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Interpretive Structural Modeling of Critical Success Factors in Banking Process Re-engineering

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Iranian banking sector is under tremendous pressure to re-engineer its processes to meet requirements of e-Banking services. Business process re-engineering practices have a great failure rate around the world. In order to better understand key elements in implementation of BPR projects, interpretive structural modeling approach have been applied. This paper proposes the underlying theoretical framework to identify critical success factors of BPR projects in banking sector.

Field of research: banking sector, business process re-engineering, interpretive structural modeling, critical success factors

1. Introduction

Business process reengineering (BPR) is a popular management tool for dealing with rapid technological and business changes (Ranganathan & Dhaliwal, 2001). It was first introduced by Hammer (1990) as a radical redesign of processes in order to gain significant improvements in cost, quality, and services (Ozcelik, 2010). BPR creates changes in people (behavior and culture), processes and technology (Al-Mashari & Zairi, 2000). It does not seek to alter or fix existing processes; yet, it forces companies to ask, whether or not a process is necessary, and then seeks to find a better way to do it (Siha, & Saad, 2008). BPR integrates all departments into a complete process which have been designed to fulfill a specific business goal (Cheng et al, 2006). Successful implementation of BPR enables organizations to achieve dramatic gains in business performance (Shin & Jemella, 2002). The banking sector could also benefit from reengineering. BPR helps banks to deal with new economic challenges and to change their traditional processes to improve their customers' satisfaction. Although BPR has many benefits, it is a complex and difficult task and has a high failure rate (Abdolvand et al, 2008). Shin and Jemella (2002) reported a 70 percent failure rate in implementing BPR. It is also reported that many BPR projects have failed to reach their potential (Caron et al., 1994, Murphy, 1994, Holland and Kumar, 1995). Failure of BPR projects is costly, not only because of the resources invested, but also because of the disruption to the organization, as well as the adverse affect to the morale of the organization (Remenyi & Heafield, 1996).

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Many researches have tried to identify the reasons BPR projects fail. Attaran (2004) mentioned that a weak connection between BPR projects and corporate goals is the main reason for the high failure rate of BPR implementation. Adeyemi & Aremu (2008) highlighted some failure factors like lack of management commitment, unrealistic scope and expectation, resistance to change, non-encouragement to conceptualization of business process, and non-detailing of rewards and recognition with new business process. Literature suggests that organizations should not try the BPR before exact examination of all phases and stages of the project (Abdolvand et al, 2008).

Deciding on which factor contribute to the failure of the project is a complex and dynamic situation. It requires a great amount of time to investigate all factors. It is even more complex if the relationships between those factors need to be investigated. The main objectives of this paper are:

- to identify CSFs in BPR implementation in Iranian banks;
- to find out the relationships between CSFs;
- to propose a structural model of CSFs in BPR implementation; and
- to classify the identified CSFs into various categories.

Interpretive structural modeling (ISM) can rightly be employed under such circumstances because on the basis of relationship between the factors, an overall structure can be extracted for the system under consideration. In this paper, the critical success factors in implementation of BPR have been analyzed by using the ISM methodology. The CSFs are also classified based on their driving power and dependence. The remainder of this paper is organized as follows. In Sections 2, based on literature being reviewed, critical success factors of a BPR project are briefly introduced. Interpretive Structural Modeling is summarized in Section 3. Section 4 provides implications and findings of the proposed methodology. The paper is concluded in Section 5.

2. Literature review

A BPR project is successful if it meets predetermined goals within the project scope and over a longer period of time. There are many reviews reporting as many as 70% of BPR projects have not been successful (Shin and Jemella 2002; Caron et al 1994; Murphy 1994; Holland and Kumar 1995). It is therefore not surprising that many organizations are not convinced that the implementation of BPR could bring significant and measurable benefits (Vergidis et al 2008). In fact, the risky nature of BPR has motivated a detailed investigation of its critical success and failure factors (Abdolvand et al 2008) and many researchers (Ariyachandra & Frolick 2008; Bandara, Gable, & Rosemann 2005) have tried to identify critical success factors of BPR. Based on an extensive literature review combining with discussion sessions with experts from both banking sector and specialists in BPR, 9 CSFs have been identified.

2.1. Egalitarian culture

Organizational culture is an important factor in successful BPR implementation. Cooperation, coordination, and empowerment of employees are the standard characteristics of an innovative organizational environment. Egalitarian culture supports these attitudes (Ahadi, 2004). An egalitarian culture should be developed in the organization to enable successful implementation of any organizational change. It also avoids stress and resistance to change among employees which is acknowledged as being a fundamental barrier to change (Abdolvand et al, 2008).

2.2. Use of information technology

Information technology (IT) is identified as a critical component and even a natural partner of a BPR project, since it has an important role in BPR projects (Abdolvand et al, 2008). Many authors have described that successful application of IT is effective in BPR success. Contrarily, overlooking the role of IT can result in failure (Shin & Jemella, 2002).

2.3. Customer involvement

Electronic banking (e-Banking) is an innovative way of doing business in an information environment. An innovative organizational requires customer involvement during BPR (Zirger & Maidique, 1990). Organizations should gather information from their customers to drive the BPR projects. This helps them to recognize their customers' needs (Ahadi, 2004).

2.4. Change management

Change management plays a crucial role in successful BPR implementation (Ahadi, 2004). Managers need to know the “art” of dealing with people during the change process. Effective change management should consider soft issues around the human, and would avoid resistance to change among employees (Ahmad et al, 2007).

2.5. Top management commitment

Top management is responsible for each and every activity at the all levels of the organizations (Singh & Kant, 2008). Top management should provide a clear direction or vision in order to help BPR team members to be directed toward the desired results (Sung & Gibson, 1998).

2.6. Less bureaucratic structure (flatter structure)

Organizational structure should be flexible enough to enable BPR in terms of its encouraging creativity and innovativeness in the organization. Therefore, the need for less bureaucratic and more participative organization is obvious (Ahmad et al, 2007). McAdam (2003) suggested that organizations should implement less bureaucracy to avoid failure of BPR implementation.

2.7. Project management

Project management is important in order to plan and manage the BPR to be correctly implemented (Al-Mashari & Zairi, 2000). Ahmad et al (2007) discussed that employees should be adequately trained to get the required skills in doing tasks assigned to them.

2.8. Adequate financial resources

BPR is normally an expensive project and requires a huge amount of money (Ahmad et al, 2007). In order for BPR to happen successfully, the organization needs to have an adequate amount of funding, sufficient to implement change and to back up unpredictable circumstances.

2.9. Quality management system

Quality management system (QMS) and Business Process Re-engineering (BPR) have been deployed as drivers to improve competitiveness (Lee & Oakes, 1996). Love and Gunasekaran (1997) mentioned that BPR and QMS can be used jointly, since they have many common features.

3. Methodology

Interpretive Structural Modeling was first proposed by Warfield (1973). It enables individuals or groups to develop a map of the complex relationships between many elements involved in a complex decision situation (Charan et al, 2008). ISM is often used to provide fundamental understanding of complex situations, as well as to put together a course of action for solving a problem. The ISM process transforms unclear, poorly articulated mental models of systems into visible, well-defined models useful for many purposes (Ahuja et al, 2009).

3.1. Structural self-interaction matrix

The first step is to analyze the contextual relationship of type “leads to”. That is one CSF leads to another. Based on this contextual relationship, a structural self-interaction matrix (SSIM) is developed. In this research, 14 experts, from the banking sector and academia were consulted in identifying the nature of contextual relationship among the CSFs.

Table 1: Structural self-interaction matrix

CSFs	9	8	7	6	5	4	3	2	1
1. Egalitarian culture	A	0	0	X	A	A	V	0	
2. Use of information technology	V	A	X	V	A	X	0		
3. Customer involvement	A	0	0	V	0	A			
4. Change management	V	A	X	V	A				
5. Top management commitment	0	V	V	V					
6. Less bureaucratic structure	A	0	0						
7. Project management	0	A							
8. Adequate financial resources	V								
9. Quality management system									

Following, four symbols are used to denote the direction of relationship between the CSFs (i and j):

- V: CSF i will help to achieve CSF j;
- A: CSF j will be achieved by CSF i;
- X: CSFs i and j will help to achieve each other; and
- O: CSFs i and j are unrelated.

Based on expert's responses, the SSIM is constructed as shown in Table 1.

3.2. Reachability Matrix

The SSIM is transformed into a binary matrix, called the initial reachability matrix by substituting V, A, X, O by 1 and 0 as per the case. The rules for the substitution of 1s and 0s are as follows:

- If the (i, j) entry in the SSIM is V, then the (i, j) entry in the reachability matrix becomes 1 and the (j, i) entry becomes 0.
- If the (i, j) entry in the SSIM is A, then the (i, j) entry in the reachability matrix becomes 0 and the (j, i) entry becomes 1.
- If the (i, j) entry in the SSIM is X, then the (i, j) entry in the reachability matrix becomes 1 and the (j, i) entry also becomes 1.
- If the (i, j) entry in the SSIM is O, then the (i, j) entry in the reachability matrix becomes 0 and the (j, i) entry also becomes 0.

Then its transitivity is checked (which means if CSF i leads to CSF j and CSF j leads to CSF k, then CSF i should lead to CSF k) and the final reachability matrix as shown in Table 2 is obtained. In this table, the driving power and dependence of each CSF are also shown. The driving power of a particular CSF is the total number of CSF (including itself) which it may help to achieve. The dependence is the total number of CSF which may help achieving it.

Table 2. Final reachability matrix

CSFs	1	2	3	4	5	6	7	8	9	driving power
1	1	0	1	0	0	1	0	0	0	3
2	1	1	1	1	0	1	1	0	1	7
3	1	0	1	0	0	1	0	0	0	3
4	1	1	1	1	0	1	1	0	1	7
5	1	1	1	1	1	1	1	1	1	9
6	1	0	1	0	0	1	0	0	0	3
7	1	1	1	1	0	1	1	0	1	7
8	1	1	1	1	0	1	1	1	1	8
9	1	0	1	0	0	1	0	0	1	4
dependence	9	5	9	5	1	9	5	2	6	

3.3. Level partitions

From the final reachability matrix, the reachability set and antecedent set for each CSF is found. The reachability set includes CSF itself and others which it may help to achieve, similarly the antecedent set consists of CFS itself and the other CSFs which help in achieving it. Then, the intersection of these sets is derived for all CSFs. The CSF for which the reachability and intersection sets are same is the top-level CSF in the ISM hierarchy.

Table 3. iteration i

CSFs	Reachability set	Antecedent set	Intersection set	Level
1	1, 3, 6	1, 2, 3, 4, 5, 6, 7, 8, 9	1, 3, 6	I
2	1, 2, 3, 4, 6, 7, 9	2, 4, 5, 7, 8	2, 4, 7	
3	1, 3, 6	1, 2, 3, 4, 5, 6, 7, 8, 9	1, 3, 6	I
4	1, 2, 3, 4, 6, 7, 9	2, 4, 5, 7, 8	2, 4, 7	
5	1, 2, 3, 4, 5, 6, 7, 8, 9	5	5	
6	1, 3, 6	1, 2, 3, 4, 5, 6, 7, 8, 9	1, 3, 6	I
7	1, 2, 3, 4, 6, 7, 9	2, 4, 5, 7, 8	2, 4, 7	
8	1, 2, 3, 4, 6, 7, 8, 9	5, 8	8	
9	1, 3, 6, 9	2, 4, 5, 7, 8, 9	9	

The top-level CSF in the hierarchy would not help achieve any other CSF above its own level. Once the top-level CSF is identified, it is separated out from the other CSFs (Table 3). Then, the same process is repeated to find out the CSFs in the next level. This process is continued until the level of each CSF is found. Results for the iteration process are summarized in Table 4. The resulting levels help in building the digraph and the final model.

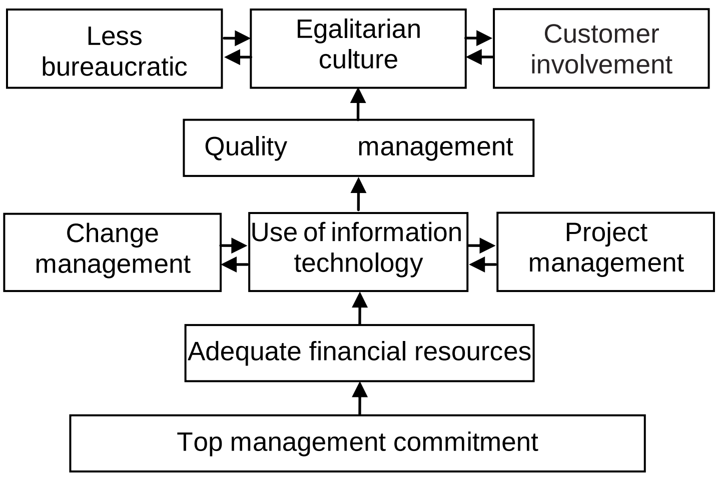
Table 4. iteration ii-v

Iteration	CSFs	Reachability set	Antecedent set	Intersection set	Level
ii	9	9	2, 4, 5, 7, 8, 9	9	II
Iii	2	2, 4, 7	2, 4, 5, 7, 8	2, 4, 7	III
Iii	4	2, 4, 7	2, 4, 5, 7, 8	2, 4, 7	III
Iii	7	2, 4, 7	2, 4, 5, 7, 8	2, 4, 7	III
Iv	8	8	5, 8	8	IV
V	5	5	5	5	V

3.4. Building the ISM model

From the final reachability matrix (Table 2), the structural model is generated. If there is a relationship between the CSFs i and j, this is shown by an arrow which points from i to j. This graph is called a directed graph, or digraph. After removing the transitivities the digraph is finally converted into the ISM-based model (Figure 1).

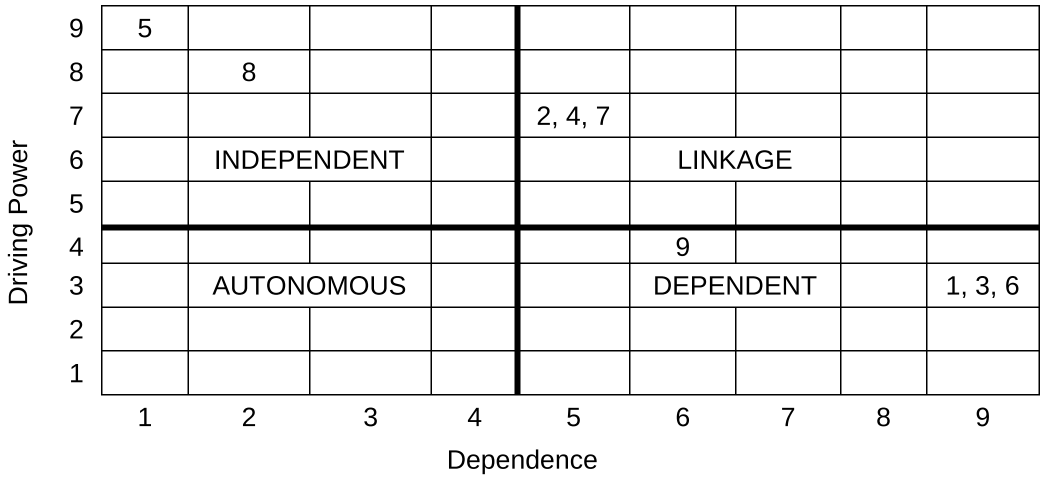
Figure 1: Structural model of CSFs in BPR implementation



4. Discussion

Several interesting findings for the implementation of BPR arise from the application of interpretive structural modeling approach. The paper offered new considerations regarding the successful implementation of BPR projects. The driving power-dependence diagram (shown in Figure 2) helps to classify various CSFs into four clusters. The first cluster includes “autonomous CSFs” that have a weak driving power and weak dependence. These CSFs are relatively disconnected from the system. The results show that there are no CSFs in the autonomous cluster.

Figure 2: Driving power and dependence diagram



The second cluster consists of the dependent CSFs that have weak driving power but strong dependence. In the present case, egalitarian culture, customer involvement, less bureaucratic structure, and quality management system are in the category of dependent CSFs.

The third cluster includes linkage CSFs that have strong driving power and dependence. Any action on these CSFs will have an effect on the CSFs in the higher level. In this case, use of information technology, change management and project management are the linkage CSFs. It implies that all the CSFs above this level would be affected by these, while these CSFs are dependent on lower level CSFs of the ISM model. The fourth cluster includes independent CSFs with strong driving power and weak dependence. In this case, top management commitment and adequate financial resources fall in the category of independent (driver) CSFs. It is obvious that the top management commitment has the maximum driving power. This CSF is, therefore, the most important CSF and has a great influence on the other CSFs. The banking sector should invest enough resources to enhance the top management commitment. As it is shown on Figure 2, this factor is the most important and influential factor in Iranian banking system. The second most influential factor is the availability and adequacy of financial resources. It would seem that because of the current situation of Iranian economy and the nature of BPR projects, it is of high importance for the banking system to find adequate budget before the project is started.

On the next level of importance, there is a need for organizational change together with good project management. In addition, the application of IT can assure that the infrastructure needed to support changes is properly utilized.

5. Summary

Iranian banking sector tries to implement business process re-engineering to migrate from old fashioned banking processes to innovative e-banking services. In order to avoid failure of BPR projects, we have applied an interpretive structural modeling approach to better understand critical success factors. This paper identified 9 CSFs and the relationships between them. It is also highlighted the level of importance of CSFs. The findings of proposed theoretical framework serve as a guideline for managers and other decision makers to concentrate on influential factors. It can assure the successful implementation of business process re-engineering.

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