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(Research Paper)

Evaluating banks' performance in handling customer complaints during the COVID-19 outbreak via DEA and based on ISO-10002:2018

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Abstract

Purpose: This paper aims to measure and evaluate the performance of units and branches of banks, especially during the COVID-19 outbreak.

Design/methodology/approach: 23 bank branches were measured and compared from the perspective of ISO10002:2018 using data envelopment analysis (DEA) based on an additive model with undesirable data. Performance assessment indicators were designed based on ISO 10002:2018 and a balanced scorecard (BSC) in four financial, growth and learning, internal process, and customer dimensions.

Findings: The results indicated that among all private banks, 14 banks were inefficient (Iran Zamin, Eghtesad Novin (EN), Ayandeh, Parsian, Pasargad, Middle East, Refah, Mellat, Saderat, Qavamin, Karafarin, Tourism, Saman, Mehr Iran) and the others were efficient (Tejarat, Mehr-e-Eqtesad, Sarmayeh, Shahr, Resalat, Ansar, Mehr Iran, Sina, Day, Hekmat Iranian).

Practical implications: The results determined the efficiency level and the change rate in the data (ISO 10002:2018 indicators) for inefficient banks to reach the border of

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efficiency and to optimize their performance. Such an issue can be used in management and planning to improve the performance of banks.

Originality/value: Using customer complaints and customer satisfaction in studying banks' performance can provide better insight into improving the quality of services. Among the various matters in customer complaints, measuring and evaluating the performance of units and branches of banks, especially during the COVID-19 outbreak, via DEA and based on ISO-10002:2018 distinguishes this study from previous studies.

Keywords: ISO 10002:2018, Balanced scorecard (BSC), Data Envelopment Analysis (DEA), Complaints-Handling Processes, COVID-19

1. Introduction

Banks are considered as one of the most important indicators of the economic activity of any system. Every action requires the acquisition of capital and financial resources, and these activities are certainly not possible without the intervention of banks and financial institutions. Therefore, concerning banks' essential role as the primary institution in the economy, evaluating their performance is significant. Today, the significance of performance appraisal in all areas is not hidden from any individual or organization. Of course, to assess performance and efficiency, scientific and established methods should be used so that the obtained results are reliable for making decisions and strategies for improvement and improvement (Tsolas, Charles, & Gherman, 2020).

The customer is known as the main capital and source of knowledge for banks. Organizations working in the service industry consider service quality to be the most critical strategic issue for business success (Boonlertvanich, 2019). Therefore, since banking is a service-oriented and customer-dependent industry, banks must differentiate themselves from competitors by providing quality services (Fakhri & Kurniawan, 2017). Research shows a 72% increase in profits for companies with high customer service than similar organizations with weaker services. Attracting a new customer costs five times as much as retaining existing customers (Duncan & Elliott, 2004).

Meanwhile, with the sudden Outbreak of COVID-19, the world economic situation changed dramatically. This outbreak poses many unique challenges that businesses have never encountered (Rumiyati & Syafarudin, 2021). Management teams have to deal with multiple issues, including health and safety, customer satisfaction, liquidity management, government support, plans, and adjusting them to the new world of telecommuting (Park & Shin, 2021; Sari & Kusumaningtias, 2021).

The first part of the economic system affected by the outbreak of the COVID-19 pandemic was banks and the banking system of countries. Stopping the activities of economic enterprises from airlines and transportation to tourism, damages to bank customers of manufacturing and commercial businesses, the weakening of the financial strength of consumers of banking facilities, and their transformation into large banking debtors of countries has affected the profitability of the banking system. It has practically upset the

balance of bank financial statements. S&P Global Ratings warns that the US banking industry, which made a profit of $ 195 billion in the past years, may lose $ 15 billion by 2020. Despite the powerful economies' experiences in addressing economic crisis caused by the outbreak of the COVID-19 pandemic, via their past experiences in managing the incomplete management of the economic crisis of 2006-2008, evidence suggests that the United States, the European Union, and the United Kingdom. They will experience the economy of the century in 2020 and beyond. The economic growth of the world's largest economic giant, China, will also be significantly slowed. Japan and South Korea will not be spared from the COVID-19 recession either. The economies of these countries, which in practice supply 70% of the world's gross goods and services, are severely damaged. Like other businesses, the banking industry has experienced a change in performance due to the COVID-19 pandemic. Banks have been forced to quickly change their strategies, which include providing banking services with a complete health protocol and even electronic banking as much as possible to adapt to the COVID-19 outbreak conditions and regain economic growth in the new requirements (Cowling, Liu, & Conway, 2021). These new changes should be in a way that does not reduce customer satisfaction and affect their loyalty. The most appropriate and effective way to achieve this complicated situation can be achieved through the customer perspective (Li, et al, 2021; Çolak & Öztekin, 2021).

Customer loyalty will be created by customer satisfaction. Customers who are satisfied with the company's performance become loyal customers of the company (Hossain, Jahan, & Kim, 2021). Therefore, researching customer complaints to increase their loyalty in the banking industry during the Outbreak of COVID-19 is significant (Saleh & Munifatussa'idah, 2020). Thus, in a pandemic situation, banks should be more active in anticipating customer expectations, customer perception of services, obtaining feedback from customers to provide customer satisfaction (Rumiyati & Syafarudin, 2021). According to IBM's future of business study, more than 59% of the organizations that participated said that the pandemic accelerated digital transformation, and more than 75% of responding executives indicated they expect changed customer behavior to continue after COVID-19 (www.IBM.co). Figure 1, shows bank performance versus consumer expectations during COVID-19 in the United States in 2020, by race (www.statista.com). Effective management of customer complaints is a critical factor in customer satisfaction and loyalty, and financial return (ŞİMŞEK, 2020). The establishment and implementation of satisfaction measurement systems, feedback management, and complaint handling according to ISO 10002, as one of the essential factors in improving performance, are the basic needs of banks as customer-oriented organizations (Bawono, Soetomo, & Apriatin, 2020; Honarkhah, 2010).

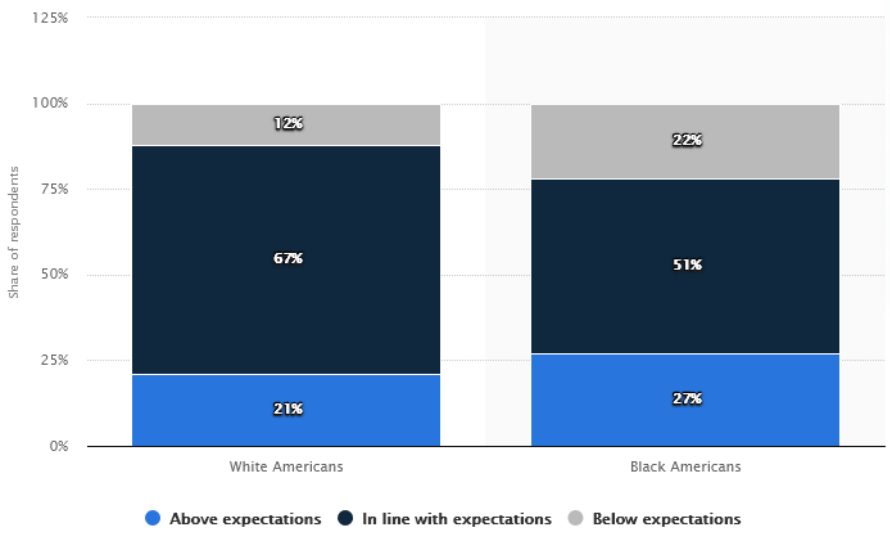


Fig 1. Bank performance versus consumer expectations during COVID-19 in the United States in 2020

Despite the significance of the issue in general and in Crohn's terms, no research on evaluating the performance of banks in handling customer complaints based on ISO 10002 was found in the research literature. In this study, indicators of dissatisfaction related to customer complaints are identified and analyzed, and the application of the ISO 10002 standard in private banks in Isfahan is evaluated. Developing the resources and processes of the Complaints Handling System (Hadjri, et al, 2020) and Feedback Handling System (FHS) and providing support programs to bank managers can help improve performance.

This study aims to assess Isfahan private banks' performance to address customer complaints from the perspective of ISO 10002 using DEA. The related literature has addressed financial criteria mostly and paid less attention to evaluating banks' communication with customers has been considered in assessing banks' performance. So, the present study has some innovations from several perspectives:

i) Less research has been done to assess the performance of banks during the COVID-19 outbreak;

ii) There has been little research on applying ISO 10002, none of which has been in the banking industry;

iii) None of the previous research in ISO 10002 has used DEA; and

iv) The combination of the two concepts of Balanced Scorecard (BSC) and DEA in dealing with customer complaints was not found in previous research.

2. Literature review

2.1 Introducing ISO-10002:2018

ISO-10002:2018 is a guideline for designing and implementing a fruitful and efficient complaints-handling process for all types of commercial or non-commercial activities, including those related to e-commerce. In particular, this standard's purpose is to be used by organizations of different sizes and departments. Such standard addresses complaints with the following objectives (UK, 2018):

i) to increase customer satisfaction by creating a customer-centric environment that is ready to hear feedback (including complaints),

ii) to resolve any complaints received and grow the organization's ability to improve products and services to the customer;

iii) to enhance participation and commitment of management through the use and expansion of resources, including personal training;

iv) to identify and address the needs and expectations of plaintiffs;

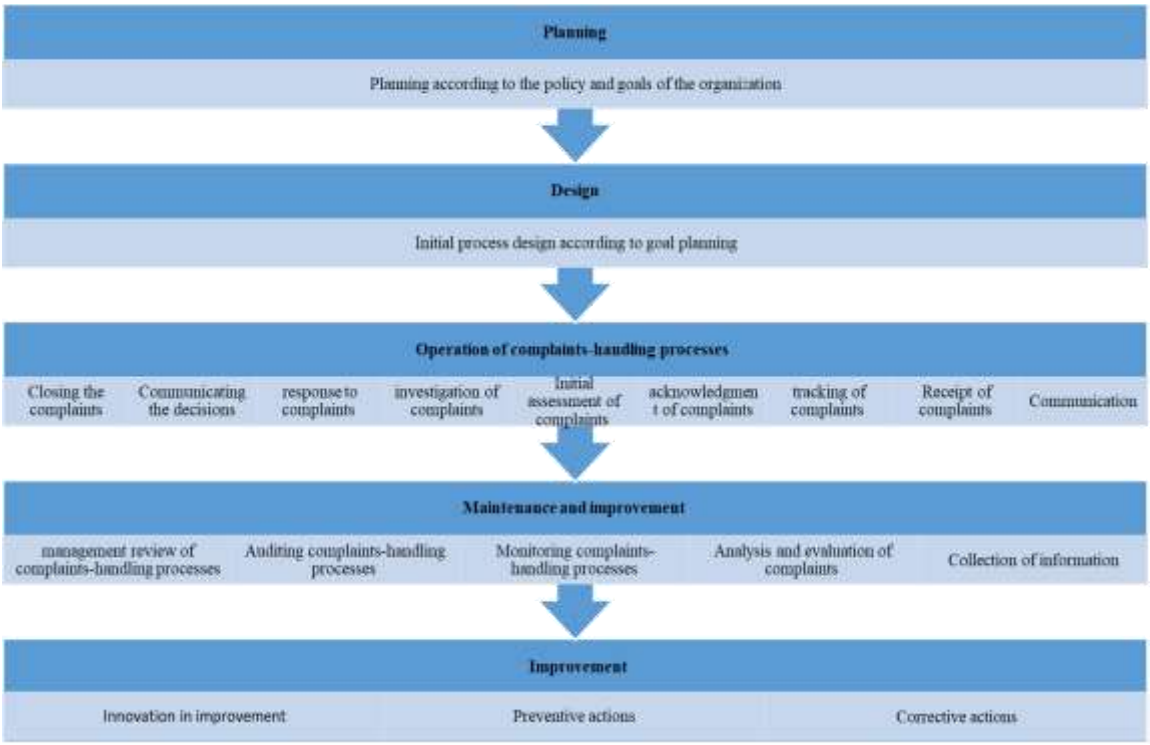
v) to provide a free, useful, and easy-to-use complaints-handling process for plaintiffs;

vi) to analyze and evaluate complaints about improving the quality of the product and customer service;

vii) to audit the complaint handling process; and

viii) to examine the effectiveness and efficiency of the complaint handling process.

Figure 2 illustrates the ISO 10002:2018 standard steps developed by the researchers.



Fige 2. ISO 10002:2018 steps

In Google Scholar, about 70 articles focus on ISO 10002, of which a limited number of papers are available in English and are presented in Table 1. There are approximately 560 articles on customer complaints in the research literature without considering ISO 10002 (Ally, Karpinski, & Israeli, 2020; Decock, et al, 2020; Koussaifi, Hart, & Lillystone, 2020; Kumari & Kumar, 2020; Shin & Larson, 2020). Also, few articles on customer complaints in the bank do not consider the ISO 10002 (Aalikhani, 2015; Ahmed & Amir, 2011; Bengül & Yılmaz, 2018; Dortyol, 2009; Kitapci & Dortyol, 2009; Nyame, 2017; Pirakaspathy, 2011; Salim, Setiawan, & Rohman, 2016; Widijanto & Rachmat, 2019; Yanto & Pandia, 2012). Little research has been found in the ISO-10001 standard on increasing customer satisfaction in the literature (Karapetrovic, 2009; Khan & Karapetrovic, 2015; Serna Albornoz, 2016).

Table 1. A review of the literature conducted on ISO-10002

Author/year	Methods	The main research component	Research results
Bawono, Soetomo, & Apriatin. (2020)	Statistical techniques	Cobit, ITIL, ISO 27001	All three research variables have a positive and significant effect on customer satisfaction based on the ISO10002 standard.
Ashiqur Rahman Khan and Karapetrovic (2014)	Interviewing	Feedback Handling System (FHS)	Applying ISO 10002 along with the feedback system increases patient satisfaction in the medical department.
Ang and Buttle (2012)	Statistical techniques	Visibility and availability of complaints-handling policy and process Easy to use the process for all complainants Responding to the complaints-handling process Customer support Customer satisfaction	Complaint handling processes that comply with ISO 10002 can have significant marketing benefits.
Simon & Casadesús (2012)	Statistical techniques	Students ISO 10001 ISO 10002	Implementing two standards, ISO 10001 and ISO 10002, can increase student satisfaction.
Dimkow and Ivanova (2012)	Hierarchical model	Customers' understanding of service quality Customer Satisfaction	The quality of telecommunication services must be evaluated from two aspects: the telecommunication services and the other the complaints-handling processes.
Honarkhah (2010)	Application of ISO 10001 and ISO 10002 in assessing student satisfaction in engineering courses	Statistical techniques	Implementation of ISO-based satisfaction measurement systems in educational units

Based on the Google Scholar database only 76 papers have focused on ISO 10002. As addressed in Table 1, no research has been conducted in the banking industry on ISO 10002. However, some researches can be found that have used DEA in their studies on different types of ISO including ISO 9001 (Quality management standard), ISO 14001 (environmental management system) (Dyckhoff & Allen, 2001; Sadat Rezaee, Haeri, & Nouri, 2018), ISO 1440 and ISO 14004 (environmental performance system) (Iribarren et al., 2015; Martín-Gamboa, et al, 2017; Vázquez-Rowe & Iribarren, 2015), ISO27001 (information security management) (Kao, Chang, & Chang, 2013), ISO 31000 (risk management) (Liu, 2019; Rueda Triana, Bonilla Vargas, & Garzón Rodríguez), ISO 50001 (energy management) (Onut & Efendigil, 2010), ISO 9126 (software engineering standard) (Liu, 2019).

2.2 Balanced Scorecard (BSC)

BSC is a technique that is widely used to measure the performance of an organization. Kaplan & Norton (1992) published a paper entitled "The Balanced Scorecard—Measures That Drive Performance" and introduced the BSC as a new management tool for performance appraisal. The BSC is a combination of organizational performance metrics that include current, past, and future performance metrics. In a balanced scorecard, non-financial criteria are placed next to financial criteria. The primary purpose of the BSC model is to apply the goals and vision of the organization in practice. These goals and indicators look at the organization's performance in its aspect. The balanced scorecard method allows managers to view the organization from four perspectives (Akinbowale, Klingelhöfer, & Zerihun, 2020; Alavi & Janatyan, 2021).

i) Customer perspective: to achieve the organization's vision, how should it look in the eyes of customers?

ii) Internal processes perspective: to create satisfaction in shareholders and customers, how should the organization's business process work?

iii) Innovation, learning, and growth perspective: how can an organization create, grow and maintain value to achieve its vision?

iv) Financial perspective: to achieve financial success, how should it be reflected in shareholders' eyes?

2.3 The synergy of BSC and DEA

In traditional models, Data Envelopment Analysis (DEA) is used in isolation so that the performance of Decision-Making Units (DMUs) is evaluated using some inputs and outputs. While the integration of DEA with BSC allows inputs and outputs to be selected based on a

comprehensive and strategic vision, managers can make more accurate decisions to improve their performance by recognizing their strengths and weaknesses in each dimension. Figure 3 introduces the BSC and DEA features as well as their synergies.

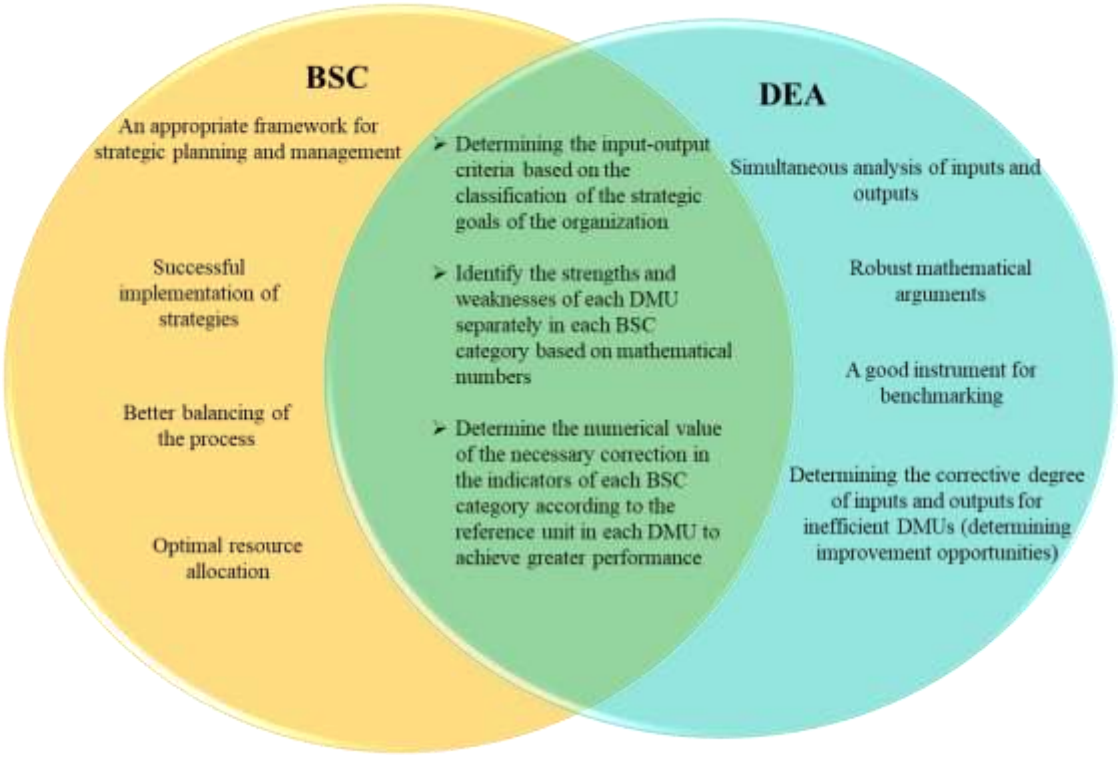


Fig 3. Integration of DEA and BSC

Despite, the synergy between BSC and DEA that can increase the accuracy of performance assessment, few studies have used BSC and DEA integration in the banking industry to evaluate banks' performance. Table 2 lists all the articles in this field in Google Scholar. As observed, no research has been done on ISO 10002 and the complaints-handling processes via BSC and DEA integration. Furthermore, compared to the previous studies, different inputs and outputs are selected based on BSC categorization.

Table 2. The studies applying BSC and DEA in the banking industry

Author/year	Title	Input	Output
Jaberi Hafshjani, et al (2021)	Integrating DEA in the neutrosophic number environment and BSC for Performance Assessment of Banks	Motivational costs, Increasing expertise of employees, employee satisfaction	Banking services, Improvement of computer software, Increasing speed of service
Bošković and Krstić (2020)	The Combined Use of Balanced Scorecard and Data Envelopment Analysis in the Banking Industry	The average number of new customers per employee, Number of issued cards, Average wage per employee in a branch, Days of training per employee	Cash flow, Net profit rate, Average employee satisfaction, Average employee commitment

Author/year	Title	Input	Output
Mehregan & Moradi (2020)	Using the Multi-Stage of Integrating Approaches Data Envelopment Analysis (DEA) and Balanced Scorecard (BSC) for Enhanced Performance Assessment	Labor costs, Number of Employees, Staff training, Employee productivity, Development of electronic services, Operation efficiency, Customer longevity, Market share	Staff training Employee productivity, Development of electronic services, Operation efficiency, Customer longevity, Market share, Profitability, Financial efficiency
Alirezaee & Tanha (2017), Sanyal (2017)	Calculating the balance index with the combined approach of DEA and BSC and its effect on productivity growth along with a case study on the branches of a specialized bank	Personnel costs, Spatial location	Resources, Expenditures, Services
Mohaghar, Hakkak & Yaghoubi (2014)	Efficiency Evaluation of Foreign Currency Branches of Bank Keshavarzi of Iran Using Integrated BSC, DEA, and AHP Approaches	Number of staff, Training hours	Operating profit, Number of foreign currency accounts, The average number of foreign exchange services
Azarbad et al. (2011)	Bank Partner Selection Framework Using Fuzzy BSC-DEA Method	Cost savings, Employees' treatment of customers and employees' knowledge, Continuous improvement and use of advanced technologies, Sales management and increase of sales, and long-term relationship with the customer	Profit margin and the ratio of income to assets and expenses to profit, Ratio of loans given to investment, ATM transactions, Diversity of services, and innovation
Najafi & Aryanezhad (2011)	A BSC-DEA approach to measuring the relative efficiency of the service industry: A case study of the banking sector	The returned fund, Cash deficit, Removed facility, Time efficiency, ATM productivity, Closed deposit, New customer, Expenditures, Deposits	Incentive, Time efficiency Number of issued cards, Internet, telephone, and SMS bank, Number of issued cheques, foreign exchange, letter of credit bill of exchange bank statement foreign draft, Income, deferred debt, facility
Najafi et al. (2009)	Efficiency and effectiveness rating of organization with combined DEA and BSC	Motivation cost, Increasing personnel major	Personnel skill, Services rate
Current study	Evaluating banks' performance in handling customer complaints via DEA and BSC based on ISO 10002:2018	Budget for infrastructure, information and advertising, Budget for the training course, Ratio of the duration of the complaints handling and customer orientation training courses to the total training course, Ratio of response time and handling of complaints to the average time mentioned in ISO 10002 (24 hours)	Number of customer complaints

3. Research methodology

Using DEA, which ultimately leads to the calculation of a relative inefficiency index for the central branches of private banks as a decision-making unit (DMU), the present study evaluates banks' performance in complaints-handling processes based on ISO 10002:2018. Research variables are assessed based on a balanced scorecard in four dimensions: financial, growth and learning, internal processes and customer, which are three financial dimensions (including the budget allocated for training and information courses and advertising to address complaints), growth and learning (including the ratio of hours of complaints-handling to the total hours of training), and internal processes (including initial response time and complaints-handling processes) are inputs to DEA, and the customer dimension (including several complaints-handling received per year) is research output. DEA is an additive model with undesirable data (Jahanshahloo, et al, 2005). Classical DEA models are based on the assumption that inputs should decrease, and outputs should increase. However, sometimes, it is necessary to raise inputs and reduce outputs to improve a decision-making unit's performance. These types of inputs and outputs are called undesirable inputs and outputs, respectively.

The advantages of using this method are:

i) The model is non-radial because there is no need to change the data in the same proportion.

ii) The model works directly with input surplus and output shortage.

iii) It shows the efficiency of low-efficiency decision-making units better than other DEA models.

Suppose there are *n* decision units where each decision unit uses *m* different inputs to produce *s* different outputs. It is also assumed that inputs and outputs are divided into desirable and undesirable categories:

$$X_j = \left(x_{1j} x_{2j} \dots x_{mj}\right) = \left(X_j^D \; X_j^U\right), \qquad j = 1.2. \dots . n \tag{1}$$

$$Y_j = \left(y_{1j} x_{2j} \dots y_{sj}\right) = \left(Y_j^D \; Y_j^U\right), \qquad j = 1.2. \dots . n \tag{2}$$

Where X_j^D and Y_j^D represent the desired inputs and outputs, respectively, and X_j^U and Y_j^U represent the undesirable inputs and outputs, respectively. To improve the DMU_o performance, X_o^U and Y_o^D can be increased, and X_o^D and Y_o^U can be decreased:

$$\theta = Min \quad 1 - \left[w_o + \frac{1}{m+s} \left(\sum_{i \in I_D} t_i^{-D} + \sum_{r \in O_D} t_r^{+D} \right) \right] 3 \tag{3}$$

$$s.t. \quad \sum_{j=1}^{n} \lambda_j \, x_{ij}^D + t_i^{-D} = x_{io}^D - w_o, \qquad i \in I_D$$

$$\sum_{j=1}^{n} \lambda_j \, x_{ij}^U + t_i^{-U} = x_{io}^U + w_o, \qquad i \in I_U$$

$$\sum_{j=1}^{n} \lambda_j \, y_{rj}^D - t_r^{+D} = y_{ro}^D + w_o, \qquad r \in O_D$$

$$\sum_{j=1}^{n} \lambda_j \, y_{rj}^U - t_r^{+U} = y_{ro}^U - w_o, \qquad r \in O_U$$

$$t_r^{+D}, t_r^{+U}, t_i^{-D}, t_i^{-U} \geq 0, \;\; i \in I_D \cup I_U, \;\; r \in O_D \cup O_U,$$

$$w_o, \lambda_j \geq 0, \quad j = 1, \dots, n$$

Where I_D and O_D are the set of desirable inputs and outputs, respectively. I_U and O_U are the undesirable inputs and outputs. In the above model, normalized data is used, which are normalized as follows:

$$x_{ij} = \frac{x_{ij}}{Max_{1 \leq j \leq n}\{x_{ij}\}}, \qquad i = 1, \dots, m, \quad j = 1, \dots, n \tag{4}$$

$$y_{rj} = \frac{y_{rj}}{Max_{1 \leq j \leq n}\{y_{rj}\}}, \quad r = 1, \dots, s, \quad j = 1, \dots, n \tag{5}$$

Where DMU_o is efficient if and only if $\theta^* = 1$.

With the values of t_r^{+D} and t_i^{-D}, it can distinguish between strong and weak efficient units. If these values are non-zero, the related unit is weak efficient. For ranking, the strong efficiency must use the super efficiency models. But distinguishing between efficient and inefficient units and introducing a pattern for inefficient units is desired. Whereas all inputs and outputs have different units and their values are very different. So, all data were normalized.

In this research, GAMS software is used for DEA. This study's statistical population includes the central branches of private banks in Isfahan, 23 branches, and the sampling is full. This process is generally based on three necessary steps as described below, in each of which a role of the analysis pattern is implemented, and the outputs of each step form the set of inputs of the next step.

1. To extract statistics on the number of customer complaints during the year based on the statistics announced by the inspection and customer complaints unit and the amount of budget and hours of training courses by the training unit;

2. To develop a questionnaire to determine the values of inputs and indicators that will be prepared from experts, including deputies, employees, and experts of the training, inspection, and complaint handling unit in private banks in Isfahan; and

3. To identify efficient and inefficient banks and provide suggestions to reduce the number of complaints received and increase customer satisfaction and bank branches loyalty.

The conceptual model of the research is illustrated in Figure 4.

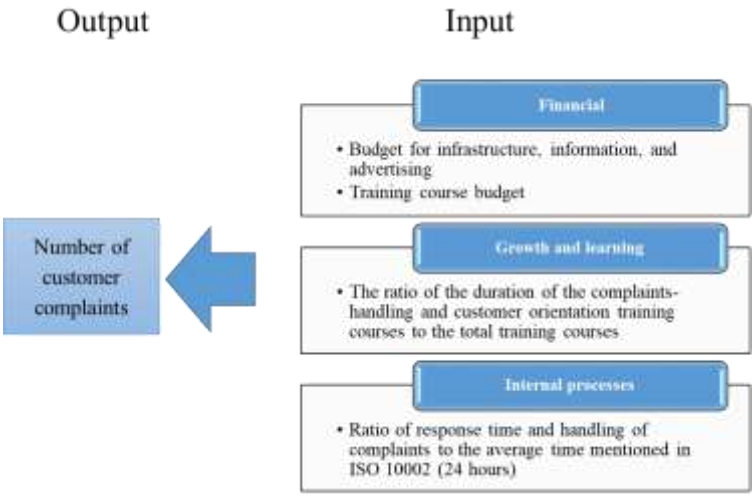


Fig 4. The conceptual model of the research

4. Findings

DEA model presented in the previous section has been implemented for 23 banks. The four inputs and the output of these banks are shown in Table 3.

Table 3. The inputs and output of bank branches

DMUs	(I)LA Training courses budget	(I)LD Information and advertising budget	(I)LH Growth and learning indicator	(I)P Internal process indicator	(O)COMPLAIN
1	1500000000	11580000000	0.215517	24	5
2	200000000	1000000000	0.125	48	5
3	0	1000000000	0.125	24	25
4	2500000000	3000000000	0.25	24	5
5	2000000000	2000000000	0.133333	3	20
6	1500000000	3500000000	0.2	24	10
7	0	1500000000	0.5	24	50
8	0	1000000000	0.1	48	10
9	1000000	500000000	0.2	48	3
10	0	500000000	0.2	24	2
11	1000000000	2500000000	0.8	1	150
12	2000000000	4000000000	0.125	24	100
13	0	1000000000	0.208333	24	25
14	0	100000000	0.24	24	20
15	10000000	1500000000	0.181818	24	45
16	500000000	200000000	0.75	72	120
17	1000000000	2000000000	0.14	24	150
18	200000000	7300000000	0.1	1	60
19	500000000	1000000000	0.25	48	7
20	2000000000	2000000000	0.4	2	5
21	200000000	500000000	0.2	24	15
22	200000000	500000000	0.05	1	100
23	0	1000000000	0.2	24	5

The rank of each bank according to its efficiency score and also the type of efficiency of each DMU with the proposed DEA model can be seen in Table 4.

Table 4. Classification of efficient and inefficient banks

DMU (Banks)	Efficiency of Banks			
	Symbols	Efficiency score	Rank	Efficiency description
Ansar	DMU3	1	1	Strongly efficient
Tejarat	DMU7	1	1	Strongly efficient
Hekmat Iranian	DMU8	1	1	Strongly efficient
Day	DMU10	1	1	Strongly efficient
Result	DMU11	1	1	Strongly efficient
Sarmayeh	DMU14	1	1	Strongly efficient
Sina	DMU15	1	1	Strongly efficient
Shahr	DMU16	1	1	Strongly efficient
Mehr-e-Eqtesad	DMU22	1	1	Strongly efficient
Saman	DMU13	1	1	Poorly efficient
Mehr Iran	DMU23	1	1	Poorly efficient
Middle East	DMU9	0.9996	12	Inefficient
Qavamin	DMU18	0.9940	13	Inefficient
Tourism	DMU20	0.9731	14	Inefficient
Parsian	DMU5	0.9611	15	Inefficient
Mellat	DMU21	0.9598	16	Inefficient
EN	DMU2	0.9273	17	Inefficient
Saderat	DMU17	0.9257	18	Inefficient
Karafarin	DMU19	0.9165	19	Inefficient
Refah	DMU12	0.9143	20	Inefficient
Pasargad	DMU6	0.7771	21	Inefficient
Ayandeh	DMU4	0.7571	22	Inefficient
Iran Zamin	DMU1	0.7566	23	Inefficient

Table 5 shows the degree of changes in the inputs and output of each bank to achieve efficiency. It should be noted that the value of proposed changes is determined by the software based on the reference unit of each inefficient bank.

Table 5. The degree of changes required for inefficient banks

Inefficient Banks	Financial indicator		Growth and learning indicator	Internal process indicator
	Information and advertising budget	Training courses budget		
Middle East	0.0000	0.0000	0.1223	0.5034
Qavamin	0.0002	0.5846	0.0000	0.0000
Tourism	0.7489	0.1328	0.4128	0.0000
Parsian	0.7059	0.1040	0.0000	0.0000
Mellat	0.0048	0.0000	0.0456	0.1179
EN	0.0000	0.0000	0.0000	0.5010
Saderat	0.1968	0.0288	0.0000	0.2367
Karafarin	0.0839	0.0000	0.0764	0.4204
Refah	0.6240	0.2109	0.0000	0.2319
Pasargad	0.3424	0.0606	0.0000	0.1044
Ayandeh	0.7187	0.0000	0.0000	0.0349
Iran Zamin	0.3233	0.7386	0.0000	0.0841

5. Discussion and conclusions

In the proposed model, Saman and Mehr Iran Banks are known as poorly performing banks. However, because they are on the verge of efficiency, in some indicators such as the budget of complaints-handling training courses, the ratio of complaints-handling training courses to overall training courses, and the ratio of time to respond to complaints, the average time in ISO 10002 need to improve efficiency.

According to field surveys, researchers among the 23 private banks in Iran, Refah, Day, Tejarat, Ayandeh, and Ansar banks have received ISO 10002:2018 from ISO International Organization. However, according to the research results, there is a profound gap between obtaining a certificate and its proper implementation in welfare and future banks, requiring creating the right infrastructure. Besides, some banks, including Iran Zamin, Karafarin, Ghavamin, Saderat, and Parsian Banks, have suitable infrastructures for the implementation of ISO 10002, including a system for registering and handling complaints in person and virtually, the establishment of an independent complaint handling unit, and provision of information about how to register and handle complaints and hold independent complaints-handling training courses. However, they have not been able to obtain this standard yet. Table 6 presents reference DMUs of each inefficient unit (bank).

Table 6. Models and references of inefficient units (Bank branches)

Insufficient banks	Reference bank 1	Reference bank 2	Reference bank 3
Iran Zamin	Mehr-e-Eqtesad	-	-
EN	Sarmayeh	Sina	Mehr-e-Eqtesad
Ayandeh	Shahr	Mehr-e-Eqtesad	-
Parsian	Resalat	Mehr-e-Eqtesad	-
Pasargad	Mehr-e-Eqtesad	-	-
Middle East	Tejarat	Mehr Iran	-
Refah	Mehr-e-Eqtesad	-	-
Mellat	Shahr	-	-
Saderat	Mehr-e-Eqtesad	-	-
Qavamin	Resalat	Mehr-e-Eqtesad	-
Karafarin	Shahr	--	-
Tourism	Resalat	-	-
Saman	Ansar	-	-
Mehr Iran	Sarmayeh	-	-

5.1 Theoretical implications

The outbreak of the COVID-19 pandemic has had far-reaching consequences and harms in human life today, especially as it has posed severe challenges to the business environment and the monetary and financial markets of countries. As the banks and the banking system of the countries play a decisive role in the economic prosperity and development of the business market in the society, they are not immune from the widespread attacks of this pandemic. The following summarizes some of the significant consequences and challenges posed by the

coronavirus pandemic on the banking system and the banks and financial and monetary institutions of countries. COVID-19 has challenged the traditional methods and practices of banking and banking services in person or person, and in practice, has placed many restrictions on banking. As a result of the COVID-19 pandemic, the world's banks, especially European banks, have strongly resisted providing long-term credit facilities and loans to large businesses. They are also extremely cautious about giving short-term, low-volume, low-risk loans. This issue poses a severe problem for cash flow in the monetary and financial markets. Individuals who have received loans or bank facilities from banks are unfortunately unable to meet their bank installment obligations due to the loss of their jobs and businesses or the decline in sales of goods and services or related profits. This has led to widespread disputes between customers and banks. If banks want to meet their obligations to depositors with high-interest rates before the outbreak of the corona, but on the other hand to new applicants for loans and bank facilities based on new interest rates, some of which have reached interest-free conditions. The result of these two measures will not result in anything but the bankruptcy of the banks. Due to their inability to pay their debts, bank customers seek financial and monetary support from central banks, operating banks, and even governments. In most countries, central banks or their respective governments have instructed or advised using banks to consider the problems of bank debtors today, mainly to defer their installment claims for several months. The operating banks have also suffered from the disruption or cessation of the business market. They, therefore, seek incentives to create a suitable environment for the continuation of their banking activities by retaining their employees and not reducing the extensive workforces. In this regard, banks try to keep their business environment from stagnant to semi-active while observing health protocols and observing social distancing. It should also be noted that the protocol governing social distance regulations means that fewer customers can go to banks in person. In practice, it puts a lot of pressure on the use of other communication infrastructures such as telephone support, online internet, and other media cyberspace.

5.2 Managerial implications

The present study results allow customers to select the most appropriate banks for investment and finance according to the level of implementation of ISO 10002 by banks. This issue is crucial for customers in a pandemic situation that has caused economic change and instability. Therefore, accurate knowledge of this category will help managers and officials of the industry be aware of customers' shortcomings in meeting their expectations, make the necessary plans to improve performance and create an active, flexible, and growing industry.

The change in inputs was presented using the results of data envelopment analysis in Table 4 to reach inefficient banks' efficiency limit. Finally, to reduce the number of complaints, it is necessary to identify and eliminate the obstacles to these changes and provide the required budget and training in this regard following the research results.

5.3 Research limitations and future study agenda

Some of the most significant limitations of this study are as follows:

i) Access to accurate and transparent statistics will lead to more accurate and realistic results. However, sometimes the researcher had difficulty referring to the banks to complete the questionnaire and receive the information of the financial statements due to the banks' security issues and the budget information, which is often classified in the category of information and confidentiality. However, every effort was made to obtain accurate and transparent information from bank branches and experts in the present study.

ii) Due to the limitations caused by the COVID-19 outbreak, the researcher did not have access to customers and distributed questionnaires at the customer level to evaluate their opinions. The questionnaire was distributed to managers and experts of inspection offices and complaints of central branches of banks.

iii) Due to the unavailability of financial statements and profit and loss of some banks, it was not possible to study the subject of research and its impact on banks' financial cases.

The following subjects are suggested to other researchers for future research:

i) Using data mining based on neural networks to cluster customer complaints and applying Fuzzy DEA for bank performance assessment in the field of ISO 10002:2018 in each cluster.

ii) It is suggested to provide a system dynamics model to evaluate bank performance in the future based on their response to customer complaints.

iii) A DEA model should be proposed to reduce the multiple optimizations of decision-making units and classify efficient decision-making units.

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