Providing a model for improving the quality of technological services based on financial development and ranking of its components in Sanat and Mine Bank of Iran (Using fuzzy TOPSIS method and structural equation modeling)

Ali Mehri, Saber Khandan Alamdari*, Neda Farah Bakhsh

Faculty of Management and Accounting, Roudehen Branch, Islamic Azad University, Roudehen, Iran

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Abstract

The very important role of electronic services and online services in every society is not hidden from anyone; what is important is the quality of these services. Electronic service quality refers to the ability of a particular Internet banking service to facilitate online transactions effectively and efficiently, thereby contributing to the financial growth of the banking system. Therefore, the subject of the presentation is the model and ranking of components that improve the quality of technological services based on financial development in Sanat and Mine Bank of Iran. Therefore, the content analysis method was used to identify the variables. After identifying the research variables, the fuzzy AHP method was used for ranking. To present the model after identifying the quality variables of banking technological services, the interpretive structural modelling method was used. Based on the obtained results, the analysis of variances shows that assuming the variance of the two groups is equal and at the confidence level of 95%, the significance obtained for the averages of the financial development components is smaller than the standard value of 0.05, so between the answers There is a significant difference between the two groups regarding the functional status of factors affecting financial development (institutional environment, monetary sector, openness of the financial sector, non-banking financial sector, banking financial sector) in Sanat and Mine Bank in the study area. In other words, these factors do not have a favourable situation for the financial development of the bank and are far from a favourable situation. According to the results of the research, it was determined that technological banking management, technological software and hardware infrastructure, technological banking marketing, customer experience management, risk management, electronic system quality of services, improving the quality of technological banking services and organizational culture on improving the quality of technological banking services based on financial development. They have a positive and significant effect.

Keywords: electronic banking, banking service quality, customer experience, customer relationship management, financial development
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*Corresponding author
  Email addresses: ali1987mehri@yahoo.com (Ali Mehri), sabersum@yahoo.com (Saber Khandan Alamdari), neda_farahbakhsh@yahoo.com (Neda Farah Bakhsh)

1 Introduction

Due to the various functions of banks in the economic system of the countries, they have always been the attention of the government and researchers as well as policymakers, and this attention is more than in other countries due to the economic and monetary conditions of Iran. By collecting small and large funds from people, banks direct these funds to various economic projects that are useful for the macro economy of the country and provide various services to depositors. Naturally, with the growth of competition in the country's banking system on the one hand, the development and change of the needs of customers and the market in all three components of banking services, resource allocation and resource allocation on the other hand, it must continuously provide new banking products, otherwise, the share And their role in the banking market decreases. Simultaneously with the increase in the number of new services offered to the market, the service life cycle decreases, and it is in this situation that the development of new services becomes an important management issue [2, 4, 8].

Electronic banking can be defined as the use of advanced telecommunication technology and networks to transfer resources (money) in the banking system. Two important concepts of electronic banking are electronic transfer and electronic money, as well as resources [9].

Therefore, digital banking means that all bank activities are done digitally and non-personally, and banking operations that were only available to customers inside the bank branch are also available outside the bank. Among the factors that have encouraged banks to use electronic banking are the convenience and profitability of banks, easy access to the Internet, cost efficiency, the increase in the number of Internet users, etc. Online banking, mobile banking and tablet banking, mobile check deposit, tax changes, e-invoicing and online bill payment are popular digital banking services with lower cost and zero error [1].

The quality of services provided to customers is essential for profitability as well as the survival of the organization, therefore, paying attention to the quality of services for service organizations such as banking services, insurance, etc., plays a fundamental role. The quality of banking services is defined as the customer's opinion or attitude regarding the excellence of the service provided in the bank environment [3, 10].

Although at the theoretical level, similar research on electronic banking has been mentioned in abundance, but in many cases, from the operational and practical point of view, the research in this field is not enough and this gap is found in many cases. Because according to extensive research in this field, deficiencies in the proper implementation of e-commerce in the banking sector are abundantly found. It is obvious that the digital revolution in financial services is coming, but unfortunately, its impact on the players of the banking industry in Iran has not been taken seriously. Continuous changes in the digital world bring the potential of reducing the role of banks, but it can help banks in providing better quality, faster and cheaper services needed by institutions and individuals in their daily lives. In order to be on the positive wave of these changes, banks must free themselves from the trap of organizational narcissism and understand that merely obeying the law and waiting for interest rates to increase cannot prevent them from losing their market share [5]. If banks are willing to increase their efficiency by providing new services, it is necessary to consider important and influential factors such as bank performance, technological service quality, transparency, ease of use, perceived profitability and low perceived risk by financial technologies and Pay attention to the reliability of banks. Also, in order to ensure their survival in the wave of digital changes, banks must consider two basic steps: the first is the successful management of past technologies, and the second step is to manage the emergence of a huge number of new innovations [6]. In the following, we will briefly review a number of similar studies.

In research, Reza et al. [12] investigated the impact of social responsibility on loyalty about the mediating role of service quality, customer identification and trust. The results showed that social responsibility is not directly related to customer loyalty. Contrary to previous findings made in developed countries. Therefore, fully confirming the mediation of customer identification, electronic service quality and trust in increasing the effect of social responsibility on customer loyalty. This study also confirms that social responsibility is positively related to e-service quality and e-service quality directly affects customer identification.

Madhavan Vethirajan [11] investigated customer satisfaction with e-banking services of public and private sector banks in Puducherry district - an empirical analysis. The results of the research show that the customers of public sector banks have a lower understanding of the various dimensions of electronic service quality compared to private sector banks. This paper recommends that the wider use of IoT-based applications in banking services will create better banking solutions.

Rodrigues et al. [13] researched to investigated the factors affecting consumers' willingness to use e-government services in the UAE. The results of this research showed that trust and attitude towards the use of technology, and identification of confidentiality are the main factors of overall satisfaction and ultimately creating a desire to use e-government services.

Senjokio [14] examined the impact of service quality on customer satisfaction in the banking sector using the SERVOVAL model. According to this research, the capability funds Trust, assurance, empathy, and responsiveness have not had a strong relationship with customer satisfaction. However, tangible aspects of service quality have a positive effect on customer satisfaction.

Conducting research in the field of electronic banking will greatly contribute to the expansion of theoretical and field research in the field of electronic banking. It will also improve performance in the field of electronic banking and improve and increase the efficiency of this system, which in turn will be a leap towards success in this field. Is. It is obvious that the digital revolution in financial services is coming, but unfortunately, its impact on the players of the banking industry in Iran has not been taken seriously. Continuous changes in the digital world bring the potential of reducing the role of banks, but it can help banks in providing better quality, faster and cheaper services needed by institutions and individuals in their daily lives. To be on the positive wave of these changes, banks must free themselves from the trap of organizational narcissism and understand that merely obeying the law and waiting for interest rates to increase cannot prevent the loss of their market share. It is obvious that if the issue of electronic service quality in state banks is not given enough attention, the negative effects of this dissatisfaction will have a direct impact on the bank's profitability.

Our country has one of the highest penetration coefficients of banking services among the countries of the world, due to the large number of university graduates in software and financial fields, as well as the high speed of money transfer in the banking system, the large number of transactions The high number of bank branches in proportion to the population shows the high capacity of Iran's banking system.

The low cost of specialized human resources in Iran places our country in a special position in the region in terms of specialized human resources, but despite the mentioned potentials, due to the uncertainty of the laws and regulations governing fintech activities in all The areas and incompatibility of these laws with the development of financial technologies, as well as the lack of awareness of the capabilities and potentials of this industry among economic actors, the absence of technical, legal and banking infrastructures to expand the security of users, are actually a long way from development. There is a flourishing of this industry; therefore, in this research, we want to answer the question of what factors improve the quality of technological services, considering the spread of technological banking services such as digital banking, corporate banking, etc., in banks. Is a bank effective in Iran?

2 Research method

The current research is fundamental in terms of its purpose, and in terms of its implementation method, it is descriptive and correlational research, and an exploratory method and a meta-composite and content analysis method were used in the qualitative part to conduct the research. In the current research, the seven-step approach of Barroso and Sandlovski was used to explain the meta-combination methodology and the content analysis method was used to find the dimensions of financial and economic development. In the qualitative phase, in the quality improvement section of the technological services between the city and the port, the decision team (participant) which includes (university professors and experts, officials of Bushehr port and container companies active in the field of environment) which have features such as availability, experience, suitability of field of study, doctoral or master's degree, employment, research and writing experience, as well as the quality of 11 banking experts in the form of targeted sampling, which have characteristics such as availability, experience, suitability with the field of study, doctoral degree or master's degree, research and writing experience were used as the decision team in identifying indicators and variable dimensions in this research.

In the quantitative part, the statistical community includes managers and experts with banking experience. In this part, the sample size will be determined based on the Kargesi and Morgan table or Cochran's formula and stratified random sampling will be used. And stratified random sampling is used in choosing, so the sample size was determined to be 210 people. To analyze the statistical data obtained, descriptive statistics methods including frequency, frequency percentage and inferential statistics including structural equation method with Spss software were used. The steps of the research method are in the table below.

2.1 New approaches in combining researches

2.1.1 Ultracombination method

Meta-synthesis is a type of qualitative study that examines the information and findings extracted from other qualitative studies with a related and similar topic. By providing a systematic approach for researchers through the

Table 1: Steps of the research method

Method	Actions	levels
Using the metacombination method	Determining and identifying the dimensions and components affecting capital market financial contracts	step one
Using content analysis method	Determining and identifying the dimensions and components of maintaining security and financial development	The second step
Using fuzzy AHP approach and EXPERT CHOICE software	Prioritizing the variables affecting capital market financial contracts	The third step
Using structural descriptive modeling approach and MATLAB software	Leveling of effective factors affecting market contracts on maintaining security and financial development	The fourth step
Using the structural equation approach	Quantitative analysis and final model fitting	The fifth step

combination of different qualitative research, meta-synthesis discovers new and fundamental topics and metaphors, and with this method, it improves the current knowledge and provides a comprehensive view of the field of issues. Creates. The intended sample for meta-synthesis consists of selected qualitative studies based on their relationship with the research question. Meta-synthesis, an integrated review of qualitative literature is not the desired topic. Also, the analysis of secondary data and primary data is not from the selected researches, but the analysis of the findings of these researches. In other words, meta-synthesis is the combination and interpretation of interpretations of the main data of selected studies. Meta-synthesis focuses on qualitative studies that do not necessarily include extensive theoretical foundations, and instead of providing a comprehensive summary of the findings, it produces an interpretive synthesis of the findings. Meta-synthesis requires that the researcher conduct a detailed and in-depth review and combine the findings of related qualitative research. Through examining the findings of the main research articles, researchers reveal and create words that show a more comprehensive understanding of the phenomenon under investigation. Synthesis, like a systematic approach, achieves a result that is greater than the sum of its parts.

2.1.2 Content analysis method

For the application of content analysis, like any other research method and in order to meet important criteria such as repeatability and validity of data, the following steps can be used. However, due to the different epistemological assumptions of qualitative and quantitative content analysis and the goals of both, things such as repeatability and validity of data, which are more prominent in quantitative approaches, take on a different color and other components are mentioned. which will be mentioned in their place.

Step one: defining the research problem

Second step: formulation of questions and objectives

The third step: defining and specifying the variables

Fourth step: Sampling and selection of units of analysis and context

Fifth step: Coding and categorization

2.1.3 Quality control (extracted code control)

For the researcher to be able to use the qualitative findings in the analysis, he must code them. Inter-coder reliability is a widely used term that refers to the degree of agreement that independent coders obtain when evaluating the features of a message or text. The specific term for consistency in content analysis is "agreement between coders". Determining validity and reliability is a critical step in the qualitative data analysis process. The Kappa method is one of the statistical decision-making tools that examines the amount of agreement and coordination between two individuals, phenomena, or sources of decision-making, each of which is measured separately. The kappa coefficient is a numerical measure between -1 and +1, the closer to +1 indicates the presence of proportional and direct agreement, the closer to -1 indicates the presence of inverse agreement, and the opposite and the values closer to zero indicate the opposite of agreement.

$$k = \frac{p_o - p_e}{1 - p_e} \tag{2.1}$$

in this relationship, p_o is equal to the ratio of units about which there is an agreement, and p_e is the ratio of units where the agreement is likely to be random.

2.2 Fuzzy AHP method

Fuzzy hierarchical analysis has two well-known methods, which are Chang's method and Yager's method. Chang's method is the most famous and common method in Iran, which we teach in this section. The stages of fuzzy AHP according to Chang's method are as follows:

Step 1: Draw a hierarchy diagram

In any multi-criteria analysis, drawing a hierarchical diagram (decision tree) is one of the first and important steps. Because it is after drawing this diagram that we clearly know the goal, the structure of the hierarchy of indicators and sub-indices, and options.

Step 2: Define fuzzy numbers to perform pairwise comparisons

At this stage, it is necessary to define your fuzzy numbers, which are needed to perform pairwise comparisons, so that the experts can provide their answers accordingly.

Step 3: Formation of pairwise comparison matrix by using fuzzy numbers

At this stage, the questionnaires have been provided to the experts and they have answered it. So we now have the matrix of pairwise comparisons that contain fuzzy numbers.

Now the point is, what should we do when we are faced with several respondents? The surest thing to do is to look for the answer in the original source of this method, i.e. in the original article on Chang's method. Chang's Fuzzy AHP article mentions that when we have multiple respondents (which is the case in 99% of cases), we should take the arithmetic mean of the opinions, that too in only one half-matrix.

Step 4: Calculate the matrix S for each row of the pairwise comparison matrix

S are triangular fuzzy numbers calculated from the following equation:

$$S_i = \sum_{j=1}^{m} M_{gi}^j \bigotimes \left[\sum_{i=1}^{n} \sum_{j=1}^{m} M_{gi}^j \right]^{-1} \tag{2.2}$$

in the above relation In the above relation, M are triangular fuzzy numbers inside the matrix of pairwise comparisons. In fact, when calculating the matrix S, we add each component of the fuzzy numbers one by one and multiply the total sum by the fuzzy inverse.

Step 5: Calculate the degree of magnitude of S relative to each other In this step, the Sis are compared with each other in terms of magnitude, based on the

$$V(M_2 \geq M_1) = hgt(M_1 \cap M_2) = \mu_{M_2}(d) = \begin{cases} 1, & \text{if } m_2 > m_1 \\ 0, & \text{if } l_1 \geq u_2 \\ \frac{l_1 - u_2}{(m_2 - u_2) - (m_1 - l_1)}, & \text{otherwise} \end{cases} \tag{2.3}$$

that in the above relation,

$$M_2 = (l_2, m_2, u_2) \text{ and } M_1 = (l_1, m_1, u_1).$$

Step 6: Calculating the weights of criteria and options in pairwise comparison matrices

In this step, it is enough to obtain the unnormalized weight vector by calculating the lowest value calculated in the previous step.

Step 7: Calculate the final weight vector

In the last step, we normalize the weight vector obtained from the previous step, which was not normalized, to obtain the final weight vector, which is our final goal of fuzzy calculations.

2.3 Interpretive structural method

The interpretive structural modelling method is an interactive learning process. In this technique, a set of different elements is structured in the form of a comprehensive systematic model. Such a model that is formed, draws the structure of a complex issue or a problem in the form of a carefully designed pattern in the form of a diagram. This method is an interpretive model in which a group of experts decide whether and how the elements are related, and it is a structural model in that it extracts complex components based on the relationship of the structure and specific relationships through the modelling method. and explains the overall structure as a diagram model. This method is

a tool to create order in the complexity of relationships between variables and is a suitable option for dealing with complex issues, especially when using systematic and logical thinking.

The various steps involved in the ISM technique are shown in the figure above. These steps ultimately lead to the creation of an ISM model, which is explained in the following steps:

Step 1) Identification of variables related to the problem: The ISM method begins with the identification of variables that are related to the problem or topic under discussion. These variables are obtained through the study of the subject literature, past studies, through receiving the opinions of experts or through questionnaires.

Step 2) Forming the structural matrix of internal relations of variables (SSIM): This matrix (structural self-interaction matrix) is a matrix with the dimensions of the variables, which are listed in the first row and column respectively. Then the two-by-two relationships of the variables are specified by symbols. The structural self-interaction matrix is formed based on the discussions and opinions of the industry, organization and university experts. To determine the type of relationships, it has been suggested to use different management techniques, such as brainstorming and nominal group techniques, etc., according to experts. The symbols in the table below are used to determine the type of relationship.

Step 3) Creating the achievement matrix (RM) or the received matrix: by converting the symbols of the SSIM matrix to the numbers zero and one, the achievement matrix can be reached. By following these rules, the initial acquisition matrix is prepared.

Step 4) Adapt the achievement matrix: After the initial achievement matrix is obtained, its internal consistency should be established. For example, if variable 1 leads to variable 2 and variable 2 leads to variable 3, then variable 1 should also lead to variable 3, and if this state was not established in the initial achievement matrix, the matrix should be modified and the relationships that were missed be replaced.

The values of the inconsistency index (I.I.) have been calculated for matrices whose numbers have been chosen completely randomly and they have called it the random matrix inconsistency index (I.I.R.), whose values for n-dimensional matrices are according to the table below:

Table 2: How to convert conceptual relationships into numbers

n	1	2	3	4	5	6	7	8	9	10
II R	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.45

For each matrix, the result of dividing the inconsistency index (I.I.) by the inconsistency index of the random matrix (I.I.R.) is then a suitable criterion for judging the inconsistency, which we call the inconsistency rate (I.R.). If this number is smaller than 0.1, the compatibility of the system is acceptable, otherwise, you should reconsider your judgments.

Step 5) Determining the level and priority of variables: In this step, using the final achievement matrix, the set of output and input for each variable is obtained. To determine the level and priority of the variables, the achievement set (output) and the prerequisite set (input) are determined for each variable.

The output set of a variable includes components of the system from which the component originates. To determine the late set of each component, the corresponding line should be checked. The numbers ((1)) of this line indicate the directional lines from which it leaves.

The input set of a variable includes components of the system that lead to that component. To determine the advanced set and its corresponding column component, the number of ((1)) in this column indicates the directional lines that enter that component. After determining the set of output (achievement) and input (prerequisite) for each variable, common elements in the set of achievement and prerequisite are identified for each variable. After determining the prerequisite sets and achieving common elements, it is time to determine the variable level (elements). In the first table, a variable with the highest level of the hierarchy of the interpretive structural model is placed, whose achievement set and common elements are completely similar. After determining this variable or variables, we remove them from the table and form the next table with the rest of the remaining variables. In the second table, as in the first table, we specify the second-level variable. This operation is repeated until the level of all variables is determined.

Step 6) Drawing the model: after determining the relationships and level of the variables, they can be drawn in the form of a model. For this purpose, first, the variables are adjusted according to their level from top to bottom. At this stage, according to the levels obtained from the variables and the final matrix, an initial model is drawn and the final model is obtained by removing transferability in the initial model. The relationship between the variables and the direction of the arrow is determined from the final matrix.

Step 7) Analysis of penetration power and degree of dependence (MICMAC): MICMAC or mutual influence of matrix multiplication applied for classification; The purpose of this analysis is to identify and analyze the power of penetration and the dependence of the variables. At this stage, by summing the entries of ((1)) in each row, the power of penetration and also the sum of the entries of ((1)) in each column, the amount of the dependence of the variables is obtained. Based on this, the influence-dependence diagram is drawn. In this analysis, the variables are classified into four groups according to their power of influence and dependence:

1. Self-governing (independent) variables: which have weak influence and dependence. These variables are somewhat separate from other variables and have few and weak connections with the system.
2. Dependent variables: they have weak influence, but high dependence.
3. Connection variables: which have high influence and dependence. These variables are non-static because any kind of change in them can affect the system and finally the feedback of the system can change these variables again. In fact, any action on these variables leads to the change of other variables.
4. Independent variables: they have high influence and low dependence.

2.4 Fitting the structural model

After examining the fit of the measurement models, it is time to fit the structural model of the research. Unlike the measurement models, the structural model section has nothing to do with the questions (manifest variables) and in this section, only the hidden variables and the relationships between them are examined. be made t-values and R^2 values have been used to check the fit of the research structural model. R^2 is a measure that shows the impact of an exogenous variable on an endogenous variable, and three values of 0.19, 0.33, and 0.67 are considered as criteria for weak, medium, and strong values.

3 Data analysis

3.1 Using the metacombination method

In this research, based on previous studies, a code was considered for all the extracted information, and then, considering the concept of each of these codes, it was categorized in a similar concept.

Based on the analysis and content analysis of the articles, 50 final articles were selected and a total of 9 categories and 37 concepts and codes were discovered and labeled for the quality improvement components of banking technological services in this research. In the table below, the extracted final codes related to each category and concept are shown.

Table 3: categories and concepts of improving the quality of banking technological services

sub-themes	Main themes
1. Support of bank managers for innovative activities	
2. Application of new mechanisms in the field of banking systems	
3. Using artificial intelligence in providing banking services	Technological banking management
4. Using strategies that are suitable for the purpose of attracting and retaining customers	
5. Recruiting specialized human resources	
6. Behavioral competence of employees	
7. Increased presence in the media and competitive market	Behavioral competence of employees
8. The ability to respond and react quickly to events	
9. Development and use of new technologies	
10. Increasing professional skills of employees	
11. Accuracy and focus of the system and employees in providing banking services	Systemic and electronic quality of services
12. Technological facilities and equipment	
13. Reliability	
14. Ease of receiving and providing banking services	
15. Ease of interaction	
16. Improving accountability and clarifying performance	Improving the quality of banking technological services
17. Development Programmers and consultants Development of technological financial planners and consultants	

18. Using cloud technologies with security, reliability and high compatibility	
19. Strengthening the ability, competence, flexibility and speed of services	
20. Continuous need for software improvements	
21. Development of software and hardware infrastructure strategy	Technological hardware and software infrastructure
22. Flexible information technology infrastructure	
23. Diversification of the portfolio of products and services	
24. Providing consulting services regarding financial income, payments, savings and investments.	
25. Customer privacy	Customer experience management
26. Follow-up, guarantee and provide 24-hour services	
27. Attracting trust and increasing customer loyalty to the bank k	
28. Improving customer satisfaction	
29. Change in the technological culture of the organization	
30. The culture of flexibility and willingness to improve services	Organizational culture
31. Establishment of a culture of change	
32. Implementation of learning culture	
33. Adapting to rapid changes in customer needs and preferences	
34. Inflation reduction and tax regulations	
35. Reduction of exchange rate fluctuations	Risk management
36. Adapting to the continuous changes in banking laws	
37. Removing political and economic obstacles	

3.2 Prioritizing the variables using the fuzzy AHP approach

After the introduction of the fuzzy AHP method by Saati in the 1970s, many models in the field of fuzzy AHP have been presented by various researchers. In these methods, fuzzy and hierarchical concepts have been used in a combined manner. In the first stage, a questionnaire was prepared to perform pairwise comparisons and it was given to 15 experts who were explained in the last chapter, and the results of the questionnaire were It has been analyzed using MATLAB software. The results are as follows:

Table 4: Final weights of criteria for improving the quality of banking technological services with the AHP approach (Inconsistency rate: 0.02)

Risk management	Organizational Culture	Customer Experience Management	Technological hardware and software infrastructure	Improving the quality of the bank 's technological services	Systemic and electronic service quality	Banking technological marketing	Technological banking management	Criteria
0.123	0.168	0.161	0.151	0.188	0.169	0.178	0.191	Weight

According to the above table, the management of the Technological Bank Improving the quality of the bank's technological services has the highest priority and risk management has the lowest priority. Also, the compatibility rate is equal to 0.02, so the compatibility of the criteria with the purpose of the research is acceptable. The output of MATLAB software for prioritizing the subsets of improving the quality of banking technological services according to the answers of the experts is as follows:

Table 5: Ranking of dimensions and components

Rank	Weight	The subject of N sub	The subject of N Main
2	0.082	Support of bank managers for innovative activities	
3	0.078	Using the mechanisms of M Novin in the middle Banking systems	Technological banking management
14	0.050	Using artificial intelligence in providing banking services	
5	0.074	Using strategies that are suitable for the purpose of attracting and retaining customers	
8	0.069	Recruiting specialized human resources	
12	0.058	Behavioral competence of employees	
1	0.104	Increased presence in the media and competitive market	Behavioral competence of employees
34	0.018	The ability to answer and react fast to events	
7	0.071	The ability to respond and react quickly to events	
10	0.059		
36	0.016	Development and use of new technologies	Systemic and electronic quality of services
3	0.078	Accuracy and concentration of the system and employees in providing banking services	
35	0.017	Technological facilities and equipment	
28	0.028	Reliability	
13	0.055	Ease of receiving and providing banking services	
16	0.048	Ease of interaction	Improving the quality of banking technological services

37	0.012	Improving accountability and clarifying performance	
17	0.047	Development of technological financial planners and consultants	
30	0.026	Using cloud technologies with security, reliability and high compatibility	
19	0.043	Strengthening the ability, competence, flexibility and speed of services	
20	0.044	Constant need for software updates	Technological hardware and software infrastructure
21	0.042	Formulation of software and hardware infrastructure strategy	
22	0.040	Flexible information technology infrastructure	
26	0.034	Diversification of the sector to the portfolio of products and services	
24	0.036	Providing consulting services regarding financial income, payments, savings and investments.	Customer experience management
25	0.035	Protecting the privacy of customers	
23	0.038	24-hour follow-up, guarantee and service	
27	0.030	Gaining trust and increasing customer loyalty to the bank	
11	0.057	Improving customer satisfaction	
29	0.027	Change in the technological culture of the organization	Organizational culture
18	0.045	A culture of flexibility and willingness to improve services.	
31	0.025	Establishing a culture of change	
15	0.049	Implementation of learning culture	
33	0.021	Adapt with the rapid change in the needs and preferences of customers	
5	0.074	Inflation reduction and tax regulations	Risk management
9	0.060	Reduction of exchange rate fluctuations	
32	0.022	Adapt with Changes My fashion They are not strong a banker	

3.3 Interpretive structural modeling

After determining the financial development components of the capital market using the metacombination method and prioritizing them using the fuzzy AHP method, in this stage of the research to extract the relationships between the components, structural interpretive modelling has been used as described in the following steps.

It should be mentioned that all the following steps have been done step by step using MATLAB software.

First step: Determining the type of content relationship (contextual) between the components of the financial development of the capital market: the context relationship between the factors may be of the type of priority and delay and with influence. Each of the identified components may affect the probability of occurrence or the intensity of the effect of other components. Therefore, the question raised in the questionnaire is as follows: What is the relationship between component i and component j?

Second step: Obtaining the structural matrix of the internal relationships of the components (SSIM): The experts participating in the ISM process, in response to the above question to determine the relationships between the components, have used one of the following signs in each pairwise comparison:

V: The row factor (i component) affects the column factor (j component).

A: The column factor (j component) affects the row factor (i component).

X: both row (component i) and column (component j) affect each other.

O: There is no relationship between the row element and the column element (component i and component j).

The third step: obtaining the achievement matrix: by converting the relationship symbols of the SSIM matrix to the numbers zero and one according to the rules presented in the third chapter, the achievement matrix is obtained.

Of course, it should be noted that in this part, because the opinions of 15 experts have been used, therefore, in fact, group interpretive structural modelling has been used. Actually, we have several SSIM matrices that we need to merge together. To integrate, we first convert each of them into zero and one number according to the third step, then we add all the corresponding matrices together and take the mod value from the resulting matrix, any number that is equal to or smaller than the mod. was the value of zero and if it was greater than the mod, it takes the value of one. The mode number in the integrated matrix of experts' opinions is equal to fourteen. Therefore, we set the values that are less than or equal to fourteen to zero and the values that are greater than fourteen are set to one. Table 6 shows the initial achievement matrix of the influencing factors on improving the quality of banking technological services and Table 7 shows the levelling of factors based on the adapted achievement matrix.

Therefore, according to the above table, it can be said that improving the quality of banking technological services has the greatest impact on improving the quality of banking technological services. The components of organizational and corporate factors, economic factors, and innovative factors have mutual influence on each other, and all three of these components are influenced by governance factors and influence social factors.

Table 6: Matrix of initial achievement of the influencing factors on improving the quality of banking technological services

	Technological banking management	Banking technological marketing	System quality and electronic services	Improving the quality of banking technological services	Technological hardware and software infrastructure	Customer Experience Management	Organizational Culture	Risk management
Technological banking management		0	0	0	0	1	0	1
Banking technological marketing	1		1	1	0	0	1	1
System quality and electronic services	1	0		1	0	0	1	1
Improving the quality of banking technological services	1	0	0		0	1	0	0
Technological hardware and software infrastructure	1	0	0	1		0	0	1
Customer Experience Management	1	0	1	0	0		0	0
Organizational Culture	0	0	1	0	0	0		0
Risk management	1	1	10	0	0	0	0	

Table 7: Leveling of factors based on the adapted achievement matrix

Component	Access set	Moghaddam collection	Subscription set	level
Technological banking management	1-6	1-2-3-4-5	1	Second
Banking technological marketing	1-2-5-6	2-3-4-5	2	Third
System quality and electronic services	6	1-2-3-4-5-6	6	Second
Improving the quality of banking technological services	6	1-2-3-4-5-6	6	First
Technological hardware and software infrastructure	1-2-4-5-6	2-4-5	2-4-5	Third
Customer Experience Management	6	1-2-3-4-5-6	6	First
Organizational Culture	1-2-4-5-6	2-3-4-5	2-4-5	Third
Risk management	1-2-3-4-6	3	3	Fourth

3.4 Evaluation of the current and desired factors affecting the quality of technological services

In the following, the gap between the current situation and the desired factors affecting market contracts was evaluated. For this purpose, using the independent T-test, the answers of managers and experts were examined in terms of significant differences.

Table 8: Independent T-test for the status of factors affecting capital market contracts

Independent Samples Test									
t-test for equality of means							Levene's Test for Equality of Variance		
The difference is at the confidence level 95%		Standard error of the mean	mean difference	meaningful	Degrees of freedom	T statistic	meaningful	F statistic	**Components**
Maximum	Lowest								
1.873	-0.178	0.521	0.846	0.104	215	1.972	0.062	3.43	Assuming equal variance of two groups	**Technological banking**
1.849	0.156	0.510	0.846	0.098	202.3	1.971			Assumption of inequality of variance of two groups
-0.546	-1.074	0.075	-0.457	0	215	-24.12	0	37.17	Assuming equal variance of two groups	**Banking technology evaluation**
-0.697	-0.947	0.046	-0.457	0	211.2	-28.10			Assumption of inequality of variance of two groups
217.1	-1.653	0.086	-1.364	0	215	-91.10	0	39.89	Assuming equal variance of two groups	**Systemic and electronic service quality**
1.058	-1.422	0.053	-1.364	0	215	-47.24			Assumption of inequality of variance of two groups
0.890-	1.079	0.124	-0.850	0	215	-11.04	0	51.67	Assuming equal variance of two groups	**Improving the quality of banking technological services**
-0.968	1.172	0.089	-0.850	0	215	-19.45			Assumption of inequality of variance of two groups
1.065	-1.569	0.669	0.254	0.705	215	-0.379	0.775	0.089	Assuming equal variance of two groups	**Technological hardware and software infrastructure**
1.059	-1.566	0.668	0.254	0.704	201.6	-0.380			Assumption of inequality of variance of two groups
-01.01	-1.314	0.106	143.1	0	215	-59.9	0	45/13	Assuming equal variance of two groups	**Customer Experience Management**
-0.941	1.007	0.054	143.1	0	215	-21.08			Assumption of inequality of variance of two groups
-0.969	-1.367	0.086	-146.1	0	215	-66.9	0	44/08	The assumption of equality between the two groups	**Organizational Culture**
-1.079	-1.241	0.037	-146.1	0	215	-17.18			Assumption of inequality _ between two groups
-1.248	-1.782	0.125	-1.514	0	215	-21.6	0	36.78	The assumption of equality between the two groups	**risk management**
-1.307	-1.567	0.077	-1.514	0	215	-48.11			Assumption of inequality _ between two groups

Based on the obtained results, the analysis of variances shows that assuming the variance of the two groups is equal and at a confidence level of 95%, the significance obtained for the averages of the components of governance factors and the transparency of organizational factors is greater than the standard value of 0.05. Therefore, there is no significant difference between the responses of the two groups regarding the functional status of these two groups. In other words, these factors have a favourable situation to influence the study. Also, the averages of the components, it is smaller than the standard value of 0.05, so there is a significant difference between the answers.

3.5 The relationship between categories and components on improving the quality of banking techno-logical services using structural equation modelling

The table data and graphs of path analysis and t-test of this software were obtained using SMART-PLS software.

Table 9: Summary of the results of the hypothesis test

| Impact rate	The significance level	t test value	Path coefficient	routes
Strong	Meaningful and positive	35.856	0.730	Institutional environment → Financial development
medium	Meaningful and positive	29.540	0.492	Economic sector of banking → Financial development
medium	Meaningful and positive	25.958	0.527	Non-banking economic sector → Financial development
Strong	Meaningful and positive	27.462	0.651	Monetary sector → Financial development
medium	Meaningful and positive	19.640	0.503	The openness of the economic sector → Financial development
medium	Meaningful and positive	40.869	0.598	Social factors → improving the quality of technological services
medium	Meaningful and positive	31.870	0.486	Coordinated and joint investment factors → improving the quality of technological services
Strong	Meaningful and positive	32.486	0.761	Environmental factors → improving the quality of technological services
Strong	Meaningful and positive	43.853	0.631	Economic factors → improving the quality of technological services
Strong	Meaningful and positive	31.972	0.602	Innovative factors → improving the quality of technological services
medium	Meaningful and positive	29.854	0.401	Cooperation opportunities and capabilities → improving the quality of technological services
Strong	Meaningful and positive	42.674	0.851	Financial development → improving the quality of technological services
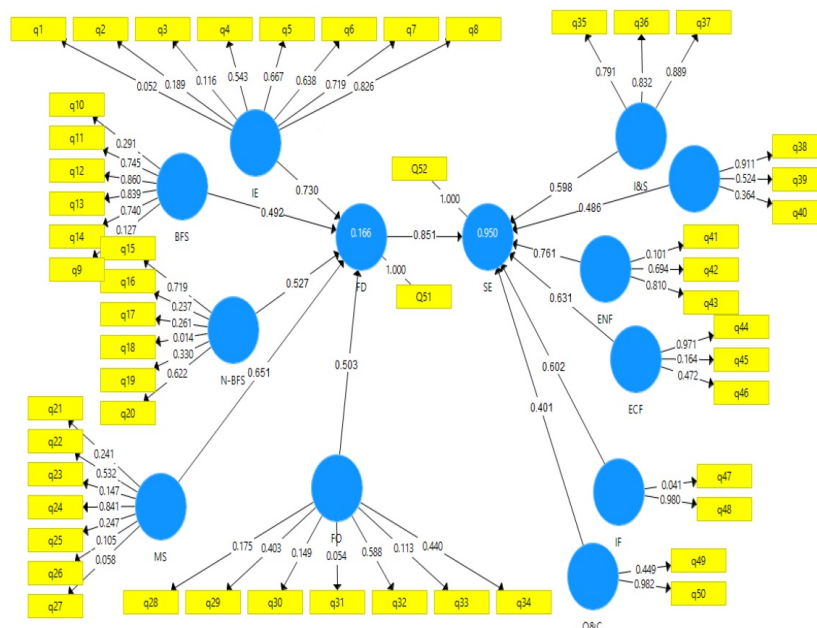
Figure 1: path analysis

According to the graphs on the previous pages, it can be said that financial development has a positive, significant and strong relationship with improving the quality of technological services of Sanat and Mine Bank according to the path coefficient of 0.851 and the t-test of 42.674. Likewise, the institutional environment and the monetary sector have a significant and strong relationship with the financial development variable, and the variables of the banking and non-banking economic sectors and the openness of the economic sector have a moderate relationship with the financial development variable. Environmental factors, economic factors, and innovative factors have a strong, positive and significant relationship with the improvement of the quality of technological services, and the factors of opportunities and cooperation capabilities have a moderate, positive and significant relationship with the improvement of the quality of the technological services of the Bank of Industry and Mine.
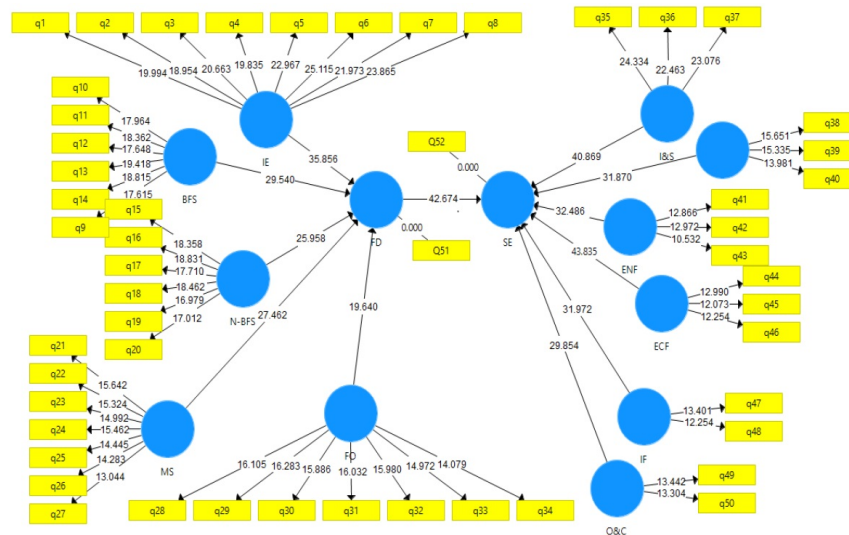
Figure 2: t test results

To confirm the validity of the measurement tool, two types of evaluation validity under the title of content validity and convergent validity were used. Content validity was established by ensuring the compatibility between measurement indicators and existing literature, and this validity was obtained by surveying professors. Convergent validity refers to the principle that the indicators of each structure have a moderate correlation with each other. According to Fornell and Larcker [7], the criterion of convergent validity is that the mean output variances are greater than 0.5. Also, in this research, to determine the reliability of the questionnaire from two criteria (Cronbach's alpha coefficient and composite reliability coefficient), according to the opinion, the convergent validity criterion is that the average output variances are more than 0.5. Also, in this research, to determine the reliability of the questionnaire, two criteria (Cronbach's alpha coefficient and composite reliability coefficient) were used according to the opinion of Fornell and Larcker [7]. Cronbach's alpha coefficients of all the variables in this study were higher than the minimum value (0.7). Unlike Cronbach's alpha, which implicitly assumes that each index has the same weight, composite reliability relies on the true factor loadings of each construct, so it provides a better measure for Provides reliability. Composite reliability should obtain a value greater than 0.7 to indicate the internal consistency of the construct. In the table below, the results of the reliability and validity of the measurement tool are given in full.

Table 10: Reliability of measurement tools

Average coefficient of extracted variance	Cronbach's alpha coefficient	Composite reliability coefficient (CR) research variables $Pc > 0.7$	Research variables
(AVE)	0.96	0.84	Institutional environment
0.71	0.84	0.79	Economic sector of banking
0.68	0.87	0.80	Non-banking economic sector
0.59	0.90	0.82	Financial sector
0.61	0.85	0.80	The openness of the economic sector
0.58	0.92	0.83	Social factors
0.81	0.78	0.78	Coordinated and joint investment agents
0.67	0.77	0.76	Environmental factors
0.65	0.78	0.74	Economic factors
0.59	0.80	0.78	Innovative factors
0.62	0.83	0.76	Cooperation opportunities and capabilities

Next, the fit of the model was evaluated. The purpose of model fit evaluation is to determine how well the model is compatible with the experimental data used. This is done based on fitness indicators. The fit of the model with the observed data of the index has been adjusted through absolute fit criteria, comparative fit indices and adjusted fit indices.

According to the results of table 11, the ratio of chi-square to degree of freedom has been calculated as 2.86, with values below 3 being acceptable. Also, the root mean square error index is equal to 0.059, which values less than 0.08 indicating that the model has an acceptable fit. The value of the normalized fit index is also estimated at 0.89, which is more than the permissible limit, i.e. 0.60. Other indicators should be more than 0.9, which is fulfilled in the

research model. As a result, it can be said that overall the model is suitable and the experimental data are in good agreement with it.

Table 11: Comparative fit and model fit indices

The obtained amount	Acceptable limit	Indicator	Grouping of indicators
0.92	More than 0.90	goodness of fit index	Absolute fit indices
0.94	More than 0.90	Modified goodness of fit index	
0.92	More than 0.90	Comparative fit index	Comparative fit indices
0.93	More than 0.90	Normalized fit index	
0.92	More than 0.90	Unnormalized fit index	
2.86	A value between 1 and 3	Chi-square ratio to degrees of freedom	Adjusted fit indices
0.89	More than 0.60	Normalized parsimonious fit index	
0.059	Less than 0.08	The root mean square error of approximation	

4 Discussion and conclusion

According to the results of the research, the factors of the institutional environment are the most influential in the strategic decisions to improve the service quality of Sanat and Mine Bank. In fact, to make strategic decisions to improve the service quality of Sanat and Mine Bank, the relevant officials should improve these variables, which have a great impact on improving decision-making. Therefore, according to the total results obtained from the research model, the component ((environmental factors)) is the most infrastructural (fourth level) and the component ((opportunities and cooperation capabilities)) is the most structural (first level) of the elements that make up the quality improvement model. The technological services of the Bank of Sanat and Mine are also the most basic (third level) institutional environment component and the ((banking economic sector)), ((non-banking economic sector)) and ((openness of the economic sector)) components of the superstructure. The most (first level) elements of the financial development model. Therefore, from the point of view of experts, the environmental factors and the institutional environment have the most influence on the decisions of Naat and Mine Bank the relevant officials make strategic decisions in the design of the plan to improve the quality of the technological services of Sanat and Mine Bank should consider these variables, which have a great influence on the improvement of the decision. The receptions are improving. In today's economic world, the success of banks depends significantly on the collection and processing of appropriate information and its use in strategic planning. Considering that Sanat and Mine Bank rely on the environment to obtain scarce and valuable resources, the organization's external environment may present problems or opportunities for these institutions. The component ((institutional environment)) includes variables such as corruption index, rule of law and order, political stability, the right to comment and answer, the amount of bureaucracy, the efficiency and effectiveness of the government, the quality of laws and regulations, and sustainable property rights. These variables are very important in the decisions of entrepreneurs from the aspect of financial development and can play a significant role in their decision-making. Financial economists believe that institutional quality can affect financial development. According to them, in the absence of a strict legal framework, due to the lack of trust of depositors, the ability of financial markets to mobilize resources is weakened. This leads to the transfer of funds abroad and denies domestic investment opportunities. In fact, it can be said that inappropriate institutional quality leads to the weakening of economic markets and then disrupts economic growth. Therefore, it seems that government functions and the characteristics of countries should be analyzed to make appropriate political recommendations to improve the level of financial development. Ignoring the institutional conditions means ignoring the economic and sociological realities of countries, and recommending a policy to promote financial development is imprecise and may even hurt it.

In the third level of the pattern of improving the quality of technological services of Sanat and Mine Bank, according to experts, the components ((coordinated and joint investment factors)), ((economic factors)) and ((innovative factors)) are placed. In addition to influencing each other, these three components have been influenced by environmental factors. Among the indicators of these components, we can mention the allocation of resources, strategic management of cooperation, strategic leadership, sustainable competitive advantage, modernization of application systems, pioneering, wealth creation, creativity and innovation in the cooperation roadmap. Therefore, the designers of the road map should improve the quality of the technological services of Sanat and Mine Bank by paying more attention to these dimensions. In the second level of the financial development model, the component ((financial sector)) is placed, which affects the components of ((banking economic sector)), ((non-banking economic sector)) and the openness of the economic sector)). The financial depth index, the balance of the central bank's participation bonds based on money, credit control, the freedom of interest rates, the efficiency of the central bank, the degree of independence of the central bank and the close supervision of the central bank can affect improving financial development, which is actually one of the indicators of the economic sector. be significant Therefore, the indicators of sustainable financial

development show that a sustainable port must crystallize a development framework that takes into account the needs of the future in addition to the current needs. The concept of cooperation between Sanat Bank and sustainable mining is very valuable, it should be noted that complete and real sustainability can never be achieved, however, this issue should never stop people from trying to move towards sustainability. A port that takes even one step forward towards sustainability should be encouraged and supported. Any positive movement towards sustainability is better than none. But it is very important to point out that man and technology are progressing day by day, but what is always constant is the environmental conditions. Everyone should use all their power to preserve the environment and natural benefits and use renewable energy sources. such as wind and sunlight to have maximum use.

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