Evaluating organizational agility in banking industry through data envelopment analysis: a case study of banks in Isfahan, Iran

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Received 2 September 2021
Revised 23 December 2021
4 May 2022
Accepted 9 June 2022

Abstract

Purpose – This study aimed to provide a model for evaluating organizational agility in the banking industry in Isfahan using the data envelopment analysis (DEA) approach.

Design/methodology/approach – This research's population consists of selected first-class branches of Saderat, Melli, Shahr, Maskan, Keshavarzi, Refah and Tejarat banks. Five branches of each bank and Bank Shahr as a newly established bank with two branches were included in the study. First, a suitable DEA model was selected and then agility inputs and outputs for designing the model were extracted from the literature. The selected model is an output-oriented returns to scale model. Inputs were agility enablers extracted from the A.T. Kearney model, whereas agility results were considered as the output.

Findings – The results showed that of the 32 selected branches, 4 were efficient and 28 were inefficient. In the end, the efficient branches were ranked using the Anderson–Peterson ranking model.

Originality/value – This study tries to provide a model for evaluating the efficiency of bank branches in terms of agility (relative agility) through the DEA technique, considering inputs and outputs of the organizational agility system. Accordingly, the managers can identify the efficiency of bank branches and also they can improve the inefficiency of bank branches.

Keywords Agility, Banking, Performance evaluation, Data envelopment analysis, Iran, Efficiency

Paper type Research paper

1. Introduction

The most descriptive characteristics that can be used for today's business world are "ever-changing" and "uncertain." As evidence of this claim, one should notice that production cycles are becoming shorter and shorter. In 1991, scholars of Lee Hai University published a paper in which they stated that today's production world is experiencing a novel paradigm called agility that is increasingly spreading as the most suitable way of competition among organizations. The world has faced significant changes at the beginning of the 21st century, especially in communication methods, violation of geographical and organizational boundaries, technological innovations, increased demand, improved customer expectations and breaking of major markets into smaller ones. Such changes have subjected organizational survival to major revisions in organizational priorities and strategic perspectives (Sharifi and Zhang, 2000). Arteta and Giachetti (2004) define agility as an organization's ability to adapt to changes and even identify and benefit from opportunities born out of change. Similarly, Christopher (2000) defines agility as an organization's ability to quickly respond to demand changes whether in volume or variation.

International Journal of Law and Management

1754-243X
DOI 10.1108/IJLMA-09-2021-0218

The concept of organizational agility was first used in manufacturing companies. Today, agility has also become popular in service organizations. The speed of technological advancements, together with increasing customer needs, will drive banks toward stepping into competition and work for customer satisfaction. Therefore, agility is the new paradigm that can fulfill the needs of bank customers and satisfy their demands (Mirsepasi and Farshchi, 2012). Various changes in the competitive world of today and the fact that Iran is on the brink of entering the World Trade Organization make it obvious that organizations need agility to guarantee their survival and banks are no exception. Without a doubt, to become agile, organizations need to have a framework to evaluate how agile they are. According to Sink and Tuttle (1989), no problem can be managed unless it can be measured. Since agility concepts entered operations management studies until now, many have tried to develop agility evaluation tools for organizations. The reason is that analysis, planning and control (as the key elements of management) require a well-documented method of concept evaluation. Fuzzy methods paired analytic hierarchy process (AHP) and cumulative index are among the evaluation methods proposed so far (Lin *et al.*, 2006). However, all these methods have only focused on evaluating agility capabilities in organizations. This means that the real need of organizations for agility has been neglected. How much an organization needs agility depends on environmental conditions? According to the definition, agility is the ability to quickly respond to changes, and because every organization is faced with its level of changes, the desirable level of agility in that organization will also be different. Therefore, organizational agility must be evaluated against the severity of environmental changes and market turbulence. The one major problem with agility evaluation methods is neglecting how much an organization needs agility in its processes. This is a requirement if businesses are to be evaluated and compared based on agility. Environmental changes and turbulence in customer needs determine the extent of agility required in a business, and because these factors differ for different organizations, the desirable level of agility will also be different. Therefore, evaluation methods need to determine how fast a business needs to respond to changes specific to its environment so that the required level of agility is properly determined. In this respect, developing agility evaluation methods have gained much importance in recent years. According to the literature, such evaluation methods can be divided into three categories: integrity index, AHP and fuzzy methods (Lin *et al.*, 2006). These methods are simple and easy to use; however, the inherent ambiguity of integrity indices and the lack of a proper evaluation of them prevent them from being as successful as expected in practice (Sutclife, 1999).To avoid the problems associated with integrity indices, many scholars have used fuzzy logic to deal with ambiguity. Again, it should be mentioned that despite the crucial role of agility in today's organizations, no unique desirable level of agility can be considered for every organization. Each agility measure must determine the desired level of agility based on the enabler structures and agility results of the specific organization. Enabler structures are affected by agility drivers, that is, the results of enabler structures are responses to agility derivers. To tackle the above shortcomings in the agility evaluation literature, a systematic view of the concepts of organization and organizational agility is needed. Only in this way can a method be developed to include agility enabler structures and agility results. Data envelopment analysis (DEA) seems an appropriate method for evaluating organizational agility because of its inherent systematic approach and mathematical and comparison capabilities. Banks are important entities and major constituents of every economy. They play a significant role in the development and economic growth. Therefore, evaluating their efficiency has always been an important issue. In this regard, DEA can be an effective approach for evaluating banks' efficiency. Using DEA, we will be able to compare and measure the efficiency of each unit in terms of agility

and provide a comprehensive ranking of bank branches. We will also be able to determine how much each unit needs to improve its outputs to reach the desirable level of efficiency, and how it can improve.

Agility measurement methods have a general drawback and that is not paying attention to the need for agility, to evaluate and compare the agility of firms with other firms. The severity of environmental changes and turbulence of customer needs determine the need for agility for firms, and because of the different nature and magnitude of these changes for different organizations, the desired level of agility for them will be different. Therefore, evaluation methods should measure the degree of agility as the ability to respond appropriately to these changes. In this paper, to eliminate this shortcoming, the DEA technique with the definition of agility inputs and outputs has been modified to evaluate the agility of organizations.

2. Theoretical background

Agility means the ability of an organization to feel, understand and predict changes in the business environment. An agile organization should be able to recognize environmental changes and see them as an opportunity to grow and bloom (Sharifi and Zhang, 1999). An agile organization is a collection of capabilities and merits that help it to survive and grow when faced with uncertain situations (Sharifi and Zhang, 2000). Such an organization must always look for environmental changes and areas of growth and prosperity without sparing even a single effort. In other words, early progress and a few successes must not fool an organization into believing that it is the absolute ruler of the business world. If this happens, it will easily be defeated by its competitors.

The research literature can be divided into three main categories: agility drivers, agility enablers and agility results. Agility drivers indicate changes in the business environment that always happen and drive an organization toward becoming agile. Agility (structural) enablers are organizational factors that constitute the agility infrastructure of an organization. Agility results refer to the achievements of an organization in response to agility drivers. However, for the term agility, a diversity of definitions has been proposed. Like any other general concept, agility cannot accept a universal definition. Based on the type of research, every researcher has proposed a specific definition for agility. Common to these definitions, however, is the ability to quickly adapt to constant changes and uncertain conditions in the modern world. Agile means "able to move quickly and easily." Goldman *et al.* define agility as a preaction to change. This means that to be agile, being prepared for change is not enough; a business needs to predict change and act before it happens. Goldman *et al.* consider four aspects of agility:

(1) enriching the customer as much as possible;

(2) cooperating to enhance competitiveness;

(3) organizing to overcome change and uncertainty; and

(4) leveraging the effect of people and information.

Zain and Rose (2005) see agility as a response to challenges imposed by a business environment replete with change and uncertainty.

Arefnejad *et al.* consider organizational agility in human resource flexibility and adaptation of the organization to environmental changes and task, competence and behavior flexibility components had the greatest roles in explaining organizational agility. These components were also strongly correlated with each other (Arefnejad *et al.*, 2020).

Sharifi and Zhang (2000) define an agile organization as one that tackles environmental turbulences and preacts to seize the profitable market with a vast insight of the modern business world and a load of capabilities and strengths. Dove (2001) mentions another fundamental characteristic of agile organizations – knowledge orientation – and defines agility as the ability to manage and use knowledge. It is clear from the above that, change, uncertainty and quick adaptation are the basic elements of a definition of agility. Many studies have so far been conducted on evaluating agility in organizations. Lin *et al.* divide agility evaluation methods into the following categories:

- integrated agility index;
- AHP; and
- fuzzy methods.

Some authors such as Yusuf *et al.* (1999), Ren *et al.* (2003), Van Hoek (2001), Christopher (2000) and Youssuf (1994) preferred the integrated index method, arguing that it is a combination of the required factors for agility. Others consider AHP as a suitable method for evaluating agility. AHP creates a hierarchy in which the first level is related to organizational agility, the second level indicates agility characteristics and the third level shows the organizations whose agility is being evaluated. In this way, AHP also provides a basis for comparison. These methods are simple and easy to use; however, the inherent ambiguity of integrity indices and the lack of a proper evaluation of them prevents them from being as successful as expected in practice (Sutclife, 1999). To solve these problems, many scholars prefer fuzzy logic to deal with uncertainty.

Tahanian *et al.* (2021) provide a framework for evaluating the large projects based on the sustainability dimensions and with an agility approach using DEA. To this end, sustainability indicators, agility indices in project management and project management critical success factors are identified. Graphs and efficiency results in sustainability attitudes show that among 27 projects, just 3 projects are efficient in all three attitudes. In addition, delivering product/service in the shortest time is the meaning of delivering value to the customer with extending the agility in project management.

2.1 Data envelopment analysis

Before discussing DEA for evaluating relative agility, a brief description of the DEA technique seems necessary.

DEA is a mathematical planning model for measuring the efficiency of a decision-making unit (DMU) with multiple inputs and outputs. Because of its importance in the performance evaluation of an organization, efficiency measurement has always been a subject of research for many scholars. Farrell (1957) tried to measure the efficiency of production units with a method similar to those for efficiency measurement in engineering. Farrell's case for measuring performance included an input and an output. In 1978, Banker *et al.* (1984) extended Farrel's work to measure the efficiency of units with multiple inputs and outputs. The model they used is now called DEA. Despite being young, this method has been used to measure the efficiency of almost all types of organizations, including banks, insurance companies, factories, universities, hospitals and educational institutions (Mehregan, 2012). Since this model was presented by Charans, Cooper and Rhodes, it became known as the Charnes, Cooper and Rhodes (CCR) model, the first letter of the above names. The basic CCR model of data envelopment analysis assumes a constant scale return. In 1982, Banker, Charns, Cooper introduced the Banker, Charnes and Cooper (BCC) model. The BCC model assuming returns to the variable scale. BCC uses returns to scale and its effect on the relationship between inputs and outputs. It is used when no definite returns to scale can be

considered for a DMU. Returns to scale models give returns of the unit to scale in addition to efficiency. ADD models consider simultaneous output improvement and input reduction. The (basic) output-oriented BCC model is as follows:

$$\text{Min } Z_0 = \sum_{i=1}^{m} v_i x_{io} + w$$

St:

$$\sum_{r=1}^{s} u_r y_{r0} = 1$$

$$\sum_{i=1}^{m} v_i x_{ij} - \sum_{r=1}^{S} u_r y_{rj} + w \geq 0 \qquad (j = 1, 2, ., n)$$

$$u_r, \quad v_i \geq \varepsilon$$

In efficient DMUs, the idea is to compare different units by eliminating the unit whose efficiency is being measured and making a linear combination of other ones. The basic model uses the unit itself as the marker unit. Therefore, because inefficient units are not considered in creating the efficiency boundary, their elimination will not affect the efficiency boundary either, and thus, their technical efficiency will not change even in the Anderson–Peterson model. On the other hand, the elimination of efficient units that play a role in forming the efficiency boundary will affect the boundary. The efficiency number given to efficient units in this model is 1 or higher:

$$\text{Max} w_p = \sum_{r=1}^{S} u_r y_{rp}$$

St:

$$\sum_{i=1}^{k} v_i x_{ip} = 1$$

$$\sum_{r=1}^{s} u_r y_{rj} - \sum_{i=1}^{k} v_i x_{ij} \leq 0 \; j = 1, 2, \ldots, n, j \neq p$$

$$u_r \geq 0 \qquad r = 1, \ldots, s$$
$$v_i \geq 0 \qquad i = 1, \ldots, k$$

2.2 Data envelopment analysis and agility

As was mentioned previously, in most cases, agility has been evaluated based on intraorganizational agility capabilities. However, an approach is needed that can provide suggestions for reaching the desired level of agility based on specific environmental changes and competitors.

Although DEA was developed to evaluate the efficiency of DMUs, the agility model still needs to be prepared so that this technique produces the desirable results. For this purpose, a systematic view of the agility model is required. In general, agility models have three parts:

(1) agility drivers (severity of change and uncertainty);

(2) agility structural enablers (intraorganizational factors that an organization needs to become agile); and

(3) agility results (organizational achievements in response to agility drivers).

The initial part of agility models usually describes the conditions that have forced an organization to move toward agility. These conditions are, in fact, environmental changes whose severity imposes a specific level of agility on the organization. The next part is related to agility enablers. These are the output of the first part and provide input for the second. Agility enablers are a collection of fundamental factors within an organization that is affected by drivers and produce results that indicate organizational achievements in response to drivers (Figure 1).

Agility drivers, which are used as inputs to the model, must be determined by banking experts. However, because efficiency is measured similarly for all branches through two-step DEA, the above model is modified so that the agility efficiency of each branch can be measured through one-step DEA (classic). The new concept model is as follows (Figure 2).

DEA can evaluate and rank the relative agility of organizations by comparing their achieved agility based on the severity of their specific environmental changes. One requirement of DEA models is the similarity of all units; in other words, for a group of units to be included in a DEA-based study, their inputs and outputs must be similar. It is not organizational efficiency that is evaluated in this study, but it is organizational efficiency in terms of agility – agility efficiency. Systematically, agility (type of inputs and outputs) has a similar structure for all organizations (as mentioned above). Therefore, using DEA for evaluating the agility efficiency of banks is completely justified.

One of the most important steps before evaluating the selected units is choosing a suitable model. In choosing the suitable model for the DEA technique, two factors are important: type of returns to scale and type of the problem, that is, whether it is input- or output-oriented. Because in evaluation problems the focus should be on a controllable characteristic, the model only needs to consider the output for enhancing agility. Therefore, an output-oriented model is suitable for this study. In addition, because returns to scale is unknown in organizational agility, the variable returns to scale model was used. To sum, for relative agility evaluation in this study, the DEA technique and the variable output-oriented returns to scale model are used.

In this model, organizations are compared in terms of changes they face (as input) and their responsiveness (output). By defining agility as the "ability to respond appropriately and quickly," we can determine the most agility efficient organizations as those who have predicted changes and have achieved the most out of agility. Such organizations are the determining units on the efficiency boundary in the DEA model.

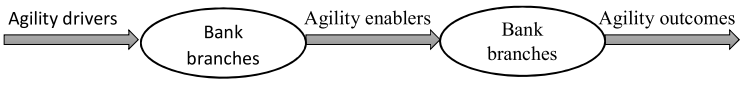

Figure 1.
Basic conceptual model

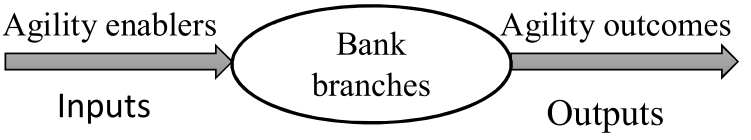

Figure 2.
Modified concept model

2.3 Inputs and outputs of data envelopment analysis model for relative agility evaluation

The main parts of the agility model in this study are drivers, enablers and agility results. Drivers are the initial components and create the need for agility in an organization. Thus, they act as the input to the system. The need for agility creates agility structural enablers; these enablers are the output of the first step. As responses to changes, organizational achievements (agility outputs) are outputs of the second step of the model. However, agility drivers (model inputs) need to be determined by banking experts. If efficiency is measured by two-step DEA, it will not be possible to compare the DMUs. Therefore, this study uses the classic model of agility evaluation, in which inputs are agility enablers and outputs are agility results. Below, the inputs and outputs of the DEA model for relative agility evaluations are explained. These components are extracted from the literature and are classified accordingly.

2.4 Inputs (agility enablers)

The initial part of agility evaluation models describes the conditions that have necessitated moving toward agility. These conditions are changed in the business environment that provides a certain level of agility, that is, a certain level of agility is required to confront them. Agility enablers are a collection of effective intraorganizational factors that are affected by agility drivers and create specific (agility) capabilities in an organization (Sharifi and Zhang, 1999).

The model used for agility enablers (the input to the DEA model) is the A.T. Kearney model. The reason is that this model is more comprehensive than its previous models. In addition, its components are localized to Iran's banking industry.

Studies by A.T. Kearney Global Consumer Institute (provider of the A.T. Kearney model) have shown that to improve agility, agile organizations need to focus on six elements: organizational change; leadership; cultures and values; performance management; customer service; and electronic baking.

In this study, we tried to use indicators that are localized to Iran's banking industry while considering the main elements of the basic model of research. These measures are shown in Table 1.

2.5 Outputs (agility results)

Agility results refer to factors used to evaluate organizational agility. These factors indicate organizational achievements in response to agility. They also indicate how an organization reacts to changes and how effective and efficient it is in achieving agility.

Agility elements	Agility indicators
Organizational change	Customer needs and requirements, competitors' conditions, regulatory governmental entities
Leadership	Planning based on strategic goals and resources, setting clear and applicable goals, using team leadership style
Cultures and values	Encouraging employees to develop and give ideas, employee participation in decision making, an active suggestion system
Customer service	Honoring the customer, a suitable IT platform, knowledge of customer needs
Performance management	Evaluating employee performance, evaluating branch performance, quantity and quality of annual educational plans
Electronic banking	Reducing personal visits, increased use of Internet, more transactions in less time

Table 1. Agility structural enablers (Kearney, 2003)

Evaluating these results gives the absolute level of organizational agility. In most studies, agility results are defined as organizational achievements in response to agility drivers. In this regard, the following indicators have been mentioned: enriching the customer with products, controlling change and uncertainty and leading the organization through knowledge (Goldman *et al.*, 1995). In a classification of change drivers, these factors are divided into customer-related and business-related factors. As was mentioned, agility results are responses to agility drivers. Therefore, agility results are also divided into customer-related and business-related categories. Table 2 shows these categories and the related six indictors.

By specifying inputs and outputs of organizational agility, the DEA model for agility evaluation is created. It is clear that, by measuring and feeding input and output values, we can obtain the expected results from the proposed model.

3. Methodology

In this section, the proposed method for relative agility evaluation is discussed in more detail.

The research sample is the first-class branches of seven banks – Saderat, Melli, Shahr, Maskan, Keshavarzi, Refah and Tejarat – in Isfahan, Iran. In each bank five branches are selected (Table 3).

First, a suitable evaluation model was designed (Figure 1). This is the most important step before beginning the evaluation process. In selecting a suitable DEA-based evaluation model, two factors must be considered: type of returns to scale and type of the problem – whether it is input- or output-oriented. In evaluation problems, the focus should be on a controllable characteristic; therefore, to enhance agility, the model only needs to consider the output. As a result, the suitable model would be output-oriented. On

Table 2.
Agility results (DEA output)

Agility dimensions	Agility indicators
Customer-related factors	Responsiveness to customer taste Christopher (2000) Levary (1992) Yusuf *et al.* (1999) Sharifi and Zhang (2001)
	Providing customized products and services Kidd (2022) [1]
Business-related factors	The increasing rate of technology development Christopher (2000) Browne *et al.* (1995) Yusuf *et al.* (1999) Kidd (2022)
	Offering new products and services Browne *et al.* (1995) Levary (1992)

Table 3.
Research population

Bank name	Saderat	Melli	Keshavarzi	Tejarat	Refah	Maskan	Shahr
No. of branches	5	5	5	5	5	5	2

the other hand, returns to scale is unknown in the organizational agility system. This requires that the variable returns to scale model is used. The next step is to define inputs and outputs. This was done through a careful study of agility evaluation literature and interviews with university professors.

The third step was to evaluate agility enablers (Table 2). This was done through questionnaires that used a five-point Likert scale, and the data were obtained from the highest-ranking person in each branch because of their comprehensive view of the unit they are responsible for.

To evaluate the output of the agility system, agility results indicators in Table 2 were sent to the chief executive of every branch in the form of questionnaires. The questionnaires measured the score of every indicator using a five-point Likert scale. To control bias and prevent misunderstandings, questionnaires were completed by experts of each branch through consensus in the presence of the researcher. Each indicator and its possible minimum and maximum values were first explained by the researcher. The experts were then asked to score their branch for that indicator. In this way, the scores of agility results of every branch were obtained.

After gathering input and output data and calculating their mean, the basic output-oriented returns to scale model was designed and calculated in Lingo software version 11. The efficient and inefficient branches were determined and efficient branches were ranked through the Anderson–Peterson model (Figure 3).

4. Results

In this study, the measuring relative agility of 32 selected first-class branches of seven banks was evaluated. After designing the DEA-based output-oriented linear model, 32 models were given to Lingo software version 11. The results are shown in Table 4.

The efficiency or inefficiency of a branch can be determined by the efficiency value obtained from the model. The column that is shown by Z in Table 4 shows the efficiency value of each branch. Z values greater than 1 indicate an efficient branch, whereas Z values lower than 1 indicate an inefficient branch. The column shown by W in Table 4 shows the returns to scale for each branch. Positive W ($W > 0$) indicates that returns to scale for the related branch is decreasing, whereas negative W ($W < 0$) shows an increasing returns to scale. $W = 0$ means that returns to scale is constant. For example, in Table 4, branch 1 is inefficient because its efficiency value (Z) is lower than 1 and it has decreasing returns to scale. In other words, if resources are doubled, the output will increase by less than twice the previous output. According to the above, only four branches satisfy efficiency conditions. Efficiency values of the branches are calculated so that they are later ranked through the Anderson–Peterson ranking technique. Ranking and ordering the braches gives the final ranking of units in terms of agility (Table 5).

As mentioned before, all DMUs experience similar environmental conditions. Agility drivers are the same for all of the branches; however, agility drivers create agility enablers, and agility enablers create agility results. These results are a response to agility drivers. According to Table 5, efficiency evaluation and ranking results show that one of the branches of Melli bank is ranked 1 inefficiency. The reason is that this branch has a small number of enablers (inputs); therefore, despite fewer agility results, it has a high level of organizational efficiency in terms of agility. In other words, the branch had been able to appropriately respond to its little need for agility. A minimum of enablers has resulted in the most achievements in this branch. A Refah Bank branch

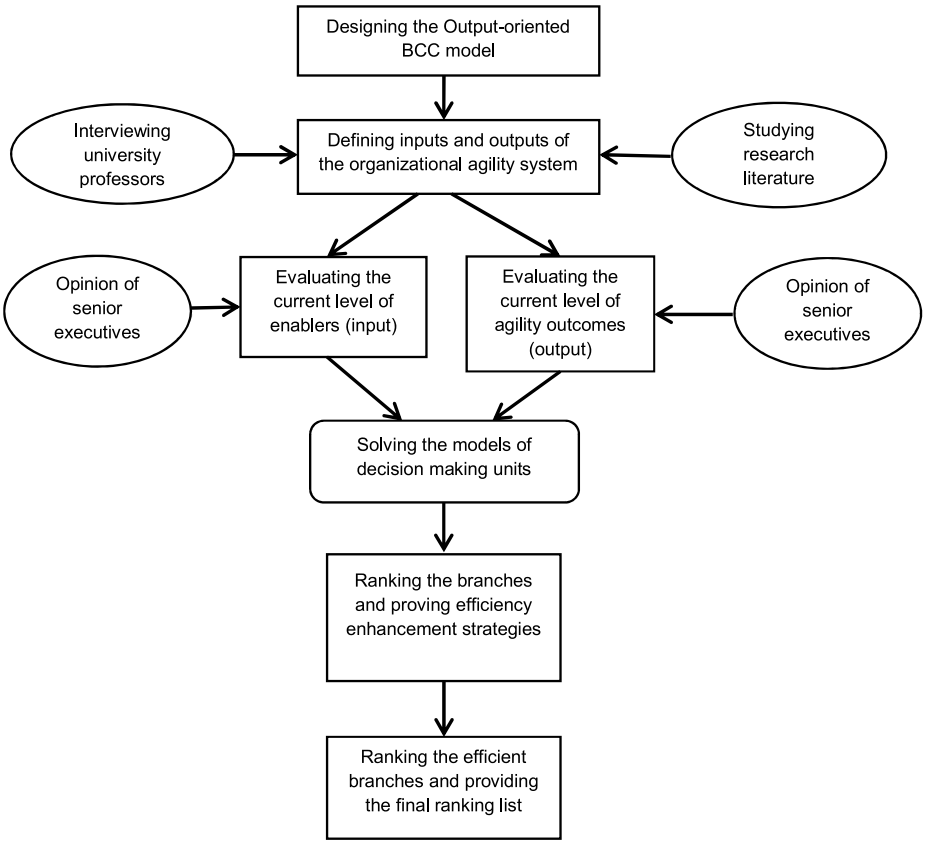

Figure 3.
Steps of the study

has ranked second in relative agility. Input and output data of this branch shows that this branch also has a few enablers (inputs) compared to other branches. Maskan and Tejarat branches have ranked third and fourth, respectively. Similarly, other branches have been ranked according to their enablers (inputs) and agility results. The above showed the status of different branches in terms of agility. But the question is "what should inefficient branches do to reach the desirable level of efficiency in terms of agility?" In DEA-based output-oriented models, the values obtained for the objective function show the output percentages required for the unit to reach the efficiency boundary in terms of agility. Therefore, applying these values to the current outputs will give the outputs required for this purpose. Table 5 shows these values for different branches. If the DEA models are solved for the values obtained in this way, the resulted efficiency values will be equal to 1.

By comparing desirable and current outputs of inefficient branches, one can obtain the required percentage of increase for the branch to become efficient. In other words, the desirable situation in the following table indicates the outputs that will convert an inefficient branch into an efficient one. An increase percentage shows the required percentage of change for this purpose.

Bank name	DMUs	Efficiency value (Z)	Returns to scale (W)
Saderat 1	DMU 1	0.9607	0.632
Saderat 2	DMU 2	0.9603	0.625
Saderat 3	DMU 3	0.933	0.979
Saderat 4	DMU 4	0.982	0.533
Saderat 5	DMU 5	0.972	0.553
Melli 1	DMU 6	0.967	0.839
Melli 2	DMU 7	0.80	0
Melli 3	DMU 8	0.811	0
Melli 4	DMU 9	0.976	0
Melli 5	DMU 10	1	0.914
Refah 1	DMU 11	1	0.355
Refah 2	DMU 12	0.977	0
Refah 3	DMU 13	0.960	0.632
Refah 4	DMU 14	0.966	0.843
Refah 5	DMU 15	1	0.857
Tejarat 1	DMU 16	0.951	0.868
Tejarat 2	DMU 17	0.891	0
Tejarat 3	DMU 18	0.848	0.756
Tejarat 4	DMU 19	0.954	0.667
Tejarat 5	DMU 21	0.929	0.981
Shahr 1	DMU 21	0.750	0.778
Shahr 2	DMU 22	0.77	1.10
Keshavarzi 1	DMU 23	0.916	0.73
Keshavarzi 2	DMU 24	0.636	1.37
Keshavarzi 3	DMU 25	0.625	1.60
Keshavarzi 4	DMU 26	0.693	1.08
Keshavarzi 5	DMU 27	0.506	1.71
Maskan 1	DMU 28	1	0.709
Maskan 2	DMU 29	0.675	0
Maskan 3	DMU 30	0.840	0.667
Maskan 4	DMU 31	0.759	1.166
Maskan 5	DMU 32	0.721	1.20

Table 4.
Results of solving 32 DEA-based models

5. Conclusion and suggestions

Environmental complexities and increased customer expectations have made performance evaluation and awareness of organizational strengths and weaknesses a necessity. The first step in this regard is to evaluate efficiency. This study tried to provide a model for evaluating the efficiency of bank branches in terms of agility (relative agility) through the DEA technique, considering inputs and outputs of the organizational agility system. For this purpose, first, a suitable DEA model was selected, and then agility inputs and outputs were extracted from the literature. Agility enablers were considered as the input, and agility results were considered as the output of the DEA model. Finally, the study model – variable output-oriented returns to scale model – was solved for input and output data.

Inputs to the study model were agility enablers selected based on the localized A.T. Kearney model. The outputs were agility results divided into two categories: customer- and business-related results. All agility results are responses to agility drivers in the banking industry. After designing the model, the efficiency of each branch in terms of agility was measured and the efficient branches were ranked. To improve efficiency in customer-related results, the results can help to find several solutions, for example, being aware of customers and their needs to respond to customer preferences, offering new products and services,

Table 5.
DMU rankings and the required values to improve efficiency

Rank	Efficiency in terms of agility	Branch no.	Bank name	Reference unit	Output 1 Customer-related results			Output 2 Business-related results		
1	2.1123	10	Melli	10	3.75	3.75	0%	3.5	3.5	0%
2	1.125	11	Refah	11	4	4	0%	4.5	4.5	0%
3	1.1023	28	Maskan	28	3.75	3.75	0%	4	4	0%
4	1.0437	15	Tejarat	15	4	4	0%	4	4	0%
5	0.98245	4	Saderat	10 and 11	2.75	3.88	41%	4	4.06	0.015%
6	0.977	12	Refah	10	3.25	3.3	0.015%	2	3.08	54%
7	0.976	9	Melli	10 and 28	2.5	3.88	55%	4	5.30	37.5%
8	0.972	5	Saderat	10 and 11	2.5	3.88	55.2%	4	4.06	1.5%
9	0.967	6	Melli	10 and 15	3.75	3.87	3.33%	3.5	3.75	7.14%
10	0.966	14	Refah	10 and 15	3.75	3.875	3.33%	3.5	3.75	7.14%
11	0.9607	1	Saderat	10 and 11	2.25	3.87	72%	3.5	3.63	3.71%
12	0.9603	13	Refah	10 and 11	3	3.78	26%	3.5	3.64	4%
13	0.9603	2	Saderat	11 and 28	3	3.83	27.66%	4	4.165	4.125%
14	0.954	19	Tejarat	10 and 11	3	3.79	26.33%	3.5	3.66	4.57%
15	0.951	16	Tejarat	10, 11 and 15	3.75	3.93	4.8%	4	4.194	4.85%
16	0.933	3	Saderat	10	3.5	3.75	7.14%	2.5	3.5	40%
17	0.929	20	Tejarat	10 and 15	3.5	5.792	62.85%	3	5.55	85%
18	0.916	23	Keshavarzi	10 and 11	2.75	3.825	38.90%	3.5	3.81	8.57%
19	0.891	17	Tejarat	10 and 28	2.75	3.32	20.72%	3	3.362	12%
20	0.848	18	Tejarat	10 and 28	2.5	6.75	170%	3	6.015	100.5%
21	0.840	30	Maskan	10 and 11	3	3.91	30.33%	3.5	4.165	17.1%
22	0.811	8	Melli	10 and 28	3.25	4.49	38.15%	3.5	4.28	22.28%
23	0.80	7	Melli	10	3	3.75	25%	2	3.5	75%
24	0.77	22	Shahr	10 and 15	3	3.87	29%	2.5	3.74	49.6%
25	0.759	31	Maskan	10, 11 and 15	3	**7.51**	**150.3%**	3	7.956	165.2%
26	0.750	21	Shahr	10 and 11	2.75	3.87	112%	3	4	33.33%
27	0.721	32	Maskan	10 and 15	2.75	3.80	38.18%	2	3.62	162%
28	0.693	26	Keshavarzi	10, 11 and 15	2.75	6.25	127.2%	3	6.61	120.3%
29	0.675	29	Maskan	10	3.25	3.3	1.53%	1	3.08	208%
30	0.636	24	Keshavarzi	10 and 15	3	3.92	30.66%	3.5	3.85	10%
31	0.625	25	Keshavarzi	15	2.5	4	60%	1.5	4	166.6%
32	0.506	27	Keshavarzi	10 and 15	2	3.948	97%	1	3.9	290%

providing customized banking services, considering customer expectations and trying to fulfill them. To improve efficiency in business-related results, the following are suggested: improving hardware and software platforms under state of the art in banking systems, focusing on competitors and the current conditions in the banking industry and identifying unpredictable events and trying to prevent their negative effects.

6. Limitations of the study and future research

One of the limitations of this study Due to the confidentiality of banks' information and insufficient cooperation of branches, the statistical population of the research was limited. Another study was on the relationship between model variables. In this study, the assumption was that an enabler directly affects agility results; however, an enabler may affect agility results through a mediating variable like agility capabilities. This was not considered in the present study. Another limitation was that the business environment was assumed similar for all DMUs – bank branches. This assumed similarity made it impossible to make a comparison of all the branches. The third limitation was related to the research population. The population was branches of seven banks in Isfahan; however, some of the banks that did not satisfy the inclusion criteria did not permit the distribution of questionnaires in the selected branches. Therefore, some of the branches were not at the same level in terms of homogeneity (resource allocation, banking expenses). Finally, the questionnaire is a limited data gathering tool by nature. Therefore, the indicators were all measured subjectively, which is another limitation of the study.

Future researchers who like to work in this area may benefit from the following suggestions. Only three variables – agility drivers, agility enablers and agility results – were considered in this study. An extension would be to include other variables in a more comprehensive model like multistage DEA. In this study, all DMUs were in the same business environment. It is suggested that future research includes a range of service industries, such as banks, insurance companies and mail services so that a comparison of different DMUs is possible. It is also suggested that future research uses a smaller number of banks so that there is more homogeneity among different branches and comparisons between efficient and inefficient units are more logical.

Note

1. www.cheshirehenbury.com

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