

A Research on Does Management Accounting in the Construction Industry Need Enterprise Resource Planning

Authors

Assistant Prof. Cagatay Akarcay^{1*}, Ozlem Tore Dogruarar²

Affiliations

¹Business Administration, Yeditepe University Graduate School of Social Sciences, Istanbul, 34755, Turkey

²Executive Master's Program in Business Administration, Yeditepe University Graduate School of Social Sciences, Istanbul, 34755, Turkey.

*To whom correspondence should be addressed; E-mail: cagatayakarcay@yeditepe.edu.tr.

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.

Keywords: Enterprise resource planning systems; digital reporting platforms; management accounting, project management in the construction sector; SAP.

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 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.

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.

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

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

Research Model

Employees' demographics

- Gender
- Age
- Level of education
- Work experience
- Department
- Managerial Accounting Practising
- ERP Usage

Companies' characteristics

- Number of employees
- Number of ongoing projects

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

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.

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 addition according to the construction report prepared by Harmony Real Estate Valuation and Consultancy 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 addition 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.

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.

RESULTS

Data Findings

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

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. 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. 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. 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. 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. 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. 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. 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. 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.

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. 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. 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.

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 ($\chi^2=1.95$, $p>0.05$, $\chi^2=4.20$, $p>0.05$ and $\chi^2=1.13$, $p>0.05$). 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.

DISCUSSION

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.

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 Fortune Turkey 500 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 hypothesis 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.

REFERENCES AND NOTES

- Ahmed, S. M. (2003). Implementation of Enterprise Resource Planning (ERP) Systems in the Construction Industry,. *Construction Research Congress: Wind of Change: Integration and Innovation*.
- Aladağ, H. (2020). Türk İnşaat Sektöründe Kurumsal Kaynak Planlaması. *Mühendislik Bilimleri ve Tasarım Dergisi*, s. Yıldız Teknik Üniversitesi, İnşaat Fakültesi, İnşaat Mühendisliği Bölümü,.
- Avinal, A. (2012). İnşaat Proje Yönetimi ERP Sistem Seçimlerinde, Sorgulanması Gerekenler ve Olması Gereken Yapı,. *2. Proje ve Yapım Yönetimi Kongresi*, (s. 421,431). izmir.
- Baran, N., & Calıs, E. (2014). Yönetim Raporlama Sisteminde Sorumluluk Muhasebesi: Bir İnşaat İşletmesinin Maliyet Merkezine Yönelik Performans Analizi. Marmara Üniversitesi, İşletme Fakültesi Muhasebe-Finansman Anabilim Dalı.
- Baskak, M., & Cetisli, H. (2003). Kurumsal Kaynak Planlama: Başarılı Sistem Kurulumu İçin Kritik Etmenlerin Analizi. *IV. Endüstri-İşletme Mühendisliği Kurultayı 12-13 Aralık 2003 / Denizli*. İstanbul Teknik Üniversitesi, İşletme Fakültesi, Endüstri Mühendisliği Bölümü.
- Cınar, E. O. (2018). Enterprise resource planning implementation in construction: Challenges and key enablers. *Journal of Construction Engineering*, 75-84.
- Chen, I. (2001). Planning for ERP systems: analysis and future trend business. *Process Management Journal*, 374,386.
- Davenport, T. (1998). Putting The enterprise into the enterprise system,. *Harward Business Review* 76, 121,131.
- Demirkan, C. (2005). Kurumsal Kaynak Planlaması (ERP) Sistemlerinin İnşaat Sektöründe Uygulanabilirlik Araştırması,. *Doktora Tezi, İTÜ, Fen Bilimleri Enstitüsü*.
- Erdem, S., & Pınar, I. (2002). Kurumsal Kaynak Planlaması (ERP) Kullanıcısı İşletmelerin Memnuniyetlerini Ölçmeye Yönelik Bir Araştırma, Yüksek Lisans Tezi. *İ.Ü.Sosyal Bilimler Enstitüsü*.
- Gok, M. (2005, Kasım). ERP Sistemlerinin Firma Performnsına Etkileri. *MUFAD*.
- Hagman, A. (2000). What will be of ERP?,. *School of Information Systems Queensland University of Technology*.
- Imai, M. (1986). *Kaizen: The Key to Japan's Competitive Success*. New York, New York: McGraw-Hill Publishing Company.

- Kalkınma Bakanlığı, T. C. (2014). Onuncu Kalkınma Planı (2014-2018) İnşaat Mühendislik- Mimarlık Teknik Müşavirlik ve Müteahhitlik Hizmetleri Özel İhtisas Komisyonu Raporu. Ankara.
- Kecek, G. (2009). Enterprise Resource Planning And The Importance For Company. *Electronic Journal of Social Sciences.*, Summer-2009 C.8 S.29 (240-258).
- Manas, O. (2000). Geliştirilmiş Kurumsal Kaynak Planlaması,.
- Slobodan , M., & Mirjana , T. (2012). How Does Management Accounting Change Under The Influence Of Erp. *Economic Research - Ekonomska Istrazivanja Vol25(3)*, 722.
- Under, B. (2006). İnşaat İşletmelerinde Proje Yönetimi ve Bilgi Teknolojileri Uygulamaları. *İstanbul Üniversitesi Sosyal Bilimler Enstitüsü İşletme Anabilim Dalı Sayısal Yöntemler Bilim Dalı*.
- Yılmaz, E. (2020). İnşaatın politik ekonomisi: İnşaat sadece inşaat değildir.

TABLES

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

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

Table 1. 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

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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
Top management's reporting method preference	Printed Reports	10	13.3
	Printed and Digital Reports	51	68.0
	Digital Reports	12	16.0

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

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				

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			
	31-40	28	4.11	1.07	W.G	94.68	72	1.31	1.08	0.34	NA
	41 +	20	4.00	1.17	Tot.	97.52	74				
											c>a
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			
	31-40 ^b	27	3.93	1.11	W.G	89.49	70	1.28	3.84	0.03	
	41 + ^c	20	4.25	0.85	Tot.	99.32	72				

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			b>a
	M.D. ^b	23	4.43	0.79	W.G	87.06	70	1.24	4.20	0.02	
	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				

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							

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							

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		
	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				0.81	0.58	NA
	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		
	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				1.11	0.37	NA
	IT	11	3.45	11						
	Warehouse	3	3.00	3						
	Tech.Offc.	9	3.56	9						

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 above	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 d}	14	4.14	1.10							

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	1.19	0.31	NA
	11-30	18	3.78	1.35	W.G	90.73	71	1.28			
	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	0.66	0.52	NA
	11-30	18	3.78	1.06	W.G	96.80	69	1.40			
	31 and +	14	4.14	1.10	Tot.	98.65	71				

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

	Sub Groups	ERP is Employed (n=62)		ERP is not Employed (n=13)		X 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		

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		

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?
- Hard copy reports
 - Hard copy & Digital Reports
 - Digital Reports
- 14) Do you believe that business resource systems (ERP) should be used for management accounting?
- Strongly Disagree,
 - Disagree,
 - What I Agree, Disagree,
 - Agree,
 - Strongly Agree,
- 15) If your answer to question 11 is yes, which modules do you use in your ERP system?
- Finance Yes No
 - Cost Control Yes No
 - Supply Chain (Material Maintenance) Yes No
 - Plant Maintenance Yes No
 - Human Resource Yes No
 - Project System Yes No
 - Sales Distribution Yes No
 - Dijital 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?
- Data Missing/Loss Yes No
 - Integration failures between modules – waste of time Yes No
 - The use of unselected modules is not suitable for the company Yes No
 - The use of unselected modules is not suitable for the company Yes No
 - 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?
- Information Systems Unit Yes No
 - Information Technologies Unit Yes No
 - Planning and Cost Control Unit Yes No
 - Budget and Reporting Unit Yes No
 - Finance (Accounting Affairs) Yes No