Identifying and Ranking the Barriers and Challenges in Implementation of Enterprise Resource Planning (ERP), a Case Study of Companies in the Industrial Estate of Golestan Province

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Abstract

Enterprise resource planning systems are the latest management tools that are capable to collect the information of the organization by IT in all activity areas of organization and provide this information and the results for users at the various level of the organization. This study has been conducted to indentify and rank the barriers and challenges in the implementation of enterprise resource planning (ERP) in the industrial states of Golestan Province. The research method is descriptive-survey. The statistical population of the study is all industrial states in Golestan Province and the decision team contains 14 directors and assistants that completed the identify questionnaires and paired comparison comparison questionnaires in two stages. In the first stage, the criteria and the sub-criteria for the key success factors to implement the enterprise resource planning (5 criteria and 23 sub-criteria), were listed from experts’ view, papers, theses, and books and were available for decision team as an identification questionnaire. The implementation of enterprise resource planning was identified after filling out the identification questionnaire, 4 criteria and 11 sub-criteria for barriers and challenges. In the second stage, the criteria and sub-criteria were ranked by the paired comparison standard questionnaire and experts selection software. In the main criteria, unfamiliarity of managers and experts in the first place, the high cost for implementation of enterprise resource planning in the second place, not to define the tasks and business processes in the line with ERP in the third place, and a long time to implement ERP take in the fourth place.

INTRODUCTION

The results of many studies show that information technology (IT) will be applied as a powerful tool to enhance the readiness of the organization and its competitiveness in the world, to increase the organization efficiency and also to change the organization structure from pyramid mode to a planar structure with a fewer levels of the management. In such system, everyone is capable to obtain the required information and make decision based on it. The organizations are capable to do together the various tasks of designs, manufacturing, and after sale services in different parts of world and receive their required and necessary information online. To reach this level of business integrity, it seems to apply the integrated systems such as enterprise resource planning system that is capable to manage all data and requirements of the organization such as finance, manufacturing, warehouse, operations, etc (Davis, N. G., Boeke, J. D. & Model, P. 111-121).

In the last years, applying of the organizational integrated systems has taken the high place of the organizations. The important tool in this regard is the enterprise resource planning system ERP. This system makes a relationship among all parts of the company by a stream of the information and establishes the time, place and resource management in the company. It makes the all parts of the company not to need to apply the different software which have the effective relationship with each other. Due to not to be native this system in Iran and the different cultures between Iran Country and the Manufacturer Country on one hand, and the exclusive technology of these systems and high cost of their employment and need to fundamental change in the companies to employ these systems on the other hand, the domestic companies are face to a deep uncertainty to
use this technology (Frgandoost, Derakhshanfar 2008). What the international statistics show is indicating the failure of over 50 percent of the organizations that have attempted without the proper feasibility to deploy the enterprise resource planning systems. As this system is new in our country, the same is expected in the coming years in country. If a research conducts in the country on the managers of the small and average companies about the causes of non-investment on the enterprise resource planning system, undoubtedly, one of their major reasons is to doubt on the success of this system in their organization. Often the managers of organizations are worried about applying the enterprise resource planning system despite of their desire. They think that maybe their organization doesn’t ready to deployment this system and by imposing of this system, the organization incurs the irreversible costs (Tabriz A. Motahari, Farimani, Yazdani, 2010).

The subject of this study mustn’t get wrong with the various researches conducted in the field of the implementation of enterprise resource planning in the organizations. Because it’s supposed that the enterprise resource planning system is potentially an accountable system for the organization. That’s why they focus on investigating the effective factors in the line with the implementation of this system. This study identifies the barriers and challenges in implementation of the enterprise resource planning by the decision team and rank each identified factor by AHP.

In the other words, the aim of this study in the first step is to identify the barriers and challenges, then to interview and fill out the questionnaire by the experts (the decision team), and at last to rank them by AHP. Due to the nature of the subject, this study is looking for answering the designed questions and has no hypothesis. This study tries to answer the following fundamental questions based on AHP.

The main question: what are the barriers and the challenges in implementation of enterprise resource planning and their priority in the industrial states of Golestan Province?

Sub-question: what are the sub-criteria for the barriers and the challenges in implementation of enterprise resource planning and their priority in the industrial states of Golestan Province?

Research Background:

A number of researches have published some papers on the subject of the barriers and challenges for enterprise resource planning in the different organizations. In this studies that some examples will mention below, usually the researches have attempted to identify the barriers and challenges and have assessed these barriers by experts’ view.

A research conducted by Gavin Sou in 2013, as “the present challenges in implementation of enterprise resource planning (ERP) in the large organization: the present similarities and differences between company and university”. The results showed that enterprise resource planning system is one the most popular business management system that provides time and unified communications capabilities for business in the large organizations. However, the implementation of all ERPs hasn’t been successful. Since the implementation of ERP affects on the entire organization including processes, people and culture, the companies may face to some challenges in implementation of ERP systems. Recently, some universities have replaced ERP systems to their previous system to improve the management and administration process. This paper focuses on challenges that there are in implementation of ERP between universities and companies and also have surveyed the previous studies to determine the critical success factors (CSFs) and risk factors in ERP implementation in both environments. Especially, the case studies in this thesis emphasize on the organizational dynamics in ERP implementation by CSFs and three phases in this framework by Miles and Huberman (1994). These three phases include the prerequisite, the implementation process and the results. This study used the findings of the case studies about ERP readiness assessment and the results of CSFs. The results of these studies help to understand well the present challenges in implementation of ERP between the university and the company environment.

Vanderklei (2013), concluded in a research entitled “risk factors in implementation ERP: the linear and hierarchical relations” that it’s over two decades that there are the enterprise resource planning systems, and still they lose billions of dollars every year because to run the designed software for reduction the costs and increasing the profitability. Risk management is a topic that deals with losses, especially according to uncertain outcomes when faced to interconnected structures such as the risk and the research distance in tactical and operational levels between the risks and controls. A comparative study method involving 13 types of different ERP implementation has been approved to explore the present designs in implementation of the project. It has two results: after observation the risks in hierarchical manner with the predictable outcomes, it was created the exploration hierarchy by the risks models. Although this model is still forming, it may help to advance our understanding about the close relationship of risks in ERP implementation and consequences of the results caused by management choice when determining the risk priority. The second finding is that there is no any direct relation between risk and control. This contrasting finding indicates that these effects are the result of risk.

Khapardi (2012), concluded in a study entitled “the present barriers in implementation of enterprise resource planning ERP” that the main purpose of this paper is to review ERP including international and reference journal as Elsevier, Inder Science, ASME, Springer and ACM, to find the barriers of ERP at the time of its implementation. So the aim of this paper is studying the review articles and findings the barriers of
enterprise resource planning ERP. The research findings: there are some barriers that need to consider, however it’s run the enterprise resource planning in the companies. 51 papers have been studied the serious barriers among 200 papers related to investigating the enterprise resource planning. These barriers are listed in Investigating Techniques Table. Despite of the implementation of enterprise resource planning ERP, the barriers can often be observed apply the huge investments because of the software, weak planning and management, the lack of perfection, the lack of education and predetermined goals of companies, the lack of good salespersons, the lack of risk assessment, no approach, the lack of data model, the lack of ERP system benefits, the lack of system performance, non-hierarchical structure and the lack of management support features, etc. the general outline of the paper: the old means and ways to overcome these barriers is AHP. This method has analyzed the barriers of the enterprise resource planning and can solve the issues related to the enterprise resource planning to perform. The results of these barriers and its implementation are great.

Samoun and Adam (2010), in a study entitled “preparing of the project and emergence of the implementation problems in enterprise resource planning projects” concluded that the problems which the organizations are face to them in implementation of ERP projects relate to their understanding of what such an effort employed and how this issue affects on the initial preparation. We try to show the relationship between the organization readiness and the performance problems. We examined four studies to have a critical look at specific causes and the problems created when no effort have been done by managers. So we consider the predicts-conclusion model to show the lack of readiness for administrative problems.

Research Steps:
1- review of the experts and senior managers’ experiences
2- extraction of barriers and challenges to implement ERP (table 1)
3- polling from the decision team by semi-structured questionnaires (questionnaire 1), to identify the barriers and challenges in implementation of ERP (4 criteria and 12 sub-criteria, listed in table 1)
4- the final polling from the decision team to rank each of identified barriers and challenges (questionnaire 2)
5- the hierarchy structure of the barriers and challenges in implementation of ERP (chart 1)
6- to set the criteria and sub-criteria matrix by geometric mean (formula 1)
7- the ranking and the consistency rate of each criteria and sub-criteria by expert choice software
8- the analyzing of data
9- conclusion and recommendations

The Barriers and Challenges in Implementation of ERP:
Many researchers have studied about the barriers and challenges in implementation of ERP. Generally, it’s been surveyed the researches done during 2009-2013 about the barriers and challenges in implementation of ERP and 5 factors and 22 sub factors were listed by experts’ opinion including the unfamiliarity of managers and experts with ERP system, the high costs for implementation of ERP, long time for implementation of ERP, undefined the tasks and business processes coordinate with ERP system, and the lack of appropriate organizational structure. It must be noted that each of these factors have some sub factors. The factors and sub factors are as follow.

Table 1: the criteria and sub criteria of challenges and barriers in implementation of ERP

<table>
<thead>
<tr>
<th>Resources</th>
<th>Code</th>
<th>Sub-criteria</th>
<th>Code</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bozorgmehri 2007, Farqandoost &amp; Derakshianfar 2008- Talebpoo Amid 2008</td>
<td>B11</td>
<td>Not to be welcomed the implementation of ERP by managers and experts</td>
<td>B1</td>
<td>Managers and experts’ unfamiliarity with ERP system</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B12</td>
<td>Believing in traditional way</td>
<td></td>
</tr>
<tr>
<td>Ferghandoos, Derakshianfar 2008 Najafi, Mohammazade 2012 Modares, Talebpoo 2008 Sadegh Nik Amal et al 2010 Bozorgmehri 2007</td>
<td>B21</td>
<td>Expensive software ERP (the original price)</td>
<td>B2</td>
<td>The high costs in implementation of ERP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B22</td>
<td>Costly preparing for infrastructure of implementation ERP such as education, counsel’s fee</td>
<td></td>
</tr>
</tbody>
</table>
It can be understood some challenges and barriers in implementation of ERP by a conceptual hierarchical framework and helped to understand the research topic. According to these factors that are listed by researcher, the required reviews are done for ranking each factor by AHP.

Hierarchical & Structural Framework of the Study:

Fig. 1: hierarchical structure

Applying of the Multi Criteria Decision Approach:

Till now, it’s been applied the different ways such as scoring, ranking, mathematical optimization, and multi criteria decision to select the ERPs. Even the mathematical optimization is been applied to select the informational systems. But it’s obvious that implementation of IT systems such as ERP, is a multi criteria decision problem. Indeed, the complex nature of the problem and the presence of the factors and different quantitative and qualitative factors with different weights in different making decision situation encouraged us to apply the multi criteria making decision methods such as AHP (Bozorgmehr et al 2007). This method allows us to measure the consistency in judgments and decisions. Generally, it’s needed to introduce three basic steps for applying AHP.

The first step:
Making Hierarchy
The first approach in AHP is development of decision tree or to create a graphical representation of the problem in which the aim is option, criteria. The figure 1 shows the barriers and challenges in implementation of ERP in the industrial states of Golestan Province.

The Second Step:
to calculate of the different weights
In this step, the elements of each level are compared with the relative element in a higher level as paired and their weight is calculated. These weights are called the relative weight. Then, by combining the relative weight of each item, the final weight of each item is specified that we call it absolute weight. In this step, first the criteria and also sub criteria are compared in pair, and then the matrix of the criteria comparison is formed.
Now, the matrix of each criteria and sub criteria is calculated by the geometric mean and locate them into the expert choice software.

The Third Step:
the final weight of elements and ranking

In this step, according to the decision matrix obtained in the previous step, it’s been shown the list of criteria and sub criteria by priority. With the highest priority criteria is chosen and has been referred to high management of the industrial states of Golestan Province (Jahanshahloo 2011).

Research Findings:
In this part, the obtained results and findings are presented in the form of the criteria and sub criteria weighting and ranking each of them. As it mentioned earlier, the research process is in the line with answering to the research questions. So each mentioned topic in this part is to answer to the questions.

In the first step, the weight of main factors (level 1) is to calculate and in the second step, the local weight of sub criteria is to calculate. In this steps, it was disturbed a questionnaire according to AHP format, to calculate the relative weight of each factor and sub factor and to get the decision team’s opinions. The final of each element is equal to multiplication of the local weight in the group weight (main factors) and at last the rank of each barrier and challenge in implementation of ERP is specified.

Table 2: ranking the barriers and challenges in implementation of ERP based on AHP

<table>
<thead>
<tr>
<th>The main factors (criteria)</th>
<th>The relative weight of criteria</th>
<th>The rank of criteria</th>
<th>Sub-criteria</th>
<th>The relative weight of sub-criteria</th>
<th>Final weight</th>
<th>The rank of sub-criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>0.479</td>
<td>1</td>
<td>B11</td>
<td>0.555</td>
<td>0.265</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B12</td>
<td>0.445</td>
<td>0.213</td>
<td>2</td>
</tr>
<tr>
<td>B2</td>
<td>0.229</td>
<td>2</td>
<td>B21</td>
<td>0.251</td>
<td>0.057</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B22</td>
<td>0.300</td>
<td>0.068</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B23</td>
<td>0.450</td>
<td>0.103</td>
<td>3</td>
</tr>
<tr>
<td>B3</td>
<td>0.121</td>
<td>4</td>
<td>B31</td>
<td>0.275</td>
<td>0.033</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B32</td>
<td>0.169</td>
<td>0.020</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B33</td>
<td>0.556</td>
<td>0.067</td>
<td>6</td>
</tr>
<tr>
<td>B4</td>
<td>0.172</td>
<td>3</td>
<td>B41</td>
<td>0.541</td>
<td>0.093</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B42</td>
<td>0.277</td>
<td>0.047</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B43</td>
<td>0.183</td>
<td>0.031</td>
<td>10</td>
</tr>
</tbody>
</table>

The Results of the Main Research Question:
The aim of this question is identifying the barriers and challenges in implementation of ERP and ranking each factor in the industrial states of Golestan Province. According to the factors that have been extracted from the different sources (table 1), and by the questionnaire 1, 4 criteria are identified to decision team. The priority of each identified criteria are based on table 2. Unfamiliarity of managers and experts with ERP system (B1) with the weight of 0.479 at the first rank, high costs of implementation ERP (B2) with the weight of 0.229 at the second rank, undefined of tasks and business processes coordinate with ERP system (B4) with the weight of 0.172 at the third rank and long time for implementation of ERP (B3) with the weight of 0.121 at the forth rank.

At the first step, the criteria of managers and experts’ unfamiliarity with ERP system have a higher relative importance than the other criteria. The companies must care to this criterion than the other ones. In the second step, the high costs for implementation of ERP are considered. The cost of ERP is short-term and has the long-term profit. In the third step, the lack of define the tasks and business processes coordinate with ERP system.

This criteria and sub criteria from the decision team are identified as the challenges and barriers in implementation of ERP in the industrial states of Golestan Province. These companies must give a special significance to these factors to be successful in implementation of ERP.
The Results of the Research Sub Question:

The aim of this question is identifying the sub criteria of challenges and barriers in implementation of ERP and ranking each factor in the industrial states of Golestan Province. According to the factors that are extracted from the different resources (table 1) and by questionnaire, 11 criteria are identified to the decision team that their priority is according to table 2. They are placed as: sub criteria B11 with the final weight of 0.265 at the first rank, B12 with the final weight of 0.213 at the second rank, B23 with the final weight of 0.103 at the third rank, B14 with the final weight of 0.093 at the fourth rank, B22, B33, B21, B42, B31 with the weights of 0.068, 0.067, 0.047, 0.033 at the ninth, eighth, seventh, sixth, and fifth rank and B43 with the final weight of 0.031 at the tenth rank and B23 with the final weight of 0.020 at the eleventh rank.

Conclusion:

In this paper, it was presented the results of the study to identify and rank the challenges and barriers in implementation of enterprise resource planning in the companies of the industrial states in Golestan Province. Hence, the initial barriers derived from various sources and experts’ opinions and were provided for the decision team (experts) that rank each of these factors. At last, it was answered to the research questions and determined the challenges and barriers for implementation of ERP in companies of the industrial states in Golestan Province. Among the achievements of this study can note to four new challenges and barriers in better implementation of ERP in companies of industrial states in Golestan Province. According to the results of the output of the expert selection software, not to know the managers and experts by ERP system was determined as the most important challenge and barrier of implementation of the system and then the high costs to implement ERP, not to define the tasks and business processes coordinate with ERP system and at last the long time for implementation of ERP system were selected.

The practical suggestions for future researches that can be mentioned in this study are that this study has been conducted in the industrial states of Golestan Province. It’s been recommended to the researches to do the same research in a wider level of the other provinces and compare the results with their study with the results of this study. It’s also been recommended that to calculate the weight of the main factors and sub factors, it’s been used the analytical methods of fuzzy network instead of AHP. The dependency between indexes (criteria) should be considered by this way. Finally, it’s recommended that by helping AHP and with the conceptual model of balanced score card (BSC), they achieve to the qualitative indexes that can have an effective role to enhance the performance of the industrial states and the other companies. The restrictions that can be considered include the lack of appropriate and in time cooperation of some managers and experts for provision of the information and to complete the questionnaires, the lack of knowledge about some members of community for the subject of thesis, the lack of the sufficient accuracy in presenting the answers of the questionnaire due to being busy, the complex bureaucracies to distribute the questionnaire and to get the information, and the lack of the adequate resources about the subject.

REFERENCES


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