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ENTERPRISE RESOURCE PLANNING IMPLEMENTATION: A SURVEY OF TURKISH MANUFACTURING ORGANIZATIONS

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Abstract

Enterprise Resource Planning (ERP) systems attempt to integrate all corporate information in one central database, they allow information to be retrieved from many different organizational positions, and in principle they render any organizational object visible [1]. The purpose of this study first of all is to conduct a literature search to identify selection criteria, critical success factors, and advantages of Enterprise Resource Planning and commonly encountered problems in ERP implementation. Hypotheses are developed and tested to investigate the differences in success factors according to the sector, in which the firm operates, ERP level, and ERP implementation stage of the firm. According to the results, functionality, cross module integration and system reliability have been identified as the most important selection criteria.

Keywords: Enterprise resources planning (ERP), Critical success factors of ERP, Implementation problems.

KURUMSAL KAYNAK PLANLAMASI UYGULAMALARI: TÜRK SANAYİ İŞLETMELERİNDE BİR ARAŞTIRMA

Özet

Kurumsal Kaynak Planlaması (KKP) sistemleri, tüm kurumsal bilgileri tek bir merkezi veritabanına entegre etmeye çalışmakta, pek çok farklı organizasyonel pozisyondan bilginin edinilmesine izin vermekte ve esas itibariyle her organizasyonel amacı görünür hale getirmektedir [1]. Bu çalışmanın amacı, öncelikle Kurumsal Kaynak Planlaması için seçim kriterlerini, kritik başarı faktörlerini ve avantajlarını ve KKP uygulamasında genellikle karşılaşılan sorunları tespit etmek üzere bir akademik yazın incelemesi gerçekleştirmektir. Firmanın faaliyet gösterdiği sektöre göre,

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ERP düzeyine göre ve firmanın ERP uygulama adımına göre başarı faktörlerindeki farklılıkların tespiti için hipotezler geliştirilmiş ve test edilmiştir. Sonuçlar, fonksiyonellik, modüllerin çapraz entegrasyonu ve sistemin güvenilirliğinin en önemli seçim kriterleri olduğunu göstermiştir.

Anahtar Kelimeler: Kurumsal Kaynak Planlaması (KKP), KKP'nin kritik başarı faktörleri, Uygulamada karşılaşılan sorunlar

I. Introduction

In the changing business environment, companies face the challenge of increasing competition, expanding markets, and rising customer expectations. This situation forces companies to lower total costs in the entire supply chain, shorten throughput times, drastically reduce inventories, expand product choice, provide more reliable delivery dates and better customer service, improve quality, and efficiently coordinate global demand, supply, and production [2, 3].

In other, words in today's highly competitive environment, companies need faster supply chains [4]. In such an environment, it is realized that the in-house information of companies, which is tried to be kept as a secret most of the time, must be shared with its stakeholders. Also, functions within the company must upgrade their capability to generate and communicate timely and accurate information [2, 3]. Therefore, information must be shared easily, correctly, and on time among both business units and stakeholders [5]. Since ERP systems are based upon a central database which integrates the business functions such as material management, production, sales, marketing, distribution, financial services, human resources, reports, etc., ERP has become more important over the years [4, 6].

ERP systems are composed of many modules, which are responsible for accessing, collecting, gathering, summarizing, interpreting and processing information for different business functions, or a group of different business functions [7, 8, 9]. ERP systems supply modules for all functions in a company such as accounting, master scheduling, material planning, inventory, forecasting, finite scheduling, distribution planning and others, which facilitates sharing and transferring information easily and freely and seeing what is happening in other departments [7, 9].

In brief it is possible to say that successful implementation of ERP obtains availability and visibility of real time data for business functions [10].

ERP is the evolution of Material Requirements Planning (MRP) and Manufacturing Resource Planning (MRP II) systems [9, 11]. ERP systems are designed to integrate these smaller systems in order to maintain real-time resource accountability across the business units and facilities [11]. In order to get the idea behind ERP, the basics of MRP and MRP II have to be understood. Thus the evolution of ERP is discussed in the next section.

Since companies have both experienced success stories and failures by implementing enterprise resource planning (ERP) systems [12], critical success factors and implementation problems are investigated respectively.

II. Literature Review and Hypotheses Development

The developments in information and communication technologies (ICT), have forced organizations to use software programs in all o their applications. During 1960's most of the manufacturing organizations focused on designing, developing and implementing software packages for controlling their inventories [2, 13]. Companies kept lots of inventory in order to meet market demand and sustain their competitive advantage. Hence, most software packages of the day focused on the best efficient way to manage large volumes of inventory.

During 1970's, companies could no longer afford the cost of maintaining large quantities of inventory [2]. Because of this necessity, material requirements planning (MRP) systems, which mainly focused on planning the part and product requirements were introduced [2, 13]. In the beginning, it depends on master production schedule, and accurate inventory record files. This then triggered a series of activities dealing with placing, canceling, and modifying the timing of orders, followed by a formal mechanism for keeping priorities valid in a changing manufacturing environment. Beside that techniques for capacity planning were added to the basic MRP system capabilities since the implementation of capacity planning is as problematic as production priorities and materials planning.

Tools were developed to support the planning of aggregate sales and production levels (sales and operations planning), the development of the specific build schedule (master production scheduling), forecasting, sales planning and customer order promising (demand management), and high-level resource analysis (rough-cut capacity planning). Scheduling techniques for the factory floor and supplier scheduling were incorporated into MRP systems. At the same time, users considered MRP as company-wide systems, which are followed by the second stage known as closed-loop MRP.

In the 1980's, companies began to take advantage of MRP II system. This system evolved to incorporate the financial accounting system and the financial management system along with the manufacturing and materials management systems. The resulting effect was a more integrated business system that derived the material and capacity requirements associated with a desired operations plan, allowed input of detailed activities, translated all this to a financial statement, and suggested a course of action to address those items that were not in balance with the desired plan.

In early 1990's, MRP II included all resource planning activities with the help of the improved technology. Areas such as product design, information warehousing, materials planning, capacity planning, communication systems, human resources, finance, and project management could now be incorporated in the plan [2]. During the 1990s, the market for standardized ERP systems grew enormously and ERP systems penetrated into companies deeply [14]. This penetration not only affected manufacturing companies, but also any company that wants to become more competitive by effectively using all its assets, including information [2].

ERP implementation is a beneficial process for companies as it affects nearly all of the processes in an organization [2, 8]. It provides a unified enterprise view of the business that encompasses all functions and departments, and an enterprise database where all business transactions are entered, recorded, processed, monitored, and reported [2]. If successfully implemented, ERP

systems provide benefits to companies such as cost reduction and quality improvements, which leads to an increase in purchasing goods. In order to obtain these benefits, companies need to manage the implementation procedure of ERP systems effectively [15].

As an integrated approach, ERP systems increase the requirement for, and the extent of, interdepartmental cooperation and coordination. This brings increased communication and responsiveness to all stakeholders. For managers who have struggled, at great expense and with great frustration, with incompatible information systems and inconsistent operating practices, the promise of a quasi "off-the-shelf" solution to the problem of business integration is enticing [2].

ERP systems consist of a set of software modules linked to a common database, and these modules can handle basic corporate functions such as finance, human resources, operations and logistics, and sales and marketing. ERP systems focus on integrating these functions in order to balance demand and supply [5].

ERP implementation begins with selection. Thus, first of all the selection criteria of ERP will be discussed. Then, the critical success factors of ERP implementation, the benefits and the implementation problems will be listed.

II.1. ERP Selection Criteria

The selection criteria can be defined as a critical success factor in deciding the right ERP package. As the installation of ERP packages are very expensive, the selection of the right solution is critical [16]. The evaluation of selection criteria is based on the study of Baki and Cakar (2005) [16]. They identify 15 criteria considered in selecting the ERP software. These are functionality, technical aspect, cost, service and support, vision, system reliability, compatibility with other systems, ease of customization, market position of the vendor, better fit with organizational structure, domain knowledge of the vendor, references of the vendor fit with parent/allied organization systems, cross module integration, methodology of the software, and consultancy.

II.2. Critical Success Factors of ERP Implementation

There are widely used critical success factors to assess ERP systems. These critical success factors generally ensure successful competitive performance at individual, departmental, and organizational levels [5]. In other words, it is possible to say that critical success factors are necessary to assure the successful implementation of ERP systems [5, 17].

The implementation of ERP is expensive, risky [2], complex and difficult, which is the reason why many companies experience unexpected failures [5]. The reasons of these failures form the main objective of this study because ERP systems are be invested due to its benefits.

The most prominent of critical success factors and implementation failures are determined on the basis of the studies that proposed comprehensive lists of factors [18, 19, 20, 21]. These studies determined critical factors which are top management support, enterprise wide support, project team competence, interdepartmental cooperation, clear goals and objectives, project champion, communication, management of expectations, vendor support, careful package selection, data accuracy, hardware requirements, training of users, education on new business processes, step by

step implementation, business process reengineering, organizational change management, and use of consultants.

II.3. Benefits of ERP

The growth and the acceptance of enterprise resource planning (ERP) have been rapid due to competitive advantages ERP imposes on manufacturing companies [22]. ERP systems attempt to integrate all corporate information in one central database, they allow information to be retrieved from many different organizational positions, and in principle they allow any organizational object to be made visible, which enables companies to gain a distinctive competitive advantage over its rivals. And it is suggested that that such systems facilitate unprecedented levels of organizational integration [1]. The areas that have benefited the most from the ERP implementation are synthesized upon the studies [17, 23, 24, 25, 26]. These are ease of use, integration of business operations/processes, improved information accuracy and improved decision-making capability, improved lead-time, improved order management/order cycle, improved inventory levels, improved financial performance, improved interaction with supplier, improved interaction with customers, improved on-time delivery, and reduced direct operating costs.

II.4. Implementation Problems

Although many companies try to implement their ERP systems according to the critical success factors cited above, they may still experience problems. ERP systems are complex, time consuming and expensive, they do not guarantee a high outcome [23].

Another big challenge of the implementation is to have the properly trained personnel for a high-performance organization. Unfortunately, most companies do not recognize that need. They underestimate the impact that the human factor has on an ERP approach; they consider the implementation as a software-installation with influence to the business. However, the implementation is much more complex. Actually, implementation effort will be bigger then ever talked about or even imagined. Therefore companies will surely face a lot of different implementation problems in ERP projects. These problems are determined based upon the studies [19, 25] and can be generalized as organizational resistance to change may be high. It takes a long time causing cost overruns, data errors being carried over throughout the system, lack of training, under-estimated work, weak planning method, ill-defined requirements, lack of communication, lack of implication of the management, lack of business process re-engineering (BPR) before project, confusions between ERP, BPR and management, and under-estimation of the importance of the choice ERP.

II.5. Hypotheses Development

Based upon the literature search, the hypotheses stated below are developed:

H_1: There is a significant difference in critical success factors according to the sector.

H_2: There is a significant difference in critical success factors according to the ERP implementation stage.

H_3: There is a significant difference in critical success factors according to the ERP level of the firm.

III. Research Methodology

III.1. Sample and Data Collection

The hypotheses are tested by utilizing the data collected through structured questionnaires that are posted to logistics/supply chain managers, production managers, plant managers, IT managers, and general managers in Turkey.

In the beginning of the questionnaire, demographic and firm-specific questions are asked. These are open-ended questions regarding the sector, firm age, size, and capital structure of the firm. In the second part of the questionnaire, respondents are asked to evaluate what their selecting criteria are, which critical success factors they draw attention, what advantages and what implementation problems they face. In order to specify the determinants of these variables, the statements commonly used in the literature are determined.

Firms in the sample are selected from the first top 500 firms of Turkey provided by the Istanbul Chamber of Industry. Questionnaires are posted to all top 500 firms and a total of 72 responses are received, yielding an effective response rate of 14.4 percent. In some questionnaires there are some missing values due to lack of knowledge, declining to give any response or because of some other reasons. In order to impute the cases with missing values mean substitution is used.

Collected data are analyzed statistically. For evaluating firm specific characteristics, frequencies are used. In the survey, 95.5 percent of the firms are operating in the private sector. The sample consists of firms from a wide variety of industries as one third of the sample has been operating over 50 years. Eighty-two percent of the firms are large-sized and 92.5% of them are serving both the domestic and foreign sector together. In the survey, 68.7% of the firms are wholly domestic-owned. Most of the respondents are working as System manager/IT manager (52.2%). Demographic characteristics of the sample are exhibited in Table 1.

III.2. Survey Instrument

Based upon the literature survey, the set of ERP selection criteria is determined according to the study of Baki and Cakar (2005) [16].

Table.1. Demographic Characteristics of the Sample

	Frequency	Percent
Sector		
Public	3	4.5
Private	64	95.5
Industry		
Textiles, wearing apparel, leather and footwear industry	4	6.0
Metal goods, machinery and equipment and professional instruments industry	10	14.9
Chemicals, oil products, rubber and plastics industry	16	23.9
Food, beverages and tobacco industry	7	10.4

Primary metals industry	15	22.4
Automobile industry	5	7.5
Stone and earth based industry	5	7.5
Paper, paper products and printing and publishing industry	1	1.5
Wood products and furniture industry	1	1.5
Mining industry	2	3.0
Electricity industry	1	1.5
Firm Age		
0-9 years	3	4.5
10-19 years	12	17.9
20-29 years	7	10.4
30-39 years	11	16.4
40-49 years	12	17.9
50 years and up	22	32.8
Scale		
Small and Medium Sized Enterprises	12	17.9
Large Sized Enterprises	55	82.1
Capital Structure		
Wholly domestic-owned	46	68.7
Foreign-domestic joint ventures	21	31.3
Target Market		
Domestic	5	7.5
Foreign	0	0
Both of them	62	92.5
Respondent's Position		
Executive	18	26.9
Logistics/supply chain manager	5	7.5
Production/inventory control	4	6.0
System manager/IT manager	35	52.2
Plant/operations manager	3	4.5
Non-respondent	2	3.0

Fifteen criteria are identified for the selection of the ERP software which included functionality, technical aspect, cost, service and support, vision, system reliability, compatibility with other systems, ease of customization, market position of the vendor, better fit with organizational structure, domain knowledge of the vendor, references of the vendor fit with parent/allied organization systems, cross module integration, methodology of the software, and consultancy. Respondents are allowed to choose one or more criteria that was/were important in their ERP software selection.

Critical success factors are determined on the basis of the studies of Somers and Nelson (2001), Gupta (2000), and García-Sanchez and Pérez-Bernal (2007) [18, 19, 20]. Respondents were asked to evaluate these factors relying on five-point scales ranging from 1 "not very important" to 5 "very important".

Benefits of ERP implementation are synthesized upon the studies Olhager and Seldin (2003), Laukkanen et al. (2000), Botta-Genoulaz and Millet (2005), Shehab et al. (2004) [23, 24, 25, 26]. Eleven benefits which included ease of use, integration of business operations/processes, improved information accuracy and improved decision-making capability, improved lead-time, improved order management/order cycle, improved inventory levels, improved financial performance, improved interaction with supplier, improved interaction with customers, improved on-time delivery, and reduced direct operating costs are identified. Respondents are allowed to choose one or more benefit(s) that was/were gained by using ERP.

Based upon the literature implementation problems are determined based upon the studies Gupta (2000), and Botta-Genoulaz and Millet (2005) [19, 25] and can be generalized as organizational resistance to change may be high. It takes a long time causing cost overruns, data errors being carried over throughout the system, lack of training, under-estimated work, weak planning method, ill-defined requirements, lack of communication, lack of implication of the management, lack of business process re-engineering (BPR) before project, confusions between ERP, BPR and management, and under-estimation of the importance of the choice ERP. Respondents are allowed to choose one or more problem(s) that was/were encountered when using ERP.

Table 2 illustrates ERP related characteristics of the firms. Five of the seventy two firms implied that they did not use any of the ERP packages, fifty-nine of the remaining sixty-seven firms installed ERP, six of them are currently installing ERP and two of them are planning to install ERP in the forthcoming eighteen months. The main driver, which forces the firms to use ERP, is the business processes they employ. Approximately fifty-seven percent of the firms utilize SAP as an ERP package. Ten out of sixty-seven firms have stated that they use their own software, and 56.7% percent of the firms are in the routinization stage of the ERP implementation. According to the frequency tests, functionality is the most important factor in selecting the ERP package and the most important advantage is the integration of business operations and processes.

Table.2. ERP Related Characteristics of the Sample

	Frequency	Percent
Package ERP saturation		
Company has installed an ERP package.	59	88.1
Company is currently installing an ERP package.	6	9.0
Company plans to install an ERP package.	2	3.0
Drivers for implementing ERP		
Competitors	7	10.4
Customers	7	10.4
Business processes	60	89.6
Market condition	18	26.9

ERP implementation stage		
Initiation	5	7.5
Adoption	1	1.5
Adaptation	2	3.0
Acceptance	7	10.4
Routinization	38	56.7
Infusion	13	19.4
Non-respondent	1	1.5
ERP software used by the firm		
SAP	38	56.7
Oracle	6	9.0
QAD	1	1.5
Axapta	4	6.0
IFS	3	4.5
IAS	1	1.5
Logo	1	1.5
Uyumsoft	2	3.0
Canias	1	1.5
Freedom	1	1.5
Workcube	1	1.5
Vera	1	1.5
Its own software	10	14.9
Selection criteria of ERP		
Functionality	50	74.6
Technical aspect	27	40.3
Cost	18	26.9
Service and support	26	38.8
Vision	15	22.4
System reliability	34	50.8
Compatibility with other systems	22	32.8
Ease of customization	20	29.9
Market position of the vendor	12	17.9
Better fit with organizational structure	21	31.3
Domain knowledge of the vendor	10	15.0
References of the vendor fit with parent/allied organization systems	17	25.4
Cross module integration	43	64.2
Methodology of the software	14	20.9
Consultancy	31	46.3

Table.2. ERP Related Characteristics of the Sample (cont.)

	Frequency	Percent
Benefits of ERP		
Ease of use	34	50.8
Integration of business operations/processes	64	95.5
Improved information accuracy and improved decision-making capability	58	86.6
Improved lead-time	26	38.8
Improved order management/order cycle	46	68.7
Improved inventory levels	43	64.2
Improved financial performance	49	73.1
Improved interaction with supplier	19	28.4
Improved interaction with customers	21	31.3
Improved on-time delivery	26	38.8
Reduced direct operating costs	27	40.3
ERP Implementation Problems		
Organizational resistance to change may be high.	43	64.2
It takes a long time causing cost overruns.	13	19.4
Data errors will be carried throughout the system.	15	22.4
Lack of training	33	49.3
Under-estimated work	1	1.5
Weak planning method	10	14.9
Ill-defined requirements	20	29.9
Lack of communication	18	26.9
Lack of implication of the management	12	17.9
Lack of business process re-engineering (BPR) before Project	23	34.3
Confusions between ERP, BPR and management	15	22.4
Under-estimation of the importance of the choice ERP	5	7.5
Satisfaction level of ERP		
Very low	0	0.0
Low	3	4.5
Indifferent	14	20.9
High	41	61.2
Very high	4	6.0

Most of the respondents share the same opinion that the commonly encountered problem in ERP implementation is the enormity of the resistance to change. Sixty-one percent of the firms declare that their satisfaction from ERP is high.

IV. Findings of Hypothesis Testing

First of all, normality test (Kolmogorov-Smirnov), reliability analysis and descriptive statistics were conducted for all variables in the research model. Based on the results of Kolmogorov-Smirnov, skewness and kurtosis analysis (p values of variables are less than 0.05), the non-parametric tests Kruskal Wallis and Mann Whitney U have been used in this study instead of ANOVA and t-test. The results of these analyses are shown in Tables 3, 4, and 5.

Tablo.3. Kruskal-Wallis Test Results for Hypothesis 1

	Mean				p-value
	1	2	3	4	
Top management support	33.62	35.79	28.30	35.41	0.316
Enterprise wide support	28.31	36.50	38.90	34.26	0.396
Project team competence	33.66	33.32	34.15	34.50	0.997
Interdepartmental cooperation	32.75	34.86	38.90	32.48	0.772
Clear goals and objectives	30.88	40.04	32.25	33.37	0.497
Champion Project	32.41	35.14	38.20	32.80	0.825
Communication	29.47	44.18	30.80	32.59	0.092
Management of Expectations	28.56	39.18	34.70	34.28	0.412
Vendor support	35.44	34.25	32.15	33.70	0.977
Careful package selection	34.75	38.39	40.60	28.83	0.203
Data accuracy	36.09	31.43	38.60	36.06	0.664
Hardware requirements	34.50	32.07	31.90	35.48	0.476
Training of users	42.03	30.18	31.10	32.30	0.959
Education on new business processes	37.59	36.43	25.45	33.78	0.911
Step by step implementation	42.03	30.18	31.10	32.30	0.223
Business process reengineering	37.59	36.43	25.45	33.78	0.353
Organizational change management	32.66	39.46	32.95	32.35	0.669
Use of consultants	35.06	33.68	28.65	35.52	0.768

1: Chemicals, oil products, rubber and plastics industry

2: Primary metals industry

3: Metal goods, machinery and equipment and professional instruments industry

H_1 and H_3 hypotheses are tested by using Kruskal Wallis test. The firms other than chemicals, oil products, rubber and plastics industry, primary metals industry, and metal goods, machinery and equipment and professional instruments industry are few. Thus, they are aggregated under the heading "other".

Based upon the results of the test, it is found that there is no significant difference between critical success factors with respect to sector. However, there is a significant difference between

success factors according to the ERP implementation stage by means of clear goals and objectives, and communication.

Most of the firms are in the routinization and infusion stage. The firms, which are in other stages of ERP implementation, are so small that they are not included in the test. Since there are only two stages and the group size is below 30, for testing Hypothesis 2, Mann-Whitney U test is used.

Tablo.4. Mann-Whitney U Test Results for Hypothesis 2

	Mean		p-value
	1	2	
Top management support	25.61	25.19	0.883
Enterprise wide support	26.20	23.50	0.501
Project team competence	23.16	32.15	0.032
Interdepartmental cooperation	25.97	24.15	0.665
Clear goals and objectives	25.57	25.31	0.950
Champion Project	24.58	28.12	0.406
Communication	25.81	24.62	0.776
Management of Expectations	25.66	25.04	0.883
Vendor support	24.18	29.27	0.257
Careful package selection	24.99	26.96	0.651
Data accuracy	26.31	23.19	0.429
Hardware requirements	27.30	20.38	0.099
Training of users	26.00	24.08	0.646
Education on new business processes	25.26	26.19	0.826
Step by step implementation	24.85	27.35	0.563
Business process reengineering	24.84	27.38	0.553
Organizational change management	24.95	27.08	0.632
Use of consultants	25.14	26.54	0.751

1: Routinization stage

2: Infusion stage

According to the test results illustrated in Table 3, Table 4 and Table 5 show that there is a significant difference between critical success factors according to the ERP level of the firm by means of project team competence.

Tablo.5. Mann-Whitney U Test Results for Hypothesis 3

	Mean			p-value
	1	2	3	
Top management support	33.46	38.00	38.00	0.546
Enterprise wide support	33.29	42.17	30.50	0.451
Project team competence	33.19	35.75	52.50	0.291
Interdepartmental cooperation	34.17	37.00	20.00	0.475
Clear goals and objectives	32.27	51.00	34.00	0.040*
Project Champion	32.98	46.67	26.00	0.150
Communication	32.63	52.50	19.00	0.013*
Management of Expectations	33.29	44.67	23.00	0.202
Vendor support	33.42	38.25	38.50	0.782
Careful package selection	33.62	40.75	25.00	0.491
Data accuracy	33.90	41.83	13.50	0.117
Hardware requirements	32.88	47.50	26.50	0.120
Training of users	34.19	37.42	18.00	0.382
Education on new business processes	34.02	37.00	24.50	0.674
Step by step implementation	34.19	40.08	10	0.116
Business process reengineering	32.85	45.75	32.50	0.234
Organizational change management	32.21	48.33	43.75	0.094
Use of consultants	35.07	29.33	16.50	0.286

1: Company installed ERP

2: Company is currently installing ERP

3: Company plans to install ERP

* : significant at 0.05 level

V. Discussion an Conclusion

This study has provided a comprehensive framework that portrays the causal links among ERP selection criteria, critical success factors, advantages and implementation problems of ERP within the Turkish manufacturing firms. However there are some other studies regarding to ERP in the literature, there isn't any study dealing with the selection criteria, critical success factors, advantages, and problems of ERP as a whole. As the definition of ERP implies the importance of the integration of all corporate information in one central database, the results indicate that the most important advantage of ERP is the integration of business operations and processes. On the whole, this study contributes to the existing body of literature by exhibiting the selection criteria, critical success factors, advantages and problems of ERP implementation in an emerging country context.

This study offers a number of managerial implications. First, by developing a multi-dimensional framework for ERP implementation and exhibiting its value in the success of business, this

study provides managers with a useful tool for evaluating their ERP software. Second, the analysis signifies the most important selection criteria, functionality, cross module integration and system reliability which might directly influence successful implementation of ERP. Third, the findings of this study indicate the enormity of the resistance to change in the implementation procedure of ERP in an emerging country. Fourth, this paper indicates the role of change management in ERP projects. Our research not only identified which critical success factors are most critical in ERP implementations, but also provides an understanding of the factors and their difference throughout the various phases of implementation, which in turn can serve as a useful guide for firms in the process of implementing an ERP system. Consequently, the findings of this study aid company managers in their efforts to implement ERP successfully.

It should also be acknowledged that the present study is subject to some limitations. First, it focuses only Turkish companies which preclude the generalization of findings to other emerging countries. Future research might be conducted in other emerging countries in Asia, Latin America and Africa. Moreover, it would be useful in future studies to examine other emerging and developed countries together in order to make a comparison between them. Besides, the data were collected from single respondents which might cause response bias. Collecting data from multiple respondents might be useful in future research.

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