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Provide an Optimal Model of Customer Relationship Management with the Approach of Improving Financial Status and Profitability using Fuzzy Analytic Hierarchy Process

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ABSTRACT

Today, the role of customer relationship management in various organizations is an inalienable role. This study examines the gaps in customer relationship systems based on the characteristics of the management information management system and in this study we seek to answer the question of whether the customer relationship management information system with organizational performance in the financial situation and profitability is significant? The statistical population of this research includes all managers and staff experts. According to estimates, the number of managers and staff experts is about 168 people. Sampling method in this study will be a simple random sampling method. In this study, the sample size was determined using the Cochran's formula. The sample will be 117 people. The results showed that loyalty with a weight of 0.56 was in the first place and then flexibility with a weight of 0.35 was in the second place of importance.

Keywords: customer orientation, customer relationship management, mutual understanding, flexibility

1. Introduction

Customer relationship management is a continuous effort that requires re-engineering the main processes from the customer's point of view, with his participation and receiving feedback from him [1]. In a product-oriented approach, the goal is to find a customer for the products using mass marketing efforts. But in the customer-centric approach, the goal is to develop products and services to adapt to customer needs [2]. On the other hand, the implementation of an organizational technology such as customer relationship management requires a change in organizational culture [3]. Although both technology and work processes are essential to the success of customer relationship management, it is the organization's personnel that are the cornerstone of customer relationships [4]. Successful implementation of customer

relationship management requires attention to various aspects of management and employees of the organization, the commitment of top management is one of the key factors for the success of customer relationship management projects [5]. A customer-centric model requires data sharing at the organizational level, and this requires a fundamental paradigm shift in the culture of knowledge and information sharing [6]. Customer relationship management has improved through business concepts and processes such as relationship marketing and a strong emphasis on customer retention, and has grown through effective customer relationship management. Customer relationship management and relationship marketing both emphasize that retention Relationships with existing customers are more effective than creating new customers [7]. Based on the content and type of interaction, Park and Kim divide customer information into three types: customer information, customer information, and customer information [8]. Customer relationship management is a set of methods that provide a strong perspective. It provides a coherent and integrated customer across the business to ensure that each customer receives the highest level of service [9].

Customer relationship management thinking is not a new idea. Since the time of cavemen, customers have had the choice of which vendor to buy their bows and arrows from. This choice depends on the customer experience of previous relationships with different vendors [10]. Naturally, a salesperson is selected who has better customer relationships and performs better before, during, and after-sales interactions with customers. Timely marketing and identification of the product in the market, considering the demands of customers in the technical and quality characteristics of products and services, providing facilities appropriate to the social situation and other conditions of customers at the time of sale and providing appropriate after-sales services and maintaining relationships with Buyers of the organization's products as business partners of the organization that play a strategic role in the survival of the organization, all in customers create the confidence that the seller of goods / services, has the right capabilities to establish and maintain good relationships with customers, and also In an atmosphere of mutual trust, the interests of both parties to this relationship will be served [11]. The existence of such a system that does not leave customers alone even after the sale of goods / services and provides them with technical, educational, service and maintenance services, is the key to the survival of the organization and guarantee future customer visits for re-purchases [12].

2. Research background

Lau et al (2016) develops a novel model that combines activity-based costing (ABC), CRM, fuzzy analytic hierarchy process (AHP), and technique for order preference by similarity to ideal solution (TOPSIS) methods to evaluate strategically customer profitability and prioritizing corporate accounts. The proposed model also directs the marketing function to customize service offerings and introduce appropriate service levels to engage customers of different segments for the purpose of maximizing corporate profitability [13].

Wang et al (2020) suggest a multicriteria decision-making (MCDM) model for N-hexane solvent (C6H14) supplier evaluation and selection for vegetable oil production. All criteria affecting to the hexane solvent supplier evaluation and selection process are defined by experts. Then, a fuzzy analytic hierarchy process (FAHP) multicriteria comparative analysis method has been applied for determining the weight of all criteria. Finally, the technique for order of preference by similarity to ideal solution (TOPSIS) was applied to select the optimal hexane solvent supplier. As a result, decision making unit 003 (DMU3) is the optimal supplier. The work also proposed a useful guideline for supplier evaluation and selection processes in other industries [14].

Henry et al (2016) tried to map the profit-based ranking of corporate customers into the current market segments, with a view of determining the relative profitability of each market segment. The proposed model also directs the marketing function to customize service offerings and introduce appropriate service levels to engage customers of different segments for the purpose of maximizing corporate profitability. This study

represents the first move to adopt the fuzzy AHP and TOPSIS methods to analyze the ABC and CRM data inputs of an airline company. In mapping the profit-based ranking of corporate customers into the current market segments, the relative profitability of each market segment can be determined [15].

Nayebasl (2020) try to identify the optimal key and key components by presenting the optimal model of customer relationship management in Keshavarzi Bank with the approach of improving financial situation and profitability, and based on the importance and performance of different CRM components. The results showed that the most important main criteria are:1- Customer-centricity 2- Loyalty 3- Knowing the need 4- Mutual understanding 5- Flexibility and the components that get the highest score in the indicators are: 1- Providing fast services to customers 2- Proper understanding of the needs of key customers through Continuous learning process 3- Existence of accurate customer feedback system and its implementation 4- Management flexibility and employees to provide new services 5- Attention of senior managers to customer relationship management as an essential principle 6- Efforts to attract customer loyalty through ways Miscellaneous [16].

Identifying risks and prioritizing is important for payment service provider (PSP) companies to get banking projects and gain more market share. However, studies regarding the identification of risks and causal relationships are insufficient in the Iranian PSP industry and the industry is unique because of its characteristics. In this study, 30 experts involved with PSP companies are employed as the research sample. Eleven key risks and Forty-six sub-risks are also identified. Subsequently, the fuzzy decision-making trial and evaluation laboratory technique is applied to determine the effective and affected risks and the severity of their effects on each other. Finally, all risks are ranked. Due to the internal interrelationships of the main risks, the weight of each risk is calculated via the fuzzy analytic network process. As the second-level risks have no significant interrelationships, they are ranked via the fuzzy analytical hierarchy process. Moreover, the best-worst method is used to ensure that the obtained rankings are reliable. This study identifies the risks affecting the loss of banking projects and determines the impacts of these risks on each. A sensitivity analysis is then conducted on the weights of the criteria, and the results are compared [17].

3. Research methodology

The present study is based on the purpose of the applied type. The research method is descriptive-correlational in terms of the method of obtaining data since it has been used to prove research hypotheses from surveys with people involved in the problem (handicraft customers). The cause-and-effect relationship between the variables in the research has been analyzed using structural equation modeling. In the present study, the variables of customer relationship management, customer loyalty and competitive advantage are the three main constructs, each of which is measured by a number of items (obvious variables).

In this study, first, using library resources, the subject literature was examined, and then the research variables were measured through a 57-item questionnaire with a five-point Likert scale. The Customer Loyalty Questionnaire was developed by Randley and Till (2005) and consisted of 26 items and 5 subscales of attitudinal loyalty (6 questions), complaining behavior (7 questions), willingness to be loyal (4 questions), and resistance to competitive bidding (6 questions) and situational loyalty (3 questions). The standard questionnaire for managing the customer relationship with the police station (2010) includes 14 items. It consists of 14 questions and components of attracting, retaining, and expanding customer relations 5 items, infrastructure 2 items and customer orientation 8 items. Li and Geo (2006) Competitive Advantage Questionnaire with five dimensions including tangible advantage (4 questions), sustainable advantage (3 questions), dynamic advantage (3 questions), homogeneous advantage (3 questions) and compound advantage 4 (question) which has 17 closed items were designed with a 5 degree Likert scale. The statistical population of the research includes the customers of the trade units selling handicraft products. According to the statistics of 2016, an average of 350 buyers visits these units daily. For this reason, according to the table of Morgan, Krajersi and Morgan (1970), the sample size of 384 people is considered for this test. Given that the size of the population is known, the Morgan table is used for sampling. A total of 183

questionnaires were distributed in the statistical population. Analyzes of this research are based on the obtained answers. To determine the face and content validity of the questionnaire, the opinions of university professors, administrators and experts who were familiar with the subject were used, which according to the collected opinions, the validity of the questionnaire was confirmed. The validity of the questionnaire was also assessed by two convergent and divergent validity criteria, which are specific to structural equation modeling.

In this study, in order to make the validity of the questionnaire appropriate, in the initial design of the questions, the structure of the questionnaire and how to use the sentences were unambiguous. After the initial design, in order to increase the validity of the questionnaire, the opinions of academic experts were used. Also, given that the statistical population of the study includes experts related to the research topic, it can be hoped that most of them are familiar with this technique. In this study, a questionnaire to assess the importance of the criteria was completed by experts and Cronbach's alpha coefficient was used to assess the reliability of the questionnaire. According to Nonali (1978), if the Cronbach's alpha is greater than 70, the result will be valid. For this purpose, initially 30 questionnaires were completed by a randomly selected statistical sample and the reliability coefficient of the questionnaire was calculated by SPSS software using Cronbach's alpha test.

In the data analysis section, the data obtained from the implementation of the questionnaires will be analyzed in two descriptive and inferential sections using SPSS software. In the descriptive part, operations related to demographic information of statistical sample people will be performed using SPSS software. Also, tables and graphs that contain the average, frequency, cumulative percentage, etc., will be used in this section. In the inferential section, the test of research hypotheses will be performed using correlation and regression tests. Also, in order to prioritize the indicators, the FAHP technique has been used using Expert choice software.

Analytical statistics are presented in the form of descriptive and inferential statistics for the analysis of the collected data. First, using descriptive statistics, cognition of the status and demographic characteristics of the respondents is obtained, and then in the inferential statistics of this research, the status of research variables by central indicators and dispersion and t-test are examined. In the final step, research hypotheses by Regression test are performed.

3-1 Conceptual model of research

According to the mentioned explanations, the conceptual model of the research is presented. A conceptual model based on theoretical relationships between a numbers of factors that have been identified as important in the research problem. Such a pattern, while showing the research variables, depicts their relationship. This model optimizes customer relationship management with the approach of improving financial status and profitability using hierarchical analysis technique.

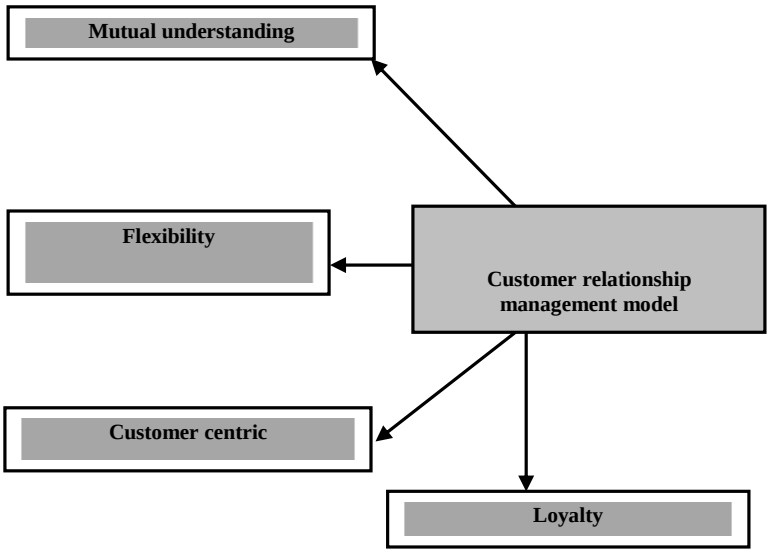

Figure 1: Conceptual model of research

4. Results

4-1 Demographic statistics:

4-1-1 Gender

Table 1 shows the frequency of respondents' gender and their frequency percentage. The highest frequency is related to male gender, which includes 63% of the sample size.

Table 1: The frequency of gender of the respondents

Frequency Percent	Frequency	Gender
63	74	Male
37	43	Female

4-1-2 Level of Education

Table 2 shows the frequency of the level of education of the respondents and the percentage of their frequency. The highest frequency is related to the bachelor's degree, which includes 66% of the number of samples.

Table 2: Frequency of education level of respondents

Level of Education	Frequency	Frequency Percent
Diploma and lower	5	4
Associate Degree	11	9
Bachelor	77	66
Master’s degree and higher	24	21

4-1-3 Age

Table 3 shows the frequency of the age status of the respondents and their frequency percentage. The highest frequency is related to 31 to 35 years.

Table 3: Frequency of age status of respondents

Age	Frequency	Frequency Percent
20 to 25	7	6
26 to 30	32	27
31 to 35	56	48
Above 35	22	19

4-1-4 Years of service

Table 4 shows the frequency of respondents' service history and the percentage of their frequency. The highest frequency is related to 6 to 10 years.

Table 4: Frequency of respondents' service history

Years of service	Frequency	Frequency Percent
5 years and less	11	9
6 to 10 years	77	66
11 to 15 years	15	13
More than 15 years	14	12

The present study has identified the dimensions of customer relationship management. Then, using fuzzy hierarchical analysis (FAHP) method, it has prioritized these dimensions from the point of view of experts. The dimensions identified in this research are described in Table 5.

Table 5: Dimensions identified in customer relationship management

Dimension	Abbreviation	Indicator
Mutual understanding	C_1	Competitive advantage by retaining customers for a long time Adequate use of Internet services to facilitate the work of customers Use maximum time and resources to serve customers in order to value customers
Flexibility	C_2	Invest to connect with each customer based on customer value added Evaluate the continuous performance of employees based on customer satisfaction Create a comprehensive database of customers
Customer centric	C_3	Existence of a precise mechanism for translating customer needs into applicable rules Defined process for identifying key customers Accurate sharing of new information about customer needs
Loyalty	C_4	Use computer technology to create the right service for customers Creating a process for two-way communication with customers Trying to gain customer loyalty in a variety of ways Senior managers' attention to customer relationship management as an essential principle

4-1-5 Fuzzy Hierarchical Analysis Technique (FAHP)

Analytic Hierarchy Process (AHP) is a research technique to support qualitative multi-factor rational decisions. This technique is a very prominent management tool for complex multi-criteria decision making problems and is generalized as a way that can provide flexible solutions to quantitative and qualitative problems (Sangjae, Wanki, Young, & Kyong , 2012). The concept of fuzzyness has been considered indirectly in the conventional AHP method without the use of fuzzy sets. In fact, in this method, using verbal expressions in Table 6, the fuzzy concept is involved in determining the pairwise comparison matrices. Therefore, by generalizing the above method, methods are presented in which fuzzy numbers are used to express the degree of preference of elements. Among these, the methods presented by Chang can be mentioned (Chang Y., 2007). Extensive research on these techniques can also be found in the works of

Karaman et al. (Kahraman, C; Cebeci, U; Ruan, D; 2004). In this study, fuzzy AHP was used by Chang development analysis method.

Table 6: Membership function of language variables to determine the weight of criteria

Row to column preference				Column to row preference			
Linguistic variable	Equivalent fuzzy number			Linguistic variable	Equivalent fuzzy number		
Equal importance	1	1	1	Equal importance	1	1	1
The same to relatively important	2.67	2	1.33	The same to relatively important	0.75	0.5	0.37
Relatively more important	3.67	3	2.33	Relatively more important	0.43	0.33	0.27
Relatively too much more important	4.67	4	3.33	Relatively too much more important	0.03	0.25	0.21
Much more important	5.67	5	4.33	Much more important	0.23	0.20	0.18

Since Chang method is used in this research, so in the following, we will explain the steps of the problem solving algorithm in this method.

In the development analysis method for each row of the pairwise comparison matrix, the value Sk, which is itself a triangular fuzzy number, is calculated as follows (Azar & Faraji, 2008:(

If X = {x1, x2, x3,…, xn} is a set of goals and U = {u1, u2,…, un} is a set of ideals, then according to this method, considering each goal, it analyzes the development. Power can be done for each of the ideals (gi). Therefore, the value of development analysis for each goal can be as follows:

$M_{g_i}^1$ و $M_{g_i}^2$ و ... و $M_{g_i}^n$ که i=1,2,3,…n

$$\begin{bmatrix} M_{g_1}^1 & M_{g_1}^2 & \cdots & M_{g_1}^n \\ M_{g_2}^1 & M_{g_2}^2 & \cdots & M_{g_2}^m \\ . & . & \cdots & .. \\ M_{g_n}^1 & M_{g_n}^2 & \cdots & M_{g_n}^m \end{bmatrix}$$

All $M_{g_i}^j$ are fuzzy triangular numbers expressed as (l, m, u). The steps of Chang's development analysis are as follows:

Step 1: Obtain fuzzy compound expansion for each target.

If $M_{g_i}^1, M_{g_i}^2, \ldots M_{g_i}^m$ the values of the development analysis of the i-th target are for the m-ideal, then the fuzzy compound expansion of the m-ideal for the i-th objective is defined as follows:

If so, $M_{g_i}^1 = (l_{ij}, m_{ij}, u_{ij})$ then $\sum_{j=1}^m M_{g_i}^j$ the ideal is defined by the fuzzy addition operator on the development analysis m as follows:

$$\sum_{j=1}^{j} M_{g_i}^j = (l_{i1}, m_{i1}, u_{i1}) + (l_{i2}, m_{i2}, u_{i2}) + \cdots + (l_{im}, m_{im}, u_{im})$$

$$=\left(\sum_{j=1}^{m} l_{ij}, \sum_{j=1}^{m} u_{ij}\right) = (l_i', m_i', u_i')$$

We will also have to obtain $\left[\sum_{i=1}^{n}\sum_{j=1}^{m}\sum_{g_i}^{j}\right]^{-1}$ by applying a fuzzy operator:

$$\sum\sum M_{g_i}^{j} = \sum_{i=1}^{n}\left(\sum_{j=1}^{m} l_{ij}, \sum_{j=1}^{m} m_{ij}, \sum_{j=1}^{m} u_{ij}\right) = \left(\sum_{i=1}^{n} l_i', \sum_{i=1}^{n} m_i', \sum_{i=1}^{n} u_i'\right)$$

$$\left(\sum_{i=1}^{n}\sum_{j=1}^{m} M_{g_i}^{J}\right)^{-1} = \left(\frac{1}{\sum_{i=1}^{n} u_i'}, \frac{1}{\sum_{i=1}^{n} m_i'}, \frac{1}{\sum_{i=1}^{n} l_i'}\right)$$

$$S_i = \sum_{j=1}^{m} M_{g_i}^{J} * \left[\sum_{i=1}^{n}\sum_{j=1}^{m} M_{g_i}^{J}\right]^{-1}$$

Then

$$(l_i', m_i', u_i') * \left(\frac{1}{\sum_{i=1}^{n} u_i'}, \frac{1}{\sum_{i=1}^{n} m_i'}, \frac{1}{\sum_{i=1}^{n} l_i'}\right) = \left(\frac{l_i'}{\sum_{i=1}^{n} u_i'}, \frac{m_i'}{\sum_{i=1}^{n} m_i'}, \frac{u_i'}{\sum_{i=1}^{n} l_i'}\right) = (l_i, m_i, u_i)$$

$$S_k = \sum_{j=1}^{n} M_{ij} \otimes \left[\sum_{i=1}^{m}\sum_{j=1}^{n} M_{ij}\right]^{-1} \qquad (1)$$

We will also have to obtain by applying a fuzzy operator:

Where k represents the line number, and i and j represent the options and indicators, respectively.

Step 2: In this method, after calculating the Sks, their magnitude should be obtained relative to each other. In general, M1 and M2 are two triangular fuzzy numbers, the magnitude of M1 and M2 is defined as follows:

(2) $$\text{if } m_i \geq m_k \qquad V(M_i \geq M_k) = 1$$

$$\text{Otherwise} \qquad V(M_i \prec M_k) = \text{hgt}(M_i \cap M_k)$$

And we have:

(3) $$hgt = (M_i \cap M_k) = \frac{U_i - L_k}{(U_i - L_k) + (m_k - m_i)}$$

Step 3: The magnitude of a triangular fuzzy number from k is another triangular fuzzy number obtained from the following equation:

(4) $$V(M_1 \geq M_2, \ldots, M_k) = V(M_1 \geq M_2) and \ldots and\ V(M_1 \geq M_k)$$

We also do the following to calculate the weight of the indicators in the pairwise comparison matrix:

$$w'(x_i) = min\{V(S_i \geq S_k)\} \qquad k = 1,2,3,\dots,n, k \neq i \tag{5}$$

Step 4: So the weight vector of the indicators will be as follows:

$$w'(x_i) = [w'(x_1), w'(x_2), \dots, w'(x_n)]^t \tag{6}$$

Which is the vector of abnormal coefficients. To obtain a normal vector, we do the following:

$$w(x_k) = \frac{w'(x_k)}{\sum_{k=1}^{n} w'(x_k)} \tag{7}$$

These steps are performed for all pairwise comparison tables to obtain their normalized weights as well.

4-2 Data analysis

In order to determine the weight of each of the 4 criteria in customer relationship management and its subset in the previous stage, the fuzzy hierarchical analysis method was used by Chang development method. To collect opinions on pairwise comparison of criteria, the membership function of language variables as described in Table 6 has been used. It should be noted that since the opinion of all experts is the same weight, the formula of geometric mean is given as said. Table 7 shows the matrix of fuzzy AHP pairwise comparisons, obtained from the geometric mean of expert opinions. In the table above, for the lower values of the original diameter, the inverse of the values obtained for the upper diameter diameters is used.

Table 7: Matrix of pairwise comparison of criteria

	C_1	C_2	C_3	C_4
C_1	(1,1,1)	(611.0, 694.0, 79.0)	(366.1, 68.1, 994.1)	(915.0, 136.1, 407.1)
C_2	(265.1, 44.1, 636.1)	(1,1,1)	(31.2, 028.3, 727.3)	(868.0, 017.1, 174.1)
C_3	(501.0, 595.0, 732.0)	(268.0, 33.0, 432.0)	(1,1,1)	(236.0, 283.0, 357.0)
C_4	(71.0, 88.0, 092.1)	(851.0, 983.0, 152.1)	(801.2, 533.3, 237.4)	(1,1,1)

Then, according to the EA method, for each row of the above pairwise comparison matrix, the value of SK, which is itself a triangular fuzzy number, is calculated using formula (1).

$$\sum_{j=1}^{4} M_{g_1}^{j} = (1,1,1) + (0.608, 0.741, 0.921) + (1.34, 1.546, 1.782) + (0.4, 0.471, 0.579) + (0.435, 0.484, 0.551) + (0.835, 0.954, 1.112) = (4.618, 5.196, 5.945)$$

$$\sum_{j=1}^{4} M_{g_2}^{j} = (6.768, 7.542, 8.0408) \qquad \sum_{j=1}^{4} M_{g_3}^{j} = (3.448, 3.91, 4.561)$$

$$\sum_{j=1}^{4} M_{g_4}^{j} = (7.763, 8.738, 9.788\ ) \qquad \sum_{j=1}^{4} M_{g_5}^{j} = (8.383, 9.179, 10.561)$$

$$\sum_{j=1}^{4} M_{g_6}^{j} = (4.824, 5.339, 5.936)$$

$$\sum_{i=1}^{3}\sum_{j=1}^{3} M_{g_i}^{j} = (35.804, 39.904, 45.199) \qquad \left(\sum_{i=1}^{3}\sum_{j=1}^{3} M_{g_i}^{j}\right)^{-1} = (0.022, 0.0250, 0.0279)$$

S_1= (102.0, 130.0, 166.0) S_2= (149.0, 189.0, 234.0)

S_3= (076.0, 097.0, 127.0) S_4= (171.0, 218.0, 273.0)

The magnitude of each of the SK values obtained is then calculated relative to the rest. The following are the large degree values obtained for each of the SKs.

$$V(S_1 \geq S_2, \ldots, S_4) = Min(V(S_1 \geq S_2), \ldots, V(S_1 \geq S_4) = 0.069$$

$$V(S_2 \geq S_1, \ldots, S_4) = Min(V(S_2 \geq S_1), \ldots, V(S_2 \geq S_4) = 0.546$$

$$V(S_3 \geq S_1, \ldots, S_4) = Min(V(S_3 \geq S_1), \ldots, V(S_3 \geq S_4) = 0.057$$

$$V(S_4 \geq S_1, \ldots, S_3) = Min(V(S_4 \geq S_2), \ldots, V(S_4 \geq S_3) = 0.888$$

$$W' = (0.069, 0.546, 0.057, 0.888)$$

$$W_N = (0.044, 0.35, 0.036, 0.56)$$

Therefore, the results of using fuzzy AHP show that the preference of each of the above factors from the customers' point of view is as shown in Table 8:

Table 8: Weight of criteria obtained from the point of view of experts

Dimensions of customer relationship management	Significance obtained from fuzzy AHP	Rank in terms of degree of importance
Mutual understanding	*0.44*	*3*
Flexibility	*0.35*	*2*
Customer centric	*0.036*	*4*
Loyalty	*0.56m*	*1*

As shown in Table 8, Loyalty weighs 0.56. In the first place is the degree of importance, which indicates that from the point of view of experts, these factors are more important. Then flexibility with a weight of 0.35. It is ranked second, followed by mutual understanding and risk cluster.

4-3 Analysis of sub-indicators related to factors

Table 9: Matrix of pairwise comparisons below the index related to profitability cluster

	C_1	C_2	C_3	C_4	C_5
C_1	(1,1,1)	(611.0, 694.0, 79.0)	(366.1, 68.1, 994.1)	(915.0, 136.1,407.1)	(371.0, 451.0,554.0)
C_2	(265.1, 44.1, 636.1)	(1,1,1)	(31.2, 028.3, 727.3)	(868.0, 017.1,174.1)	(683.0, 791.0,916.0)
C_3	(501.0, 595.0,732.0)	(268.0, 33.0, 432.0)	(1,1,1)	(236.0, 283.0,357.0)	(214.0, 252.0,305.0)
C_4	(71.0, 88.0, 092.1)	(851.0, 983.0,152.1)	(801.2, 533.3,237.4)	(1,1,1)	(623.0, 717.0,816.0)
C_5	(805.1, 217.2,695.2)	(091.1, 264.1,464.1)	(278.3, 968.3,672.4)	(225.1, 394.1,605.1)	(1,1,1)

All calculations are obtained as the results of the factors, which are avoided. The results are as follows.

$$\sum_{j=1}^{5} M_{g_1}^{j} = (5.453, 6.493, 7.668) \qquad \sum_{j=1}^{5} M_{g_2}^{j} = (7.556, 9.077, 10.654)$$

$$\sum_{j=1}^{5} M_{g_3}^{j} = (2.592, 2.901, 3.365) \qquad \sum_{j=1}^{5} M_{g_4}^{j} = (7.381, 8.824, 10.371\ )$$

$$\sum_{j=1}^{5} M_{g_5}^{j} = (9.764, 11.46, 13.342) \qquad \sum_{j=1}^{5} M_{g_6}^{j} = (4.835, 5.676, 6.667)$$

$$\sum_{i=1}^{4}\sum_{j=1}^{4} M_{g_i}^{j} = (37.581, 44.43, 52.068) \qquad \left(\sum_{i=1}^{4}\sum_{j=1}^{4} M_{g_i}^{j}\right)^{-1} = (0.0192, 0.022, 0.026)$$

S_1= (0.1047, 0.146, 0.204) S_2= (145.0, 204.0, 283.0)

S_3= (049.0, 065.0, 0.089) S_4= (141.0, 198.0, 275.0)

S_5= (187.0, 257.0, 355.0)

$$V(S_1 \geq S_2, \ldots, S_5) = Min(V(S_1 \geq S_2), \ldots, V(S_1 \geq S_5) = 0.129$$

$$V(S_2 \geq S_1, \ldots, S_5) = Min(V(S_2 \geq S_1), \ldots, V(S_2 \geq S_5) = 0.641$$

$$V(S_3 \geq S_1, \ldots, S_5) = Min(V(S_3 \geq S_1), \ldots, V(S_3 \geq S_5) = 0.035$$

$$V(S_4 \geq S_1, \ldots, S_5) = Min(V(S_4 \geq S_2), \ldots, V(S_4 \geq S_5) = 0.598$$

$$V(S_5 \geq S_1, \ldots, S_4) = Min(V(S_5 \geq S_1), \ldots, V(S_5 \geq S_4) = 1$$

$$W' = (0.129, 0.641, 0.035, 0.598, 1) \rightarrow$$

$$W_N = (0.0536, 0.2667, 0.01456, 0.248, 0.416)$$

5. Conclusion

First, the status of demographic statistics was examined. The results showed that the highest frequency is related to male gender, which includes 63% of the sample. Regarding the education of the respondents, the highest frequency is related to the bachelor's degree, which includes 66% of the sample. Also, 4% have a diploma or lower, 9% have a master's degree and 21% have a master's degree or higher. In relation to age, the highest frequency is related to 31 to 35 years. 35. In relation to service history, the highest frequency is related to 6 to 10 years, which includes 66% of the sample, also 9% have 5 years and less, 13% have 11 to 15 years and 12% have more than 15 years of work experience. After processing the data by statistical tools and software, the following results were obtained, which can confirm or refute the hypotheses presented in the research. The most important question of this research was that prioritizing the dimensions of customer relationship management with the approach of improving financial status and profitability using the technique of hierarchical analysis.

After reviewing the research literature related to this topic, 4 related factors were identified, which are mutual understanding, flexibility, customer orientation and loyalty. After analyzing the results, as shown in the diagram, loyalty with a weight of 0.56 was ranked first and then flexibility with a weight of 0.35 was ranked second with importance.

References

Diouf, M.; Choonjong, K. Fuzzy AHP, DEA, and Managerial Analysis for Supplier Selection and Development; From the Perspective of Open Innovation. Sustainability 2018, 10, 3779.

Ziemba, P.; Jankowski, J.; Wątróbski, J. Online Comparison System with Certain and Uncertain Criteria Based on Multi-criteria Decision Analysis Method. In Proceedings of the Computational Collective Intelligence; Nguyen, N.T., Papadopoulos, G.A., Jędrzejowicz, P., Trawiński, B., Vossen, G., Eds.; Springer International Publishing: Berlin/Heidelberg, Germany, 2017; pp. 579–589.

Wang, C.; Nguyen, V.T.; Duy, D.; Do, H. A Hybrid Fuzzy Analytic Network Process (FANP) and Data Envelopment Analysis (DEA) Approach for Supplier Evaluation and Selection in the Rice Supply Chain. Symmetry 2018, 10, 221.

Gustavo B. Alvarez, Rafael G. Almeida, Cecilia T. Hernández, Patrícia A. P. Sousa. (2021) Some mathematical comments about the analytic hierarchy process: Part I – theoretical analysis. Journal of Multi-Criteria Decision Analysis 154.

Movin Sequeira, Per Hilletofth, Anders Adlemo. (2021) AHP-based support tools for initial screening of manufacturing reshoring decisions. Journal of Global Operations and Strategic Sourcing 14:3, pages 502-527.

Haonan Li, Xu Wu, Yinghui Liang, Chen Zhang, Yu-Ting Bai. (2021) A Multistakeholder Approach to the Airport Gate Assignment Problem: Application of Fuzzy Theory for Optimal Performance Indicator Selection. Computational Intelligence and Neuroscience 2021, pages 1-15.

Sanaz Tabatabaee, Mojtaba Ashour, Saeed Reza Mohandes, Haleh Sadeghi, Amir Mahdiyar, M. Reza Hosseini, Syuhaida Ismail. (2021) Deterrents to the adoption of green walls: a hybrid fuzzy-based approach. Engineering, Construction and Architectural Management ahead-of-print:ahead-of-print.

Antonio Lombardi Netto, Valerio Antonio Pamplona Salomon, Miguel Angel Ortiz Barrios. (2021) Multi-Criteria Analysis of Green Bonds: Hybrid Multi-Method Applications. Sustainability 13:19, pages 10512.

Diptiranjan Mahapatra, Rajesh Katiyar, Ratri Parida, Divesh Kumar. (2021) A fuzzy multi-criteria approach for evaluating the contribution of freight transportation towards India's Nationally Determined Contributions (NDCs). International Journal of Production Research 59:9, pages 2857-2884.

Sinrat, S., & Atthirawon, W. (2015). Integrated factor analysis and fuzzy analytic network process (FANP) model for supplier selection based on supply chain risk factors. *Research Journal of Business Management*, *9*(1), 106–123.

Tsai, W.-H., Chou, Y.-W., Lee, K.-C., Lin, W.-R., & Hwang, E. T. Y. (2013). Combining decision making trial and evaluation laboratory with analytic network process to perform an investigation of information technology auditing and risk control in an enterprise resource planning environment. *Systems Research and Behavioral Science*, *30*(2), 176–193.

Uygun, Ö., Canvar Kahveci, T., Taşkın, H., & Piriştine, B. (2015). Readiness assessment model for institutionalization of SMEs using fuzzy hybrid MCDM techniques. *Computers & Industrial Engineering*, *88*, 217–228.

Lau, H., Nakandala, D., Samaranayake, P. and Shum, P. (2016), "A hybrid multi-criteria decision model for supporting customer-focused profitability analysis", Industrial Management & Data Systems, Vol. 116 No. 6, pp. 1105-1130. https://doi.org/10.1108/IMDS-10-2015-0410

Wang, Chia-Nan and Tsai, Hsiung-Tien and Nguyen, Van Thanh and Nguyen, Viet Tinh and Huang, Ying-Fang (2020). A Hybrid Fuzzy Analytic Hierarchy Process and the Technique for Order of Preference by Similarity to Ideal Solution Supplier Evaluation and Selection in the Food Processing Industry, Symmetry, VOLUME 12, YEAR 2020, NUMBER 2, 211,URL = https://www.mdpi.com/2073-12.8994/211.2,

Lau, Henry & Nakandala, Dilupa & Samaranayake, Premaratne & Shum, Paul. (2016). A hybrid multi-criteria decision model for supporting customer-focused profitability analysis. Industrial Management & Data Systems. 116. 1105-1130. 10.1108/IMDS-10-2015-0410.

Nayebasl, S. (2020). Providing an optimal model of customer relationship management in Keshavarzi Bank with the approach of improving the financial situation and profitability using hierarchical analysis technique. *Journal of Accounting and Management Vision*, 3(25), 33-45.

Khalilzadeh, M., Katoueizadeh, L. & Zavadskas, E.K (2020. Risk identification and prioritization in banking projects of payment service provider companies: an empirical study. *Front. Bus. Res. China* **14,** 15 (2020). https://doi.org/10.1186/s11782-020-00083-5.