

Assessment of Universities' and Higher Education Centres' Preparedness for Successful Establishment of Enterprise Resource Planning Based on SWARA Method

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Regarding existing pressures for effectiveness and performance improvement, there is a steep rise for the establishment of Enterprise Resource Planning (ERP). Unfortunately, failure rate for successful ERP establishment is high. Thereupon, evaluation of organizations' preparedness to ensure organizational capabilities aimed at reaching desired outcomes is of paramount importance. The current research is intended to suggest Step-wise Weight Assessment Ratio Analysis (SWARA) method and assess the preparedness of our case study, i.e. the University of Mazandaran, for successful ERP implementation. Related factors impacting on the accomplishment of the ERP system were identified from former studies and weighted according to a hierarchical structure using our suggested methodology. After receiving numerical results, the preparedness of the University of Mazandaran for successful ERP implementation was calculated when the final weights were determined. Results showed that motivations required for ERP establishment as well as processes and IT infrastructures are average, while the influencing cultural factors, protective factors, and capabilities of the organization are weak.

Keywords: *Enterprise Resource Planning (ERP); Assessment of Preparedness; Critical Success Factors; Higher Education Centres; SWARA; University of Mazandaran.*

Introduction

Enterprise Resource Planning System (ERP) is a configurable package that integrates and manages flow of information across all functional areas of an organization. ERP is an IT-based systematic solution that using an interconnected system quickly, accurately and in a qualitative manner provides managers of different levels of organization with organization's resources. Using ERP, they can properly manage organization's planning and operation processes. Causes of organizations' desire to accelerate and standardize the processes may include integration of operational information, integration of financial information, integration of customer order information, standardization and integration of human resources information, providing opportunity for organization. Today, given the many advantages of these systems, many organizations including universities are using these systems (Chen, 2011).

Universities are confronted with decreased governmental budgets as well as increased expectations of students and their parents to offer high-quality services with lowered expenses. Under such conditions, Enterprise Resource Planning (ERP) systems are proper solutions to help university deans to address such challenges (Juma *et al.*, 2013). ERP system is a configurable software package that integrates and manages information flows at all functional areas (Chen, 2011). It is taken to universities to integrate and improve managerial and executive processes such as student registration, human resources systems, and financial processes (Von Hellens *et al.*, 2005).

Despite such competitive advantages, there is still a high rate of failures for establishment of such systems as a main source of concern (Davenport, 1998). According to Al-Mashari (2000), approximately 70 percent of ERP projects fail to accomplish their pre-determined objectives. This indicates high levels of complexity of such systems compared to other systems, which necessitates basic organizational changes (Wang *et al.*, 2008).

Therefore, feasibility studies and evaluations are to be well taken into account prior to implementation of such system. An assessment of such system is thus mandatory before ERP is implemented in order to have system implementations conducted based on existing realities and aligned with organizational capabilities and constraints (Shokri *et al.*, 2011).

So far, to the best of our knowledge, no model-based research on key success criteria and factors in implementation of ERP system is presented in universities and higher education institutions and their preparedness to establish these systems is not evaluated. Since they are faced with a growing need to use such systems, so first of all this paper aims to introduce motives of universities and higher education institutions to apply ERP systems and then proposes a framework of key success factors for implementing these systems at universities and finally assess their preparedness before implementing such systems. This will help identify weaknesses and strengths of the centre and, in line with it, we can find a suitable platform for successful implementation of this system in the near future to minimize the likelihood of failure of the system.

Steps and tools for this research are as follow: first, identifying factors affecting the ERP implementation (based on literature survey and expert survey); then, selecting an appropriate method for formal, objective (not subjective) evaluation; after that, selecting experts; and, finally, applying SWARA, receiving numerical results, and making conclusions.

Literature Review

A comprehensive management tool offered in a software package, i.e. ERP, is implemented in organizations to integrate all existing organizational systems and functions. ERP implementation is one of the most wide-ranging change activities that organizations have undergone in the last decade (Von Hellens *et al.*, 2005).

ERP system includes the following departments: financial, accounting, supply chain and customer information, sales, distribution, production planning, material management and human resources management. This system includes software support modules where information between them flows and is shared in a central database (Clemmons & Simon, 2001).

The system emerged in the late 1990s in manufacturing industry, where primary versions of applied software were being used for manufacturing resource planning (MRP) and computer integrated manufacturing (CIM). In fact, business organizations tended to use ERP systems to improve their business processes in order to reduce their automatic cost, to increase efficacy and to gain competitive advantage over their rivals (Nour & Mouakket, 2011). Due to advantages of ERP system, many organizations have tended to use these systems. For example, an organization can take advantage of it through enhanced customer service and reduced production costs (Hendrickson 2010). Today many organizations around the world are using the system.

In educational institutes, however, ERP implementation has been challenging due to shortage of required experts and IT resources for its execution (Esteves & Pastor, 2001). ERP is widely adopted in higher education institutes and its market has experienced a rapid rise in recent years (Harris *et al.* 2008). Related literature comprises motivations for ERP adoption in higher education centres and universities including updating systems, greater needs to flexibility and functionality, reengineering the business processes, integration of data and systems, risk avoidance and reduced maintenance (King, 2002; Oliver & Romm, 2000), ERP-related issues like organizational issues associated with decision-making process, management support, change management practices, project management issues, privacy and security issues, and impact of organizational culture (Von Hellens *et al.* 2005; Beekhuyzen, 2001).

ERP systems is initially designed to support ordinary organizational functions such as payroll issues, human resource management, materials management, accounting, etc. As ERP was extended into new aspects such as public segment, higher education, and service industries, new modules were added to fulfill industry- and operation-specific requirements (Pollock & Cornford, 2004).

In case of higher education institutions, ERP systems can offer a different array of operational and university functions such as student enrolments (applications, fee calculation, short lists, etc.), course enrolments, student data management

(attendance management, scientific degree information, etc.), course management (enrolments, course feedbacks), assets management (contracts, scholarships), library systems, graduates management, and research networks. Therefore, higher education presents special needs and challenges to the ERP execution. Complexity and broad scope of ERP execution have changed it into an important organizational change rather than a simple attempt to implement a technology (Pollock & Cornford, 2004; Zornada & Velkavrh, 2005). Universities are currently using the system around the world to benefit from its competitive advantages over other universities.

Despite its popularity, however, the failure rate of ERP implementation is still high. Thereupon, all organizations should pay enough attention to conscious decision-making. That is, they should through their in-depth studies to calculate exorbitant expenses, time of long-term projects, required human resources, organizational culture and so on to examine their preparedness for such a great change and avoid wasting of their financial/human resources and time (Eshraghnia-Jahromi *et al.*, 2005).

Critical success factors as well as those leading to failure and ineffective implementation of ERP in higher education centres have been discussed by some scholars. Rockhart (1997) defines critical success factors as a number of special areas which guarantee an organization's competitive performance if they are fully satisfactory. Identification of critical success factors helps recognition of required elements for a successful business operation (Hossein & Shakir, 2001).

Although, identification of critical factors, which have critical role in success or failure of ERP implementation in an organization, is not sufficient. Having proper insight about the preparation level in order to manage the effort properly and to design strategies proper as critical factors in ERP implementation are of great importance. Organizations should, accordingly, assess and conduct feasibility studies before ERP implementations in order to align their organizational capabilities and constraints based on existing realities (Eshraghnia-Jahromi *et al.*, 2005).

The current study is held for replying to three main questions:

RQ1. What is the final framework of critical success factors on successful ERP implementation?

RQ2. Which criteria and sub subcriteria are more important compared whit others in each category of final framework?

RQ3. What is the level of general preparedness for successful implementation of the system based on final factors in our case study?

Methodology

Since purpose of the research is investigating preparedness of universities and higher education centres for successful establishment of enterprise resource planning using key success criteria, so, first, we need a comprehensive list of appropriate criteria for this organization. Then we need to evaluate weight of these criteria, which is provided using SWARA method, and finally, we evaluate preparedness of an organization. To this purpose, we used comments of relevant experts at the intended university or higher education centre and a questionnaire.

Generally, the present research includes three different phases to assess an organization’s preparedness for ERP implementation (Figure 1):

Phase 1, in which an expert team is united. Then, the variables impacting on successful implementation of ERP systems are identified, after which questionnaires are distributed to experts to determine the most important qualitative and quantitative criteria. Figure 2 exhibits the hierarchical diagram for affirmed variables.

Phase 2, in which factors and sub-factors are weighted in terms of experts’ opinions using SWARA method.

Phase 3, in which sub-factors are assessed using Table 1 data and sub-factors’ weight is multiplied by the assessed values. Table 1 is used to convert qualitative scales to quantitative scales according to the comments of the experts (Shokri *et al.*, 2011). Then, the preparedness level of an organization to successfully implement ERP system in both general and separated manners is calculated.

Table 1

Lingual Amounts to Measure Criteria

Lingual amounts	Assessment scale
Very low	0
Low	25
Average	50
High	75
Very high	100

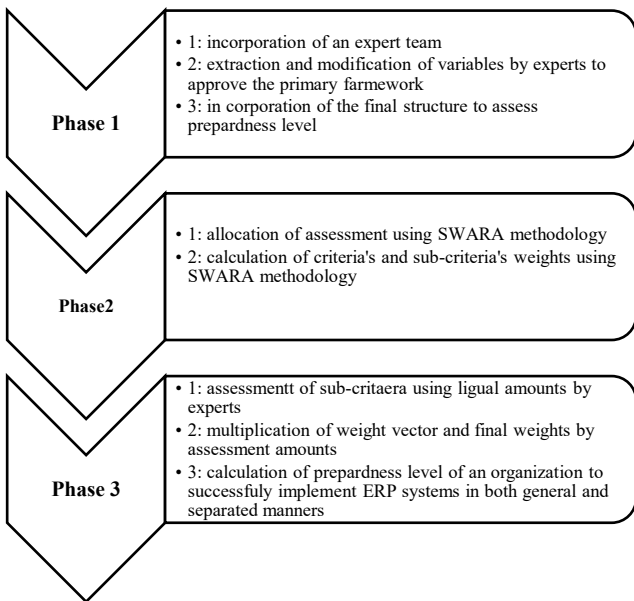


Figure 1. The Preparation Evaluation Process

Phase 1

The presented research aims to investigate effective criteria that influence on the success of ERP systems at organization, so, after extracting the criteria from the literature, we used experts’ comments by using Delphi method to filter the criteria and present a suitable model. Finally, the selected criteria and sub-criteria were presented in Table 2 and as a framework in Figure 2.

Phase 2

Step-wise Weight Assessment Ratio Analysis (SWARA) method

Step-wise weight assessment ratio analysis (SWARA) was developed in 2010 (Kersulienė *et al.*, 2010). The selection way was developed for the selection of rational dispute resolution (Kersulienė & Turskis 2011).

In this way, experts have important role in evaluation and measurement. Experts’ ability about importance of the ratio criteria relevant to the weight is the primary principle in this approach (Kersulienė *et al.*, 2010).

Furthermore, this way is useful for consonance and data collecting from specialists. SWARA can be beneficial in some matters that preferences are recognized of their antecedent based on some circumstances (Hashemkhani-Zolfani *et al.*, 2013). Moreover, this method is uncomplicated and specialists can simply work together.

The main advantage of this method in decision-making is that in some problems priorities are defined based on policies of companies or countries and there is no need for evaluation to rank criteria. SWARA can be useful for some issues with known priorities depending on a situation; and finally, SWARA is proposed in a certain environment of decision-making.

Priority of the main criteria based on policies of the studied organization in the current circumstances was found and evaluation of criteria rank is not done by the experts, therefore, the use of this method to determine weight of the criteria is a suitable method.

The Computational Procedure of the SWARA Method

Process of determining weight of criteria by using the SWARA method is based on following steps (Stanujkic *et al.* 2015; Kersulienė *et al.* 2010):

- Determining criteria ranks:** respondents arrange criteria according to rank (the most important criterion list as first, etc.)
- Comparative importance of average value, S_j :** after ranking the criteria, the respondents evaluate how much is $j+1$ criterion more important than j criterion.
- Determining the coefficient (K_j):**

$$K_j = \begin{cases} 1 & J = 1 \\ S_j + 1 & J > 1 \end{cases} \quad (1)$$

- Determining of recalculated weight (q_j):**

$$q_j = \begin{cases} 1 & J = 1 \\ \frac{K_{j-1}}{K_j} & J > 1 \end{cases} \quad (2)$$

- Determining of criteria importance (W_j):**

$$w_j = \frac{q_j}{\sum_{j=1}^n q_j} \quad (3)$$

Table 2

Factors Taken from Review of the Related Literature that Are Affecting on ERP Successful Implementation

Criteria	Sub-Criteria	References
Protective factors (C ₁)	Good project scope management (C ₁₋₁)	Aghaoghlu <i>et al.</i> (2015), D.Deshmukh <i>et al.</i> (2015), Garg & Chuahan (2015), Simatupang <i>et al.</i> (2015), Beheshti <i>et al.</i> (2014), Garg & Garg (2014), Ahmad & Piendo Cuenca (2013), Ahmadi <i>et al.</i> (2012), Nazari & Baghaie (2010), Dezdar & Sulaiman (2009), Razmi <i>et al.</i> (2009), Snider <i>et al.</i> (2009), Finney & Corbett (2007), Plant & Willcocks (2007), Saremi, <i>et al.</i> (2007), Nah & Delgado (2006), Jafarnejad <i>et al.</i> (2005), Sharifiyan (2004), Somers & Nelson (2004), Motwani <i>et al.</i> (2002), Esteves & Pastor (2001), Umble <i>et al.</i> (2003).
	Expectation Management (C ₁₋₂)	
	Project sponsor (C ₁₋₃)	
	Adequate resources (C ₁₋₄)	
Cultural factors (C ₂)	Empowered decision makers (C ₁₋₅)	Garg & Chuahan (2015), Garg & Garg (2014), Ahmadi <i>et al.</i> (2012), Dezdar & Sulaiman (2009), Vathanophas (2007), Finney & Corbett (2007), Plant & Willcocks (2007), Somers & Nelson (2004), Sharifiyan (2004), Umble <i>et al.</i> (2003), Rosario (2000), Wee (2000), Esteves & Pastor (2000).
	Top management commitment (C ₁₋₆)	
	Vendors support (C ₁₋₇)	
Software and IT infrastructure (C ₃)	Good change management (C ₁₋₈)	Garg & Chuahan (2015), Aghaoghlu <i>et al.</i> (2015), Deshmukh <i>et al.</i> (2015), Garg & Garg (2014), Ahmadi <i>et al.</i> (2012), Dezdar & Sulaiman (2009), Finney & Corbett (2007), Vathanophas (2007), Motwani, <i>et al.</i> (2005), Nah & Delgado (2006), Somers & Nelson (2004), Al-Mashari (2003), Umble <i>et al.</i> (2003), Baki & Cakar (2005), Esteves & Pastor (2000), Sharifiyan (2004), Rosario (2000), Wee (2000), Mahmudi & Ahmadi (2011).
	Strong relationship among staff (C ₂₋₁)	
	ERP Implementation strategy (C ₂₋₂)	
	Teamwork culture in organization (C ₂₋₃)	
	Variability capacity (C ₂₋₄)	
	Software Customization (C ₃₋₁)	
	Software configuration (C ₃₋₂)	
	Data analysis and conversion (C ₃₋₃)	
	Data accuracy (C ₃₋₄)	
Adequate ERP software selection (C ₃₋₅)		
Capabilities of the organization (C ₄)	Hardware and software infrastructure (C ₃₋₆)	Aghaoghlu <i>et al.</i> (2015), Deshmukh <i>et al.</i> (2015), Garg & Chuahan (2015), Beheshti <i>et al.</i> (2014), Garg & Garg (2014), Ahmad & Piendo Cuenca (2013), Dezdar & Sulaiman (2009), Snider <i>et al.</i> (2009), Finney & Corbett (2007), Saremi <i>et al.</i> (2007), Vathanophas (2007), Hanifehzadeh (2007), Plant & Willcocks (2007), Jafarnejad <i>et al.</i> (2005), Somers & Nelson (2004), Esteves & Pastor (2000).
	Engineers and IT experts (C ₃₋₇)	
	High flexibility (C ₃₋₈)	
	Comfortable working with software (C ₃₋₉)	
Process (C ₅)	Project plan/schedule (C ₄₋₁)	Aghaoghlu <i>et al.</i> (2015), Garg & Chuahan (2015), Simatupang <i>et al.</i> (2015), Beheshti <i>et al.</i> (2014), Ahmadi <i>et al.</i> (2012), Yang <i>et al.</i> (2007), Yusuf <i>et al.</i> (2006), Murray & Coffin (2001), Rosario (2000), Shanks, <i>et al.</i> (2000), Wee (2000), Esteves & Pastor (2000).
	Appropriate use of consultants (C ₄₋₂)	
Motivational factors (C ₆)	trouble shooting/ project risk (C ₄₋₃)	Aghaoghlu <i>et al.</i> (2015), Beheshti <i>et al.</i> (2014), Razmi <i>et al.</i> (2009), Nah & Delgado (2006), Al-Mashari <i>et al.</i> (2003), Esteves & Pastor (2000), Shanks <i>et al.</i> (2000), Somers & Nelson (2001).
	Training on software (C ₄₋₄)	
	Education of new business process (C ₄₋₅)	
	Cost/budget (C ₄₋₆)	
	Project team composition/ team skills (C ₄₋₇)	
	appropriateness of processes(C ₅₋₁)	
	Reengineering of business process (C ₅₋₂)	
	Clear goals and objectives (C ₆₋₁)	
	Knowledge about legacy system (C ₆₋₂)	

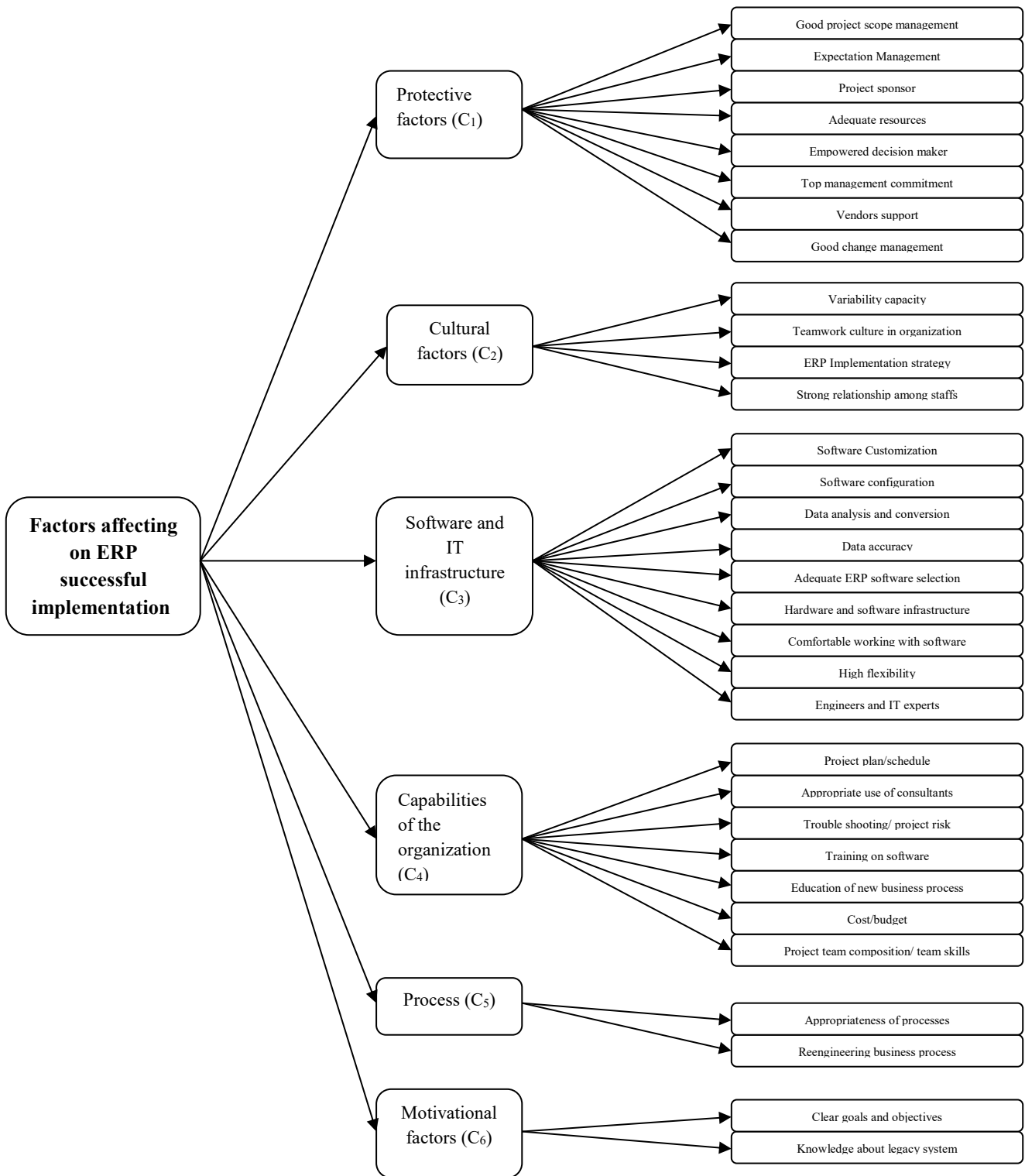


Figure 2. Final Structure of Approved Variables

Phase 3

When research variables were extracted and final structure was specified, data analysis method and expert team constituents were determined, the focus would, then, be on the numerical data.

The illustration of the current Phase is presented in Results section, using numerical data of a particular organization - University of Mazandaran.

Results

Experts' data for a case study of University of Mazandaran is presented in Table 3. Moreover, results of criteria's weights are displayed in the following Tables (4-5). Weight of sub-criteria is calculated in the same way and is presented in Table 6.

Experts were, afterwards, asked to judge preparedness level of University of Mazandaran in terms of each of the components presented in Table 1. Since most sub-criteria of software and IT infrastructures are associated with ERP

package, they cannot be used in preparedness assessment section, therefore, in which only two variables are considered and others are omitted. To do so, new weights of software and IT infrastructures sub-criteria are to be calculated regardless of the omitted sub-variables (Table 5).

Preparedness level of University of Mazandaran as separated by each factor as well as its general preparedness are shown in Table 6 and Table 7, respectively. In order to show more comfortably, the total results of Table 6 are indicated in Fig. 3.

Table 3

Category	Classification	No.
Education	Bachelor	0
	Master	3
	Ph.D.	2
Age	30-40	4
	40-50	1
Work experience	5-10	2
	10-15	2
	15-20	1
Sex	Male	5
	Female	0

Table 4

Criterion	Comparative importance of average value S_j	Coefficient $K_j = S_j + 1$	Recalculated Weight $q_j = \frac{X_{(j-1)}}{K_j}$	Weight $W_j = \frac{q_j}{\sum_{j=1}^n q_j}$
C ₁	0	1	1	0.265
C ₆	0.3	1.3	0.769	0.203
C ₃	0	1	0.769	0.203
C ₄	0.475	1.475	0.521	0.14
C ₅	0.2	1.2	0.434	0.115
C ₂	0.55	1.55	0.28	0.074

Table 5

Criterion	Comparative importance of average value S_j	Coefficient $K_j = S_j + 1$	Recalculated Weight $q_j = \frac{X_{(j-1)}}{K_j}$	Weight $W_j = \frac{q_j}{\sum_{j=1}^n q_j}$	Total Weight
C ₃₋₆	0	1	1	0.53	0.108
C ₃₋₇	0.15	1.15	0.87	0.47	0.095

Table 6

Criteria	Sub- Criteria	Lingual amounts Average	Sub- Criteria Weight	Sub- Criteria preparedness level	Criteria preparedness level
Protective factors (C ₁)	Good project scope management(C ₁₋₁)	50	0.213	10.65	28.382
	Expectation Management(C ₁₋₂)	37.5	0.08	3	
	Project sponsor(C ₁₋₃)	12.5	0.13	1.625	
	Adequate resources(C ₁₋₄)	50	0.105	5.25	
	Empowered decision makers(C ₁₋₅)	25	0.105	2.625	
	Top management commitment(C ₁₋₆)	25	0.157	3.92	
	Vendors support(C ₁₋₇)	0	0.105	0	
Cultural factors(C ₂)	Good change management(C ₁₋₈)	12.5	0.105	1.312	36.437
	Strong relationship among staff(C ₂₋₁)	62.5	0.183	11.437	
	ERP Implementation strategy(C ₂₋₂)	25	0.284	7.1	
	Teamwork culture in organization(C ₂₋₃)	50	0.183	9.15	
	Variability capacity(C ₂₋₄)	25	0.35	8.75	

Criteria	Sub- Criteria	Lingual amounts Average	Sub- Criteria Weight	Sub- Criteria preparedness level	Criteria preparedness level
Motivational factors(C ₆)	Clear goals and objectives(C _{6.1})	50	0.59	29.5	55.125
	Knowledge about legacy system(C _{6.2})	62.5	0.41	25.625	
Capabilities of the organization(C ₄)	Project plan/schedule(C _{4.1})	37.5	0.18	6.75	35.587
	Appropriate use of consultants(C _{4.2})	12.5	0.094	1.175	
	trouble shooting/ project risk(C _{4.3})	37.5	0.124	4.65	
	Training on software(C _{4.4})	50	0.11	5.5	
	Education of new business process(C _{4.5})	25	0.075	1.875	
	Cost/budget(C _{4.6})	37.5	0.265	9.937	
	Project team composition/ team skills(C _{4.7})	37.5	0.152	5.7	
Process(C ₅)	appropriateness of processes(C _{5.1})	50	0.45	22.5	56.875
	Reengineering business process(C _{5.2})	62.5	0.55	34.375	
Software and IT infrastructure(C ₃)	Hardware and software infrastructure(C _{3.1})	62.5	0.53	33.125	56.625
	Engineers and IT experts(C _{3.2})	50	0.47	23.5	

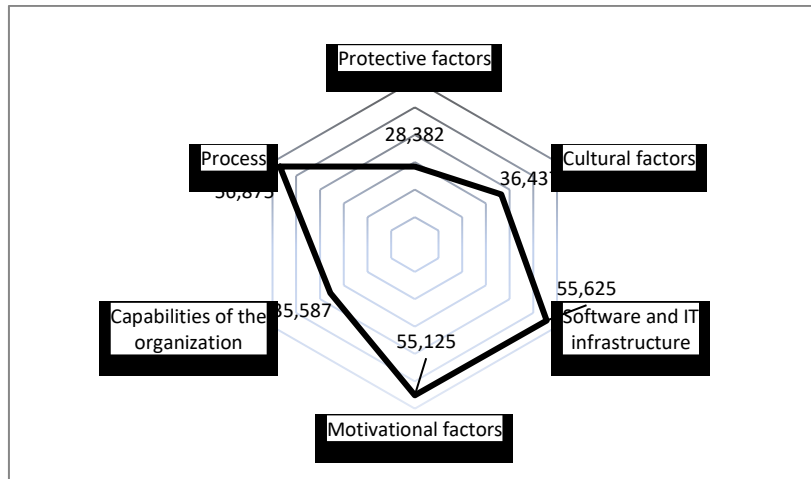


Figure 3. University of Mazandaran’s Preparedness Level as Separated by Each Critical Factor

Table 7

General Preparedness Assessment by Experts

Criteria and Sub- Criteria	Total Weight	Lingual amounts Average	General preparedness
Protective factors	0.265		
Good project scope management	0.056	50	2.8
Expectation Management	0.021	37.5	0.787
Project sponsor	0.034	12.5	0.425
Adequate resources	0.028	50	1.4
Empowered decision makers	0.028	25	0.7
Top management commitment	0.042	25	1.05
Vendors support	0.028	0	0
Good change management	0.028	12.5	0.35
Cultural factors	0.074		
Strong relationship among staff	0.0135	62.5	0.844
ERP Implementation strategy	0.021	25	0.525
Teamwork culture in organization	0.0135	50	0.675
Variability capacity	0.026	25	0.65
Capabilities of the organization	0.138		
Project plan/schedule	0.0252	37.5	0.945
Appropriate use of consultants	0.013	12.5	0.162
trouble shooting/ project risk	0.0172	37.5	0.645
Training on software	0.0154	50	0.77
Education of new business process	0.011	25	0.275
Cost/budget	0.037	37.5	1.387
Project team composition/ team skills	0.0212	37.5	0.795
Process	0.115		
appropriateness of processes	0.0517	50	2.585
Reengineering business process	0.0633	62.5	3.956

Criteria and Sub- Criteria	Total Weight	Lingual amounts Average	General preparedness
Motivational factors	0.203		
Clear goals and objectives	0.120	50	6
Knowledge about legacy system	0.083	62.5	5.187
Software and IT infrastructure	0.203		
Hardware and software infrastructure	0.108	62.5	6.75
Engineers and IT experts	0.095	50	4.75
Sum	1		44.413

Conclusions

Since the failure rate of implementing ERP systems in organizations is still high, so, investigation of preparedness level is a preliminary study to determine a project's successfulness probability before it is emerged in the real world. This process ensures achievement of desired objectives by organizational capabilities in order to allow making decision about either completion or rejection of a project. Successful assessment of ERP systems and the way to achieve them are important issues, which have been addressed by many researchers. This is obvious that identification of factors which lead to a project's success or failure is very important in ensuring of the organization's preparedness level. The main input of the current study to ERP and at the same time to enterprise management is the suggestion of the framework applying SWARA method for weighting of decision criteria.

Many organizations in the world today tend to use ERP systems so that thorough its implementation to gain competitive advantages over other organizations. In the meantime, universities are no exception. This research besides expressing motivations of universities and higher education institutions for establishing this system was also intended to present an appropriate framework of such critical success factors for University of Mazandaran, followed by assessing its preparedness level. After different variables were extracted and their effectiveness/ineffectiveness was tested by experts, a final structure for assessment was achieved, whereby criteria and sub-criteria were assigned weight using SWARA method. This is a relatively simple method in decision-making process, in which trainings and experiences of experts play a significant role.

As a result protective factors were determined as the most important criteria, and after that Software and IT infrastructure as well as Motivational factors have the same importance, and lower priority criteria are Capabilities of the organization, Process and Cultural factors.

After obtaining general preparedness level of University of Mazandaran by using weights of criteria and sub-criteria also the scores which experts have pointed to those, results demonstrate that motivations required to establishment of this system, processes and IT infrastructures are average, while influencing cultural factors, protective factors and capabilities of the

organization are much feeble and call for serious improvements.

As shown in Table 7, preparedness level of our case study is generally 44.413, which is a low-to-average level. Preparedness in strong relationship among staffs, appropriateness of processes, and knowledge about legacy system as well as hardware/software infrastructures are at a suitable level. Despite high significance of protective factors, project's sponsor, expectations management, empowered decision makers, commitment and supports by top management, vendors' supports, and effective organizational change management, they are at a week level. In addition, preparedness level of University of Mazandaran regarding the following variables was assessed to be low: ERP implementation strategy and variability capacity of cultural factors, project plan/schedule, troubleshooting/ project risk, appropriate use of consultants and training of new business processes, cost/budget, and team skills. Other items are average.

In studies already done by (Beheshti *et al.* 2015; Mahmoud & Ahmadi, 2011; Nour & Mouakket, 2011; Aghaoghlu, 2014), we saw more that researchers are trying to provide frameworks or appropriate models for successful implementation of ERP system in manufacturing and distribution companies or in state or private organizations, which is done by identifying and prioritizing key factors of success implementation of ERP. Also, the topic of evaluating preparedness of organizations for successful implementation of the system is considered in several studies, but examining all these topics together at universities and higher education centres are not taken into consideration. Additionally, to do this research at the study centre, we were faced by the limited number of experts who were completely familiar with the subject, which may limit to some extent generalization of the research results.

Regarding high importance of ERP implementation and increasing need for it in universities and higher education centres, relevant officials are recommended to present this framework to their experts in order to enable them to test and then achieve an inclusive framework of variables that should be taken into consideration before ERP systems are implemented.

As a future research plan, the authors are going to achieve an extensible and comprehensive final framework of critical success factors for ERP implementation by the help of related experts of all universities and higher education centres of the country.

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