Identification and Prioritization of Efficiency-Influencing Factors in Banking Using MADM Technique (Case Study: Tejarat Bank)

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Abstract

The present study is an attempt to identify and prioritize efficiency-influencing factors in banking system based on Analytic Hierarchy Process (AHP) and (topsis), performed by considering comments and remarks of Tejarat bank experts in Tehran. For this purpose, first the most important efficiency-influencing factors were identified by studying the related literature, background of the study, and interviews with some of Tejarat bank's managers and authorities. Then, by performing a field study, it was attempted to ask Tejarat bank experts for their opinions in Tehran as the statistical population of the study. After analyzing data and testing measures using T- student test, it was finally found that all recognized variables and factors influence banking efficiency. Results obtained from Analytic Hierarchy Process (AHP)-based statistical studies and analyses indicated that among the main criteria, the criteria of hardware, software, and working systems are the most important, followed by manpower; financial tools and attitudes have the lowest priority. Also, regarding sub-criteria, the sub-criteria of customers-specific convenient facilities, targeted marketing and advertisement of products and services had the highest rank.

Keywords: Efficiency, Analytic Hierarchy Process, (AHP) Technique, Topsis

Introduction

Since the remote past, humans have paid attention to evaluation and assessment of performance. In fact, performance evaluation is a process which begins with human birth and attempts to correct and promote individuals' performance. Human has been faced with a problem called limited resources and facilities of production at all times. Considering limited resources and facilities and increasing promotion of goods and services' level of consumption, maximum use of existing facilities is one of the most important feasible solutions to reduce the gap between supply and demand (Samaoilenko *et al.* 2013).

In the current era, significant changes in management knowledge has made the existence of evaluation system inevitable in such a way that absence of evaluation system in different aspects including evaluation in using resources, facilities, aims, and strategies regards managers and staff as one of the symptoms of organization's diseases (Bougnol *et al.* 2012).

Evaluating amount of achievement to aims and the way of using resources and facilities plays a very important role in this regard. Indeed, performance evaluation is considered as the core of activities and measures of management (Akçay *et al.* 2013). The fact is that due to the fundamental role of banking system in countries' economy, efficiency of banking system has always gained attention from statesmen because weak banking system can be threatening to economic stability. With the entry of private banks into the arena of Iran's banking system and also due to privatization of some public banks, banks are increasingly competing to attract customers' funds and it is quite clear that there is a high capacity in this regard in our country because every day we are witnessing the emergence of a new private bank (Venos and Safaiyan, 2010). Thus, the present study attempts to determine and explain the factors influencing Tejarat bank's branches

efficiency and prioritization of these factors in Tehran with the help of Multiple Attribute Decision Model (MADM).

Review of Literature

Under current circumstances and with the increasing development of science and technology, it still limited to existing facilities. Economic attempts by human have always focused on obtaining maximum result from existing facilities and factors, which is the very tendency of humans to the highest efficiency. Regarding efficiency, including at the level of enterprises and monetary and financial institutions, the present study is considered as one of the most important and fundamental economy-centered research (Imami Meybodi, Ali, 2000).

In 1957, Farrell attempted to measure efficiency for a production unit using a method like measuring efficiency in engineering matters. Efficiency is the relation of actual obtained return to the expected return. In other words, it is the relation of the amount of work done to the amount of work that must be done (Wu *et al*, 2013). Webster dictionary has considered efficiency as equivalent to effectiveness and has defined it as the capacity of desirable production with minimum consumption of energy, time, money, or material (Farhang, Manouchehr, 1997).

A study by Hauner (2005) has attempted to compare and investigate the efficiency of cost and measure between Germany and Austria's major banks during 1995-1999 using Data Envelopment Analysis (DEA) method. Results of this study indicate that the mean efficiency of Austrian banks is lower than that of German banks (Hauner, 2005).

In 2009, Asrayeri conducted a study in relation to Persian Gulf Cooperation Council Countries and concluded that inefficiency has a positive relationship with operational cost and loan-to-asset ratio and a negative relationship with the ratio of stock holders' rights to asset, of net profit to total asset, and bank size (Asrayeri, 2009).

In a study, Hadiyan and Azimi (2006) have investigated the status of 10 specialized and commercial banks in the country during 1997-1999. Results of this study suggest that during the study period, specialized banks have enjoyed a better position than commercial banks in terms of specialized and economic technological efficiency (Hadiayn et.al, 2004).

Research Methodology

The present study was conducted in Tehran in 2013 with a research approach. First, the factors influencing efficiency of branches of Tejarat bank in Tehran are identified and prioritized. Research data are collected through library and field studies as well as doing interviews with subject-familiar managers and experts and filling out questionnaire by them. This study is a survey-type descriptive research in terms of collecting data and an applied research in terms of aim.

The statistical population of the study includes faculties and Tejarat bank managers and experts. This study adopts a simple random sampling method. The statistical sample of this study includes managers and experts of 10 branches of Tehran's Tejarat bank.

In order to determine the suitable sample size from the introduced population and verify research findings, "Cochran" formula with below-mentioned conditions has been used. Cochran formula:

$$n = \frac{NZ\left(\frac{\alpha}{2}\right)^2 P(1-P)}{(N-1)\varepsilon^2 + Z\left(\frac{\alpha}{2}\right)^2 P(1-P)} \qquad n = \frac{70 * (1.96)^2 * 0.5 * 0.5}{69 * (0.05)^2 + (1.96)^2 * 0.5 * 0.5} = 60$$

The appropriate sample size for this study will be 60 persons.

Among the distributed questionnaires, 66 questionnaires were returned and due to answers' incompleteness, 60 questionnaires have been analyzed. Thus, selecting sample in this kind of

analyses isn't as true as other analyses and has been used from the viewpoint of this bank's experts and managers who were 20 persons.

The method adopted in the present study is the Multiple Attribute Decision Making combined model of AHP-TOPSIS. Also, T-test has been used to identify efficiency-influencing factors in Iran's banking system. Finally, in order to choose the most important efficiency-influencing factors, SPSS-gathered data have been analyzed. Next, after gathering data, Expert Choice and Excel 2007 have been used. Validity of research questionnaire is content-type in which questionnaires' content have been confirmed by research advisors and readers and some production experts, counselors, and Tejarat bank experts. In order to test reliability, Cronbach's alpha has been computed with the help of SPSS. Considering the measure of Cronbach's alpha coefficient which is 0/735, the reliability of the study has been confirmed. Research hypotheses are as follow: the main hypothesis: "factors of organization and management, hardware, software and, work systems, manpower, customer and environmental factors, and financial tools and attitudes influence the improvement of banking efficiency."

H1: The aspect of organization and management influences the improvement of banking system.

H2: Hardware, software, and work systems influence the improvement of banking system.

H3: The aspect of manpower influences the improvement of banking system.

H4: The aspect of customer and environmental factors influences the improvement of banking system.

H5: The aspect of financial tools and attitudes influences the improvement of banking system.

The tree of decision which constitutes the basis of hierarchical structure includes aim, criteria, and sub- criteria as follow:

Level 1: It is the same as research purpose, meaning the prioritization of efficiency-influencing factors in banking.

Level 2: It is referring to criteria which are divided into five factors: organization and management, hardware, software, work systems, manpower, customer, and environmental factors.

Level 3: It in fact regards sub-criteria in which study, 60 sub-criteria influencing banking efficiency have been identified.

Research Findings

Respondents of relative frequency are between 35-45 years old, followed by the age group of 55-64 in such a way that these two age groups have constituted 83% of the sample size. Also, the age group of 55 years and above has the least frequency, meaning 17%. The highest frequency of education level relates to people with bachelor's degree, meaning 36% of the sample size. Also, 20% of the sample size belongs to people with associate degree, and 20% belongs to graduate students. In terms of gender, men constitute 85% of the sample size. Furthermore, among respondents, 82% have had an expert position in the organization and the rest have had a management position in units.

The main hypothesis:

H0: Efficiency-influencing factors in Tejarat bank are normally distributed.

H1: Efficiency-influencing factors in Tejarat bank are not normally distributed.

Considering Kolmogorov – Smirnov test results, we see that factors influencing the improvement of Tejarat-e-Eghtesad bank's efficiency are normally distributed. KS value calculated at the confidence level of 95%, (α= 0/05), is smaller than KS in the critical table and (Sig≥0.05).

Therefore, the H0 is corroborated by observations and it is concluded that variables are normally distributed.

Table 1: Hypotheses-related descriptive statistics

Variable	Number	Mean	SD	Mean SD Error
Banking Efficiency-Influencing Factors	60	3.856	0.29322	0.03785
Organization and Management	60	3.7833	0.48334	0.0624
Hardware, Software, and Work System	60	3.8467	0.41065	0.05301
Manpower	60	3.9618	0.52131	0.0673
Customer and Environmental Factors	60	3.7	0.40074	0.05174
Financial Tools and Attitudes	60	3.6458	0.22686	0.02929

Table 2: Hypotheses-related t-test

	T-test Statistics	Freedom Degree	Two-way significance test	Mean difference	Confidence distance difference 95%	
					Low	High
Banking Efficiency-Influencing Factors	22.613	59	0/00	0.856	0.78003	0.9317
Organization and Management	12.554	59	0/00	0.78333	0.6585	0.9082
Hardware, Software, and Work System	15.97	59	0	0.84667	0.7406	0.9527
Manpower	14.291	59	0	0.96183	0.8272	1.0965
Customer and Environmental Factors	13.53	59	0/002	0.7	0.5965	0.8035
Financial Tools and Attitudes	22.052	59	0/00	0.64583	0.5872	0.7044

It is concluded from the results of the main hypothesis testing that the main hypothesis is corroborated with confidence of 95%. In other words, "factors of organization and management, hardware, software, and work systems, manpower, customer and environmental factors, and financial tools and attitudes influence the improvement of banking efficiency. Considering the results of testing H1, we conclude that with confidence of 0.95%, the aspect of organization and management influences the improvement of banking efficiency. Concerning H3, it is concluded that with confidence of 95%, the aspect of manpower influences the improvement of banking efficiency. Regarding H4, it is concluded that with confidence of 95%, the aspect of customer and environmental factors influences the improvement of banking efficiency. Regarding H5, we conclude that with confidence of 95%, the aspect of financial tools and attitudes influences the improvement of banking efficiency.

As it can be seen, the aspect of hardware, software, and work systems has the most importance, with relative weight of 0/306. Therefore, it has the greatest impact among the factors influencing the improvement of efficiency, followed by manpower with relative weight of 0/239.

The aspect of financial tools and attitudes has the last priority, with relative weight of 0/108. Inconsistency rate of paired comparisons has been obtained as 0/03. The consistency of these comparisons is acceptable due to the inconsistency ratio of smaller than 0/10.

Table 3: Matrix of Paired Comparisons of Main Criteria

Major Criterion	Organization and Management	Hardware, Software, and Work System	Manpower	Customer and Environmental Factors	Financial Tools and Attitudes
Organization and Management	1.00	0.56	0.83	1.40	2.90
Hardware, Software, and Work System	1.80	1.00	1.20	2.50	2.30
Manpower	1.20	0.83	1.00	1.70	1.50
Customer and Environmental Factors	0.71	0.40	0.59	1.00	1.70
Financial Tools and Attitudes	0.34	0.43	0.67	0.59	1.00

Table 4: Weighting and Prioritization of Main Efficiency Improvement-Influencing Factors

Row	Main Criteria	Weight	Priority
1	Organization and Management	0.203	3
2	Hardware, Software, and Work System	0.306	1
3	Manpower	0.239	2
4	Customer and Environmental Factors	0.144	4
5	Financial Tools and Attitudes	0.108	5

Table 5: Prioritization of Sub-Criteria of Organization and Management Criterion

Row	Sub-Criterion	Weight	Priority
1	Manager's Behavioral Characteristics	0.098	2
2	Division of Labor and Description of Specified Jobs	0.083	4
3	Delegation of Authority	0.057	9
4	Internal Control System	0.059	8
5	Transparency in Business Processes and Activities	0.078	5
6	Strategic and Operational Program and Specified Targets	0.042	13
7	Attention to Research and Development	0.064	6
8	System of Evaluating Organization's performance and Manpower	0.045	12
9	Use of Modern Methods in Budgeting Process	0.05	11
10	Presentation of Transparent (Financial and Non-financial) Periodic	0.029	15
11	Organization's Brand	0.032	14
12	Performing Social Responsibilities	0.052	10
13	Customer-Respect Culture	0.09	3
14	Organization's Strategies	0.14	1
15	Focus on Islamic Banking	0.061	7
16	Stockholders' Decision-Making Approach	0.021	16

Performance Reports

Consistency rate for combined matrix of criteria of the above table is 0/04. Thus, respondent-made paired comparisons enjoy a high consistency. The sub-criteria of organization's strategies and manager's behavioral features have the most importance and top priorities, with weights of 0/140 and 0/098 respectively.

Table 6: Prioritization of Sub-Criteria of Hardware, Software, and Work Systems Aspect

Row	Sub-Criteria	Weight	Priority
1	Up-to-date Hardware Equipment	0.096	6
2	Work environment-Suitable Ergonomics	0.111	4
3	Customer-Specific Facilities	0.137	1
4	Products and Services' Targeted Marketing	0.127	2
5	Products and Services' Targeted Advertisement	0.112	3
6	Classification of Customers and Offer of Special Services to Each Class	0.09	7
7	Establishment of Work Process Management System	0.063	8
8	Comprehensive Information System and (Financial and Non-financial) Information Dashboards	0.1	5
9	Establishment of System of Physical Assets Management	0.042	11
10	Offer of Modern Banking Products (in the Area of Deposits, Facilities, Investments, etc.)	0.046	9
11	Use of IT in Offering Services	0.045	10
12	Branch Planning System	0.031	12

Considering the software-obtained results, the sub-criteria of customer-specific facilities and products and services targeted marketing have the most importance, with weights of 0/137 and 0/127 respectively. Therefore, they occupy the first and second priority. The inconsistency rate of paired comparisons is 0/08. Thus, consistency of these comparisons is acceptable too.

Table 7: Prioritization of Manpower Sub-criteria

Row	Sub-Criteria	Weight	Priority
1	Expert Managerial Body	0.048	11
2	Meritocratic system	0.055	10
3	Salary and Welfare Facilities	0.109	4
4	General Training of Manpower	0.077	6
5	Specialized Training of Manpower	0.066	9
6	Education of Manpower	0.12	2
7	Skill and Experience of Manpower	0.074	7
8	Age Integration of Manpower	0.073	8
9	Behavioral Features of Manpower	0.118	3
10	Reward System (Encouragement & Punishment) Based on Manpower Performance	0.087	5
11	Job Security for Manpower	0.173	1