must develop new strategies using digital management systems, which is the necessity of the age, to organize work flows and to use resources (raw materials, workforce, machinery-equipment, finance, etc.) more effectively and efficiently in order to protect and/or increase customer potential and work in a customer-oriented way.

Although enterprises may not have a perfect information and operating system at the beginning, they can potentially do better in challenging environments where competition is intense. In other words, they can gain experience by learning the information they need and correcting their mistakes. For this purpose, enterprises have started to adopt the "Kaizen" methodology, which means continuous improvement or continuous development, and which is a Japanese teaching that was universalized after World War II. For this purpose, enterprises have started to adopt the "Kaizen" methodology, which means continuous improvement or continuous development, and which is a Japanese teaching that was universalized after World War II. Kaizen includes stability planning, customer satisfaction, total quality control programs, suggestion systems, group work, just-in-time production and information, system development, cross-functional management, policy implementation and placement, total productive maintenance, supplier relations, participation of senior management, organizational culture and employee-employer relations matters (Imai, 1986). According to Masaaki Imai, the founder of the Kaizen strategy, the Kaizen principle is a management strategy

based on continuous improvement, used for development and innovation, and providing organizational success. Kaizen strategy not only contributes to the organizational development of enterprises, but also provides benefits for enterprises to manage their costs at an optimum level, thanks to the principle of not making mistakes at any stage and information technologies.

It is possible for enterprises to make their operating profit sustainable, by maintaining their existence by growing, maintaining their quality and efficiency, and reducing their costs. These three parameters necessitate a strategic and integrated planning approach in the understanding of global thinking. The information age emphasizes the importance of accurate and real-time shared, integrated information. For this reason, positive developments in information technologies and communication have made information systems a tool for enterprises to gain competitive advantage. Enterprises that are innovative and open to development have developed new management and business approaches by choosing change management and transformation in accordance with the developments in information and communication technology. In addition, they have developed information technology software that prepares the infrastructure for the transformation of information into meaningful outputs. In this century, the cutting edge of developments is Enterprise Resource Planning (ERP).

ERP is a comprehensive and modular software package that enables enterprises to manage all business processes from supply to distribution with the support of an integrated data/information management system and partially automates these processes. ERP systems gather the business and information flows of all functions of an enterprise in a single system. Thus, the enterprise can easily perform strategic planning, risk control, non-compliance and audit activities for the future by using its resources in the most efficient way. In an environment of change, a condition for being competitive is

to be able to anticipate changing business conditions and respond to them in a timely manner. Enterprises that want to achieve this goal should use robust information systems such as ERP that support all aspects in a strong and flexible way. The function of the ERP system is to provide speed and real-time information flow in flawless design and implementation that provides integrated information (Davenport, 1998).

ERP systems deal with very broad planning, operation and management accounting functions such as accounting, finance, logistics, production planning, stock management, purchasing, manufacturing, sales/marketing, quality management, maintenance/repair, human resources, customer relationship management, materials management, supply chain management in an integrated manner in order to improve cooperation and interaction between functions. The integrated structure has transformed the jobs that require continuity into automation in order to bring qualified manpower to the enterprise and directed the time spent with the operation to the analysis and control. This led to an increase in the speed of work, the acquisition of an organizational behavior model, and an increase in the quality of the information circulating in the enterprise. As the quality of the information increases, the decisions made within the enterprise will be more realistic and accurate. In addition to improving internal processes, the ERP system also enables the simultaneous planning of units of global companies located in different geographical regions. (Aladağ, 2020; Kecek, 2009)

According to Yılmaz (2020), construction alone accounts for approximately 10% of the gross national product and 50% of real estate investments in many developed countries. According to Ünder & Baran (2006), the construction sector plays a key role in social development, including the restoration of residences, workplaces, industrial facilities and historical assets. For this reason, it is affected by all the developments of the century.

The construction sector, together with the more than 200 sub-industries it is associated with, constitutes 30% of the gross national product in our country as well as in the rest of the world (Kalkınma Bakanlığı, 2014). For this reason, the efficiency and productivity of the construction industry has a critical importance for the entire country's economy.

However, researches and literature studies on the construction industry show that the construction industry has a different dynamism in itself, it has many problems such as different geographical conditions, inefficient use of resources or the organizational structure and stakeholders with closed perspectives on technology, and the distinctness of productions. In addition, many enterprises in the construction industry combine productivity and quality and make their decisions by prioritizing minimum cost and maximum profit instead of concepts such as sustainable occupational safety and value creation. This has ensured that the need for information integration has not developed in the construction industry. However, the construction manufacturing process is a process that starts from the tender offer stage and continues until the completion of the manufacturing process. In this process, it is important to use resources effectively and appropriately for time, quality and cost management, to establish an effective chain of operation in effective time planning and project management. For this reason, the construction industry is in a development effort to fulfill the project management principles and find solutions to its structural problems. (Demirkan, 2005; Avinal, 2012; Aladağ, 2020) The construction industry is a large, fragmented industry. Over time, the scope and size of construction projects have increased and become more complex. Subcontractor management has become essential. Over time, the number of external control consultants has increased in project controls. The product range has increased, economic and social change has accelerated, and it has become increasingly difficult to

predict future possibilities. For this reason, planning management equipped with integrated information has been the startup key of this sector. Enterprises need information systems that will present their past project management information and market information of current external stakeholders (employers, material and equipment suppliers, vendors, contractors, designers, subcontractors, other branches of the industry and customers) for the steps, in which time, quality and cost elements which are the main elements of planning management are stated, such as setting precise goals, determining the necessary resources and making an action plan to achieve the goal, deciding on the most efficient use of resources, and identifying the necessary steps to implement the plan.

ERP systems are recommended to be used by construction companies to increase their responsibilities to their customers, strengthen supply chain partnerships, improve organizational flexibility, improve decision-making abilities, shorten project completion time and minimize costs. Today, the construction industry, which has a project management understanding and employs construction technologies and management techniques and information technologies, needs an ERP system in line with the needs of the sector. However, the features such as the lack of continuity and originality that distinguish the construction sector from other manufacturing sectors make it difficult for the design and implementation of ERP systems, which require uniformity and target the manufacturing sector. Some large construction companies use certain modules of ERP by integrating design, work plan and planning business processes with different information systems. ERP is a set of corporate applications that can theoretically be installed in one or two months, but will be available to users in at least 6 months. Before such a system is fully installed, it is important to complete the current state-process analysis of the business and to include the future state modeling / strategy in the project. The ERP system takes

its final form by resolving the contradictions in the processes and making the solutions consistent. New business processes that come to the fore with the needs of the ERP system allow the company to review its current workflows. However, it should be noted that in the change management that comes with the ERP systems of the enterprises, it will not be possible to change the entire structure at once; the nature and internal balance of companies stand against this change. Therefore, the selection of a pilot project is a successful first step. At the same time, management support is another important aspect for successful establishment and dissemination of the project. Another important issue is that ERP project management stakeholders should be integrators who can think analytically, have leadership qualities, are innovative, and have command of operations and business processes. On the other hand, ERP projects are good opportunities for the new generation to participate in company management, because in these projects, all processes of companies are discussed. All kinds of processes that can be modeled in ERP systems can be defined and reported. During the project, the star candidates of the enterprise are identified, the employees and managers who will take part in the inspection and control activities of the enterprise are determined. This is the positive impact of ERP on business organization. In the construction sector, where technical teams sit in the director's chair, the responsibility center of management reporting brings technical planning teams and management accounting, in other words, budget and cost control teams up against each other at every stage. As the manufacturing diversity, which is a requirement of the unique structure of the sector, gathers non-uniform workflows under the same roof thanks to the ERP system, the areas of responsibility for the technical and financial teams have been clarified. The technical teams are separated to be responsible for the quantity data, and the financial teams to be responsible for the amount data; the

consolidated financial data are presented as consolidated financial reports to the board of directors, decision makers, and external resources upon request.

In parallel with these considerations, the scope of the research was explained in the introduction section and the method employed in the study was determined. In this section, the definition of the problem related to the study and the objectives are explained.

The second section includes the definition of the concept of ERP, its history, general features, the benefits it provides to the enterprises, the perspective of the construction sector on the ERP system, the factors that push the use of ERP in the construction sector, the relationship between the ERP system and management accounting, the expectations of construction enterprises from management accounting / cost management, the data quality of ERP in the management accounting information system and its reflections on financial reporting, and previous literature studies in a similar context.

In the third section, information about the survey information method, sample selection and methodology of the research is given.

In the fourth section, findings and results of the analysis were evaluated.

In the fifth section, the purpose of the thesis is to combine the literature and survey findings by emphasizing the importance of management accounting in the construction industry, and why the presented reports need an ERP-based structure fed from real-time and accurate sources. It is intended to bring the current findings up for discussion and to inspire future studies that make the construction industry an industry that can manage time, resources and quality by using integrated information systems, and to contribute to scientific theory for this.

2. LITERATURE REVIEW OF RELATIONSHIP BETWEEN MANAGERIAL ACCOUNTING AND ENTERPRISE RESOURCE PLANNING SYSTEM

2.1 Managerial Accounting

2.1.1. Definition of Managerial Accounting

As a result of the developing commercial network and universalization, the concept, which was formerly cost accounting, has been replaced by managerial accounting with the developing information system structure. In general terms, managerial accounting is the whole process in which the data within the business activities are collected from the zero point after the control and classification processes and reports are created that will meet the future business needs (Kalaycı, 2019). Managerial accounting is a discipline that provides business managers with the numerical information they need to use in decision-making processes (Aktas R. , 2013).

The managerial accounting system is structured to feed on realistic data recorded by the accounting information system, which is a sub-branch. The system has a structure that collects, classifies, analyzes and reports all kinds of information affecting business activities (Wilkinson & Cerullo, 1997). The accounting information system follows the input-process-output workflow and transactions related to the activities carried out by the enterprise (Surmeli, 2010).

In accordance with the changing global world needs after the 1980s, large-scale enterprises have needed to follow all kinds of developments and renew themselves in order not to lose their competitiveness in the market (Kalaycı, 2019). In an intensely competitive environment, business managers who want to make the right decision among alternative decisions need information among decision options to achieve their business goals (Kestane & Kurnaz, 2019).

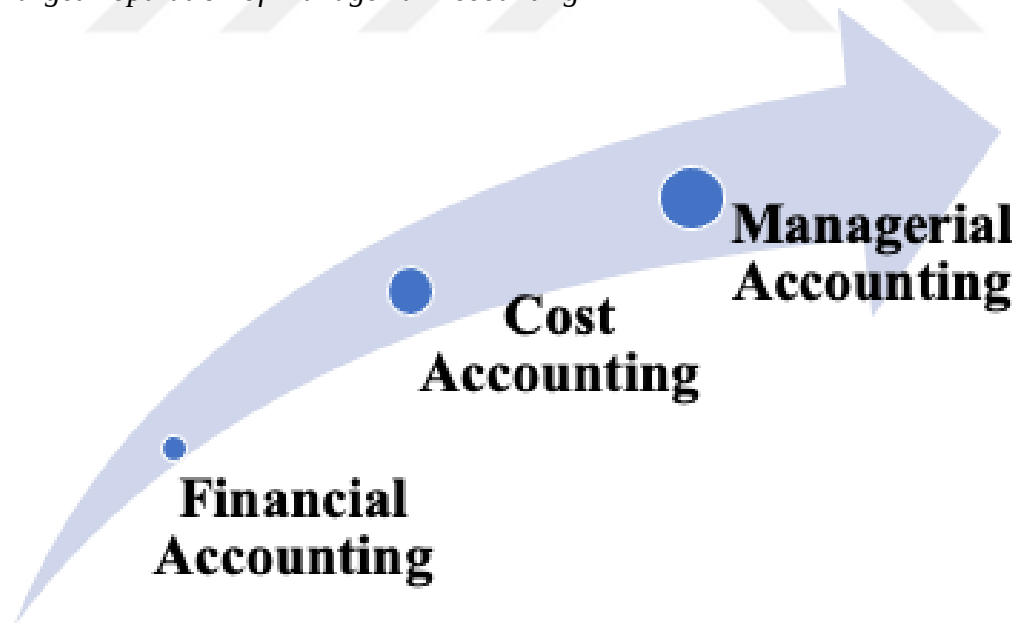
At the same time, making positive plans for the benefit of the enterprise for the future in the way of fascination by making use of all the past resources of the accounting

and finance unit of the enterprises and comparing the past data with the data of the day is among the main tasks of managerial accounting practices (Kalaycı, 2019).

Cost information has a special place among the information provided by the managerial accounting system to business managers. Accurate and timely cost information is an indispensable element of effective management in a constantly changing business environment (Aktas R. , 2013).

Factors such as the universal business factor, strategic management policies, cultural and sociological factors and competition, changes in production and information technologies, the growing economy, the spread of the internet and e-commerce factor, customer value are included in the responsibility of the managerial accounting function; planning, controlling, decision making and implementation, management reporting required for performance measurement are included in its task (Pehlivan, 2009).

Figure 1.
Target Population of Managerial Accounting



Taken from Ceran, Y. (2013). Stratejik Yönetim Muhasebesinde Yeni Bir Yaklaşım Olarak Eş Zamanlı Maliyetleme [Concurrent Costing as a New Approach in Strategic Management Accounting]. Kahramanmaraş Sutcu Imam Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 209-221.

As shown in Figure 1, it was found that a proper managerial accounting application cannot be established at a point where the information system is not proper because it is fed from the database of managerial accounting, finance and cost accounting.

2.1.2. The Effect of Managerial Accounting on Enterprise Performance

Management accounting classifies and controls data for business management or other decision makers and for the formation of effective planning and control. It provides control of the process by acting jointly with other functions within the enterprise. It provides the motivation of business management and related funds towards the goals of the business. It analyzes the studies obtained from all in-house applications (Yurekli, 2017,).

On the other hand, management accounting, different from financial accounting in terms of both its area of responsibility and perspective, provides planning, control and forward-looking perspective, and in this context, in-house information is provided. It examines all units separately as well as the whole of the enterprise, and ensures that the steps to be taken by the enterprise are forward-looking (Ozkan, 2013).

In the light of the above information, the main contributions of managerial accounting to company performance are as follows (Alagöz, 2013; Aktas R. , 2013; Ifac, 2009; Kalaycı, 2019; Kalaycı, 2019; Parlakkaya & Ozkurkculer, 2004; Yucela, 2015).

Traceability enterprises measure all functions within their structure with the performance evaluation criteria that they have included in the target / performance measurement management systems applications. In management accounting, the goal is to develop a decision-making mechanism for management. Managerial accounting activities and enterprise objectives are directly related to each other

Contribution to the decision-making process with planning decision-making support systems that contribute to the management in the decision-making process are

defined as "Business Planning Models". Accounting practices provide the information needed in the organization and execution of planning models. In addition, accounting applications provide the information needed in the process of business planning and analysis of results. Accounting practices that contribute to the decision-making process have three factors;

1- Database to Provide Data for Planning and Budgeting

2- Strategic Planning Evaluation System

3- Business Planning Models (Alagoz, 2013). In addition, according to a research conducted by (Kalaycı, 2019) it has been determined that the planning and implementation dimension of management accounting positively affects the competitiveness of enterprises; for this reason, it is stated that the adoption and application of management accounting by enterprises will be in the interest of the enterprise.

Contribution to the decision-making process with Cost Control the activity, production, etc. cost information, which is effective in the decision-making processes of the managerial accounting system in the enterprises, has a critical role in the processes of realizing the sustainable activity goals of the enterprise and making strategic investment decisions for the future. Cost information has been designed to meet financial accounting needs for many years, and the information prepared for this purpose has been used in management's decisions. Accurate and timely cost information is an indispensable element of effective management in a constantly changing business environment (Aktas R. , 2013).

Cost control contributes to understanding how business profits and values are created, how operational processes are used effectively and efficiently, and how inputs are transformed into outputs for this purpose. Cost control sheds light on the information

related to the source, process, product/service, customer and channel that constitute the values of the enterprise. Realistic calculation and knowledge of the cost of operating resources contributes to the strategic management of the enterprise. Cost information improves and changes past performance, and feedback motivates and improves future performance (Ifac, 2009)

With the cost control responsibility of managerial accounting, new managerial and cost accounting methods have been developed in order to obtain accurate cost information to be used in different management decisions for different purposes. These are target costing, product life cycle costing, quality costs, just-in-time costing and lean accounting. In the recent past, resource consumption costing method has been put into service of managers and management information system together with “time-effective activity-based costing”. The costing methods applied according to the needs of the enterprise in the management information system aim to calculate the cost of the cost items correctly (Aktas R. , 2013).

In terms of cost control, managerial accounting applications can be listed as follows:

- Flexible Budgeting,
- Zero-Based Budgeting,
- Cash Budgeting,
- Activity-Based Budgeting,
- Balanced Scorecard,
- Target Costing,
- Product Lifetime Costing,
- Activity-Based Costing,
- Value Chain Analysis,

- Traditional Cost Techniques,
- Customer Profitability Analysis,
- Break-even Analysis,
- Sales Analysis,
- Operations Analysis,
- Shareholder Value Analysis,
- Benchmarking,
- Profitability Analysis,
- Ratio Analysis,
- Data Envelopment Analysis by using these techniques, one may discuss the benefits of cost control responsibility and managerial accounting to the enterprise (Kalaycı, 2019).

Figure 2.
Effects of Cost Control on the enterprise



Taken from Kalaycı, M. U. (2019). Karar Destek Sistemi Olarak Yönetim Muhasebesinin Küçük Ve Orta Büyüklükteki İşletmelerde Uygulanması Ve Rekabet Gücüne Etkisi [Application of Management Accounting as a Decision Support System in Small and Medium Sized Enterprises and Its Effect on Competitiveness] [Unpublished Master Thesis]. Istanbul Gelisim Universitesi Sosyal Bilimler Enstitüsü .

Reporting Accounting information system is at the center of management information systems and has a structure that produces information for information users inside and outside the enterprise. It ensures that the data required during the decision-making regarding planning, execution and control activities are processed and transformed into information; the data of the transactions carried out regarding the business activities are collected and recorded, and the assets and resources of the enterprise are taken under control and reliable data regarding the said elements are obtained if needed (Parlakkaya & Ozkurkculer, 2004).

In addition to the information above, management accounting applications, thanks to the integrated analysis reporting within the enterprise, make the following

contributions regardless of the sector in which the enterprise is located: 1- Reducing operating costs and ensuring their control, continuous improvement, in other words, Kaizen application, 3- Well-equipped employee ownership 4- Business management and the business itself to improve their competitiveness policies and performance (Yucela, 2015).

2.1.3. Expectations of Construction Enterprises from Managerial Accounting / Cost Management

2.1.3.1. Central Management Expectations in Construction Enterprises

Regardless of the sector, managerial accounting practices are classified as planning and control, cost management and performance measurement and evaluation (Hyvonen, 2003).

Managerial accounting, which has a critical place in the internal control system of enterprises, and management reporting systems, which are its output, enable managers to turn to problems in the right and timely manner. This situation creates results that will support the achievement of the objectives of the enterprise. Responsibility accounting constitutes a large part of management reporting systems in enterprises. Many companies structure their liability reporting systems around areas of responsibility within the enterprise. Responsibility accounting is a system that measures the plans, budgets, actions and actual results of each responsibility center. Management reports prepared for responsibility centers are generally intended to measure financial success. The most common responsibility center classifications in enterprises are grouped under cost, profit, investment and income centers. Cost centers are organizational units that are responsible for cost management within the limits determined by budgets (Calis & Altinsoy, 2014). The management reporting system provides information to the business management for the effective management of different business processes. The system records the information that emerges during all business processes for reporting purposes, and these reports focus on presenting strategic information that will help business managers make

long-term decisions. In this way, the information required for decision making is produced at every stage needed for the execution of business activities (Calis & Altınsoy, 2014).

Financial accounting records the business processes within the enterprise in order to prepare reporting, notification and financial statements in accordance with the laws and regulations, which is the responsibility of the enterprise. Managerial accounting, on the other hand, is internally focused, providing information for the effective management of the organization's different business processes. The managerial accounting system records business processes and operational information for reporting purposes, just like in financial accounting. However, the focus of these reports is on costs and revenues, which contain the necessary information to achieve basic business objectives such as increasing revenues, reducing costs and increasing profitability (Ceran, 2013).

Performance measurement functions as an important management tool in evaluating whether the targeted results are achieved in the activities carried out by an enterprise, and whether its services are carried out at an efficient, effective and profitable level. In the performance management literature, the issue of performance measurement is handled in different ways by researchers from many disciplines (Slobodan & Mirjana, 2012; Aladağ, 2020; Gök, 2005; Çınar, 2018).

Figure 3.
Success Factors for Construction Enterprises

CRITICAL SUCCESS FACTORS AND SUCCESS MEASURES IN THE CONSTRUCTION SECTOR		
Responsible Status	Financial Factors	Report / Performance Measures
For Business Management & Project Management,	Profitability: Budget Management;	For all planned and realized values; operating profit, profit trend, parts of profit growth related to productivity growth and growth,
For Business Management & Project Management,	Liquidity: Cash Management	For all planned and realized values; cash flow trends, interest earned, asset, inventory and receivables turnover, financial leverage, debt ratio
Business Management	Sales;	Sales trend, ratio of new ventures/investments to total sales, accuracy of sales forecasts, sales trend among similar projects, and ratio of sales to total sales
Business Management	Market value:	Total equity value, stock prices and trend over the years
Project Management	Return on Investment Value:	Evaluation of the investment cost of build-operate projects and the expected income performance during the operation period
Responsible Status	Financial Factors	Report / Performance Measures
Business Management	Customer Satisfaction:	Feedback and complaints from customers for real estate, Number of new tenders for contracting projects,
For Business Management & Project Management,	Quality:	For commitment projects; Quality control non-conformance tracking; For the real estate business, customer complaints, warranty costs, service speed and efficiency
For Business Management & Project Management,	Marketing and Sales: Sales performance:	

Responsible Status	Financial Factors	Report / Performance Measures
Project Management	Quality:	Number of requests for defective manufacturing, return, wastage, expected scrap, remanufacturing, pre- and post-warranty service
Project Management	Productivity:	The time from the entry of the material to the production of the product (business cycle time), labor and machine efficiency, the number of lost, wastage and remanufactured products, expected-actual performance measurements (machine, labor, subcontractor), work program follow-up, success- head point
Project Management	Flexibility:	Machine setting time, duty cycle time, programming efficiency
Project Management	Gear Preparation:	Downtime, operator experience, machine capacity, maintenance activities.
Project Management	Work safety:	Number of occupational accidents, causes, effects and consequences of accidents
Project Management	Development in Processes:	The ratio of the process section to the total process where advanced control techniques are applied, the number of re-engineering studies on process designs.
Project Management	Project Time Tracking, Time Tracking:	Manufacturing delivery time, the ratio of the shortened works to the total project time and its effect on the connected works, the effect and ratio of the delayed deliveries/to be delivered on the total project time, the planned-actual manufacturing deviation analysis (with man/day frequency) over the work schedule
Responsible Status	Financial Factors	Report / Performance Measures
For Business Management & Project Management,	Value Engineering	Number of design changes, number of new patents or copyrights, design design, skills of R&D / quality control personnel,
Business Management	Use of Advanced Technology:	The rate of use of new technologies in the communication network, The capacity of employees to benefit from technology in their work processes
For Business Management & Project Management,	Employee motivation, belonging:	Staff turnover rate, number of employees' complaints, general complaints reasons, number of employees generating new ideas
Business Management	Sufficiency:	Education, experience adaptability, financial and operational measures of success, proportion of workforce allowed to participate in decision-making, empowerment performance,
Responsible Status	Financial Factors	Report / Performance Measures
For Business Management & Project Management,	Relations with Public Institutions:	Number of violations of laws, penalties incurred, number of services rendered to the public interest

Taken from Basık, F. O. (2012). Rekabet Stratejisinde Maliyet Yönetimi [Cost Management in Competitive Strategy]; Calıs, Y. E., & Altınsoy, N. B. (2014). Yönetim Raporlama Sisteminde Sorumluluk Muhasebesi: Bir İnşaat İşletmesinin Maliyet Merkezine Yönelik Performans Analizi [Responsibility Accounting in Management Reporting System: Performance Analysis of a Construction Enterprise for Cost Center]. Journal of Economics and Administrative Sciences, 29-44.; Aladağ, H. (2020). Turk

Insaat Sektorunde Kurumsal Kaynak Planlaması [Enterprise Resource Planning in the Turkish Construction Industry]. Muhendislik Bilimleri ve Tasarım Dergisi [Journal of Engineering Sciences and Design] Yıldız Teknik Universitesi, Insaat Fakultesi, Insaat Muhendisligi Bolumu,.

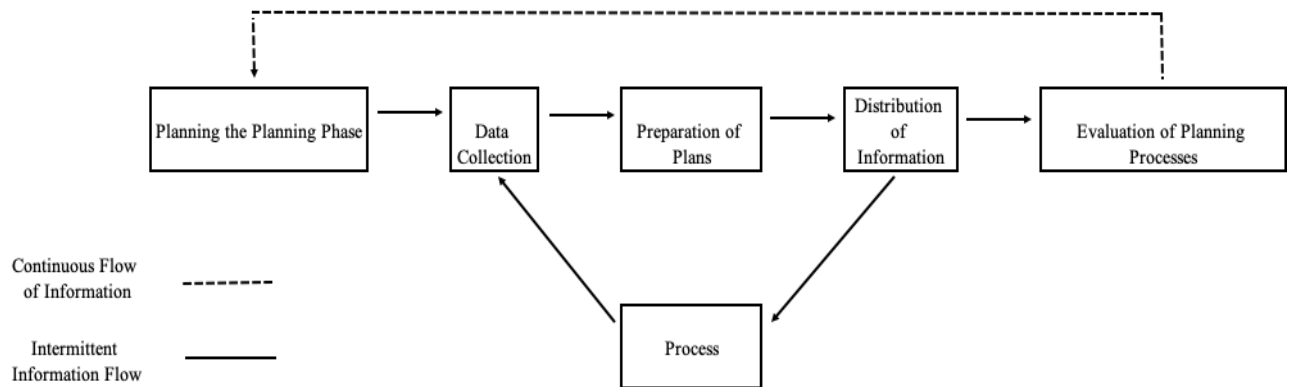
In Figure 3, managerial accounting and reports and critical factors that should be followed separately and consolidated for the success of the construction enterprise and ongoing projects, and performance success measures are presented (Çalış & Altınsoy , 2014; Basık, 2012; Aladağ, 2020).

2.1.3.2. Project Management Expectations in Construction Enterprises

Construction manufacturing project management is the organized use of experience, knowledge, techniques, tools and approaches in order to meet the needs and expectations of those who will be directly or indirectly affected by the production process and results of the project in order to achieve the objectives of the project. Construction project management is the activity of performing management functions in order to solve problems in construction projects, achieve project objectives, increase efficiency by using operational resources efficiently, and create a systematic working environment between the project senior management and the construction site (Avinal, 2012; Aladağ, 2020; Demirkan, 2005; Eda, 2015).

Project Management Methodology planning is the process of coordinating all work-related units in terms of order, duration, location, capacity, and cost within the framework of internal and external boundary conditions, depending on time, so that a work can be carried out with optimum time and cost. Planning together with the project manufacturing team, practical approaches to realistic goals, use of advanced techniques in project management, effective control system and standardization in documentation are critical elements of planning and control activities (Demirkan, 2005; Chen, 2001).

Figure 4.
The planning process is explained in



Taken from Chen, I. (2001). Planning for ERP systems: analysis and future trend business. *Process Management Journal*, 374,386.

Construction project planning, in general, consists of three basic phases, namely Establishing Infrastructure for Project Planning, Developing Cost and Time Plans, Finalizing Cost and Time Plans, Checking and Renewing Plans (Chen, 2001; Demirkan, 2005; Avinal, 2012)

1- Time management the works that have to be completed within a certain time period are connected to each other in the work program as antecedents and successors, and the optimum production time of the project is calculated. Then, the quantitative data of the production to be made are classified according to the temporal interval in the work program, and the timeline and planned budget of the project are formed (Demirkan, 2005; Chen, 2001).

2- Quality management it is the quality of the production and the quality of the whole of the materials, workmanship and work process applications used in that production (Avinal, 2012; Demirkan, 2005).

3- Cost management it is the periodic control of any amount calculated during the planning phase, converted into an amount. The results are interpreted by evaluating the efficiency, deviation, trend and opportunity criteria (Avinal, 2012; Demirkan, 2005).

Project Management Functions the first and most important condition for the success of the various project planning and control techniques applied in management, construction projects is that the center, site, project and planning managers maintain a harmonious teamwork from the beginning to the end of the project. In construction project management, each project should have an organizational structure that includes the following functions. Each function in the project organization is functionally interconnected with the central function of the enterprise with a matrix structure. Financial Functions are contract management, corporate communications, personnel management, employees, supply chain, Finance, Accounting, Cost Accounting and, Technical Functions; are planning control, design, design, contract management, warehouse material management, quality control program, cost control program and reports, work safety, security reports, subcontractor progress payment management, machinery and equipment management (Demirkan, 2005).

Project Management Performance is made by evaluating the profit rate of the project, labor saving, time saving, personnel development through job training, material saving, equipment management (purchase/rental), and customer satisfaction (Basık, 2012; Aladağ, 2020; Demirkan, 2005). These data are followed by management reports, which are the output of managerial accounting systems, thanks to ERP systems (Demirkan, 2005).

ERP system in order for a construction project to be successful, first of all, a very good information system is needed, because the main reason for conflicts during the project is either lack of information or misunderstanding of information. The way to a good system is through a real-time integrated information system that works in a healthy and integrated way. Recording, classifying, storing and converting information into reports provides time and labor savings thanks to ERP systems (Demirkan, 2005;

Beşkese, 2004; Avinal, 2012). Project managers can make predictions about the future with historical information with the ERP system, but the other deciding factor for project managers is information about the progress of the project (Demirkan, 2005). The ERP system is an inward information system for project management stakeholders. It has sub-elements as data processing, management information system, decision support system, expert systems and office automation systems (Demirkan, 2005).

According to Demirkan (2005) states that expectations of construction project management from management information system are as follow

- The management information system aims to reveal the project performance in line with the time, cost and efficiency factors during the project and to determine the deviations of the activities from the planned program and control standards in a simple and understandable way. Information should be in a way that guides the future rather than being based on the past. The efficiency of information is closely related to whether that information reaches the managers in a timely manner. Managers should feel that the information which receive is reliable

- This system should be able to provide specific information for each manager regarding their needs; no matter how good the system is, information that does not meet the administrator's requirements cannot be used. The information should be flexible enough to meet the needs of a changing management environment, different levels of management, different types of projects and functional managers.

The management information system should be able to prepare approval reports in line with the urgent needs of the managers (Demirkan, 2005; Chen, 2001; Cetdsld & Başkak, 2013; O' leary, 2000).

2.2. Erp Usage

2.2.1. Definition and Scope of Enterprise Resource Planning

Although there are already agreed definitions in the academic field about what exactly ERP (Enterprise Resource Planning) means thanks to the developing technology and what is the extent of its scope; , there are discussions on its definition owing to the fact that improvement of the system continues along with the developments in the technology (Bayraktar , 2009).

The concept of ERP can be generally defined as commercial software packages that provide the integration of all ongoing information flow in a company. In other words, ERP applications are software that help organizations integrate information flow and business processes. Typically, it supports different departments and functions in organizations using a single database that collects and stores real-time data (Hancer, 2004).

Although it is possible to make different definitions for the concept of ERP by looking at it from different perspectives, ERP can be defined as commercial software that provides the integration of all ongoing information flow in companies, covering all activity units (after-sales service, maintenance, repair, human resources, etc.) of all sectors (telecommunications, retail, media, health, public, etc.) (Aktaş, 2015).

With the help of information technologies, an ERP system plans all the information, evaluating all the resources of the organization and the needs of the management system. ERP system solutions enable organizations to manage their production and service delivery. Strategic decision-making processes are real-time and more consistent with the data obtained through the system. Therefore, ERP implementation process, reorganization of business processes, adaptation to future

competitive strategies and all information technology structures are considered as a innovation opportunity (Bayraktar , 2009).

ERP is a comprehensive and modular software package that enables institutions to manage all business processes from procurement to distribution with the support of an integrated data/information management system (Cetdsld & Başkak, 2013).

ERP systems, which can be expressed as a software system with functions that allow effective and efficient planning, coordination and control of production, supply and distribution facilities located in different regions in order to meet customer expectations in line with the objectives of the enterprises, covers the functions of enterprises operating in the production of goods and services and an integrated structure (Kestane & Kurnaz, 2019).

ERP is an integrated software that ensures the most effective and efficient planning, coordination and control of the supply, production and distribution channels and resources in different regions in order to meet the internal and external customer demands in the most appropriate way in line with the strategic purpose and objectives of the enterprise, and which has modules that meet the needs of all functions (Kecek, 2009).

ERP systems are commercial software packages in which all processes and data of an institution such as accounting-finance, maintenance-repair, project follow-up, investment, inventory control, material and human resources management are integrated by providing a single database and an integrated interface, which ensure the effective and efficient use of resources in line with the strategies of the enterprise (Davenport, 1998; Bingi, 1999; Klaus , Rosemann, & Gable , 2000; Abdinnour-Helm, 2003; Voordijk, 2003; Shi & Halpin, 2003; Yang, Wu, & Tsai, 2007) .

ERP are applications where the desired data can be obtained by collecting meaningful information about each function such as software purchasing, production,

inventory management, accounting, finance, quality management, human resources, sales, logistics, etc (Celebi & Bulut, 2016).

ERP systems are in-house data warehouses, in other words, information systems that combine all aspects of the enterprise. The system is an application in which everything from human resources to accounting, sales, production and distribution is integrated, providing a single database, a single application and an integrated interface (Bingi, 1999).

Gök, 2005 states that the ERP system has the potential to provide broad integration and effective communication among all users in the resource chain. (Gök, 2005).

The need for a management tool that will ensure the efficient use of resources with the right information at the right time leads to the emergence of ERP systems (Kecek, 2009).

The real and instant data provided by the ERP system has revealed the need for integrated information in the 21st century business world, where it poses a risk as an opportunity cost for institutions if time cannot be managed with proper and real data. For this reason, the main driver of ERP systems is the strategic planning system (Baskak & Cetisli, 2003).

While MRP II (Manufacturing Resources Planning) is used in the planning of manufacturing resources, DRP (Distribution Resources Planning) is used in the planning of distribution resources, and CIM (Computer Integrated Manufacturing) systems are used in the effective and efficient execution of manufacturing; ERP is a planning system that plans and controls all systems in coordination. More broadly, ERP is a holistic software strategy that realizes global information integration between companies (Tanyas, 1997).

Today, through well-designed ERP systems suitable for the sector, it is possible to ensure the correct, effective and efficient use of business resources with a data collection, reporting, evaluation and documentation system, to make optimizations, to create strategies, targets and policies that will take companies to the future, and to manage all the processes that form the basis for this. ERP forms the backbone of an organization by standardizing the entire information system (Kestane & Kurnaz, 2019).

It is necessary to have an ERP approach in order to reduce the lead times (design - supply - production - distribution) in enterprises in accordance with the principles of efficiency, productivity and performance, to realize the production in accordance with the constantly changing customer demands, to ensure the desired level of communication among the supplier company, manufacturer, vendor and customers in the supply chain, and to structure the activities in an integrated and healthy way that triggers each other (Gok, 2005).

ERP system eliminates the need to use a large number of interfaces by performing all business processes and automation on the same software in the fields of operations and reporting of function groups such as logistics, purchasing, accounting applications, finance, manufacturing (production), sales & marketing, distribution, inventory management, human resources, quality and project management; besides, by creating a natural integration between all processes, it ensures that the valuable information obtained from each process is used in real time, without error and without loss of time. Thus, information can be transmitted to the right person at the right time on a single system (Kecek, 2009).

The four main features of ERP systems, which have a flexible structure that can provide solutions to different sectors and different needs and can be considered common,

regardless of the sector in which the enterprises are located, and their branches of activity are as follows;

1. ERP is a commercial computer software product that offers customization during installation, can be adapted to any sector, and can be bought and sold.
2. ERP is a development goal that collects all processes and data of an enterprise on a single database with a comprehensive and integrated structure,
3. It is a key element of an infrastructure that offers solutions to business processes,
4. Database and operating systems which is a more general application software (Klaus , Rosemann, & Gable , 2000).

In this study, instead of addressing one of the above-mentioned perspectives, the concept of ERP will be examined from all perspectives as a whole and in the last part, why companies in the construction sector need an ERP system in their management reporting they use in their strategic decisions will be discussed in detail.

2.2.2. Historical Development of ERP

Previous studies show that the industrial sector and the enterprises having production, sales/marketing and distribution functions have been using computers and investing in software for about 45 years in order to improve efficiency, profitability and information flow (Demirkan, 2005).

The development process of ERP has closely followed the development of computer hardware and software systems. Along with its use by production enterprises in the industrial sector for their production and commercial activities, it has been improved as open-ended prospectively through the processes of developing and integrating activities such as material management and production planning within the scope of production, management and information systems in parallel with the developments in information technologies until today (Shi & Halpin, 2003).

It is found that the basis of ERP systems dates back to the 1960s. In the 1960s, since the records of production and material management in the enterprises were made manually, the lack of clear information about the delivery times of the orders, the actual-dematerial inventory led to the development of systems on Material Requirements Planning (MRP I) in the following years (Demirkan, 2005).

Then, based on the fact that the adequacy of the factory capacity to carry out the relevant production has not been confirmed when transmitting production sales and purchase work orders despite the advantages of the MRP I system such as lower stock level, less inventory holding cost, shorter production lead time, on-time delivery to the customer, Closed Loop Material Requirements Planning (Closed Loop MRP) system was developed (Demirkan, 2005) .

The Material Requirements Planning system has enabled the main production plan to be confirmed and fed back by comparing the production plan with the available capacity (Demirkan, 2005).

In the 1980s, following the MRP I systems, which include the raw material requirements or the planning of the product according to the main production plan, Manufacturing Resource Planning (MRP-II) systems were developed, which ensure the best use of the production process by synchronizing the production needs with the materials (Demirkan, 2005) .

In the 1990s, along with the developing technology and the emerging needs of the world, companies felt the need to redesign all their ways of doing business and renew their resource requirements, and started to buy goods and services from distant geographies and to offer products and services to the same geographies (Demirkan, 2005).

Based on the needs of the globalizing world, the rapidly expanding multinational companies wanted to establish an integrated structure that complements each other in all

operating systems in order to manage healthy business processes, take the right decisions at the right time, and ensure sustainable business performance. The current situation requires a higher level of information integration that exceeds the capacity of the MRP II system, which is best describe as the concept of "Enterprise Resource Planning". In fact, ERP is a holistic software strategy that realizes global information integration (Aladağ, 2020).

In order for a company to coordinate its activities in different geographical regions, it is required to adhere to the philosophy of Just in Time (JIT) production and procurement. At the point where the functions offered by MRP-II systems cannot meet the needs of the day; ERP systems, which are software that can provide integrated and real-time information, have emerged (Demirkan, 2005).

The main difference between ERP and MRP II is that MRP II provides services for a single plant, while ERP serves more for the integration of multiple plants and facilities. ERP software is the required tool for the integrated planning and control of enterprises that produce at more than one point or in more than one type, together with all their functions (Kecek, 2009).

In Baki (2000) summarized the reasons for the development of ERP as follows.

- Physically dispersed manufacturing operations
- International supply chains
- The need to open up to international markets
- Fierce competition
- Competitive changes in product and production policies
- Changing and developing world market conditions
- Demolition of economic walls
- Simplification in management organizations.

When the requirements arising from the reasons above were supported by the developments in management and information systems and technologies, the ERP system was born. In this distributed database system, which consists of client/server design, distributing information to physical points on a network, and storing it in different computers, connection is provided through electronic operating technology and graphical user interfaces. Any user, regardless of the physical location of the programs and databases, can access global data and use the distributed data system as a single unit. In this way, the new ERP system provides high-level information integration, rapid access to the most up-to-date information, global logistics, inventory control and supply/demand integration, and instant reaction to market/customer/business world formations (Aladağ, 2020).

ERP systems have integrated the supplier and customer relations functions, which are outside the basic operations of the enterprises, into the company's process structure. Today, companies have the opportunity to manage the demands of their customers in electronic environment, to plan and follow their production in line with these demands, to reach the suppliers electronically by taking into account the material needs and stocks arising from the demands, as well as to select, evaluate and keep the suppliers under control (Aladağ, 2020).

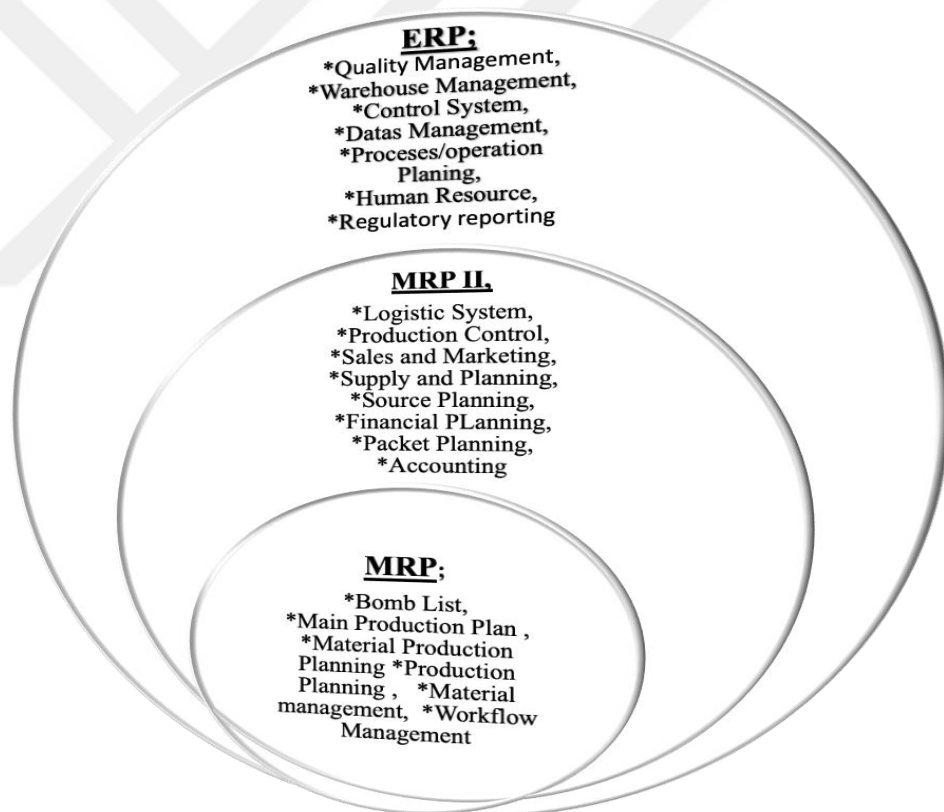
The integrated structure and unifying feature of ERP is to simultaneously plan, coordinate and control the resources of enterprises, factories located in different geographical regions, their suppliers and distribution centers. Thus, the ERP system approach makes it possible for the enterprise to plan all its resources and performance effectively and efficiently (Bayraktar , 2009).

In this context, users can determine which customer's order should be met from which distribution center or in which factory, where it would be appropriate to meet the

material and service needs of all factories, how the production and distribution resources of the factories such as machinery, materials, labor, energy, information, etc. can be used coordinately and jointly. Thus, the capacity and characteristics of distribution, production and supply resources of all subsidiaries are taken into account at the same time in order to meet the customer's order as soon as possible with the desired quality and cost. (Hancer, 2004).

The evolution of ERP systems in terms of scope is shown in Figure 5. (Altinkeser, 1999)

Figure 5.
ERP's Development in Terms of Content



Taken from Altinkeser, H. (1999). Kurumsal Kaynak Planlaması [Enterprise Resource Planning Systems][Unpublished Doctoral Thesis], Yıldız Teknik Üniversitesi Fen Bilimleri Enstitüsü.

With the development and emergence of MRP II production resource planning in the 1990s, the word production in the MRP provincial definition was replaced by the word enterprise in ERP. Two important reasons for the need are as follows;

1- Now all direct or indirect activities related to production (human resources, after-sales service, sales, quality management, maintenance - repair ...) were within the scope.

2- Not only production companies, but all sectors (media, health, sales/distribution, defense, public administration ...) were finding solutions within ERP software (Altinkeser, 1999).

Integrating many functions of businesses in a single system, accessing information from a single source, improving communication and interaction with customers and suppliers, globalization trends, adapting to competitive pressures and competitive pressures and strategic advantages have contributed to the development of ERP systems (Kecek, 2009).

In the 2000s, the business world met the definitions of back office and front office, that is, inside and outside the business. The Internet has begun to change the the world of the business. These years are generally seen as the e-business (electronic business) period. ERP systems have expanded their conceptual structure by incorporating the following functions along with the needs of the day and the developments in information and communication technology (Demirkan, 2005).

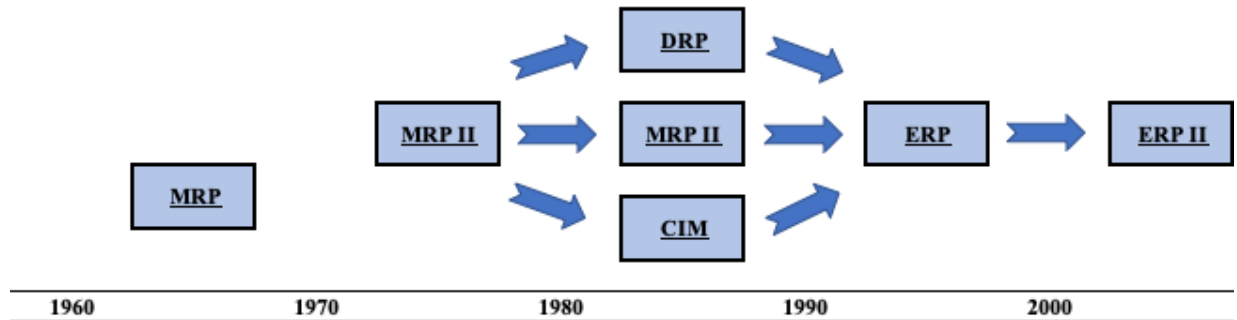
1- Customer Relationship Management: CRM,

2- (Supply Chain Management: SCM

3- Business Intelligence: BI functions. It has expanded its conceptual structure by incorporating Business Intelligence (BI) functions. The new revised system is defined as ERP II. (Demirkan, 2005).

Figure 6.

Shows The Development Process Of Erp Systems.



Taken from Demirkan, Ç. (2005). Kurumsal Kaynak Planlaması (ERP) Sistemlerinin İnşaat Sektöründe Uygulanabilirlik Araştırması [Applicability Research of Enterprise Resource Planning Systems in Construction Industry] [*Unpublished Doctoral Thesis*] İstanbul Teknik Üniversitesi Fen Bilimleri Enstitüsü.

With ERP II, ERP software is not only a solution for the needs of production sector businesses, but also started to serve other sectors (Demirkan, 2005).

After a while, ERP II found faster solutions by including suppliers outside the company, providing optimum cost management, increasing the efficiency and effectiveness of the supply chain market, and cooperation. With these features, it has become more functional than classical ERP solutions by attracting the attention of innovative businesses (Demirkan, 2005) .

The expression of ERP II in one word is "cooperation". ERP II systems are not just the backbone of the organization. It is also the information link for the organization to the supply chain. For this reason, while moving from traditional sources to electronic markets, the ways of doing business of the future will play various roles in many supply chains. The expression of ERP II in one word is "cooperation". ERP II systems are not just the backbone of the organization. It is also the information link for the organization to the supply chain. For this reason, while moving from traditional sources to electronic markets, the ways of doing business of the future will play various roles in many supply

chains. In order to ensure customer satisfaction, customer relationship management, supply chain management, employment satisfaction, human resources, manager satisfaction, corporate budget, etc., companies need a very good information infrastructure and a core ERP system to provide this infrastructure (Aladağ, 2020).

The concept of the 2000s, which includes an integrated database in business, business processes and flows and an integrated structure, can be summarized as ERP II's formula $ERP\ II = ERP + CRM\ (Customer\ Relationship\ Management) + SCM\ (Supply\ Chain\ Management) + BI\ (Business\ Intelligence)$ (Aladağ, 2020).

It is out of question for businesses that cannot manage their activities in an efficient and timely manner in order to achieve their current and future targets, their resources and performance, to sustain their operations. Businesses need to manage their own business processes correctly, and then develop their relations with external stakeholders (customers, suppliers, investors) (Beskese, 2004). For this reason, ERP systems, which are predominantly a back office management system, should be at the base of the structure. The development process of ERP described above stems from the need to take the competition one step further at every stage. Today, new boundaries are being discovered; increasing competition, decreasing profit margins and customer-oriented understandings such as "gaining new customers and protecting the present ones" have become more important in businesses in globalizing world (Bayraktar , 2009).

2.2.3. General Structure and Main Features of ERP

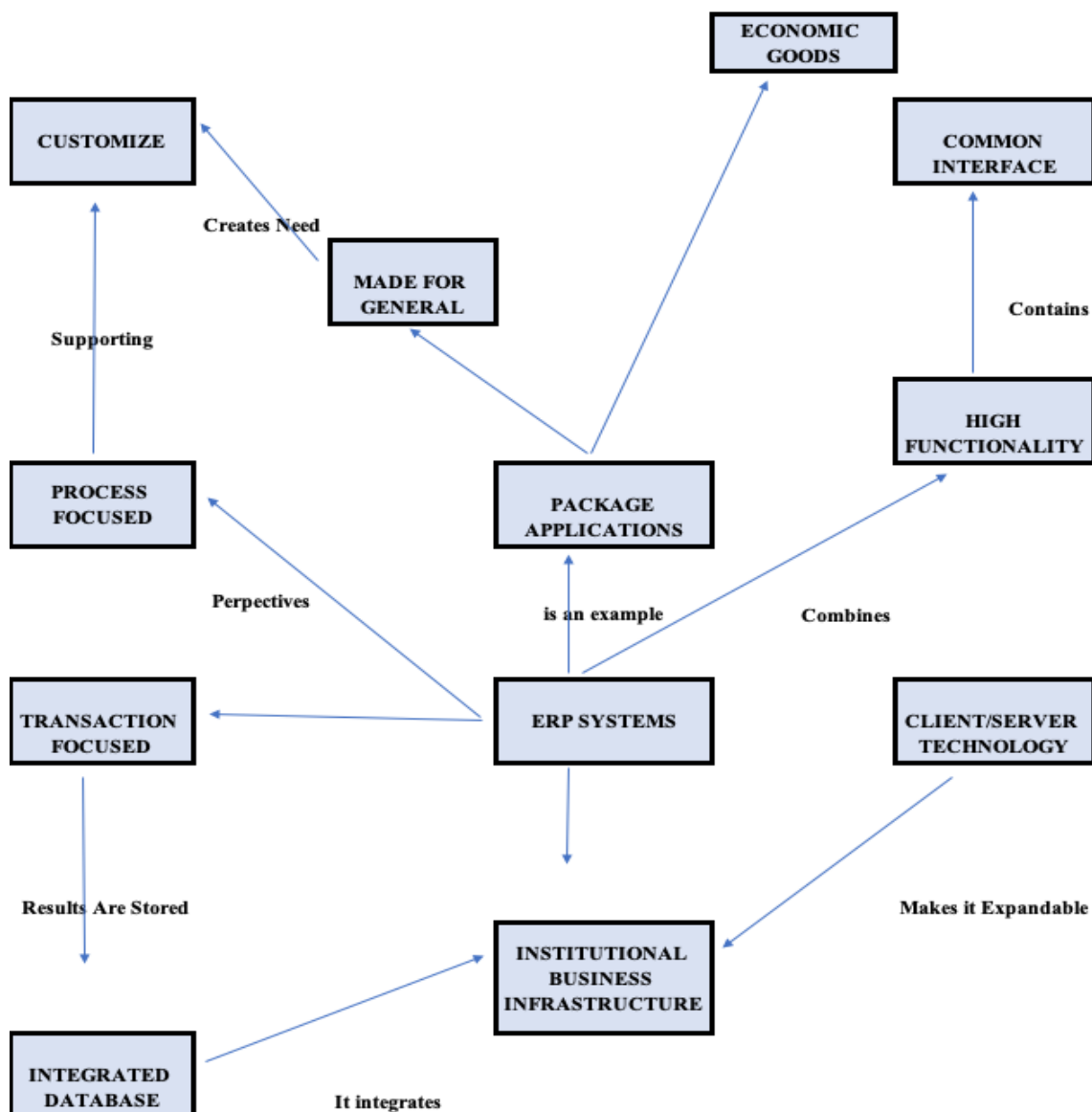
ERP applications are informatics projects that have a defined start and end date and are carried out with limited resources such as time, budget and people. In reality, unlike projects, ERP applications are works that change rapidly and are continuous in current business conditions. The main reasons for this are technological change and updates, company mergers, company separations, business process changes and the circulation of people in the project (Bayraktar , 2009).

The ERP system is a software that collects all the processes and data of the enterprise on a single platform. The main technical features of ERP are as follows (Hagman, 2000).

- Consistent graphical interfaces in all application areas.
- A client/server architect, consisting of three layers as application, database and presentation, is independent of operating system and hardware; ERP packages can be installed on different systems such as Solaris, Windows NT or Linux.
- Its management is more complex than local systems.

These common features of ERP can be seen in the conceptual graph given in *Figure 7* (Hagman, 2000).

Figure 7.
Main features of ERP



Taken from Hagman, A. (2000). What will be of ERP?., School of Information Systems Queensland University of Technology.

Although ERP systems differ according to the sector, company size or company, they are generally software with the following features (Verschoyle-king, 1999; Klaus , Rosemann, & Gable , 2000).

- It has a functional structure as it aims to support the functions of many institutions.

- They are standard software packages that target all sectors and can be customized according to the company during installation. Industry-related solutions can also be developed with additional options (add-on).
- ERP is application software rather than database management software, middleware or an operating system. It operates in an operating architecture consisting of three layers: application, database, and server.
- It offers solutions to basic business processes with its best business practices (Best Business Practices).
- ERP packages are designed to provide solutions worldwide, independent of country and region concepts. However, it allows functions such as accounting transactions subject to local legislation, creation of special documents (quotes, invoices, etc.) and human resources management, which differ from country to country, in accordance with local requirements.
- ERP software can be applied in all sectors, thanks to its functionality that allows it to be used on a global scale.
- It is an application with an integrated database that hold both master data and data of business processes.
- It has consistent graphical interfaces in all application areas.
- ERP packages support repetitive and continuous business processes such as supply management, order management and treasury operations.
- Although it is independent of the operating system and hardware, its use with hardware and software recommended and approved by the ERP supplier minimizes potential risks (Verschoyle-king, 1999; Klaus , Rosemann, & Gable , 2000).

In general, the ERP system provides an infrastructure and data warehouse where risk control and audit functions can establish a healthy internal control structure and

provide real-time control, while responding to all operational and reporting needs of the basic governance functions of an enterprise

2.2.4. Intended Uses of ERP by Institutions

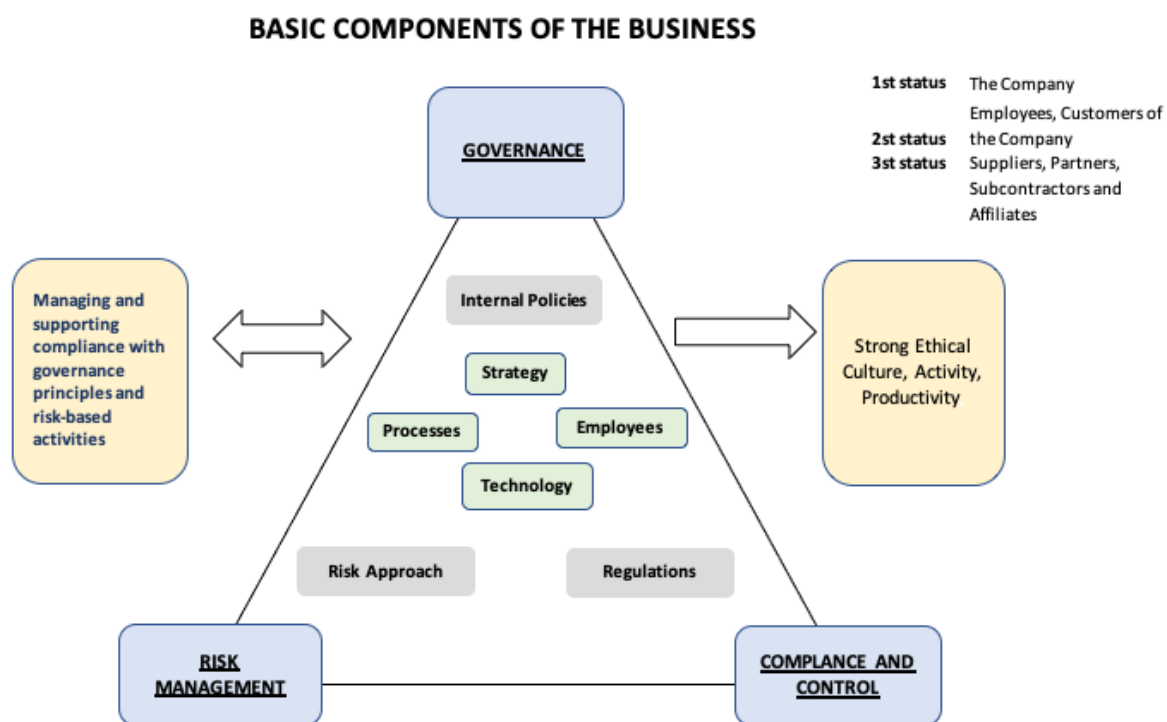
2.2.4.1. Importance of ERP for Enterprise

The business entrepreneur takes investment decisions and establishes a business in order to make a profit.

The most important criteria for making a profit are to catch the market needs instantly and to have the resources and performance to meet these needs. This consistent behavior will bring profit to the business and ensure that it has a share in the market (Altinkeser, 1999).

Figure 8 below shows the basic components required for the business to maintain its presence in the market by growing. This holistic approach shows how much it takes to communicate instant real and holistic data. The business makes this capability possible with the presence of an ERP system (Moeller, 2011).

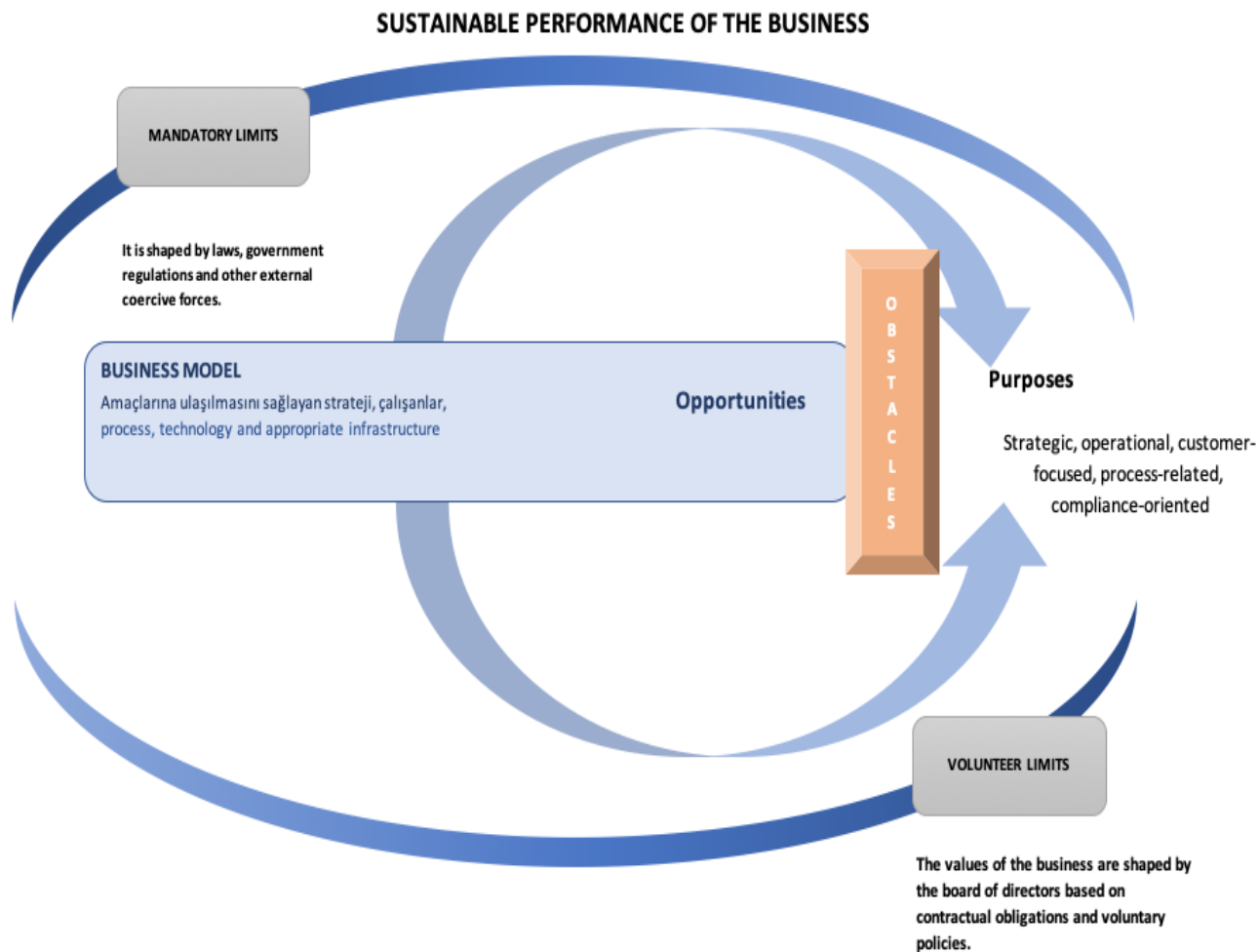
Figure 8.
Main components of the enterprise



Taken from Moeller, R. (2011). COSO Enterprise Risk Management: establishing effective governance, risk, and compliance processes. New Jersey.

On the other hand, having a sustainable share in the market depends on being able to compete with other businesses. Globalization has increased competition to unprecedented levels. For Competition, Figure 9 shows what strategic management needs for an enterprise to keep its sustainable presence stable in the market (Mitchell, 2008).

Figure 9.
Sustainable Performance of the Enterprise

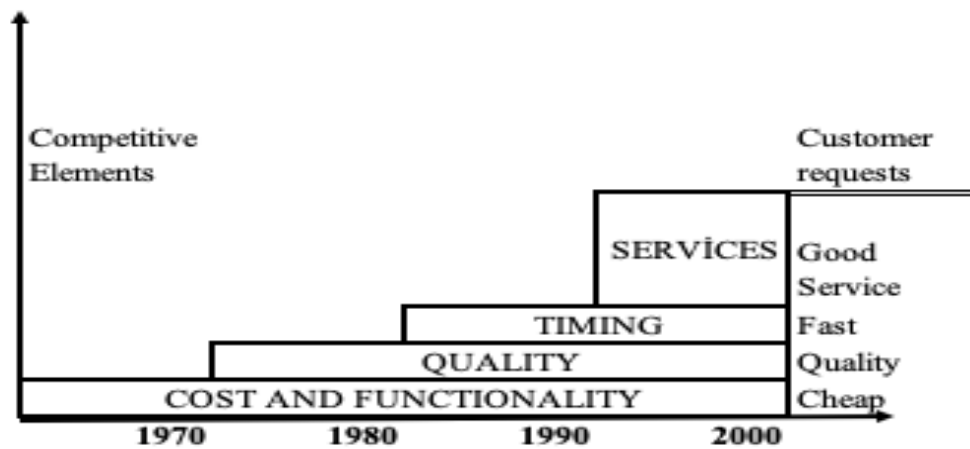


Taken from Mitchell, S. (2008). Governance, Risk and Compliance (GRC). Corporate Defense Insights: Dispatches from the Front Line (s. 68-75).

Sustainable competition brings continuity if enterprises do not compromise on the concepts of "quality", "price" and "time".

Product quality, on-time delivery and production speed are important factors for the customer. When environmental factors are taken into account, enterprises feel the need to better plan their activities and organizational structures, resources and performance. In order to survive and develop, businesses have to adapt to new competitive elements that have emerged over time. In such a competitive environment, companies must follow the best practices in industry to be successful. The changing elements of competition are shown in Figure 10 (Altınkeser, 1999).

Figure 10.
Changing elements of competition



Taken from Altinkeser, H. (1999). Kurumsal Kaynak Planlaması [Enterprise Resource Planning] [Unpublished Master Thesis]. Yildiz Teknik Universitesi Fen Bilimleri Enstitüsü.

Today, using computer-based systems in a dynamic economy creates an infrastructure that will help manage and coordinate the work in the organization and keep up with the new trends in the world as soon as possible. These systems enable the transformation of the data obtained in the 'input - operation - output', which are the three basic activities in organizations, into useful information used in supporting organizational functions, ensuring effective communication, and performing good analysis and control processes. These days when companies add their IT investments to their short-term plans in the light of economic conditions, it is time to question how effective the business processes and interprocess information flow in organizations are in order not to fall behind in the race (Hancer, 2004).

2.2.4.2. Reasons for Institutions to Use ERP System

In order for enterprises to compete by benefiting from today's technological opportunities, they need to create an institutional source that will meet the consistent information needs of the enterprise, to access real-time, up-to-date and reliable data, and to integrate their business systems under a single roof as much as possible. Since the ERP

system has the software infrastructure to meet this need, these are the main reasons why it is preferred by enterprises. In addition, ERP systems have recently been preferred not only for integrating internal business processes, but also because of their ability to establish time and location-independent integration between the company's suppliers and customers on the internet (Karakanian, 2000).

With the ERP system, the integrated processing of functions such as supply management, inventory management, master purchasing planning in parallel with sales, budget planning, production, quality, finance, treasury, management/cost accounting, machinery and equipment management, human resources is indispensable for companies to use their resources in the most effective way. Being able to deliver the product they want to the customers anytime they want, in the cheapest way and without sacrificing quality are indispensable necessities today (Aladağ, 2020).

Employees of institutions using ERP applications act with the assurance that they use up-to-date and reliable corporate data when they enter customer orders, provide new production materials. Managers, on the other hand, enjoy the peace of mind of making decisions with confidence by making sure that workers use the same information. Information technology departments can easily support ERP applications as they use systems based on industry standard technologies. For this reason, ERP systems can also be called "Corporate Backbone" (Manas, 2000).

According to a study conducted by Deloitte & Touch Consulting, the factors that push enterprises to the ERP system are summarized as follows (Manas, 2000).

1. Technological reasons

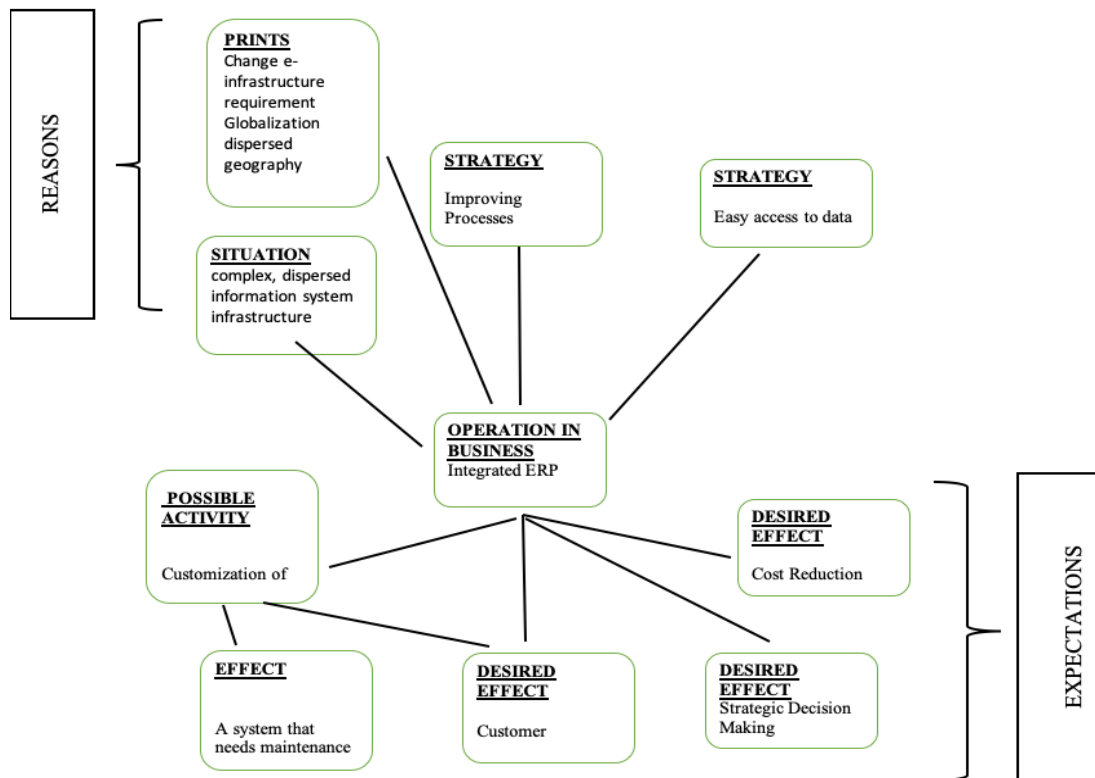
- Integration of commercial transactions and systems,
- Simplifying the integration of acquired business knowledge into existing technology infrastructure,

- Replacing old and outdated systems,
- To obtain expandable systems that will enable growth in business life.
- Relocation of dispersed systems,
- Increasing the quality and reliability of information,

2. Functional reasons

- Increasing success,
- To reduce production and general management costs,
- To increase customer satisfaction, to simplify all ineffective and complex work,
- To have the opportunity to develop new business strategies,
- Adapting to a global business management field.

Figure 11.
Reasons and Expectations for Establishing ERP



Taken from Beşkese, B. (2004). Bilişim Teknolojisi Yatırımlarının Değerlendirilmesine Yönelik Uygun Yöntemin Seçilmesi Modeli - ERP Yazılımı Seçimi Uygulaması [Model of Selection of the Appropriate Method for the Evaluation of Information Technology Investments - ERP Software Selection Practice] [Unpublished Doctoral Thesis]. Istanbul Teknik Üniversitesi

Figure 11 summarizes the reasons for the use of an enterprise's ERP system and the expectations of the enterprise (Beskese, 2004).

2.2.4.3. Benefits of ERP to Enterprises

ERP system is computer software. It is a development goal that gathers all processes and data of the enterprise under a comprehensive and valuable whole on a single platform (Postacı, 2012).

According to Partners of Deloitte studies (1998), which includes 62 Fortune 500 companies that have invested in ERP systems, the benefits obtained by enterprises as a result of ERP investments are summarized under the titles of reduction in costs, improvement in revenues, improved cash management, healthy inventory control and

reduction in personnel employment, reduction in order deadlines, productivity and order management improvement, information and process flows and customer service times.

Enterprises that prefer ERP systems generally save on maintenance costs by removing old software systems, thus reducing information technology costs. On the other hand, three years must pass before the developments in the ratio of cost of goods sold to revenues can be observed. However, significant improvements can be observed in the ratio of the number of employees to income during this period (Poston, 2001).

ERP systems are the key elements of an infrastructure that offer solutions to business processes (Postacı, 2012).

Strategic advantages of ERP systems

- Data mining
- Digital workflow (procedure)
- Increase in flexibility,
- Increase in productivity,
- Healthy communication,
- Low operating costs,
- Income increase,
- Short cycle times,
- Effective cooperation,
- High profit margin
- Effective internal control system (Postacı, 2012).

The installation of ERP systems in a company should not be seen as just the installation of commercial software, but should be seen as an initial investment for instant access to comparable and accurate information. For this reason, while ERP systems are being designed, the digital procedure should be established as a process of management

systems in the workflow. This is highly correlated with the success of ERP systems (Postaci, 2012).

ERP systems are also information technology systems that have been preferred in recent years owing to their ability to provide effective coordination between external users, suppliers and customers, and internal users, employees and management, and to provide wide integration in business processes (Kestane & Kurnaz, 2019).

ERP systems maximize the information flow within the company and accelerate business processes by ensuring that up-to-date information is obtained both inside and outside the organization when and where necessary (Gefen, 2002).

It also provides an effective integration between physical and human resources (Bradford & Florin, 2003).

2.2.4.4. Effect of ERP on Company Performance

One of the important factors for the successful contribution of the ERP system to the performance of the enterprise is the healthy integration design and the opportunities it provides. Figure 12 explains the impact of the ERP system on the performance of an enterprise in terms of scope and function (Kecek, 2009).

Figure 12.
Effect of ERP on performance

Analytics	Strategic Corporate Governance		Financial Analytics		Workforce Analytics		Operations Analytics	
Financials	Financial Accounting		Managerial Accounting		Corporate Transparency		Financial Supply Chain Management	
Operations	Supply Chain	Stock & Warehouse management	Production Planning		Shipping & Distribution		Sales & Service	
Supporting Operations	Product Lifecycle Management		Program and Project Management		Quality Management		Enterprise Asset Management (Maintenance & Repair)	
Human Resources Management	Employee Relationship Management		Employee Lifecycle Management			Employee Process Management		
Technology	User Integration		Data Integration		Processes Integration		Application Platform	
Supporting Solutions	Environmental Health and Work safety		Payroll		Treasury and ve Risk Management		Property Management	

Taken from Kecek, G. (2009). Enterprise Resource Planning And The Importance For Company. Electronic Journal of Social Sciences.

With the acceleration of the information flow between the departments, the general working speed of the company increases, and the report and analysis opportunities throughout the day and period are enriched. However, ensuring integration is not as easy as it sounds. Everyone in the system must convey the right information at the right time. (Hancer, 2004)

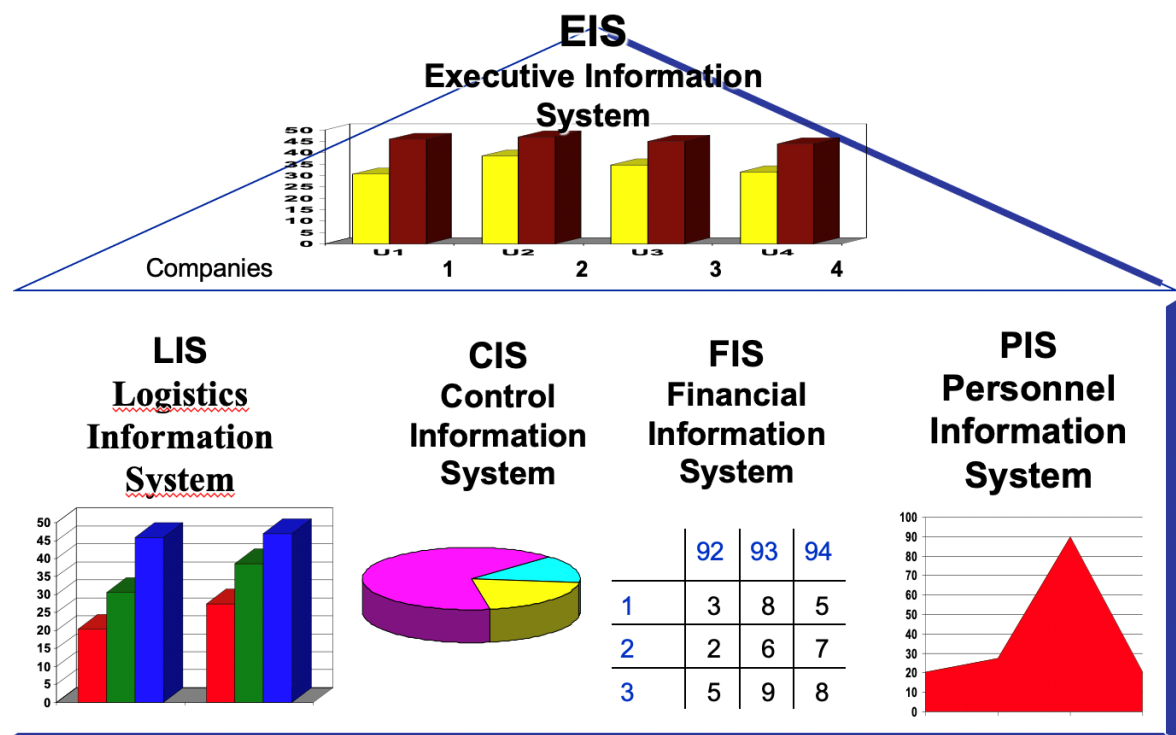
One of the best aspects of the ERP system is that the mishap is instantly visible to everyone, so that the error can be corrected in no time. For example, when the warehouse stock - the ones in production - the financial information of the customer are displayed together during the order entry, the service that the sales department will provide to the customer will be both faster and higher quality. For another example, an order officer who provides information about the customer's pending order can access the customer's financial data and share the current account status with the customer (Kestane & Kurnaz, 2019).

As can be seen in both examples above, the ERP system will change the duties and responsibilities of every business employee, from business representatives to decision-making managers, who run the hot operation.

If the scope and functions in Figure 12 are designed and used in accordance with business activities, the Enterprise will have a reliable, real-time data mine, in other words, an information store, as seen in the example in Figure 13.

Figure 13.

ERP system - Example of Enterprise Information Store



Taken from Kestane, N., & Kurnaz, A. (2019). ERP Sistemlerinin Muhasebe Bilgi Sistemine Entegrasyonu ve Finansal Raporlamaya Yansımaları [Integration of ERP Systems into Accounting Information System and Reflections on Financial Reporting] Dumlupınar Üniversitesi Sosyal Bilimler Dergisi, 145,158.

2.2.4.5. Investment Cost of ERP

Especially, technological innovations are of vital importance for the growth and profitability of companies and play a serious role in the welfare of national economies when examined in terms of international competitiveness. Importance of technological innovations are increasing for companies day by day, as it is realized by developed countries that the cost of producing technology, which is such an important source of

prosperity, is quite high and that 50% of new products and processes originate from outside the company (Davenport, 1998).

However, the cost of the ERP system is not limited to the software alone. In order to establish a successful ERP system, a large-scale transformation process is needed in the enterprise. Therefore, the cost of installing an ERP system should be evaluated as a whole (Avinal, 2012).

When evaluating the ERP system from the point of view of managers, first of all, it is explained that a good planning, a good analysis of the needs of the business and the decision process should be made according to these results. He explains that through a successful conceptual process, maintained ERP systems are systems that requires a lot of time to return from its high costs while there are long-term applications (Gok, 2005).

ERP systems are a very critical decision for companies in terms of both cost and time. To benefit from an ERP solution, the ERP implementation must be carefully managed. ERP applications made without patience and careful planning will not go beyond wasting corporate resources instead of providing competitive advantage (Beskese, 2004).

An ERP system implemented with an effective planning, taking into account internal and external factors, will be successful and have the potential to add value to the enterprise, so that the effects of the success of the ERP system implementation on the performance of the company will be positive in parallel (Kecek, 2009).

2.2.5. The Construction Sector's Perspective on ERP

In construction projects, manufacturing requires the effective use of all resources.

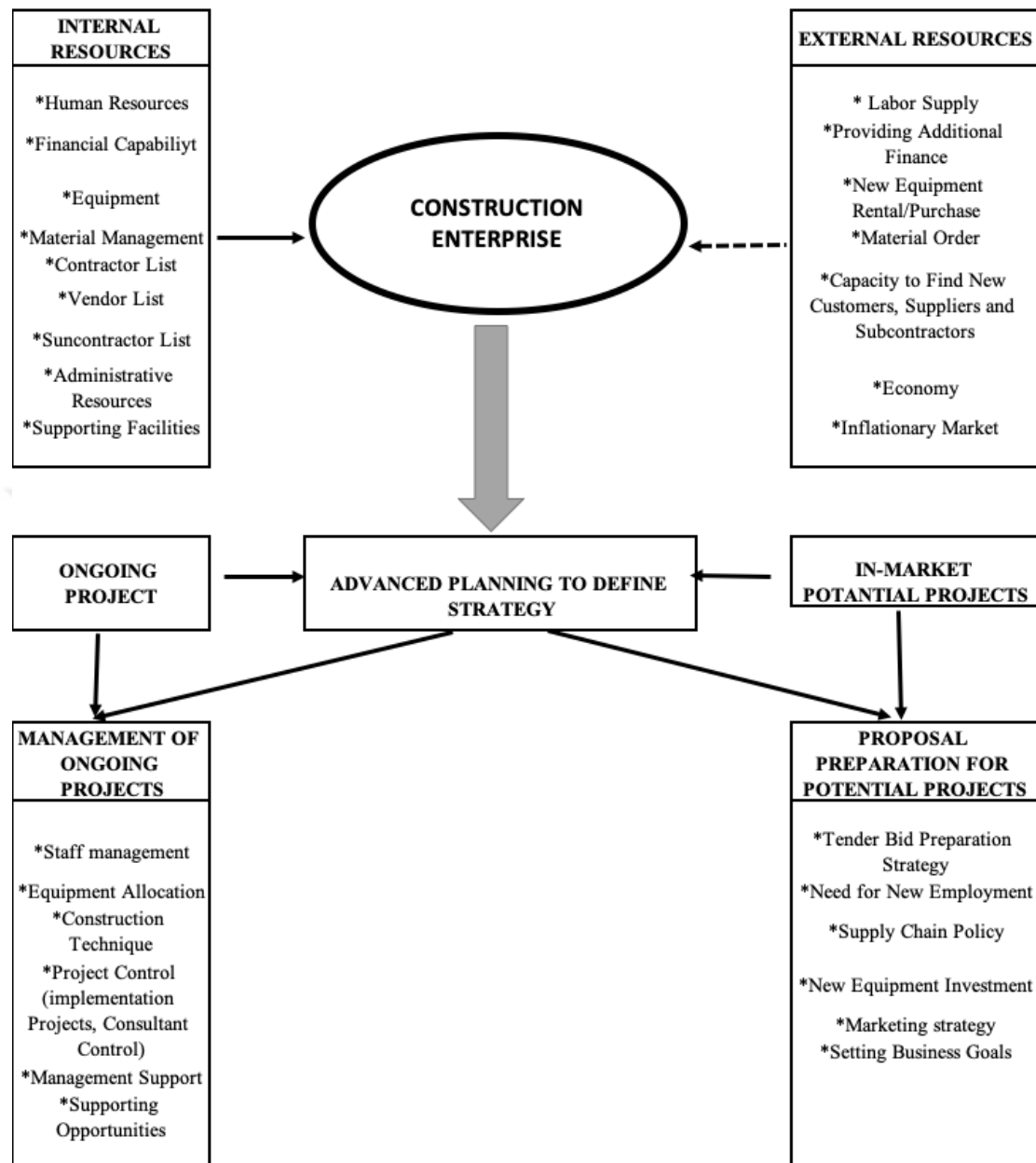
Availability of resources defines the capacity of manufacturing for the sector entrepreneur. In general, the construction business uses two categories of resources

1. Internal resources (Labor, machinery-equipment, facility, etc.) owned by the company

2. External resources are the items that the company procures from its market (rental machines, loans, etc.) in return for a certain price. The general opinion is that the company's internal resources are used at the maximum level and the foreign market is used to balance the company's activities, experience and profit. Construction projects are temporary projects in nature, they span different lengths of time, require different resources, and it is often very difficult for a construction enterprise to strike a balance between its ever-present production capability and the actual business potential available (Shi & Halpin, 2003).

The activities of the construction enterprise are shown in Figure 14. The figure shows the internal resources that the company has and the external resources that it can obtain from the market. The resources on the left are internal resources owned by the business and are indicated by a bold arrow in terms of usage because their connection with the business is organic. The resources on the right are external resources and the business can obtain these resources from the market for a certain fee. Since the connection of the business with external resources is inorganic, it is shown with a dotted arrow (Shi & Halpin, 2003).

Figure 14.
General fields of activity of the construction company



Taken from Shi, J., & Halpin. (2003). Enterprise resource planning for construction business management. *Journal of Construction Engineering and Management*, 214,221.

In light of the above information, a construction enterprise should optimize its use of internal and external resources to maximize its objectives in the project. In order to use its resources optimally, its current projects, how the company should allocate its resources (labor, equipment, materials and money), how it should compete whether or not it is necessary for in-market extra resources (competitive strategy and business development),

and finally should decide what its strategy should be when bidding for new projects and how it will manage these potential projects (strategic planning and management) if the tender is won. While this decision-making process requires the use of a large amount of integrated information from many fields, it also requires the use of advanced planning techniques. Internet technology meets this need of the business with a cohesive work environment for the management functions that are classically separated from each other. Thus, information can be shared and decisions based on cooperation can be made effectively. Here is the conclusion: Internet-based integrated resource planning system is a potential solution to achieve work automation in a construction company (Shi & Halpin, 2003).

It is a fact that production planning and management systems in the manufacturing sector, which are based on information and integration systems, have differences due to the management perspective and gained experience in the construction sector. For this reason, the ERP system makes it necessary to examine the development processes in the sector in which it emerged in order to examine its applicability in accordance with the structure of the construction sector. (Demirkan, 2005)

Construction is the process that transforms materials and permanent equipment into a completed structure. Compared with other industries, the unique characteristics of the construction industry, especially the manufacturing industry, are immediately striking. The uniqueness of the construction industry and the fact that it produces a single product also prevents the direct application of many methods and concepts such as mass production developed in the manufacturing industry (Peurifoy, 1996).

Many technology and production companies follow the digital world closely because of their field of activity. However, while the construction industry shows an introverted approach due to its structure, the information age, which is the biggest return

of the 20th century, brought along teachings such as recording the learned information, setting a precedent and reaching the right person; enterprises that have been in the construction industry for about 20 years have started to invest in ERP systems and digitize depending on the growth rate. For this reason, even though the need arises from the production and manufacturing sectors, it has been found that companies operating in the construction sector use ERP systems more efficiently and effectively (Shi & Halpin, 2003; Ahmed, 2003). Chen's (2001) study stated that despite all these positive results, 20% of the ERP implementation efforts ended in failure.

BooYoung Chung's (2009) research explained that in the 20th century, a significant number of large construction companies started to implement ERP system because they needed integrated information. Many construction enterprises are looking for technology solutions such as enterprise resource planning / ERP systems to better integrate their functions. However, the integrated structure in the construction industry presents a number of unique challenges to the preferred ERP systems as it differs from manufacturing or other industries. For this reason, in this research includes the importance of expectation and understanding of the definition from the ERP system, as many problems have been experienced in the implementation of ERP systems in the construction industry in the past, and explains the factors that determine the success or failure of the ERP application in the construction industry.

Some of the corporate businesses say that they have some "know-how" about ERP systems and that by integrating ERP systems in their business activities, their operations will become more functional and this system can benefit their organizations (BooYoung Chung, 2009).

Ahmed 's (2003) study explains that thanks to the ERP system, more automation and more flexibility in operations and access to information come to the fore but, since

the implementation of ERP systems requires capital, human and technical infrastructure and resources, it will not be possible for small-scale enterprises to invest in large software systems such as ERP. The same study shows that internal change management, which started with the ERP system, should be started from the top management and then passed to the middle and lower management. On the other hand, he explains that few ERP software has been developed for the construction industry and this slows down the ERP system installation in the construction industry. It also highlights that ERP software vendors and contractors should work with professionals in the construction industry to develop more specific solutions (Ahmed, 2003).

For this reason, it is very important for decision makers and practitioners to understand why companies in the construction industry need ERP systems, the difficulties they experience in ERP selection, use and dissemination processes, and the success factors necessary for the success of the ERP project. Intensity of competition and the dynamic structure of the sector, companies in the construction sector need to have innovative developments, proactive, productive, flexible and effective structure that can follow the process. In line with the cost, time and quality management, which is the main principle of construction projects and project management, they are among the projects that need to be completed most in its budget, on time and with appropriate quality (Avinal, 2012).

2.2.6. Differences in Resource Planning in ERP Systems of Manufacturing and Construction Sectors

The construction sector is a very important sector in Turkey's economy due to the fact that it is based on domestic industry, the high employment it provides, its power to support sub-industries, and its foreign currency earning feature (Oncu & Ata, 2017).

According to Akinsola et al. (2000) explained that the construction industry is highly fragmented and complex when compared to other manufacturing industries. He

explained that the size of the scattered and fragmented structure has been the subject of many integrated research studies in the last forty years, and as a result of these researches, the need to integrate information in the construction processes is now a need of the industry with the developing web technology. Kaushik's (2018) study states that unlike the manufacturing industry, the construction industry has two types of information flow and sharing, at the enterprise level and at the project level. In the same research, it was claimed that the complexity in the structure of construction stems from two sources, which are uncertainty and interdependence: He explained that the factors that create uncertainty are due to the unpredictability of local resources and environmental conditions, the uniqueness of construction projects, and the lack of specification of activities that cause irregularity in the flow of information. In addition, he underlines that the organization of the construction sector, which takes part in the manufacturing process, is not continuous but is project-based (Kaushik, 2018).

On the other hand, he explained the factors that create operational interdependence as the interdependence between multiple technologies and the strict disciplines of antecedent and successive work between various operations (for example; BIM-ERP integration) (Kaushik, 2018).

Sorguç (1993) summarized the differences of the construction sector, as distinct from the production sector, as follows.

- The construction industry uses labor-intensive technology. The vast majority of workers are temporary. Employment contracts are made for a temporary period in accordance with the project time frame.
- The construction industry is divided into many parts and has a scattered structure.

- There are many uncertainties in the construction process, and the associated risk factor is high.
- Production in construction works is often carried out under unfavorable climatic conditions. Factors of production are exposed to external influences.
- In the construction industry, the production site is mobile, the product is fixed. The production site is not next to the operating center, it may be in different geographical regions.
- Each project is unique. There is no continuity in construction project manufacturing. Therefore, each product can be produced only once.
- The design and construction processes are long, difficult (demanding) and complex.
- Produced manufacturing has many stakeholders. (There are many parties (participants) including employers, consultants, architects, design engineers, contractors, suppliers, subcontractors...
- Construction technique and method vary depending on the construction site (site) conditions (soil, climate, transportation, workers, energy possibilities). For this reason, it is not possible to manage production uniformly, and different manufacturing management slows down the innovative perspective according to the production sector.
- The construction phase is a comprehensive process and includes complex assemblies.

While there are various planning, work schedule, quantity, progress payment, cost control and finance software with construction project management, manual, paper information flow is still common in construction projects. Today, thanks to ERP systems, the output of different functions is used as the input of another function. The construction industry feels the lack of standardized systems to integrate. In many construction

companies, some systems have been developed in-house for each department. However, these systems are generally point-to-point solutions, meaning they are only suitable for receiving inputs and outputs in the department in which they are used. It is not compatible with other departments and is not integrated with other project areas (Tatari, 2004).

Another major problem is the lack of real-time information. Especially in time-orbited works, which are dynamic and time-indexed construction works, this deficiency brings along many problems. In addition, the lack of tools to act correctly in advance and on time encourages reactive rather than proactive management (Tatari, 2004).

Due to these unique features of the construction industry, it should be thoroughly analyzed whether ERP systems can bring benefits to companies in the construction industry. ERP is a complex system and it is very important to predetermine the risks and problems that construction companies will encounter during the installation phase. In addition, another important issue is to investigate how ERP implementation should be managed properly (Chia & Ling , 2003).

In the course of time, ERP applications have been developed by ERP companies, taking into account the needs of the construction industry, and have gained a more flexible structure. But the process is still in the development phase. A wide adaptation is needed to meet the needs of the sector. The main problems encountered in ERP applications in the construction sector are the unique conditions of each new project, the fact that the projects work under different regional conditions and different legal regulations, and the internet infrastructure support of the countries are the main problems encountered (Aydinefe, 2015).

2.2.7. Push Factors for the Use of ERP in the Construction Sector

Rogers emphasized that innovativeness takes little place in organizational research. He explained that enterprises should attach importance to their innovative visions and realize their innovative capacities. According to (Rogers, 1995; Johnson,

Meyer, Berkowitz, Ethington, & Miller , 1997) enterprises have to be innovative in order to survive in the dynamic environment.

Since the construction sector is a difficult sector with dynamic and limited resources, involving many stakeholders, working conditions and geographical conditions, it is possible to successfully complete the ongoing projects with the principles of project management. For this reason, the construction industry considers ERP systems as a tool that can carry out ongoing projects at the right time with the right cost and quality (Eda, 2015).

The goal of ERP is to plan, execute and control all the activities of an enterprise with an integrated structure with the opportunities offered by today's information technologies. For this reason, ERP systems contribute to the formation of vision with a corporate perspective in the central perspectives of companies as well as project management for businesses in the construction industry. In addition, the widespread use of information systems such as ERP systems for the solution of problems arising from business processes provides an increase in efficiency, profitability, flexibility and competitiveness criteria in companies (Aladağ, 2020).

Fitzgerald (2000) explains the functional reasons for preference of ERP systems, whose scope cannot be drawn with a specific sector as follows

- **Integrated structure** it combines the business processes of the functions of the enterprise such as production, purchasing, planning, inventory management, finance and human resources
- **Functionality** establishes a uniform structure with solutions that can respond to every sector in general, regardless of a specific sector

- **Modular structure** it offers a structure where each optional module can be used separately / together. Flexibility; ERP systems enable the establishment of a flexible organizational structure
- **Login to the system from different locations** businesses can integrate their factories or business processes in different regions
- **Possibilities of use in different sectors** it has a usage area that can respond to every sector without sectoral limitations
- **Quick access to information** every information requested in accordance with the business flow design of the enterprise reaches the user at any time
- **Possibility of use in different languages** every business that has branch projects in different locations around the world can display their business activities in their mother tongue in the main central structure (Fitzgerald, 2000).

Innovative perspective in enterprises ensures the return of the communication between the internal functions of the enterprise, by transferring the communication between the external institutions and the market of the sector in which the business is located, by continuing the activities of the business, making the commercial profit sustainable and gaining the competitive advantage in the market (Calantone, Cavusgil, & Zhao, 2002).

The information above explains the basic requirements of the dynamic construction industry, which accelerates its speed in today's conditions, to prefer ERP systems.

2.2.7.1. Application Purposes and Benefits of ERP in the Construction Sector

It is used to strengthen the decision-making capabilities of companies in the construction sector, to strengthen resource planning and effective project management, to strengthen customer relations, to strengthen and integrate supply chain stakeholders and tender processes, to increase organizational flexibility and to make cost management

effective and for financial management, human resources management, material management (Cınar, 2018).

Cınar (2018) evaluate the benefits of ERP systems to construction enterprises in 2 main groups as follows

1- The benefits it will bring to project management; With the planning and cost management, it provides quick and easy communication with the construction site units whose production continues in dispersed locations, creating administrative and operational management reports, and ensuring that work flows that trigger each other are carried out faster

2-The benefits it will bring to the corporate structure are; It transforms experience into data by creating a data warehouse with a digital know-how (corporate memory), provides a vision for the company, provides review and development of some processes because of Business Process Reengineering, it increases their working performance by providing an environment for feasibility studies by creating accurate and reliable reports in the short and long term (Cınar, 2018).

As a result of the literature review, the factors that push the construction companies to use ERP are summarized below under operational, managerial, strategic, informational and organizational factors as follow (Ahmed, 2003; Shang & Seddon, 2000; Karabaş S., 2017; Çınar, 2018).

- **Operational Factors** improvement in customer service, empowering supply chain stakeholders and creating alternatives, standard personnel employment information, efficient inventory control, efficiency in business processes, communication and coordination between units, audit-transparency, quality business development, managerial elements, efficiency in resource management,

decision making and improvement in planning processes, reporting correct and up-to-date information about the company and creating self-management reports, formation of healthy project data warehouses (experience storage), communication between the center and construction sites, uniform management of many projects simultaneously, performance improvement.

- **Strategic Factors** ensuring growth, foreseeing possible operational / financial risks, providing institutionalization, creating a common vision within the organization, increasing business partnerships, providing innovation in business processes, providing cost leadership, product (customer) supplier differentiation or diversification.
- **User-Related Factors** supporting organizational change, creating strong and flexible employment, creating an integrated working environment
- **Computational Factors** the increase in the use of information technology is to create qualified manpower by activating automation.

2.2.8. Selection, Installation and Expansion Phases of ERP in the Construction Sector

2.2.8.1. Choosing the Right ERP for the Sector

ERP software covers supply chain, material management, finance, human resources, machine maintenance management and basic modules as it aims to find solutions to the basic needs of all businesses independent of the sector. The most important distinguishing criterion in the ERP system for the construction industry is its infrastructure, implementation ability and experience about project management applications (Aktaş, 2015).

The ERP system, which can meet the needs of the general public, may include enterprise-specific applications when it is included in the construction sector. This is one of the critical issues that should be considered during selection. (Eda, 2015) At the same

time, this is an issue that should be considered, since it will be faced by the enterprise as the cost of developing originality in the basis of the agreement to be made with the consultant firm after the selection (Aktaş, 2015).

If the budget, planning and cost control basic elements of project management are to be used in the ERP system, it is critical that the system is flexible enough to adapt to the conditions of each country, is open to development, and that all subsequent development processes are easy and cost-effective. In addition, the fact that ERP systems have an infrastructure that can be integrated with different systems that are required to be used in any project by the customer or the consultant firm depending on the administrative contract is one of the reasons for preference for the sector (Aktaş, 2015). If the enterprise has two separate systems, such as MS project and primavera, that it uses to monitor the work program, the integration of the programs used into the ERP system used by the company can be given as an example (Aktaş, 2015). In addition, being able to monitor and report planning, cost control and cash management activities through manufacturing resource assignments in user-friendly interfaces in order to follow the industry-specific, unique productions, unlike other industries, is another critical point in choosing an ERP system in the construction industry (Aktaş, 2015).

In general, the ERP system offers the following modules for enterprises operating in the construction sector

- 1- Business development
- 2- Tender-offer follow-up
- 3- Employer contract - progress payment follow-up
- 4- Master plan (work schedule, budget, cash flow planning)
- 5- Purchasing, logistics warehouse, subcontractor tracking
- 6- Human resources, personnel

7- Machinery - equipment fixtures

8- Document management

9- Task management, finance-accounting modules as well as business intelligence reporting and cockpit solutions and platforms for instant viewing of project management report activities (Anşın, 2015).

On the other hand, companies in the construction industry, who see ERP systems as a project management tool, emphasize that the accuracy of the processes developed with this system, the organizational structure of the company and the capabilities of the employees are as important as the system chosen to establish a successful ERP project not considering ERP projects as an ordinary software project, acknowledging that this project is a change and transformation project for the enterprise is an important turning point in the selection phase (Eda, 2015). A construction company that wants to use an ERP system should have an ERP project team that is experienced in project management, has a good command of construction work processes, and is prone to digital applications. For the project team that cannot be established with in-house human resources, it is possible to assign potential external resources (Aktaş, 2015).

2.2.8.2. Factors to Consider in Sector-Specific ERP Installation Phases

Top Management Approach the project sponsor of the ERP system is the board of directors of the enterprise, in other words the top management. Ownership of the ERP project by its sponsor, the acumen shown in the enterprise and the requirements of the system for the enterprise and the enforcement of sanction for this contribute greatly to the project (Eda, 2015).

ERP Project team although the ERP system may seem like a software project, the responsibility of the project does not only belong to the information technology functions. For this reason, it is important to assign the right stakeholders to the ERP project team (Eda, 2015). Since the ERP project regulates the main activity of the

company, The fact that the project manager position is undertaken by professional managers who are experienced in planning, contract and progress payment management, budget and cost control units selected from the technical unit, will be beneficial for ERP to communicate with other departments during the installation and design phase, as well as during the post-installation reporting phase. Also, the sole task of the ERP project manager, including the deployment process of the ERP system, should be to manage the ERP project (Anşın, 2015). It is also critical in the post-installation period of the project that the employers of the enterprise, which are the project team members who will take part in these determined processes, are trained in a flexible and leader-communicative structure according to the determined process work (Erim , 2015).

Conceptual design since the ERP system is uniquely applied in every construction enterprise, it is one of the most critical steps at this stage to clarify the expectations and needs before starting the installation and to meet the new business needs. The clarity of the project scope and objectives should be expressed frequently in interviews with project stakeholders after they have been determined. The scope, which is prepared according to the needs of the processing, should be divided into sections to proceed step by step. This will pave the way for both business employees and managers to contribute to the project team as participants. Pilot project selection practice can be given as a good example of this situation. Factors such as the size of the project, the number of ongoing works, and the geography it is located in will force the construction company to switch to the ERP system at once and it will be assertive (Eda, 2015).

At the initial stage of the installation, cash management, planning, and cost controls will be made at all levels, including the Senior Management and operation managers, and the determination of the operating code structure that is the basis for reporting is important for the preliminary formation of possible report drafts, and it is an

important and critical issue at this stage to obtain the opinions and approvals of the senior management and managers (Anşin, 2015). On the other hand, in ERP projects, reporting needs when handling processes and reports that may attract the attention of senior management while going live can be ignored.

ERP systems provide an infrastructure that combines data on an integrated and same database consisting of modules with different end-user interfaces, customized for different departments of the organization. ERP systems that are established and implemented will also be different because the business processes and business methods of each enterprise operating in the same sector are different. For this reason, it shows that the ERP system to be created for each business should consist of unique modules (Ahmed, 2003; Shang & Seddon, 2000; Karabaş S., 2017; Çınar, 2018) .

Since all functions will feed each other in the operation, it is strategically and operationally important to raise the modules simultaneously between the functions (Anşin, 2015).

Project Duration in order to prevent decision change, it is important that the installation process of the ERP system is not long. After the action decision is taken, there should be no loss of time in the transition (Anşin, 2015).

Reporting process since the ERP system shows its success in the eyes of the senior management, it is a section that needs to be studied in a separate phase after the installation (Eda, 2015).

Construction Project Management and Construction Teams knowing the benefits of the system, in which all business employees from the top to the bottom are a part of the integrative ERP system and will meet at the common denominator, will make the employees a member of a participatory team and will also contribute to the success of the ERP project. Participation of all employees in the project must be ensured. Since

construction industry managers assume that on-site manufacturing is more important than other processes, they can less support the issues such as planning, cost tracking, cash management, and the effort spent on these issues, which improve the ERP systems itself and the business processes it brings. For this reason, it is important that the project sponsor, who owns the project, expresses his expectations and goals from the ERP project in every environment (Eda, 2015). For the new system established, it is also an important issue that the work done and the applicability of the business should be accepted by the will of the business itself and its employees (Erim , 2015).

2.2.8.3. ERP Post-Installation Expansion Phase

Sustainable Life Cycle as the completed phases of the project are successful in the dissemination process of the post-installation ERP system, it is important to implement other processes that will complete the system. An example of this process can be given to the implementation of other projects after the successful implementation of the pilot project (Erim , 2015).

Development in order to ensure that the acquisition targets from the ERP system are determined correctly and effectively, questions should be asked both among the project team leaders and among the employees. On the other hand, the ERP system, which provides meaningful connections and outputs between business processes, should combine the system with Business intelligence (BI) solutions for changing competitive conditions and internal business demands and analysis capability in the following stages (Anşin, 2015). In this way, the company's senior managers will have detailed information on all projects. Quick and accurate answers to the requested questions will be obtained. In this way, they can ensure that all processes of their software are used successfully in the sector (Erim , 2015).

Training as in other sectors, it will ensure that the ERP system is disseminated by the trainings they provide to all key users, other employees and managers of the enterprise, who receive adequate post-installation training in the construction sector (Baskak & Cetisli, 2003).

2.3 Relationship Between ERP System and Managerial Accounting

2.3.1 Relationship Between ERP System and Managerial Accounting

With the development of production and information technologies, a structural change has occurred in production costs, and the share of fixed and indirect costs in production costs has increased due to technology costs. Thus, the validity of cost information obtained by traditional volume-based costing methods has begun to be questioned. Since the 1980s, management and cost accounting techniques that business managers can use have been developed (Aktas R. , 2013).

The 1990s were the years when technological developments were realized and implemented rapidly in terms of financial applications in enterprises (O' leary, 2000).

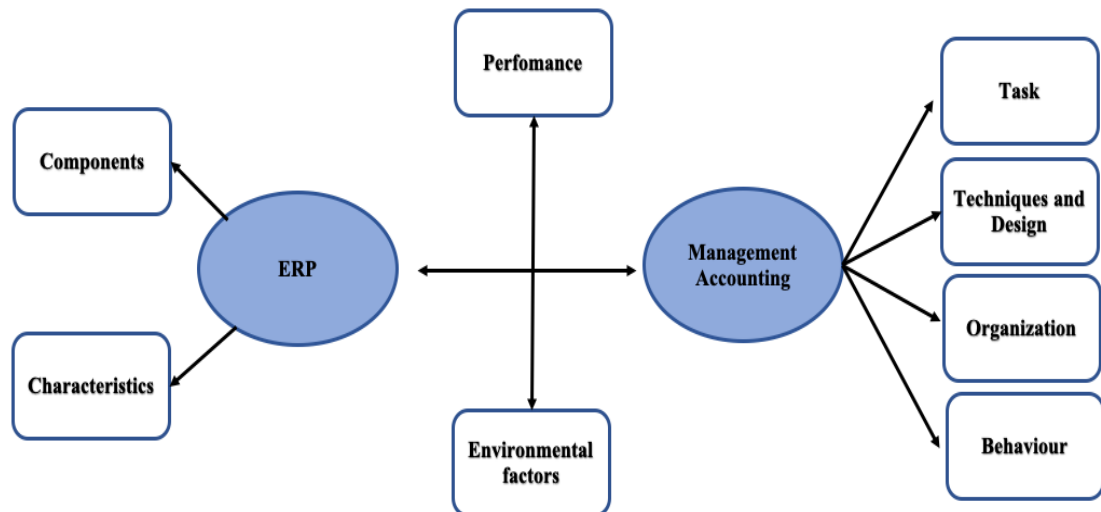
On the other hand, after the 2000s, not only in-house activities, but also all 3rd party other enterprises associated with the enterprise, government institutions and organizations and ERP systems have been integrated through sub-modules. Thus, the effect and integration of ERP systems on the accounting information systems of enterprises, which are a dynamic economic unit, has become a matter of curiosity, especially the quality of the information to be presented to information users (Kestane & Kurnaz, 2019).

Information technologies and changing economic cyclical and environmental factors necessitated information exchange and influence between business units. The necessity of presenting realistic and consistent information to information users, especially by calculating costs accurately, has developed new information technology tools for business decision makers and managers. ERP systems have been developed in

order to control business activities by integrating all inputs and outputs of functional business units from a central database (Aktas R. , 2013).

Figure 15.

Describes the relationship between ERP and managerial accounting.



Taken from Slobodan , M., & Mirjana , T. (2012). How Does Management Accounting Change Under The Influence Of Erp. *Economic Research - Ekonomska Istrazivanja* Vol25(3), 722.

While the businesses carried their activities to the international platform, they became stronger in the economic markets and turned the global market into an integrated structure. This situation has revealed great changes and different requirements in the needs of the finance/accounting functions of the enterprises. Requirements such as the technological progress of the time and keeping up with the global world have encouraged businesses to establish a new financial infrastructure and to use the tools applied for this. For the continuity of the activity, which is the first philosophy of the enterprises, financial management function groups were affected before the technological developments due to the sustainable profit policy. It has become a duty of financial management functions such as information systems to follow the process closely (Poston, 2001).

The determination and analysis of the impact of ERP on the management accounting of enterprises largely depends on the organizational structure of the accounting department. The consequences of considering the relationship between ERP

and management accounting will depend primarily on organizational needs and management expectations, which must be considered in order to benefit from meeting the information needs of a large number of users. (Slobodan & Mirjana , 2012)

2.3.2. Change of Management Accounting Under the Influence of ERP

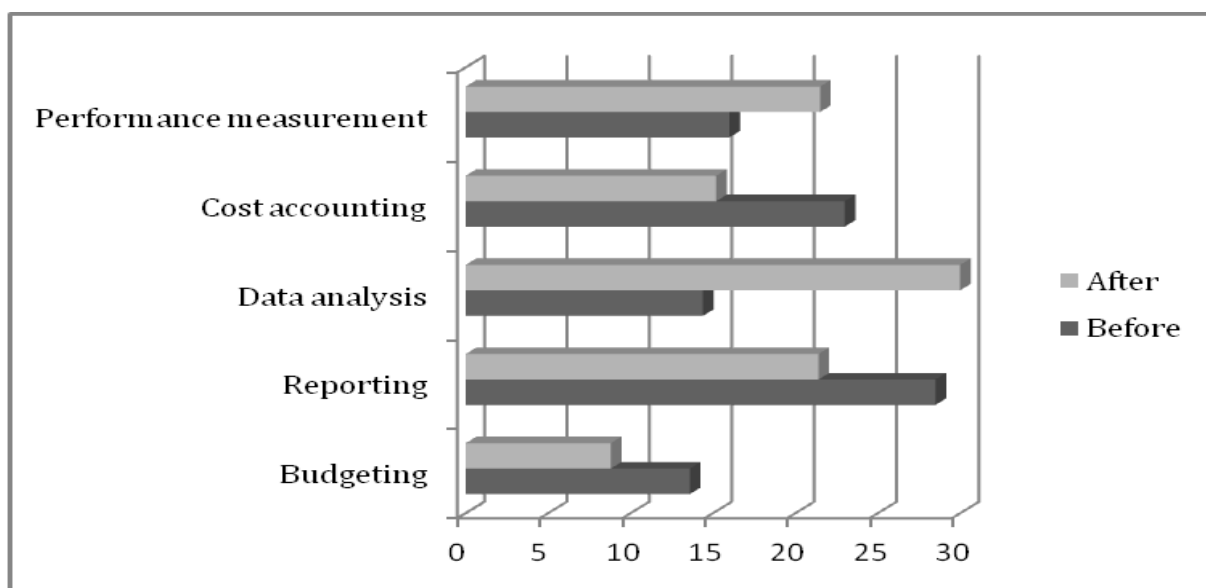
Today's information technologies have offered more effective options to enterprises for the finance function, and ERP systems have increased their popularity in terms of integrating and coordinating financial activities with all other processes in terms of these technological innovations (Akkermans & Helden, 2002,). For this reason, ERP system and accounting/finance modules are always considered as one of the most important modules as they provide managers with necessary information on treasury management, cash management, cost control and budgeting (Nicolaou, 1999).

The financial performance of ERP systems increases by reducing transaction times, using idle capacity, inventory management, providing effective relations with external partners, obtaining information more easily and cheaply, and increasing the customer potential thanks to the long-term competitive advantage and its positive reflection on the operating profit (Poston, 2001). A successful ERP implementation is seen as a factor that has positive contributions to the enterprise both in the short term and in the long term and has positive effects on financial performance.

One of the tasks of managerial accounting is the budgeting process (Slobodan & Mirjana , 2012) According to a research which was about on the effects of the ERP system on managerial accounting by Slobodan & Mirjana (2012) states that it was found that while the time spent by managerial accounting officers for budget reporting before using the ERP system in budget management operations was 14%, this time decreased to 9.22% after the ERP system was used. It is concluded that the time spent on budget activities after the ERP system is significantly shorter.

Figure 16.

Working time of Managerial Accountants before and after ERP



Taken from Slobodan , M., & Mirjana , T. (2012). How Does Management Accounting Change Under The Influence Of Erp. *Economic Research - Ekonomska Istrazivanja* Vol25(3), 722.

According to the same research by Slobodan & Mirjana (2012) as shown in Figure 16 , the study states that managerial accounting officers have the time needed to make better analysis thanks to the ERP system, where the shortening of the cost calculation, budgeting and reporting periods after the use of the ERP system is transferred to the analysis period before and after the ERP system.

The ERP system provides managerial accounting officers with more time for analysis instead of routine tasks (Aktas R. , 2013).

2.3.3 Reflections of ERP on Information Quality in Managerial Accounting Information System and Financial Reporting

ERP systems, with regard to standardization, integration and ensuring the flexibility of integrated processes, also include the information, technical infrastructure, maintenance-repair and changes that can provide continuity, which are necessary for the implementation of the said actions (Jacobs & Bendoly, 2003). The ERP system greatly

supports managerial accounting with increased internal communication, improved decisions based on timely and reliable accounting information, and improved report quality (Nguyena, Nguyena, & Hoang, 2020).

ERP systems consist of a combination of units such as supply management, material and product management, product development, production management, marketing and distribution, after-sales services and customer relations, human resources and accounting information systems, and modules with sub-components of these units. The importance of ERP systems, which take an active role in ensuring the relations and interactions of these units with each other, is obvious in business activities (Majed, 2003).

Management reporting systems are systems that are of great importance on the internal control structure of the enterprise, which operate in a way to reveal the strengths and weaknesses of the enterprise, as well as about the existing and possible problems for internal information users. The most important feature that distinguishes the management reporting system from the financial accounting system is that it is not regulated by any law or legislation, that is, it is optional. Managers can be informed about internal business units or any event or situation whenever they need and in any way they want (Baran & Calis, 2014).

2.3.3.1. Business Data Warehouse

Relational databases are used in the structuring of data in ERP systems, and some files and tables, which are expressed as "relationships", are utilized in the storage of data through this method. It provides the opportunity to query on the database, see its relational structure and report the result. The ERP system aims to integrate administrative activities into the operating segments of the enterprise. In this sense, unit relations model is generally used as a design tool in relational database model. In terms of harmonization of business processes and ERP systems of business activities, enterprises have found the

opportunity to collect real-time data as soon as the data is generated through the use of relational databases. Thus, all users have the opportunity to access the data which are needed (O' leary, 2000).

ERP systems, which enable enterprises to integrate their computing activities, benefit from databases that have the power to store many data and information. ERP systems, which give life to the creation of a relational database model by using relational data from other functions and some tables and files in accounting information systems, bring all relations into a whole and lay the groundwork for the creation of a corporate information pool in enterprises, allowing the consistency of information between business functions through accounting information systems (Beskese, 2004).

The relational system approach in accounting information systems, which is based on the assumption that enterprises have a unique system, ensures that the data that will be needed from the business management of the business information systems are collected in a central database (O' leary, 2000). In the light of the information above, accounting information systems have become accessible to any information they need, accurately and in real time, as ERP systems bring all processes of enterprises into an integrated structure and create a relational data warehouse suitable for this structure. This situation creates an important roadmap for information users in accessing information and provides a competitive advantage to enterprises (Demirkan, 2005).

2.3.3.2. Data Accuracy and Quality

ERP systems, which are established in order to contribute to the decision makers of the enterprises, have an integrated structure, which is also supported by software, thanks to the fact that they have a central database. The said structure plays an important role in connecting, integrating and automating all processes from the supply process to after-sales services (Klaus , Rosemann, & Gable , 2000). In this sense, unlike operating

systems software, ERP systems are considered as application software integrated into all processes within the enterprise, with accounting information systems and relational database structure, as well as business process data as well as master data. When relational databases are evaluated from a technical perspective, it is found that having user-based graphical interfaces, computer-aided applications within R&D (Research & Develop) studies, client/server architecture and open system approach have important applications in terms of benefit to accounting information system (Bayraktar , 2009). In addition, since the ERP systems have a central database, the interaction of the processes with each other allows the contribution and importance of the business functions to production, costs and decision making to be evaluated separately (Beskese, 2004).

Applications such as e-invoice, e-waybill and e-ledger which have emerged by means of the regulations made in the current legal legislation system in Turkey, clearly demonstrate the importance of using ERP systems in terms of ensuring unity in practice in keeping accounting records in the public and recording more information (Gok, 2005).

In traditional accounting information systems, information on commercial transactions consists only of accounting records and is collected and recorded in other departments due to the fact that other information is out of the system. Therefore, many enterprises needed separate information systems for units other than accounting units. This situation, on the other hand, has led to the existence of more than one information system in the enterprises, and since there is no unity in the records and documents in practice, it has led to adverse events in the structural efficiency (Karabaş, Uysal, & Karkacier, 2017).

On the other hand, when the quality of the data to be accessed in the accounting information system is taken into account, the function of ERP systems within the enterprise has gained a particular importance. In addition, although it is compatible and

can be integrated with the XBRL reporting language used in ERP systems and accounting information systems, the determinants of the quality of the information to be presented are generally not emphasized. ERP systems, which allow information exchange between business functions and enable all data to be analyzed in a common pool, will be able to yield truly productive results by including the determinants of the quality of the accounting information presented in terms of presenting more consistent and realistic information (Kalaycı, 2019).

In particular, the quality of the information in the accounting information system should be based on and the shared information should have the qualifications to meet the needs (Kalaycı, 2019). In this sense, it is important to increase the quality of accounting information so that information users can make accurate decisions (Poston, 2001).

In this sense, the storage, processing, evaluation and reporting of the information produced in accounting information systems through ERP systems has been systematized and an important breakthrough has been achieved in presenting quality information to those who need it. In addition, the fact that enterprises have the opportunity to control more data allows the strategies and targets for future activities to be shaped on more realistic data, the restructuring of cash flows and predictable cost studies be carried out (Aktas R. , 2013).

ERP systems, which provide real-time consolidation of data from accounting information systems of enterprises, facilitate access to desired data by financial information users. In addition, a proper reporting opportunity has emerged in the light of quality information at any time, and coordination between processes can also become effective (O' leary, 2000; O' leary, 2000).

It is clear that information users can make more accurate decisions with the increase in the reliability and quality of the information reflected in the financial

statements prepared as a result of the recording of more data by effectively performing the internal control activities by integrating the business processes that are related to the business activities with the ERP systems using sub-modules through the rules. At this point, it is true that the correct integration of the operations of the accounting information systems into the ERP systems of the enterprises will both increase the functionality of the financial statements and create a separate assurance for those who are interested and the decisions they take in the future (Gok, 2005).

2.3.3.4. Data Workflow

One of the most basic conditions of effective and efficient working is knowing and fulfilling responsibilities and establishing a proper communication chain between the units within the enterprise and providing coordination and laying the groundwork for information sharing. Relational databases, which enable reliable and easy access over the system, facilitate information sharing among functions; it can minimize communication costs, and allows the system to work efficiently as a whole (Poston, 2001).

By integrating the processes of business activities into ERP systems through modules, not only the information within the enterprise is recorded, but also the events related to the enterprise's environment can be recorded. ERP systems, which include elements such as taking into account all processes from raw material purchase to after-sales services, and even customer requests and expectations, can create added value directly to business owners and managers and indirectly to all stakeholders by providing convenience in application with relational database and user interfaces and integrating information sharing between units (Aladağ, 2020).

2.3.3.5. Processing Speed

With the widespread use of internet-based applications, applications such as e-mail, electronic data transfer and online transactions have used in enterprises more

commonly. In this context, receipts, invoices, data files and financial statements can be easily shared in a short time with computer-assisted electronic data transfer (Electronic Data Interchange) within the scope of record and document order in enterprises. It has become easier to share financial information faster and more effectively at a lower cost through ERP systems that minimize human-oriented applications (Henk-Jan van & Martijn van der, 2017).

With the integration of accounting information systems into ERP systems, it has become possible to access all information in real time through the central database. The scope of the data to be used in decision making has been expanded by restructuring the way and direction of communication between functional units and the real-time access to the information needed by the accounting information users can be provided by making it easier to access any desired information (Gok, 2005).

The ERP system includes tools that allow data sharing in electronic environment for information flow. One of these tools can provide important conveniences for defining XML document types, which can be defined as a computer programming language. It is also important in terms of being compatible with the internet and providing data sharing and transfer between applications with a customizable and expandable structure (Demirkan, 2005).

2.3.3.6. Reporting Capabilities;

As management reporting format and content is not based on standards such as financial reporting, it is also called discretionary reporting as an element of the internal reporting system. A critical element in the organization's internal control structure, management reports direct the manager's attention to potential risks in real time and they include all kinds of numerical and textual information for the purpose of achieving the objectives of the enterprise. They have a great impact on all business decisions to be taken

in the future (Aktaş, 2013). The information presented in management reports is entirely related to the planning and control of business activities. The fact that the reports are discretionary is the most important difference that distinguishes the management reporting system from the financial reporting system, and for this reason, management reports are prepared entirely for the needs of internal users. Management reports can have a textual, numerical or graphical structure. Regardless of the form, the most important feature that all reports should have is that they contain information (Hall, 2011).

In addition, the system's comprehensive or narrow, hourly, daily and periodic analyzes and reports contribute to making financial decisions more accurately by providing more realistic, consistent and accurate data to both internal and external information users outside the enterprise (Hancer, 2004).

In XML technology, which enables the sharing of information between internal and external organizations through the internet and in which reporting is used, there are generalizations, restrictions and limitations in the use of data. "Extensible Business Reporting Language - XBRL" technology, which is expressed as "Extensible Business Programming Language", has been developed in order to eliminate these problems. It is clear that XBRL applications, which can be easily customized by business users, have gained a global position in terms of reporting and analyzing financial information of enterprises (Sevim & Bülbül, 2016). This situation, with the acceleration of access to financial reports, enables financial information to reach its users in a short time when they need it. Information users accessing the financial statements can search on financial reports and access real-time information through the tags used in XBRL technology. Since uniformity is ensured with the reporting infrastructure brought by the ERP system, the control of the said report data can be carried out more effectively (Sevim & Bülbül, 2016).

In the light of the above information, the source of management reporting, which is an important indicator of management accounting performance, is based on the accounting information system. Accounting information system data must have features such as cost-effectiveness, accessibility, reliability, relevance, timely presentation, comprehensibility, verifiability, comparability, fair presentation and relevance. These required features are offered to users thanks to ERP systems.

2.4 Previous research studies

2.4.1. Previous research studies relevant to the scope of this thesis

In Baran & Calis (2014) who emphasized that management reporting systems, which are fed by ERP systems in the construction sector and have a critical place in the internal control system of enterprises, provide information to business management for the effective management of different business processes; it enables the manager to address the problems at the right time; since it records the information emerging during all business processes for reporting purposes, it provides the opportunity to make retrospective analysis for all kinds of economic events that occur within the business and affect the business; in this way, it allows the presentation of strategic information that will help business managers make long-term decisions for sustainable business performance.

Aladağ (2020) stated that in order for the Turkish construction sector to maintain its sustainable performance, the leading companies of the sector should manage the projects they undertake with more effective systems and explained that many construction companies operating in the construction sector invest in ERP systems with the increasing interest and need for ERP systems in order to meet the requirement; however, he underlined that the investments made resulted in a substantial failure. For this reason, a survey was conducted with 62 Turkish construction companies in order to investigate the

difficulties experienced by Turkish construction companies when using ERP systems and to obtain more successful applications. The solution proposals put forward as a result of the study suggested that it would be beneficial for the construction companies that want to implement ERP systems to complete the infrastructure works by acting according to their unique roadmap. The study will contribute to the sustainable performance of the Turkish construction sector by increasing the global competitiveness of Turkish construction enterprises.

Slobodan & Mirjana (2012) evaluated the effect of ERP systems on management accounting and accountants while achieving the goals of enterprises in the industrial sector and shared the analysis results. In his research, the applications of the SAP system, which is the ERP system, of 9 different Serbian companies operating in different sectors were evaluated. The results of the research indicate that thanks to the SAP system, the traditional operational activities of management accountants have decreased, and it has been found that SAP provides more opportunities and time for data analysis, performance measurement and detailed strategic reporting activities. This situation has brought along important changes in the area of responsibility and role of management accountants.

Cınar (2018) explained that compelling competitive factors force the construction processes to work in a more productive, efficient and integrated structure, and ERP systems respond to this need and carry the business performance to a more measurable structure. However, he shared the difficulties of the implementation process of ERP systems, the ways to facilitate it, and the results with a case study on 3 large companies. As a result of the research, ERP systems in the construction industry indicated the failures in the implementation process, the reluctance of the employees, the lack of scope management and geographical barriers are the most important challenges faced by the implementation teams; in order to overcome these difficulties, it was emphasized that the

support of top management, restructuring of business processes, clear goals and objectives, competent team and leader, training and consultancy processes should be followed.

According to a study by Gok (2005) explained the value and benefits that ERP systems, which continue to develop rapidly, bring to business performance, it is important to monitor the opportunity costs with effective planning management, especially in countries with a developing economy. In this reason, it emphasizes the importance of an economic order in which there is a globalizing competition and businesses can access integrated ERP system information through their own systems. However, he underlines that for the sustainability part, which is the biggest deficit of these systems, a lot of work falls on the business management and senior managers.

(Nguyena, Nguyena, & Hoang, 2020) The satisfaction of financial officers/managers in the use of ERP systems was analyzed through a survey conducted on approximately 225 financial officers/managers working in 42 large Vietnamese construction companies. As a result of the study, it has been concluded that the high quality, accurate and real-time information obtained from ERP systems has positive effects and benefits on the work of the finance unit, and the system users are satisfied with it. The study also showed that business management's commitment has significant effects on ERP system quality.

While Shi & Halpin (2003) emphasizes the importance of establishing resource planning systems for construction companies, Voordijk (2003) endeavored to determine the interactions of topics such as information technologies, organizational change, maturation of information technology infrastructure and the factors that lead to the success or failure of ERP in the large construction companies of the Netherlands.

Ahmed (2003) investigated the suitability and application status of ERP systems in contractor companies. In Tatari's (2004) study aimed to determine the key success indicators of ERP systems, and they obtained in-depth analysis results considering the problems encountered during the implementation phase and how these problems were solved through various strategies. According to Karabaş et al. (2017) investigated the relationship between the use of ERP and business performance.

Demirkan (2005) recommended to use ERP systems by construction companies to increase their responsibilities towards their customers, to strengthen their supply chain partnerships, to improve organizational flexibility, to improve their decision-making abilities, to shorten project completion time and to minimize costs; on the other hand, it has revealed the points that should be considered in the decision of the construction enterprises to switch to the ERP system, the system selection and the installation of the system.

According to a study by Kestane & Kurnaz (2019) the reflections on financial reporting for the integration of ERP systems with the accounting information system and the transfer of the needed information to the information users in an accurate, reliable and real-time manner were examined and suggestions were made by making practical evaluations. It has been suggested that the development and dissemination of ERP systems and implementation environment in both the public and private sectors will bring a new discipline to the national economic structure, and that governance activities will be brought under control and more transparent practices will be implemented.

In Oncu & Ata (2017) explained the expectations from cost management of construction enterprises operating in Turkey, as the same study explained that enterprises that want to be successful in an intense competitive environment have to meet customer demands with optimum cost and in demanded time. In the same study explained that

enterprises that want to overcome this obligation have implemented strategic cost management information systems, which provide the cost information they need and help plan costs. As a result of the study, it was found that enterprises focus on cost management due to the intense competition in the sector; they include their suppliers, subcontractors and business employees in this process, and they focus on cost reduction efforts at the project stage.

As a result of the literature review, in the light of the above information, it was found that there are more recent studies on the ERP adaptation of the construction industry in the global archive compared to Turkey. On the other hand, in Turkey, less study is carried out in the construction sector compared to other sectors in terms of ERP system implementations; the studies carried out mainly focus on the critical factors in the installation and selection stages of the system and successful installation. It is recommended to explain the benefits of the studies on design, proposal-tender, planning, cost control and management accounting and reports in the implementation phase and why ERP systems should be preferred in the future in the construction industry through case studies on the post-implementation development process using the target results.

3. METHODOLOGY

In this part of the research, the subject, purpose, scope, limitations, the model of the research, hypotheses, scales, sample selection, data collection, data analysis, research findings, results, and recommendations are included.

3.1. Purpose of the Study

In this research, it is aimed to reveal whether the management accounting functions of the companies operating in the construction sector need an Enterprise Resource Planning (ERP) system. It is also aimed to reveal the factors that push the companies in the construction sector to use the ERP system and the effect of the ERP system on the strategic decisions of the companies, planning and cost management. In addition, whether the perception of ERP systems differ according to the gender, age, education level, work experience, the number of employees in the enterprise and the number of projects carried out in the company have been examined in this research. In accordance with this purpose of the research, a quantitative research design was used in the research and scanning model was used as the research model.

3.2. Theoretical Framework

According to Kestane & Kurnaz (2019)' study states that the reflections on financial reporting for the integration of ERP systems with the accounting information system. It has been suggested that the development and dissemination of ERP systems and implementation environment in both the public and private sectors will bring a new discipline to the national economic structure, and that governance activities will be brought under control and more transparent practices will be implemented.

The solution proposals put forward as a result of the study aiming to contribute to the sustainable performance of the Turkish construction industry suggested that it would be beneficial for construction companies that want to implement ERP systems to complete infrastructure works by acting according to their unique roadmap. (Aladağ, 2020)

On the other hand evaluating the applications of the SAP system, which is the ERP system of 9 different Serbian companies operating in different sectors, Slobodan & Mirjana 's (2012) research results show that the traditional operational activities of management accountants are reduced thanks to the SAP system, and more opportunities and time for SAP's data analysis, performance measurement and detailed strategic reporting activities. found to be provided. They emphasized that this situation will bring about important changes in the responsibility and role areas of management accountants.

According to the Hyvonen's (2003) study obtained indicate that financial departments have been more interested in traditional systems, while other departments have concentrated more on ERP solutions. In addition the same study states that there were no statistically significant differences between the groups of traditional system or ERP adopters, and the problems perceived in management accounting or the adoption of advanced management accounting technique

Based on the above information, this study analyzes the need for ERP systems by emphasizing the differences between the financial accounting and managerial accounting function which has strategic importance for companies in the construction sector in Turkey

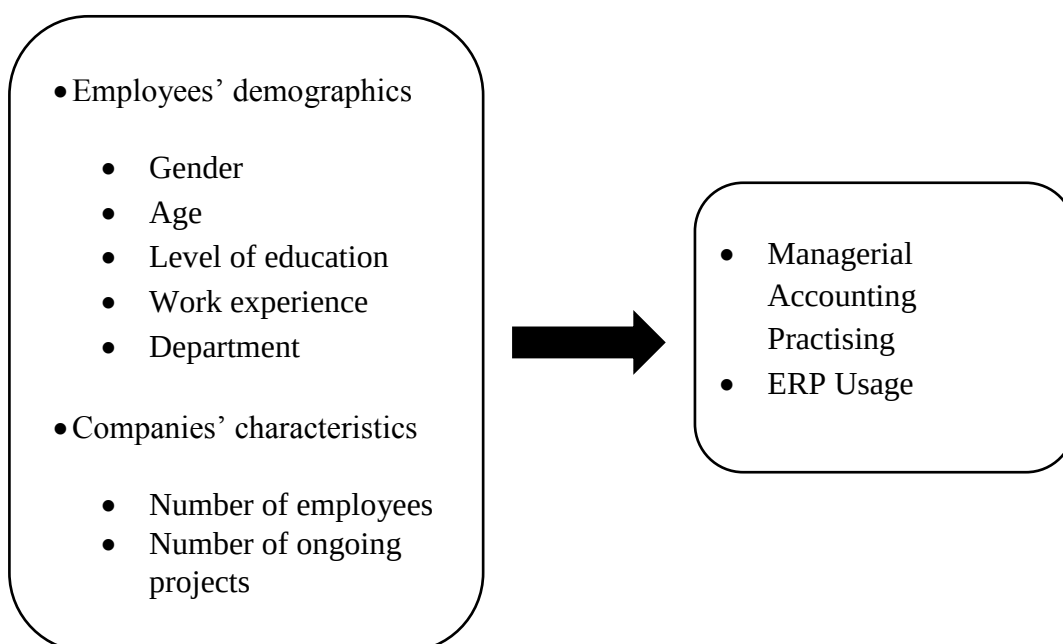
3.3. Research Questions

In this research study, the answers of **six** critical research questions were looked for.

1. To analyze the relationship between Managerial Accounting and ERP usage " Do you believe that business resource systems (ERP) should be used for management accounting? " and "Which department is responsible for Management Reporting, which works integrated with the ERP system in your company?" questions are asked
2. To analyze the performances of ERP in companies ""11-Do you use ERP system in your company?" "If your answer to question 11 is yes, which modules do you use in your ERP system?" question is asked.
3. To analyze the perspectives on ERP systems "Today's technologies prefer to combine big datas with an integrated structure. Do you agree with this view" and "What are your thoughts on the integration of modules?" questions are asked

3.4. Research Model and Hypotheses

3.4.1. Research Model



3.4.2. Hypotheses

In accordance with the research model above this study has nine research hypotheses:

H₁: The perception levels about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting differ in accordance with gender.

H₂: The perception levels about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting differ in accordance with age.

H₃: The perception levels about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting differ in accordance with level of education.

H₄: The perception levels about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting differ in accordance with work experience.

H₅: The perception levels about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting differ in accordance with department.

H₆: The perception levels about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting differ in accordance with number of employees of companies.

H₇: The perception levels about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting differ in accordance with number of ongoing projects of companies.

H₈: There is a relationship between the usage of ERP in companies and both the number of employees in the companies and the number of ongoing projects in companies.

H₉: There is a relationship between the success of using ERP in companies and the number of employees in the companies and the number of ongoing projects in the companies

3.5. Research Scales

Questionnaire technique was used in this study in order to collect data suitable for the purpose of the research. In the introduction part of the questionnaires, information was given about the research and it was stated that participation in the research was on a voluntary basis (Annex-X).

In order to create the questionnaire and to make it valid and reliable the relevant literature was comprehensively scanned and a questionnaire was drafted in this way extensively and meticulously. The variables that the research aimed to measure and the options related to them were determined. Since no scale was used in the survey form and the survey questions mainly aimed to measure categorical variables, surface and content validity was tried to be ensured. "Face validity method in which expert opinion is received in order to investigate the validity of measurement tools used and which is accepted as the most basic validity attainment method" (Demir & Arslan, 2018) . "Face validity A type of measurement validity in which an indicator “makes sense” as a measure of a construct in the judgment of others, especially in the scientific community" (Neuman, 2014)

Attention was paid to ensure that the survey form covers all the subjects that the research aims to measure and that the questions are of a quality that will enable them to get the targeted answers. (Neuman, 2014) (Demir & Arslan, 2018) The draft form prepared in this context was examined by an expert. The final version of the

questionnaire, which was revised on expert opinions, was presented to 7 construction industry representatives and it was confirmed that the questions were clear and understandable. Thus, the questionnaire form was given its final form.

There were 17 questions in the survey. 6 questions targeted the demographics of the participants. 3 questions targeted information about the company the participants work for. 8 questions targeted relationship between ER usage and managerial Accounting Practicing in companies, its effects and employees' perspectives on ERP and Managemant Accounting.

3.6. Sample Selection

The universe of the research consists of leader 7 companies which are among the construction companies in the top 50 companies in the FortuneTurkey500 2020 list operating in the construction sector in Turkey according to their turnover. In adition according to the construction report prepared by Harmony Real Estate Valuation and Consultin CO, the construction industry turnover in 2020 is 110 billion Turkish Liras. The turnover of the this leader companies in the research area in 2020 represents approximately 40% of the ones coming from Turkey.

In consideration of this information, the data of the research were collected from 75 people with different titles working in leading construction companies in Turkey in different departments such as information technologies, planning and cost control, financial affairs, budget and reporting, audit, internal control project managers, technical office in 7 leading construction companies in Turkey. Detailed information about the participants is given in the findings section. In adition approximately 50% of the survey answers are composed of employees in the positions of managers and cheffs, and the total number of managers and cheffs working in the departments included in the survey in the

central organizations of 7 leading construction companies in Turkey is approximately 525 people.

A purposive sampling method that is not based on probability was used in the study. In the book *Research Method in Business*, Uma Sekaran (1975) expresses that 30 to 500 responses are valid for the research.

3.7. Data Analysis

The prepared questionnaire was transformed into a digital questionnaire through the Survey Monkey application. It was distributed to the universe of the research by using e-mail and the WhatsApp application through the Survey Monkey application link in between 2021. Responses came automatically through the Survey Monkey platform. Incoming questionnaires were examined and it was seen that 75 of them were usable.

The data of the research collected through questionnaires were analyzed using the IBM SPSS 26.0 program. Descriptive statistics such as frequency, percentage, mean and standard deviation were used for the analyses. In addition, independent samples *t*-test and one-way analysis of variance (ANOVA) were used to analyze the differences between groups. For relationship analysis, the chi-square test was used because the variables were categorical. Statistical significance was sought within the 95% confidence interval.

4. FINDINGS

The findings regarding the demographics of the participants are presented in Table 1 below.

Table 1.

Participants' Demographics

Variables	Groups	f	%
Gender	Male	50	66.7
	Female	24	32.0
Age	22-30	27	36.0
	31-40	28	37.3
	41 years and older	20	26.7
Level of Education	College	47	62.7
	Master's Degree	23	30.7
	Doctorate	3	4.0
Work Experience	1-5	17	22.7
	6-10	17	22.7
	11-15	23	30.7
	16 years and above	18	24.0
Title	Deputy General Manager	6	8.0
	Director	11	14.7
	Manager	21	28.0
	Expert	36	48.0
Department	Planning and Cost Control	15	20.0
	Financial affairs	23	30.7
	Budget and Reporting	6	8.0
	Supply Chain	5	6.7
	IT	11	14.7
	Machinery Supply	1	1.3
	Warehouse	3	4.0
	Technical office	9	12.0

According to the findings in Table 1. 66.7% of the participants are male and 32.0% are female, 36.0% of the participants are aged 22-30, 37.3% are aged 31-40, and 26.7% are aged 41 and over. Considering the educational levels of the participants, it is seen that 62.7% of them are undergraduate, 30.7% of them are master's degree graduates and 4.0% of them are doctoral graduates. Among the participants, the rate of those with 1-5 years of work experience is 22.7%, the rate of those with 6-10 years of work experience is 22.7%, the rate of those with 11-15 years of work experience is 30.7%, and the rate of those with 16 years or more work experience is % is 24.0. Looking at the titles of the participants, it is seen that almost half of the participants (48.0%) are experts, 28.0% are managers, 14.7% are directors and 8.0% are deputy general managers. The rates of the participants are listed respectively in accordance with their departments: financial affairs department (30.7%), planning and cost control department (20.0%), data processing department (14.7%), technical office department (12.0%), budget and reporting department (8.0%), purchasing department (6.7%), warehouse department (4.0%) and machinery supply department (1.3%).

Table 2 below presents the findings about the companies the participants work for.

Table 2.
Findings about the Companies the Participants Work for

Variables	Groups	f	%
Number of employees	500 and below	35	46.7
	501-1000	16	21.3
	1001-2000	6	8.0
	2001 and above	15	20.0
Number of ongoing projects	10 and below	42	56.0
	11-30	18	24.0
	31 and above	14	18.7
Type of ongoing projects	Superstructure project	48	64.0
	Rail system project	24	32.0
	Highway project	30	40.0
	Infrastructure project	28	53.8

According to the findings in Table 2, nearly half (46.7%) of the companies the participants work for have 500 or less employees. The ratio of companies with 501-1000 employees is 21.3%, the ratio of companies with 1001-2000 employees is 8.0% and the ratio of companies with 2001 or more employees is 20.0%. When we look at the number of ongoing projects in companies, it is seen that the number of ongoing projects is 10 or less in slightly more than half of the companies (56.0%). While the rate of companies

with the number of ongoing projects in the range of 11-30 is 24.0%, the rate of companies with 31 or more is 18.7%. When we look at the types of projects currently ongoing in companies, a significant majority of the projects (64.0%) are superstructure projects, 53.8% of the projects are infrastructure projects, 40.0% of the projects are highway projects, and 32% of the projects are rail system project.

Table 3 below presents the findings regarding the ERP perception of the participants.

Table 3.

Findings about ERP Perception

Variables	Groups	f	%
Belief in the necessity of combining big data with an integrated structure	Strongly disagree	5	6.7
	Disagree	4	5.3
	Undecided	10	13.3
	Agree	29	38.7
	Strongly agree	27	36.0
Belief in the necessity of using ERP for management accounting	Strongly disagree	7	9.3
	Disagree	2	2.7
	Undecided	10	13.3
	Agree	33	44.0
	Strongly agree	21	28.0

According to the findings in Table 3, the majority of the participants (74.7%) agree with the idea of combining big data with an integrated structure. While the rate of those who are undecided about this idea is 13.3%, the rate of those who do not agree with this idea is 12.0%. Again, the majority of the participants (72.0%) agree that ERP should be used for management accounting. While the rate of those who are undecided about this idea is 13.3%, the rate of those who do not agree with this idea is 12.0%.

Table 4 below presents the findings about the usage of ERP in companies.

Table 4.

Findings about the Usage of ERP in Companies

Variables	Groups	f	%
ERP usage	In use	62	82.7
	Not in use	13	17.3
ERP success in the Firm	Successful	43	57.3
	Not successful	32	42.7
Utilized modules in the ERP system	Finance	50	66.7
	Cost Control	44	58.7
	Supply Chain (Material Maintenance)	49	65.3
	Equipment Management (Plant Maintenance)	26	34.7
	Human Resources	40	53.3
	Project System (Planning Management)	33	44.0
	Sales Distribution	27	36.0
	Business Model Digital Reporting Tools	33	44.0
Reasons for not being utilized if there is an unutilized module	Lack or Loss of Data	9	12.0
	Integration Failures Between Modules - Waste of Time	16	21.3
	Not Suitable for Company	8	10.7
	Not Suitable for Construction Industry	9	12.0
The department in charge of management reporting integrated with ERP system	Information Systems Unit	20	26.7
	Information Technologies Unit	34	45.3
	Planning and Cost Control	28	37.3
	Budget and Reporting Unit	34	45.3
	Financial Affairs Unit (Accounting & Finance)	31	41.3
	Printed Reports	10	13.3

Top management's reporting method preference	Printed and Digital Reports	51	68.0
	Digital Reports	12	16.0

According to the findings in Table 4, ERP is used in 82.7% of the companies where the participants work. While 57.3% of the participants find the usage of ERP in companies successful, the rest find it unsuccessful. According to the findings, although all of the ERP modules are used, the most frequently used modules are finance (66.7%), purchasing (65.3%), cost control (58.7%), human resources (53.3%), project system (44.0%), business model digital reporting tools (44.0%), sales distribution (36.0%) and machinery equipment management (34.7%) modules. When we look at the reasons why the unused modules are not used, it is seen that the most frequently stated reasons are inter-module integration failure and time concerns (21.3%). Other reasons are those: the module causes data deficiency or loss (12.0%), the module is not suitable for the construction industry (12.0%), and the module is not suitable for the company (10.7%). When we look at the departments that are responsible for management reporting that work integrated with the ERP system, it is seen that different departments are responsible for reporting; however, the most frequently responsible departments are information technology unit (45.3%), budget and reporting unit (45.3%), financial affairs unit (accounting and finance) (41.3%), planning and cost control unit (37.3%) and information systems unit (26.7%). Regarding the type of reporting preferred by the decision-making senior management in the companies where the participants work, it was found that in the vast majority of companies (68.0%), managers use both printed and digital reports at the same time. While the rate of managers who prefer only digital reports is 16.0%, the rate of managers who prefer only printed reports is 13.3%.

The findings regarding the reasons for not using ERP in companies are presented in Table 5 below.

Table 5.

Findings about Reasons for not Using ERP in Companies

Variables	Groups	f	%
High Cost	Important	26	34.7
	Not Important	2	2.7
	Undecided	8	10.7
Long Implementation Times	Important	25	33.3
	Not Important	1	1.3
	Undecided	8	10.7
Infrastructure Deficiencies	Important	26	34.7
	Not Important	1	1.3
	Undecided	9	12.0
Being an Unnecessary Investment	Important	9	12.0
	Not Important	3	4.0
	Undecided	13	17.3
System Failures and Usage Difficulties	Important	17	22.7
	Not Important	1	1.3
	Undecided	10	13.3
Inability to Decide on the Appropriate System	Important	15	20.0
	Not Important	5	6.7
	Undecided	10	13.3

According to the findings in Table 5, 34.7% of the participants see high costs as an important reason for not using ERP in companies, while 2.7% of the participants do not see high costs as an important reason. 10.7% of the participants are undecided on this issue. While 33.3% of the participants see long implementation times as an important reason for not using ERP in companies, 1.3% of the participants do not see long implementation times as an important reason. 10.7% of the participants are undecided on

this issue. While 34.7% of the participants see the infrastructure deficiencies as an important reason for not using ERP in companies, 1.3% of the participants do not see the infrastructure deficiencies as an important reason. 12.0% of the participants are undecided on this issue. While 12.0% of the participants see the thought of an unnecessary investment as an important reason for not using ERP in companies, 4.0% of the participants do not see the thought of an unnecessary investment as an important reason. 17.3% of the participants are undecided on this issue. While 22.7% of the participants see system failures and usage difficulties as an important reason for not using ERP in companies, 1.3% of the participants do not see system failures and usage difficulties as an important reason. 13.3% of the participants are undecided on this issue. While 20.0% of the participants consider not being able to decide on the appropriate system as an important reason for not using ERP in companies, 6.7% of the participants do not see the inability to decide on the appropriate system as an important reason. 13.3% of the participants are undecided on this issue.

Table 6 below shows the findings of analysis of whether the perception levels of the participants about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting differ in accordance with the participants' gender.

Table 6.*Difference Analysis by Gender*

	Gender	n	$\bar{X}$	Sd.	Levene Test		t Test	
					F	p	t	p
Belief in the necessity of combining big data with an integrated structure	Male	50	3.78	1.23	4.00	0.05	-1.51	0.14
	Female	24	4.17	0.92				
Belief in the necessity of using ERP for management accounting	Male	48	3.75	1.21	0.47	0.50	-0.42	0.67
	Female	24	3.88	1.12				

According to the findings in Table 6, the perception levels of the participants about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting do not differ significantly according to their genders ($t=-1.51$, $p>0.05$ and $t=-0.42$, $p>0.05$). In other words, the perception levels of male and female participants on the need to combine big data with an integrated structure and the need to use ERP for management accounting are similar.

The findings of the age difference analysis of the perception levels of the participants about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting are shown below in Table 7.

Table 7.*Difference Analysis by Age*

	Age	n	$\bar{X}$	Sd		S.o.S	df	M.S.	F	p	Dif.
Belief in the necessity of combining big data with an integrated structure	22-30	27	3.67	1.21	B.G.	2.84	2	1.42	1.08	0.34	NA
	31-40	28	4.11	1.07	W.G	94.68	72	1.31			
	41 +	20	4.00	1.17	Tot.	97.52	74				
Belief in the necessity of using ERP for management accounting	22-30 ^a	26	3.35	1.32	B.G.	9.83	2	4.91	3.84	0.03	c>a
	31-40 ^b	27	3.93	1.11	W.G	89.49	70	1.28			
	41 + ^c	20	4.25	0.85	Tot.	99.32	72				

According to the findings in Table 7, the perception levels of the participants about the necessity of combining big data with an integrated structure do not differ significantly according to the participants' ages ($F=1.08$, $p>0.05$). On the other hand, it was found that the perception levels of the participants about the necessity of using ERP for management accounting differ significantly according to participants' ages ($F=3.84$, $p<0.05$). When it is looked at to see the one-to-one differences between which groups using the Bonferroni Post Hoc analysis, it is seen that the difference is only between the participants aged 41 and over and the participants aged 22-30. It is found that the perception levels of the participants aged 41 and over about the necessity of using ERP

for management accounting are significantly higher than those of the participants aged 22-30.

Table 8 below shows the findings of the difference analyzes of the perception levels of the participants about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting by education level.

Table 8.

Difference Analysis by Levels of Education

	Level of Education	n	$\bar{X}$	Sd		S.o.S	df	M.S.	F	p	Dif.
Belief in the necessity of combining big data with an integrated structure	College ^a	47	3.72	1.25	B.G.	10.45	2	5.23	4.20	0.02	b>a
	M.D. ^b	23	4.43	0.79	W.G	87.06	70	1.24			
	PhD ^c	3	3.00	1.00	Tot.	97.51	72				
Belief in the necessity of using ERP for management accounting	College ^a	45	3.64	1.30	B.G.	4.96	2	2.48	1.79	0.18	NA
	M.D. ^b	23	4.17	0.94	W.G	94.28	68	1.39			
	PhD ^c	3	3.33	0.58	Tot.	99.24	70				

According to the findings in Table 8, the perception levels of the participants about the necessity of using ERP for management accounting do not differ significantly according to the participants' education level ($F=1.79$, $p>0.05$). On the other hand, it is found that the perception levels of the participants about the necessity of combining big

data with an integrated structure differ significantly according to the participants' education level ($F=4.20$, $p<0.05$). When it is looked at to see the one-to-one differences between which groups using the Bonferroni Post Hoc analysis, it is found that the difference is only between the undergraduate and graduates, and the perception levels of the graduates about the necessity of combining big data with an integrated structure are significantly higher than those of the undergraduates.

Table 9 below shows the findings of the difference analyzes of the perception levels of the participants about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting by work experience.

Table 9.
Difference Analysis by Work Experience

	Work Experience	n	$\bar{X}$	Sd		S.o.S	df	M.S.	F	p	Dif.
Belief in the necessity of combining big data with an integrated structure	1-5	17	3.53	1.18	B.G.	4.57	3	1.52	1.16	0.33	NA
	6-10	17	3.82	1.29	W.G	92.95	71	1.31			
	11-15	23	4.17	1.15	Tot.	97.52	74				
	16 years +	18	4.06	0.94							
Belief in the necessity of using ERP for management accounting	1-5 ^a	17	3.18	1.38	B.G.	13.20	3	4.40	3.53	0.02	d>a
	6-10 ^b	16	3.56	1.21	W.G	86.11	69	1.25			
	11-15 ^c	22	4.14	0.99	Tot.	99.32	72				
	16 years + ^d	18	4.22	0.88							

According to the findings in Table 9, the perception levels of the participants about the necessity of combining big data with an integrated structure do not differ significantly according to the participants' work experience ($F=1.16$, $p>0.05$). On the

other hand, it is found that the perception levels of the participants about the necessity of using ERP for management accounting differ significantly according to their work experience ($F=3.53$, $p<0.05$). When looking at which groups there are one-to-one differences with the Bonferroni Post Hoc analysis, the difference is only between the participants with 16 years or more of work experience and those with 1-5 years of work experience. It is found that the perception levels of the participants with 16 years or more work experience about the necessity of using ERP for management accounting are significantly higher than those of the participants with 1-5 years of work experience.

Table 10 below shows the findings of the difference analyzes of the perception levels of the participants about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting by titles.

Table 10.
Difference Analysis by Title

	Title	n	$\bar{X}$	Sd		S.o.S	df	M.S.	F	p	Dif.
Belief in the necessity of combining big data with an integrated structure	DGM	6	3.83	6	B.G.	2.96	3	0.99	0.73	0.54	NA
	Director	11	4.36	11	W.G	94.55	70	1.35			
	Manager	21	3.95	21	Tot.	97.51	73				
	Expert	36	3.78	36							
Belief in the necessity of using ERP for management accounting	DGM	6	4.00	6	B.G.	1.65	3	0.55	0.38	0.77	NA
	Director	11	4.09	11	W.G	97.63	68	1.44			
	Manager	20	3.65	20	Tot.	99.28	71				
	Expert	35	3.77	35							

According to the findings in Table 10, the perception levels of the participants about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting do not differ significantly according to the participants' work experience ($F=0.73$, $p>0.05$ and $F=0.38$, $p>0.05$). In other words,

although the titles of the participants differ, their perceptions of the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting do not differ.

Table 11 below shows the findings of the difference analyzes of the perception levels of the participants about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting by department.

Table 11.

Difference Analysis by Department

	Department	n	$\bar{X}$	Sd		S.o.S	df	M.S.	F	p	Dif.
Belief in the necessity of combining big data with an integrated structure	Pln.Cst.Ctrl	15	3.60	15	B.G.	7.70	7	1.10	0.81	0.58	NA
	Fin.Affr.	23	4.30	23	W.G	88.63	65	1.36			
	Bud.Rprt.	6	3.83	6	Tot.	96.33	72				
	Supply Ch.	5	3.80	5							
	IT	11	3.82	11							
	Warehouse	3	3.00	3							
	Tech.Offc.	9	3.89	9							
Belief in the necessity of using ERP for management accounting	Pln.Cst.Ctrl	15	3.67	15	B.G.	10.78	7	1.54	1.11	0.37	NA
	Fin.Affr.	22	4.32	22	W.G	87.06	63	1.38			
	Bud.Rprt.	5	3.60	5	Tot.	97.83	70				
	Supply Ch.	5	3.80	5							
	IT	11	3.45	11							
	Warehouse	3	3.00	3							
	Tech.Offc.	9	3.56	9							

According to the findings in Table 11, the perception levels of the participants about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting do not differ significantly according to the

participants' department ($F=0.81$, $p>0.05$ and $F=1.11$, $p>0.05$). In other words, although the departments of the participants differ, their perceptions of the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting do not differ.

Table 12 below shows the findings of the difference analyzes of the perception levels of the participants about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting by number of employees.

Table 12.

Difference Analysis by Number of Employees

	Number of Employees	n	$\bar{X}$	Sd		S.o.S	df	M.S.	F	p	Dif.
Belief in the necessity of combining big data with an integrated structure	500 and -	35	4.06	0.94	B.G.	2.56	3	0.85	0.63	0.60	NA
	501-1000	16	3.75	1.34	W.G	91.32	68	1.34			
	1001-2000	6	3.50	1.38	Tot.	93.88	71				
	2001 and	15	3.73	1.33							
Belief in the necessity of using ERP for management accounting	500 and - ^a	34	3.91	0.83	B.G.	12.64	3	4.21	3.32	0.02	a>c
	501-1000 ^b	16	3.63	1.41	W.G	83.70	66	1.27			d>c
	1001-2000 ^c	6	2.50	1.76	Tot.	96.34	69				
	2001 and ^{+d}	14	4.14	1.10							

According to the findings in Table 12, the perception levels of the participants about the necessity of combining big data with an integrated structure do not differ significantly according to the number of employees of the companies where the participants work ($F=0.63$, $p>0.05$). On the other hand, it is found that the perception

levels of the participants about the necessity of using ERP for management accounting differ significantly according to the number of employees of the companies where the participants work ($F=3.53$, $p<0.05$). When looking at which groups there are one-to-one differences with the Bonferroni Post Hoc analysis, the difference is between the companies having 500 or less employees and companies having 1001-2000 employees. There is also difference is between the companies having 2001 or more employees and companies having 1001-2000 employees. It is found that the perception levels of the participants working in companies having 1001-2000 employees about the necessity of using ERP for management accounting are significantly lower than those of the participants working in companies having 500 or less employees and companies having 2001 or more employees.

Table 13 below shows the findings of the difference analyzes of the perception levels of the participants about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting by number of ongoing projects.

Table 13.
Difference Analysis by Number of Ongoing Projects

	Number of Ongoing Projects	n	$\bar{X}$	Sd		S.o.S	df	M.S.	F	p	Dif.
Belief in the necessity of combining big data with an integrated structure	10 and -	42	3.88	1.02	B.G.	3.05	2	1.53			
	11-30	18	3.78	1.35	W.G	90.73	71	1.28	1.19	0.31	NA
	31 and +	14	4.36	1.15	Tot.	93.78	73				

Belief in the necessity of using ERP for management accounting	10 and -	40	3.73	1.26	B.G.	1.85	2	0.93			
	11-30	18	3.78	1.06	W.G	96.80	69	1.40	0.66	0.52	NA
	31 and +	14	4.14	1.10	Tot.	98.65	71				

According to the findings in Table 13, the perception levels of the participants about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting do not differ significantly according to the number of ongoing projects of the companies where the participants work ($F=1.19$, $p>0.05$ and $F=0.66$, $p>0.05$). In other words, although the number of ongoing projects of the companies where the participants work differ, their perceptions of the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting do not differ.

Table 14 below shows the findings of the relationship between the usage of ERP in companies and both the number of employees in the companies and the number of ongoing projects in the companies.

Table 14.*Relationship Between ERP Usage in Companies and Company Characteristics*

Sub Groups		ERP is Employed (n=62)		ERP is not Employed (n=13)		χ^2	p
		f	%	f	%		
Number of Employees	500 and below	28	38.9	7	9.7	5.96	0.11
	501-1000	15	20.8	1	1.4		
	1001-2000	3	4.2	3	4.2		
	2001 and above	13	18.1	2	2.8		
Number of Ongoing Projects	10 and below	32	43.2	10	13.5	4.84	0.09
	11-30	16	21.6	2	2.7		
	31 and below	14	18.9	0	0.0		

According to the findings in Table 14, there is no significant relationship between the usage of ERP in companies and both the number of employees in the companies and the number of ongoing projects in the companies ($X^2=5.96, p>0.05$ and $X^2=4.84, p>0.05$). In other words, although the number of employees of the companies and the number of ongoing projects in the companies differ, whether the companies use ERP or not does not differ significantly.

Table 15 below shows the findings of the relationship between the success of using ERP in companies and the number of employees in the companies and the number of ongoing projects in the companies.

Table 15.

Relationship Between Success of ERP Usage in Companies and Company Characteristics

Sub Groups		ERP Usage is Succesfull (n=62)		ERP Usage is not Succesfull (n=13)		X^2	p
		f	%	f	%		
Number of Employees	500 and	22	30.6	13	18.1	1.95	0.58
	501-1000	7	9.7	9	12.5		
	1001-2000	4	5.6	2	2.8		
	2001 and .	8	11.1	7	9.7		
Number of Ongoing Projects	10 and below	28	37.8	14	18.9	4.20	0.12
	11-30	10	13.5	8	10.8		
	31 and above	5	6.8	9	12.2		

According to the findings in Table 15, there is no significant relationship between the success of using ERP in companies and the number of employees in the companies and the number of ongoing projects in the companies ($X^2=1.95$, $p>0.05$, $X^2=4.20$, $p>0.05$ and $X^2=1.13$, $p>0.05$). In other words, although the number of employees of the companies and the number of ongoing projects in the companies differ, the success of the usage of ERP used in companies does not differ significantly.

5. CONCLUSION AND RECOMMANDATION

5.1. Conclusion

This study aimed to reveal whether the management accounting functions of the companies operating in the construction sector need an ERP system, and to reveal the factors that push the companies in the construction sector to use the ERP system and the effect of the ERP system on the strategic decisions of the companies, planning and cost management. The data of the research were collected using a questionnaire from 75 people with different titles working in different departments in 7 leading construction companies which are among the construction companies in the top 50 companies in the FortuneTurkey500 2020 list operating in the construction sector in Turkey according to their turnover.

The findings showed that nearly half of the companies where the data is collected have 500 or less employees. The number of ongoing projects in more than half of the companies is 10 or less. Ongoing projects in companies are mainly superstructure and infrastructure projects.

It has been found that an ERP is used in the vast majority of the companies where the research was conducted. The fact that companies in the construction sector use ERP at a high rate indicates that these companies want to benefit from the opportunities and benefits specified in the ERP literature (Manas, 2000; Demirkan, 2005; Slobodan and Mirjana, 2012; Baran and Calis, 2014). However, only a little more than half of the employees in the enterprise find the use of ERP successful. The failure of the use of ERP may be due to many reasons. Cinar (2018) exemplified these reasons as failures in the implementation process, the reluctance of the employees, the lack of scope management and geographical barriers. One of these reasons may be that the ERP outputs and the path

line shown by it are not fully complied with (Aladağ, 2020). The fact that ERP is installed in a business is not a guarantee of success on its own. Chen (2001) points out that 20% of ERP installation attempts fail. This risk should always be guarded against.

It has been found that all of the ERP modules are used in the enterprises, however, the modules used in more than half of the companies are finance, purchasing, cost control and human resources. Integration failure between modules and loss of time came to the fore as the reason for not using unused modules. It is very costly and troublesome to bring ERP systems to businesses. The reason for bringing these systems to businesses is that certain benefits are expected from these systems. While purchasing ERP, expenditure is made for all modules. When the already paid modules of the ERP systems are not used, it will mean that extra money has been spent on the unused models of the ERP. Therefore, effective use of every paid module in ERP systems should be ensured. Or, when purchasing ERP systems, it is necessary to correctly decide which modules are necessary for the business with precise planning and to spend only on the modules to be used.

It has been found that the majority of the top management in businesses use both digital reports at the same time, and those who prefer only the printed report or only the digital report are relatively few.

The reasons why businesses do not use ERP were found in the following order of importance: infrastructure deficiencies, high cost, long implementation times, system failures and difficulties in using, not being able to decide on the appropriate system and being an unnecessary investment. These findings of the studies are compatible with the literature. Avinal (2012) stated that ERP is costly and this cost is not limited to software only because a long transition period is needed when installing ERP. For this reason, it was pointed out that all these processes should be calculated while calculating the cost of ERP. Gök (2005), on the other hand, stated that ERP can be seen as high cost in the short

term and stated that ERP will provide profitability in the long run. Again, Gök (2005) stated that the sustainability of ERP systems is one of the most important flaws of these systems. Demirkan (2005) drew attention to the importance of choosing the ERP system. Pınar and Erdem (2002) also pointed out that deciding on an ERP system suitable for the needs of the business is a long, laborious and costly process.

In response to the hypotheses H1,H2, H3,H4, H5,H6 and H7 which mean H1; the perception levels about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting differ in accordance with gender. H2; the perception levels about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting differ in accordance with age. H3; The perception levels about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting differ in accordance with level of education. H4; The perception levels about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting differ in accordance with work experience. H5; The perception levels about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting differ in accordance with department. H6; The perception levels about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting differ in accordance with number of employees of companies. H7; The perception levels about the necessity of combining big data with an integrated structure and the necessity of using ERP for management accounting differ in accordance with number of ongoing projects of companies. More than 70% of the employees working in the construction sector agree both with the idea of combining big data with an integrated structure and the idea that ERP should be used for management accounting. It was found that the level of agreement

in the idea of combining big data with an integrated structure did not differ significantly according to the gender, age, work experience, title, department, number of employees in the enterprise and the number of ongoing projects in the enterprise. On the other hand, it was found that the level of agreement in the idea of combining big data with an integrated structure differed significantly according to the education level of the employees. Those with a master's degree have a significantly higher level of agreement with this idea than those with a bachelor's degree. It was found that the level of agreement with the idea that ERP should be used for management accounting did not differ significantly according to the gender, education level, title, department of the employees and the number of ongoing projects in the enterprise. On the other hand, it has been found that the level of agreement with the idea that ERP should be used for management accounting differs significantly according to the age, work experience and the number of employees in the enterprise. The level of agreement of employees aged 41 and over is significantly higher than those aged 22-30. Employees with 16 years or more of work experience agree with this idea significantly higher than those with 1-5 years of work experience. The level of agreement of the employees in the companies with 2001 and above and 500 and below employees is significantly higher than that of the employees in the companies with 1001-2000 employees.

The fact that the employees in the construction industry support both the idea of combining big data with an integrated structure and the idea that ERP should be used for management accounting is important for businesses to adapt to ERP systems and to use these systems more widely and effectively. However, it should be determined why those who hold the opposite view, even if a little, think this way. Finding the reasons that cause these employees to think otherwise and eliminating them will provide a more effective use of ERP systems and thus obtaining the expected benefits from ERP systems at a

higher rate. Training employees on ERP may be a solution. The lower acceptance levels of undergraduate graduates of younger students in these trainings should also be taken into account.

In response to the hypotheses H8 there is a relationship between the usage of ERP in companies and both the number of employees in the companies and the number of ongoing projects in companies. There was no relationship between the number of employees in the companies and the use of ERP in the companies and the successful use of ERP. In addition to response H9 there is a relationship between the success of using ERP in companies and the number of employees in the companies and the number of ongoing projects in the companies. Similarly, there was no relationship between the number of ongoing projects in companies and the use of ERP in companies and the successful use of ERP. Ahmed (2003) stated that ERP systems may not be suitable for small businesses which require large financial, human and technological resources. However, the findings of this research showed that at least the number of employees does not make a difference in terms of the use and success of ERP in construction companies.

5.2. Recommendation

Based on the above findings of the research, some suggestions can be made to ensure more widespread and effective use of ERP in businesses working in the construction industry. First of all, it should be clearly determined why the business needs an ERP. It should be planned for what purpose ERP systems will be purchased, which functions will be performed on the ERP, which modules will be used, and what benefits will be obtained from the use of ERP. Choosing, purchasing and installing ERP alone is not enough for success. All these processes should be carefully followed and managed properly. It should be noted that these processes require extensive financial, human and technological resources. It should be noted that the management of change and

management support are vital to the success of ERP. In this regard, it is necessary to provide trainings in sufficient time and scope for ERP. They should be trained to both teach the use of ERP to the employees of the business and to make them accept these systems. It is also necessary to have a leader who manages and directs the change brought by ERP. Although the selection, installation and transition process of ERP is a long and arduous road, it should not be forgotten that ERP will bring benefits to the business in the long run.

Future research should investigate the use of ERP by businesses in the construction industry, the factors affecting this use, the management accounting perspective of the construction industry, the benefits of the ERP system to the management accounting information system and the outputs of the use of reports more frequently and comprehensively. In these studies, businesses in different geographical regions should be examined with different sample groups using quantitative and qualitative methods.

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APPENDIX

Survey Questions Of The Research

In appendix, there are survey questions prepared in accordance with the subject of the thesis and used in the research.

Does the managerial accounting information system need ERP in the construction industry?

Survey questions to determine why the next generation Enterprise Resource Planning (ERP) systems on management accounting practices are preferred by companies in the construction industry and how they implement change management

- 1) What Is Your Gender
 - a) Female
 - b) Male

- 2) What is your age?
 - a) 22-30
 - b) 30-40
 - c) 40-50
 - d) 50-60

- 3) What Is Your Education Level?
 - a) Bachelor's Degree
 - b) Master Degree
 - c) Doctor

- 4) What is your Work Experience Period?
 - a) 1-5 years
 - b) 5-10 years
 - c) 10-15 years
 - d) 20 years & plus

- 5) What is your title?
 - a) Deputy General Manager
 - b) Director
 - c) Manager
 - d) Specialist

- 6) Which Department do you work in?
 - a) Planning and Cost Control
 - b) Finance
 - c) Budget and Reporting
 - d) Supply Chain
 - e) Information Technologies
 - f) Plant Maintenance
 - g) Warehouse
 - h) Technical Office

- 7) What is the number of employees of your company?
 - a) < - 500

- b) 500-1000
 - c) 1500-2000
 - d) 2000 - >
- 8) What are the types of ongoing projects?
- a) Superstructure
 - b) Subway Projects
 - c) Motorway Projects
 - d) Substructure
- 9) What is the number of your projects in the last five years?
- a) < - 10
 - b) 10-30
 - c) 30 - >
- 10) Today's technologies prefer to combine big datas with an integrated structure. Do you agree with this view?
- a) Strongly Disagree,
 - b) Disagree,
 - c) What I Agree, Disagree,
 - d) Agree,
 - e) Strongly Agree,
- 11) Do you use ERP system in your company?
- a) Yes
 - b) No
- 12) If your answer to question 11 is no, what do you think are the reasons why companies in the construction industry do not use ERP?
- a) High Investment Cost
☐ Important ☐ Not important ☐ I'm not sure
 - b) Long Implementation Period
☐ Important ☐ Not important ☐ I'm not sure
 - c) Lack of technical infrastructure in the company
☐ Important ☐ Not important ☐ I'm not sure
 - d) Unnecessary Investment ☐ Important ☐ Not important ☐ I'm not sure
 - e) System Failures and Difficulty to Use
☐ Important ☐ Not important ☐ I'm not sure
 - f) Difficulty deciding which system to choose
☐ Important ☐ Not important ☐ I'm not sure
- 13) In your company; Does the decision maker use print or digital reports from senior management?
- a) Hard copy reports
 - b) Hard copy & Digital Reports
 - c) Digital Reports
- 14) Do you believe that business resource systems (ERP) should be used for management accounting?
- a) Strongly Disagree,

- b) Disagree,
 c) What I Agree, Disagree,
 d) Agree,
 e) Strongly Agree,
- 15) If your answer to question 11 is yes, which modules do you use in your ERP system?
- a) Finance ☐ Yes ☐ No
 b) Cost Control ☐ Yes ☐ No
 c) Supply Chain (Material Maintenance) ☐ Yes ☐ No
 d) Plant Maintenance ☐ Yes ☐ No
 e) Human Resource ☐ Yes ☐ No
 f) Project System ☐ Yes ☐ No
 g) Sales Distribution ☐ Yes ☐ No
 h) Digital Reports Tools (BI) ☐ Yes ☐ No
- 16) If you marked at most two options in your answer to question 20; What are your thoughts on the integration of modules?
- a) Data Missing/Loss ☐ Yes ☐ No
 b) Integration failures between modules – waste of time ☐ Yes ☐ No
 c) The use of unselected modules is not suitable for the company
☐ Yes ☐ No
 d) The use of unselected modules is not suitable for the company
☐ Yes ☐ No
 e) The use of unselected modules is not suitable for the construction industry
☐ Yes ☐ No
- 17) Which department is responsible for Management Reporting, which works integrated with the ERP system in your company?
- a) Information Systems Unit ☐ Yes ☐ No
 b) Information Technologies Unit ☐ Yes ☐ No
 c) Planning and Cost Control Unit ☐ Yes ☐ No
 d) Budget and Reporting Unit ☐ Yes ☐ No
 e) Finance (Accounting Affairs) ☐ Yes ☐ No