Critical success factors for ERP system implementation in Mongolia

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Abstract- In the competitive business environment of the fourth industrial revolution and digital transition, the need to process qualitative information and use it for decision-making has become an important issue for company managers. Recently, many companies are considering this problem to be solved by implementing an integrated system /Enterprise Resource Planning-ERP/ that includes many functions such as finance, accounting, human resources, production, sales, distribution, ordering, purchasing, and customer management. In this research, we intended to determine the factors that influence the successful adoption of ERP systems, and rank those factors that influence the adoption of ERP systems based on the stakeholders' for the selected enterprises.

Keywords - Critical success factors, ERP Implementation, Stakeholder, Business process, Blueprinting

1. INTRODUCTION

Adopting an enterprise resource planning (ERP) system enables better management of resources and information flows. When properly implemented, the system streamlines data flow and provides employees with real-time access to operational data [1].

Organization can be more developed using modern information technology and perform more productive work at a lower cost [2].

The adoption of ERP systems has increased noticeably since the last three decades due to its efficiency and the growing need for an integrated enterprise system. However, the implementation of ERP systems poses challenges to organizations in terms of costs, process,

planning, technology fit, and adoption. For example, there are difficulties in solving many problems such as process uncertainty, planning, and compatibility with technology [3].

ERP systems hold the promise of improving processes and decreasing costs. Furthermore, two important new frontiers for ERP are electronic business (e-business) and supply-chain management [4]. They can also reach beyond their own corporate walls to better connect with suppliers, distributors, and customers to engage in e-business [1].

ERP systems are the largest of any enterprise-wide projects. There is a one-time investment in the project and the software is expensive, but the consulting costs are even higher. For Meta Group, ERP implementation took about 23 months to figure out, with a total project cost of $12 million [5]. From the business perspective, the need for Business Process Reengineering (BPR) to fit system functionalities or already embedded business processes, could be considered as the most important effect of implementing ERP solution [6].

Sometimes, most of the positions need to be re-planned according to the ERP system and change the business process. Therefore, the challenges and high failure rates of ERP system implementation continue to be widely reported in studies. A study pointed out that the probability of ERP failure ranged from 40 to 60 percent and another study still higher at 60 to 90 percent [7].

The studies show that the reasons for failure of implementing the ERP system were those: ERP Consultants recommendations were not followed, the IT department staff of the organization were inexperienced, many problems occurred during the implementation process due to understaffed, as well as the failure to successfully manage the communication between the project members, inadequate training for the project members, the failure to recruit in line with this mission, inadequate management support, inability to translate into the original language and insufficient knowledge of foreign languages have been identified. However, the close relationship and cooperation between the external consultants and the company's employees greatly influenced the successful implementation of such a project.

This study will contribute to the identification and evaluation of key success factors that reduce the probability of ERP system failure. It helps organizations to consider these factors during the ERP system implementation phases and use them effectively, so organizations can avoid ERP system failure. Our research purpose is to determine the factors that influence the successful adoption of ERP systems, and rank those factors that influence the adoption of ERP systems based on the stakeholders' survey of the selected enterprises. The following objectives were set in the research:

First. Determine a success factor indicator for ERP implementation

Second. Describe an evaluating method of success factor indicators

Third. Explain a success factor indicator by research data

Fourth. Rank a success factor indicator by research data and score

Fifth. Examine a hypothesis of this research comparing with research results and international studies

The following three assumptions were made.

Hypothesis I: If the organization has adopted the ISO9001 quality management system, it will have a positive effect on the successful implementation of the ERP system.

Hypothesis II: Organizational restructuring to fit the ERP system will have a positive effect on the successful adoption of the ERP system.

Hypothesis III: If blueprinting (Architecture choices) is done at the initial stage of the project, it will have a positive effect on the successful implementation of the ERP system.

2. LITERATURE REVIEW

Our literature review consists of two parts: introduction to ERP systems and implementation of ERP systems critical success factors.

2.1. INTRODUCTION TO ERP SYSTEM

An enterprise resource planning system (ERP) is a software package that integrates functional units such as production, finance, accounting, sales, distribution, and human resources in an organization and connects these processes to the supply chain [8].

ERP systems can significantly improve efficiency, productivity, service quality, reduce service costs, as well as make more effective decisions, improve information flow, generate financial information faster, support e-commerce, and assist in the development of new organizational strategies.

ERP began in the 1960s as material requirements planning (MRP) and later evolved into a more advanced system called MRP II. The latest ERP systems became more advanced and more productive when working with multiple business units: sales, operational planning, inventory/materials management, manufacturing, purchase, order processing, accounting, finance, human resources, customer relationship management and so on.

The basic architecture of an ERP system is a unified enterprise interface based on databases and applications. ERP systems have the following characteristics [9].

1. The ERP system is a software package designed for a client server environment supplies (traditional or web-based)
2. ERP systems integrate most of the business processes.
3. ERP systems process most of an organization's transactions.
4. ERP systems create and use extensive databases of the organization by storing information in the smallest units.
5. ERP system provides real-time access to data.

In some cases, ERP requires the integration of transaction processing and planning activities. These include: supporting multiple currencies, languages and multiple industries, etc. A successful ERP system can streamline processes within a company and improve overall

efficiency, while improving competitive performance externally, increasing customer responsiveness, and supporting strategic initiatives [1].

There are many factors to consider when deciding whether to implement an ERP system. The technical aspect is not the only factor required. Unfortunately, many companies realize that too late. The financial commitment is huge, so CEOs and senior executives must be deeply involved. Simply put, ERP is not for every business. Develop a business case and formally evaluate the benefits to the individual as well as the company's competitors to inform the decision to invest in an ERP system. The analysis needs to consider not only specific cost/benefit analysis but also non-financial factors. Non-financial benefits include information transparency and flexibility. [10].

Information technology maturity, computer education, business size, business process-reengineering experience, and management commitment are identified as organization-level factors in the study, and didn't categorize factors as success factors and failure factors [11].

ERP system implementation costs fall into three areas: software, hardware, and employees. Employees (HR) costs are the largest and most expensive, but the least attention-grabbing part. Software and hardware costs can often be easily calculated. But the cost of "human capital" is not. Articles on the factors influencing the adoption of ERP systems continue to propose a conceptual model to examine the influence of top management in an organization.

2.2 SUCCESS FACTORS

Implementing ERP system is always challenging and requires consideration of various risks for its successful implementation. Researchers continue to conclude that focusing on the evaluation of Critical Success Factors (CSFs) of ERP implementations is critical to project success. Therefore, by summarizing the results of 15 studies, identifying, and analyzing the CSF, the indicators shown in Table 1 were determined. Based on the results of the study, the CSFs affecting the implementation of the ERP system were identified in five categories as follows: 1. Factors related to organization: 2. Factors related to technology: 3. Factors related to project: 4. Factors related to individuals: Factors related to operation: Also, indicators to measure each general category are defined.

Each researcher defines the success factors that influence the introduction of ERP systems differently depending on the object they are studying. We identified the following success factors from the study of [12 ~14] and classified them according to their relevance.

Table 1. Study of success factors that affect ERP system implementation

Success factors affect the implementation of ERP system	Literature review
Factors related to organization: Top Management support and responsibilities: Financial and other support, involvement and knowledge Clarity of vision, goals and objectives Change management: Systematic management activities aimed at changing the current state of the organization by directing future goals and strategies in accordance with changing environmental conditions. Communication between departments/offices/places Uncertain conditions that may arise during the project and its implementation Resources for projects Organizational Culture/Culture Change Cooperation between departments/offices/places Business plan and long-term vision Official project plan/schedule Organizational compatibility with ERP systems Experienced Project Manager-Leader Sufficient resources Performance monitoring and evaluation Motivational factors for ERP system adoption Effectiveness of Management to Reduce Customer Resistance	(Ram & Corkindale, 2014) (M & Cuenca, 2013)
Factors related to technology: Suitability of legacy information systems Data analysis and conversion Data and data quality Opportunity for the IT department Technical issues	(Ram & Corkindale, 2014)
Factors related to project: Training for every user Project Management: Specific management activities to plan, manage, lead, motivate and control the human resource and other resources implement the project ERP project leader Business process redesign and process management Communication between ERP project team members Appropriateness of ERP system selection ERP project team skills ERP project team structure Compatibility with system settings Board: A board made up of individuals and organizations that provides strategic level guidance on the project Cooperation Implementing strategies Defined architecture Integration of ERP plan with business plan User project formal methods and methodology	(Ram & Corkindale, 2014)
Factors related to individuals: User engagement Ease of use of the system and user acceptance Support from all employees	(Ram & Corkindale, 2014)

Factors related to operation: ERP system supplier capacity utilization Ongoing ERP supplier support Cognition of new business processes Expectation management: the motivation of human action considering the relationship of: labor expenditure-result, result-incentive, incentive-inspiration Use of tools developed by the supplier Supplier/customer partnerships Empowered decision makers Scope Management: Activities responsible for meeting project goals and objectives through project conceptualization, planning, execution, and completion processes. Leading consultants Stakeholder trust	(Ram & Corkindale, 2014)

3. RESEARCH

3.1. RESEARCH METHODOLOGY

This survey was obtained by questionnaire method. The questionnaire consisted of a total of 158 questions in 2 parts (general and special) for 6 types of employees/departments: ERP project team, TOP management, Administration and HR, IT department/office, Business process specialist, and other employees. Table 2 shows the number of questions were asked by each participants.

Table 2. Number of questions for each participant

Question type	ERP project team	TOP management	Administration and HR	IT department/team/office	Business process specialists	Other employees	Total
Part I. General questions	5	5	5	5	5	5	30
Part II.	27	33	17	19	18	14	128
-About ERP system	2	3					5
-Success factors	25	30	17	19	18	14	123
Total	**32**	**38**	**22**	**24**	**23**	**19**	**158**

The general questions are the same for each participant, and the special questions are different. In the part of special questions, are the following factors important for ERP system implementation? there were 51 questions and 5 answers (1. Totally disagree, 2. Disagree, 3. Don't know, 4. Agree, 5. Strongly agree).

3.2 METHOD OF DATA COLLECTION

Employees of 9 companies that have successfully introduced ERP systems were included in the survey, and questionnaires were collected using Google form. The data was collected for 50 days from March to April 2023.

4. RESEARCH RESULTS

A total of 78 respondents of 9 companies participated in the survey. The participant is shown by the industry and position. Figure 1 shows a operation sectors of entities that have implemented ERP systems and Figure 2 shows an information of position of employees who participated in the study.
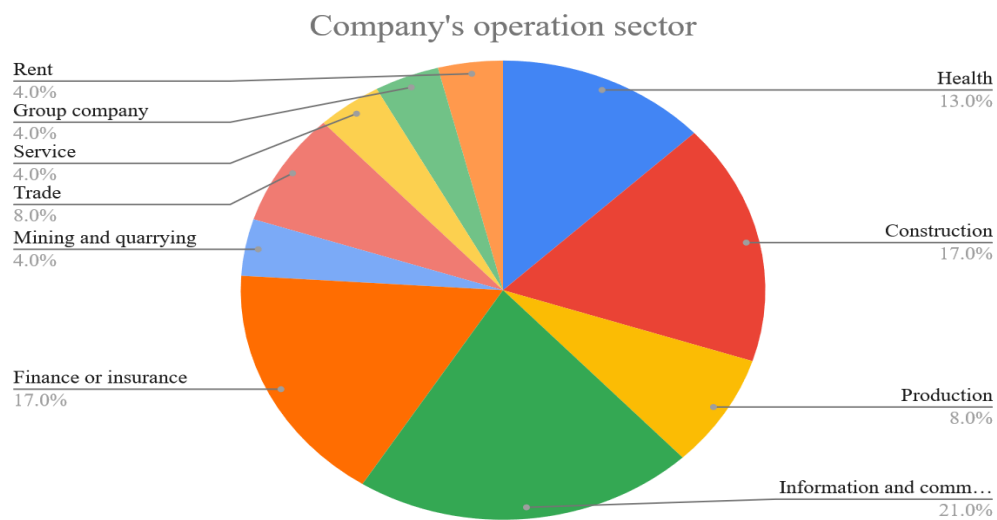

Figure 1. Industry of the respondents

As can be seen from the figure, companies in the fields of information and communication, construction, health, and finance and insurance are for the majority of the companies that participated in the survey.
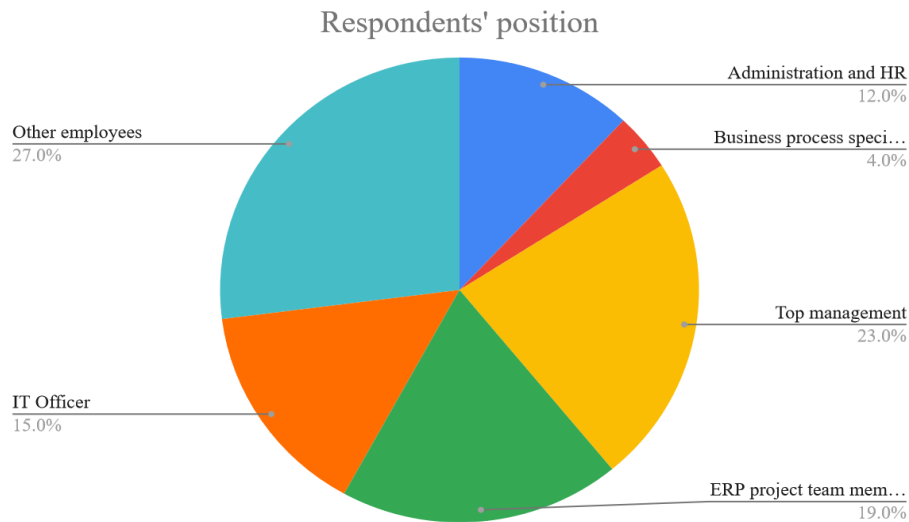
Figure 2. Position of the respondents

For the employees surveyed, TOP management, ERP project team members, IT department, and administrative HR officers were the most involved.

Organizations responded in survey have implemented the following ERP system modules. Figure 3 shows that 83.3% of the organizations participating in the study using the financial module of the ERP system. 62.5% of respondents said that they have implemented the inventory module and 16.8% have implemented all modules. From this, finance and accounting modules and inventory modules are used more.
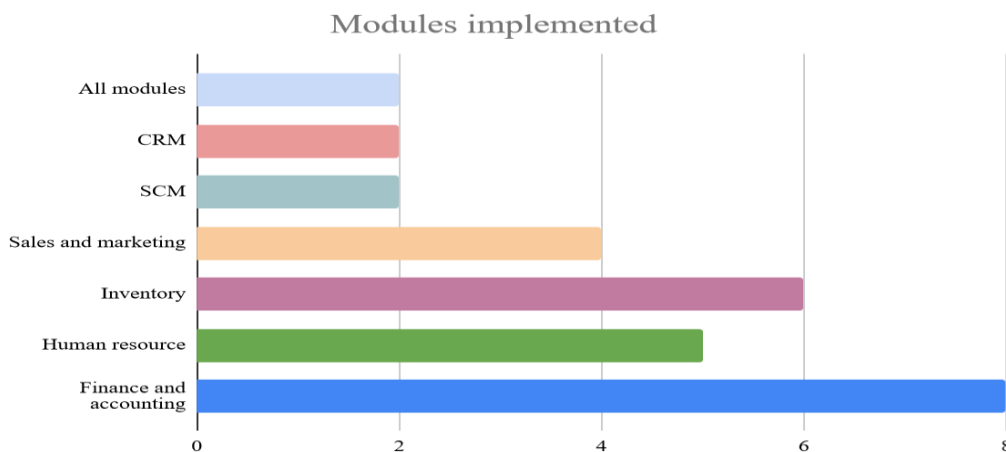

Figure 3. The modules of the ERP system implemented by the organizations

The questions related to the three-hypothesis raised in this study are as follows answered as:
Did your organization implement ISO9001: Quality Management System? 46% of all participants answered "yes" for the question and the hypothesis-1 was not confirmed for the participants of this study.

Did your organization restructure to fit the ERP system? 54% of the respondents answered "yes" to the question and the hypothesis-2 confirmed for the respondents of this study.

When asked whether Blueprinting was done in the initial phase of the ERP project, 38% of all participants answered "yes" and 58% did not know, which did not confirm the hypothesis-3 for the participants of this study. Also, the organization does not provide complete information about the project to the participants of the ERP system led to the conclusion that.
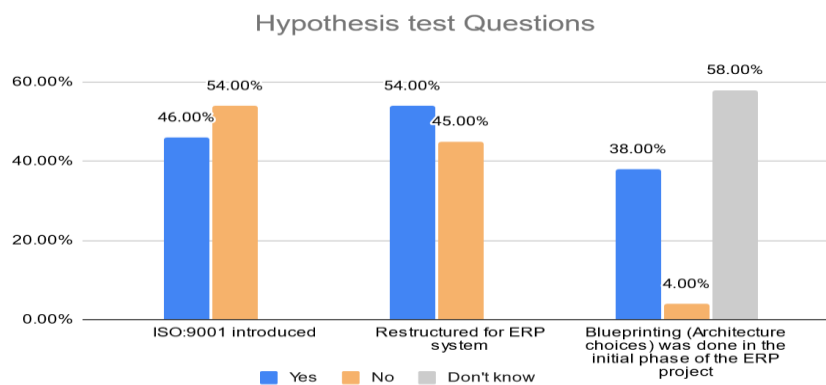

Figure 4. Hypothesis test questions

The impact of the factors influencing the successful implementation of the ERP system was evaluated on a scale of 1-5 and ranked by the total score. Based on international research, the factors affecting success are ranked from highest to lowest, and in this question, the "+" sign shows which participants will respond.

Table 3. Classification and ranking of success factors

№	The following factors are important for the successful implementation of an ERP system	ERP project team	TOP manage ment	Administ ration and HR	IT departme nt/team/of fice	Business process specialists	Other employ ees	Score	Rank of the research	Internati onal rank
1	Cooperation	+	+	+	+	+	+	112	1	24
2	Board	+	+	+	+	+	+	106	2	19
3	Training for every user	+	+	+	+	+	+	105	3	2
4	Support from all employees		+	+	+		+	86	4	43
5	Concentration on requirements of users	+	+				+	81	5	50
6	Business process redesign and process management		+	+		+	+	79	6	9
7	Organizational Culture/Culture Change	+	+	+	+	+		77	7	22
8	Communication between members of ERP project team	+			+	+	+	73	8	10
9	Empowered decision makers	+	+		+	+		72	9	32
10	Cognition of new business processes		+	+		+	+	72	10	17
11	Data and data quality	+			+		+	71	11	30
12	Official project plan/schedule	+	+		+	+		70	12	36
13	Implementing strategies	+	+	+		+	+	66	13	25

№	The following factors are important for the successful implementation of an ERP system	ERP project team	TOP manage ment	Administ ration and HR	IT departme nt/team/of fice	Business process specialists	Other employ ees	Score	Rank of the research	Internati onal rank
14	Ease of use of the system and user acceptance		+				+	60	14	35
15	Sufficient resources		+	+	+			57	15	41
16	Resources for projects		+	+	+			54	16	21
17	Project Management	+	+					53	17	3
18	ERP project leader	+	+					53	18	7
19	ERP project team skills	+	+					53	19	12
20	Communication between departments/teams/offices	+					+	52	20	6
21	Appropriateness of ERP system selection		+		+	+		51	21	11
22	Scope Management	+	+					48	22	39
23	Capacity of supplier of ERP systems		+	+		+		48	23	8
24	Business plan and long-term vision		+	+		+		48	24	33
25	Expectation management	+	+		+			47	25	20
26	Leading consultants	+	+					47	26	42
27	User project formal methods and methodology	+	+					47	27	51
28	Data analysis and conversion	+			+	+		45	28	27

№	The following factors are important for the successful implementation of an ERP system	ERP project team	TOP management	Administration and HR	IT department/team/office	Business process specialists	Other employees	Score	Rank of the research	International rank
29	Defined architecture	+			+	+		45	29	34
30	Clarity of vision, goals and objectives		+	+		+		45	30	4
31	Motivational factors for ERP system adoption		+	+				40	31	47
32	Effectiveness of Management to Reduce Customer Resistance		+	+				37	32	49
33	Supplier/customer partnerships	+		+				32	33	29
34	Collaboration between departments/teams/offices						+	30	34	26
35	Top Management support and responsibilities		+					28	35	1
36	Change management		+					28	36	5
37	Stakeholder trust		+					26	37	48
38	User engagement						+	26	38	16
39	ERP project team structure	+						25	39	14
40	Experienced Project Manager-Leader	+						22	40	40
41	Performance monitoring and evaluation	+						22	41	44
42	Use of tools developed by the supplier	+						18	42	28

№	The following factors are important for the successful implementation of an ERP system	ERP project team	TOP management	Administration and HR	IT department/team/office	Business process specialists	Other employees	Score	Rank of the research	International rank
43	Uncertain conditions that may arise during the project and its implementation				+			18	43	18
44	IT infrastructure				+			18	44	31
45	Opportunity for the IT department				+			17	45	38
46	Organizational compatibility with ERP systems			+				15	46	37
47	Technical issues				+			15	47	46
48	Suitability of legacy information systems				+			14	48	23
49	Compatibility with system settings					+		5	49	15
50	Ongoing ERP supplier support						+	-	50	13
51	Integration of ERP plan with business plan							-	51	45

Compared to the study results of other countries, the rank of ERP system success factors for selected organizations in Mongolia is very different. We concluded that respondents did not pay much attention to the methods and approaches commonly used internationally for the implementation of ERP projects. This creates the need for further research to assess whether Mongolian companies are fully utilizing the potential of the ERP system. Factors such as training for every user, Business process redesign and process management were ranked in the top 10 success factors, which is consistent with the results of other countries' research. The result was that the financial resources identified as the most influential in other countries are not so influential in our country. This is due to the fact that the system was not fully adopted by the respondents.

5. CONCLUSION

According to foreign studies, Implementing ERP system has a positive effect on the organization's operations, but there are 40-60% probability of failures due to any errors in the implementation phase. Therefore, as a researcher, we aimed to rank the factors that influenced the success of the organization that successfully implemented the ERP system in our country. The results of our study differ significantly from the results of studies conducted in other countries. ISO9001: The quality management systems implementation is below 50%, which means that the business process of the organization is not clear, and this is the basis for making the research results different from the other countries' results. Therefore, the following conclusion can be given only for the research participants.

Management methods and approaches (such as Change management, Project management, etc.) are ranked low, indicating a lack of management knowledge and experience of organizations implementing the ERP system.

Top management support was ranked at 35, leading to the conclusion that they do not attach importance to the implementation of the ERP system.

The lack of full utilization of the ERP system supplier's capacity raises doubts as to whether the system is being fully utilized.

The vision, goals and objectives of the organization are not considered important, but the support of all employees is considered important. This makes the research results contradictory

The results of the study show the importance of training for each user of the ERP system. Therefore, before the implementation of the project, it is necessary to plan the curriculum and methodology very well.

According to the results of this study, the importance of project management ranked 3rd in the international level is underestimated compared to the importance of project management ranked 17th. This can lead to project failure and reduced results.

The lack of understanding of change management, which must be focus into project implementation, can be seen from the situation ranked 36th. As the key factors such as project management and change management are not considered important, the support of all employees is weak, and the getting their support is ranked 4th as one of the important factors.

RECOMMENDATIONS

Based on the results of the research, the following limited suggestions and recommendations can be given to all participants: Based on international experience, determine the stages of the project, introduce step-by-step guidance to all participants, and provide them with complete information. Make participants understand the value of this project and their role to feel. Improve managements' knowledge and skills.

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AUTHOR'S INTRODUCTION

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