

Providing a way to Recognize Bank Customers' needs Effectively based on Clustering Techniques, the Fuzzy TOPSIS and Kano Model: A Case Study in Bank of Qarzollhassaneh Mehr Iran in Khuzestan

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Abstract

The service organizations and especially banks as economic units attempt to get customers' expectations and needs. But one of the main challenges of bank managers is how to get a framework to classify customers and recognize their needs in order to provide better services. The present study aim is to provide a model to recognize the bank customers' needs effectively and classify them through three ways-clustering, fuzzy TOPSIS, Kano model to supply better services. The questionnaire is used to get data, population included 384 clients of contribution bank of Mehr Iran in Khuzestan and 5 cluster of customers were selected as sample through Weka software and experts' perspectives. Then, clusters were classified by Fuzzy TOPSIS and clients' expectations were determined through satisfaction model of Kano. The results showed that this model may use in most service organizations especially in banks, so it caused to make satisfaction, loyalty and recognize the customers' needs and more competition.

Keywords: Clustering, Customers' Satisfaction, Fuzzy TOPSIS, Kano Model, Quality of Services

1. Introduction

No organization will survive without the customer and their stability key is to have customers. The customers' satisfaction as one of the interesting issues and challenges of management in new millennium¹. Today, all organizations such as banks try to provide best quality services to customers². Most organizations use customers' satisfaction strategy to improve customers' attitude goods and production and recognize customers' needs and thoughts. The organizations believe that customers are the guarantee survival and stability and their satisfaction is considered as the main preference and continuous goal. Also, all customers may not benefit

equally³ and banks and credit and financial institutions as for-profit organizations know this. More competitive markets, collapse the economic borders, globalization of economy and customers' expectations and needs cause to increase the importance of customers' demands⁴. Perhaps, it is the most obvious banking phenomena in globalization era⁵. So, in a healthy competitive market, the customer's satisfaction and loyalty may not be simple and need to design strategies based on business and trade. Now, customers continue the organization cycle in universal economy and companies cannot be indifferent for customers' demands and needs. They should try to consider activities and abilities based on customers because it is the just source of investment return among customers.

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Banks, Credit and Financial Institutes are organizations having many customers in different levels, so they are interested in separate customers and provide appropriate services, based on customers' importance⁶. One technique to help customers' satisfaction and improve the quality of services is Kano model. Two dimensional quality model of Kano is an effective mean to analyze customers' needs and demands⁷. The organizations may not consider all customers equally³, so the organization focus on customers who make much more profit⁶. All customers are classified in one group based on their characteristics and equal conditions through classification, and it cause to recognized needs and features well, also organization are free from individual customers, because individuals in one cluster have same needs and characteristics. In order to classify customers, the data searching technique may use⁶.

So, the aim of present study is to investigate the quality of productions and services and provide the real needs of customers, but some limitations in sources and equipment force organization to cluster customers so that customers are preferred based on making much more profit and guarantee their satisfaction. The main goal is to use clustering techniques, Fuzzy TOPSIS and Kano model to cluster bank customers and credit and financial institutes, so customers cluster in preference and needs. If the needs provide in appropriate ways, so it cause to make loyalty. Combining three techniques may make an effective technique in which every organization can make competitive market through clustering market, recognize the important customers and get provide their satisfaction.

2. Literature Review

2.1 Concept of Clustering

The clustering is one of the data searching technique. In fact the goal is to search data to explore knowledge, it make regularities in data. The goal is not to search data, and clustering may not use to search data only. Data searching deals with massive and million data and try to find existed and embedded data. The present study included 384 customers as sample to classify and reprioritize them regarding to certain criteria to find out how bunches of different customer in banks and their priority.

The recordings included most similarities fall in one cluster through clustering. So, the existed data in different clusters have at least similarities. The output of clustering

algorithm will be analyze again to make regularities as possible. It must be noted that the clustering always perform based on input characteristics of the sample.

2.2 Fuzzy TOPSIS

The technique of Fuzzy TOPSIS is presented by Howang and Yun in 1981. The classical ideal option use certain and precise amounts to determine the weight of norms and ranking options. In most cases, the uncertainty of human thoughts impose effects on decision makings. So, the Fuzzy TOPSIS is a good technique and the classical ideal option is one of its techniques. In this way, the elements of decision making matric or weight of norms or both are presented by linguistic variables in fuzzy numbers, therefore the problems are removed. Also, the options which have maximum closeness to positive ideal solution and at most distance to negative ideal solution are selected. The positive ideal solution and negative ideal solution presented best possibilities and worst possibilities, respectively.

2.3 Kano Model

Noriaki Kano, the instructor in Rika University of Tokyo and one of the greatest scholars in the science of quality management, presented a model which use in most models of customers satisfaction today. He classified customers' needs or the quality characteristics of the productions in three groups and showed them in a two dimensional diagram (Figure 1).

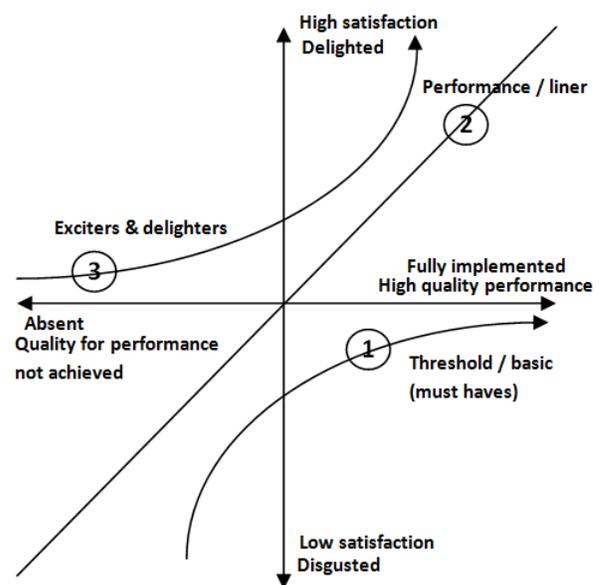


Figure 1. Kano model.

The vertical axis show the customers' satisfaction and horizontal axis show providing the quality basics of customers' idea. The highest and lowest point of the vertical axis represents the customers' satisfaction and their dissatisfaction, respectively. The confluence of the two axes is when there is balance in customers' satisfaction and dissatisfaction.

The right side of horizontal axis show the target basic quality provided completely. The left side of horizontal axis represents the provided production which is lack of the expected quality, and the basics quality were not considered in production or services. .

- **Basic Quality:** The first requirement is basic quality. Kano believes that providing the complete basic quality only prevent the customers' dissatisfaction, and can not to provide their satisfaction. In other words, providing the complete basic quality only cause to send products to market, and cannot help to overcome on competitors to get the market completely.
- **Performance Quality:** The second group is the performance quality which they cannot provide, it cause to customers' dissatisfaction and vice versa. The importance of performance quality is to recognize and consider them in services, and it is the least attempt to survive the financial position of the organization in competitive market.
- **Attractive Quality:** The third group of quality characteristics in Kano model are quality demands that may not be consider as basic and need from the customers' perspective in the time of production implementation. So, the failure to meet such basic may not cause to customers' dissatisfaction, but offering them attract their satisfaction. The obvious characteristics of attractive basic is: It help to recognize and consider in designing and replace to similar products of competitors in market and provide an appropriate situation.

Rad et al.⁸ in a study to consider the combination of clustering and AHP, clustered and classified 177 university fields in 10 different clusters regarding to differences and similarities through clustering algorithm of K-means. Kim et al. also, performed studies in clustering customers. They proposed a structure to analyze the customers' importance and clustered customers through Lifetime value model.

Hua Han et al.⁹ presented a model based on the customers' lifetime to cluster telecom customers. It is included 5 models of decision making as: Current value, historical value, predict the long-time value, credit and

loyalty. The case study of the model was in one of the telecom in one of the provinces of China.

In other study, Ho et al.¹⁰ tried to classify the current customers of the company through genetic algorithm based on luster algorithm of K-mean. One of the important characteristics of the model is: Unlike the K-means algorithm, it may help to select the better and optimized clusters. This case study performed in one company of curtain making.

Feiz and Mola Zadeh¹¹ distributed 196 questionnaire included 30 items among main customers-who had more than five million Riyals in their accounts- of credit and financial institute of Mehr in Semnan province. The research goal was to investigate the effective factors on the customers' satisfaction and classify them into three basic, performance and attractive quality through Kano model. Finally, the effective factors on the customers' satisfaction ranked by Freedman test.

Also, Etebarian and Farahbakhsh⁵ in order to consider the role of Kano model in banks and credit and financial institutes, recognized the customers' needs through a questionnaire included 53 items among 384 customers-who were the main customers of Saderat Tose'e Bank of Iran in Tehran. This model classified the customers' needs into three basic, performance and attractive quality.

Regarding to Fuzzy TOPSIS in Banking, Hatami Nasab and Talee Far¹² conducted a study to investigate and evaluate the marketing means in banking services in banking industry of Iran. Also, they recognized and ranked important and effective factors. They used Fuzzy TOPSIS to rank.

Shahin and Saleh Zadeh⁶ applied clustering techniques, AHP and Kano model to describe the services of Saman Bank. They classified customers through clustering, then reprioritized them by AHP algorithm, finally attempted to find needs in each cluster through Kano model. The population consisted of all customers of Saman Bank in Ghom, then 144 customers selected as sample through simple random sampling to take questionnaire to get data and analyze them.

Ardakani et al.¹³ in a study as "ranking employees and selecting leaders through fuzzy approach hierarchical process and fuzzy TOPSIS" ranked 125 personnel in the Iranian Steel company.

According to the study of Shahin and Saleh Zadeh, it must be noted that one of the main duties of the banks in banking without usury is to allocate sources or provide

facilities. Almost, all customers may want to use bank facilities now or in the future, so it is so emphasized to cluster and classify customers. But, the current research didn't use such important factor. Also, some new services in banks are so common among customers such as e-bank, mobile-bank and telephone-bank. These new services are so important especially among educated individuals, and plays the key role in clustering customers. However, this factor did not pay attention to such factor, doing banking exchanges indirectly is emphasized. The experts are considered other important factor as customers' age, because it may impose effects on some banking services. For instance, young customers usually use modern bank services more than traditional and elder customers. The present study attempt to solve some problems and clustered customers through revised criteria, and larger population. As the fuzzy sets may provide better and obvious picture of decision makers' ideas, so the current research used fuzzy sets to gather the experts' perspectives and Fuzzy TOPSIS algorithm to prioritize the clusters.

3. Method

Regarding to the goal, the present research is theoretical-applied research and descriptive-survey naturally. The population included customers of Saving Bank of Mehr Iran in Khuzestan-the customers used bank services and had accounts. The data gathered through questionnaire and experts' perspectives. The questionnaire consisted of two parts: The first part included items of customers' characteristics such as age, educational degree, and income, and the items were the criteria to cluster customers. Second part included items related to Kano model-qualitative and quantitative items and items to measure increases of satisfaction. All items were selected after reviewing the pertinent works and experts' perspectives and high ranked managers of the bank. The simple random sampling used to get the sample, and sampling performed among customers of different branches of the mentioned bank in Khuzestan to determine the individuals' levels. In order to determine the sample size, Morgan chart used, so 384 customer selected. The managers and experts confirmed the reliability of the questionnaire, and 30 questionnaire distributor to measure the reliability. After that, Alpha Cronbach applied to evaluate the data-84.1% for positive items, and 82.6% for negative items, in fact it showed the high reliability of the presented questionnaire. After collecting questionnaires, the same scale construction

used in the first part of the questionnaire, and stored in Excel. Then, the file interred in Weka software and customers clustered through Simple K-means algorithm. In order to prioritize the clusters, Fuzzy TOPSIS used.

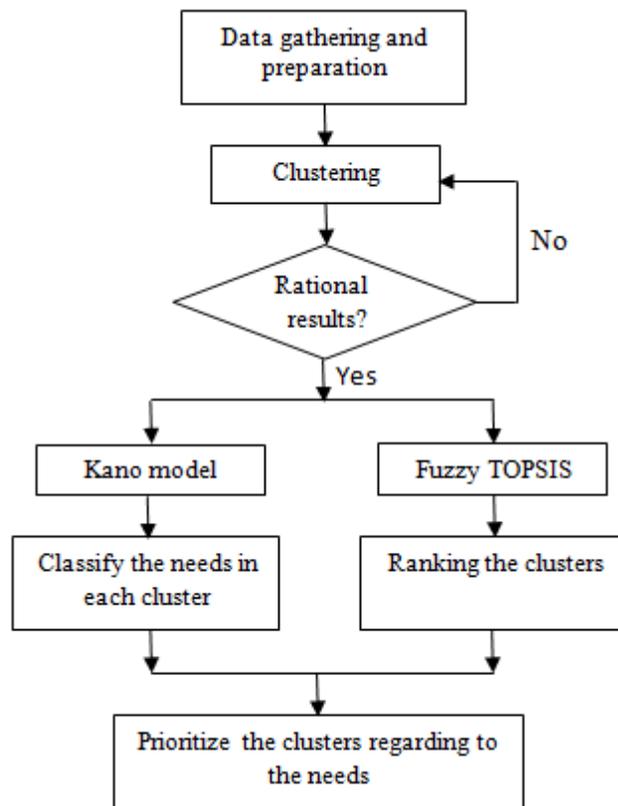


Figure 2. The conceptual model of research.

Evaluate the factors according to perspectives of 5 bank experts and managers, also their opinions were fuzzed through triangular method. Finally, Kano model used to determine the customers' needs and provided services as the goal of study.

4. Results

4.1 Clustering

Clustering needs some criteria to separate the customers in different groups. Every cluster should consist of customers who have the most similarities- same needs and demands- and different clusters have most differences. In fact, customers who are placed in different clusters, have obvious differences in their needs and demands, also customers may be prioritize based on their values in banks and criteria. So, 8 criterion selected as follow:

4.1.1 Customers' Age

As individuals have different characteristics in different ages such as beliefs, emotions, attitudes and expectations, so some services may be allocated to certain ages. Or this reason, one emphasized criterion was customer's age.

4.1.2 Educational Degree

Banks usually pay more attention to educated individuals. The new services may be presented to educated individuals easily. Educated customers uses electronic banking more than others, in fact providing such facilities help to increase the social statue of the bank.

4.1.3 Income

Individuals who have more income, can make more investments in banks, and it cause to increase the financial flow and bank resources. When banks have more turnover, they may have more abilities to allocate the resources and other investments, so it make much more profits.

4.1.4 Average Number of Times to have Bank Affairs Weekly

Using more times to have bank affairs leads to increase their turnover and financial flow, then increase bank financial flow. Also, more attending cause to propagate and attract more customers.

4.1.5 Using Facilities, Banking Guarantees and Credit Cards

One of the main duties of the banking without usury is to allocate the resources or facilities and it is one of the main sources to get income for banks. When customers use more services, so more profit will be make. Moreover, commissions of issuing banking guarantees and credit cards is considered as one of the income sources which has the lowest cost for the bank. For this reason, banks pay more attention to such customers. The customers who uses such banking services, are the main customers of the bank.

4.1.6 Average use of Bank ATM through Week

Customers who use ATM regularly, avoid to attend in banks to get money, so it cause to reduce the bank costs

and increase the bank priority through bank commissions by using ATM. In addition, various services presented in ATM to prevent the attending of customers in banks and provide opportunities to present better and best quality services to customers.

4.1.7 Using of Shopping Terminals during the Day

Regarding to increases the shopping terminals and in order to reduce and prevent the possible dangers of money carrying and money destruction and providing services through shopping terminals, all customers-customers who buy, and vendors stores- uses the facilities. Also, the commission of the exchanges allocate to banks, and this machine make profits for banks.

4.1.8 Using New Services such as E-bank, Telephone-Band and Mobile-Bank

Banks allocates much costs to develop the bases of new services and customers usually use them. The customers who use such various equipment anywhere, have the lease presence in branches, and it may be an advertisement and considered as profit sources for banks.

After gathering data, the same-scales operation of the variables performed.

- **Customers' age**
Below 20 years = 1, 20-30 years = 2, 30-40 years = 3, more than years = 3
- **Educational degree**
Lower diploma = 1, Diploma = 2, A. A = 3, B. A. = 4, M. A. and more than M.A. = 5
- **Income**
Lower than 500000 toman = 1, 500000-1000000 toman = 2, 1000000-15000000 toman = 3, 1500000-2000000 toman = 4, more than 2000000 toman = 5
- **Average number of times to do banking exchanges**
1-2 times = 1, 3-4 times = 2, 5-6 times = 3, more than 6 times = 4
- **Using facilities, banking guarantees, credit cards**
I haven't used so far = 1, 1-2 times = 2, 3-4 times = 3, more than 4 times = 4
- **Average use of ATM through week**
I don't use = 1, 1-2 times = 2, 3-4 times = 3, more than 4 times = 4
- **Using shopping terminals during day**
I don't use = 1, 1-2 times = 2, 3-4 times = 3, more than 4 times = 4

- **Using new services such as e-bank, telephone-bank and mobile-bank**

I don't use = 1, 1-2 times = 2, 3-4 times = 3, more than 4 times = 4

After scaling, data entered to Excel software, then the file clustered through Weka software and simple K-means as K = 2 to K = 10, respectively. And, the results of each step evaluated. Finally, the results had appropriate separation in 5 cluster, and 384 customers selected to be clustered.

Table 1. The clusters in simple K-means algorithm

Criterion	Total data	First cluster	2nd cluster	3rd cluster	4th cluster	5th cluster
Age	2.8203	3.6308	1.8525	2.8922	2.1286	3.3721
Educational degree	3.2604	3.3385	2.1475	4.2549	4.0143	2.1977
Income	3.2578	3.8462	1.7705	4.0098	2.7571	3.3837
Banking activities	1.9818	1.5077	1.0984	3.2451	1.2143	2.0930
Facilities	2.3229	2.7538	1.1967	3.2157	2.0143	1.9884
ATM	2.9505	2.5231	2	3.5980	3	3.1395
Shopping terminals	2.7344	2.0462	1.6393	3.4706	2.8714	3.0465
New services	2.1172	2.2154	1.1475	3.4020	1.9571	1.3372

The number and percentages in clusters:

First cluster: 65 (17%),
 Second cluster: 61 (16%),
 Third cluster: 102 (27%),
 Fourth cluster: 70 (18%),
 Fifth cluster: 86 (22%)

4.2 Evaluation Method for Quality of the Clusters

The clustering performed for different amounts of K from 2-10 and the clusters considered in precise. The selected clusters should be able to analyze and have a rational separation so that there was significant difference among customers in different clusters. And, each cluster is unique regarding to customers. The difference should be so that experts who want to priority the clusters, can observe the difference between them in appropriate manner.

Table 4. The matric of embedded decision making for customers' clusters

	C1	C2	C3	C4	C5	C6	C7	C8
A1	(1,6.66,9)	(1,4.33,9)	(3,8.33,9)	(3,6.33,9)	(5,7.66,9)	(1,6.66,9)	(3,7,9)	(3,7.33,9)
A2	(1,3.33,7)	(1,3,7)	(1,4.66,9)	(3,5.66,9)	(1,3.33,9)	(1,5.33,9)	(1,3,9)	(1,2.66,9)
A3	(5,8.33,9)	(5,8,9)	(5,7.66,9)	(5,8,9)	(5,8.33,9)	(3,7.66,9)	(5,8.33,9)	(3,8,9)
A4	(1,4,9)	(1,5.33,9)	(1,5.33,9)	(3,5.33,9)	(1,5.66,9)	(5,7.33,9)	(1,5.66,9)	(1,6,9)
A5	(1,5.66,9)	(1,5.33,9)	(3,7.33,9)	(1,6.33,9)	(3,5.66,9)	(1,6.66,9)	(1,7,9)	(1,7,9)

Moreover, in order to determine the reality of clusters, customers in each cluster considered the frequency in total data and compared them with the customers' frequency in clusters. In fact, if there are acceptable numbers of customers in clusters, it means that customers are in real world regards to mentioned characteristics. In addition, if the clusters have acceptable separation and appropriate frequency, so it can be claim that the clustering is performed appropriately. The acceptable clusters in the present study were 5 clusters.

4.3 Prioritize the Clusters through Fuzzy TOPSIS

The aim of Fuzzy TOPSIS is to prioritize the clusters of previous step. In the current research, the ideas of 6 experts used to evaluate and prioritize clusters. The linguistic statements of experts opinions are as follow:

Table 2. The convert of linguistic statements to fuzzy numbers

Membership function	Latin equivalence	Linguistic statement
(1,1,3)	VP	Very weak
(1,3,5)	P	Weak
(3,5,7)	F	Average
(5,7,9)	H	Important
(7,9,9)	VH	Very important

Table 3. The evaluation of clustering criteria

	Decision Maker						Weight	
	D1	D2	D3	D4	D5	D6		
Criteria	C1	F	VP	F	P	H	F	(1,4.33,9)
	C2	P	VP	F	P	VH	P	(1,4,9)
	C3	VH	VH	VH	VH	VH	H	(5,8.66,9)
	C4	H	F	P	F	H	F	(1,5.33,9)
	C5	VH	H	H	H	F	F	(3,6.66,9)
	C6	H	F	F	H	H	H	(3,6.33,9)
	C7	VH	H	F	VH	H	H	(3,7.33,9)
	C8	H	F	H	F	H	F	(3,6,9)

Table 5. The decision making matrix of normal issues

	C1	C2	C3	C4	C5	C6	C7	C8
A1	(0.11,3.18,9)	(0.11,1.92,9)	(1.66,8.05,9)	(0.33,3.72,9)	(1.66,5.70,9)	(0.33,4.66,9)	(1,5.67,9)	(1,4.88,9)
A2	(0.11,1.59,7)	(0.11,1.33,7)	(0.55,4.51,9)	(0.33,3.33,9)	(0.33,2.48,9)	(0.33,3.73,9)	(0.33,2.43,9)	(0.33,1.77,9)
A3	(0.55,3.98,9)	(0.55,3.55,9)	(2.77,7.41,9)	(0.55,4.71,9)	(1.66,6.20,9)	(1,5.36,9)	(1.66,6.75,9)	(1,5.33,9)
A4	(0.11,1.91,9)	(0.11,2.37,9)	(0.55,5.15,9)	(0.33,3.14,9)	(0.33,4.21,9)	(1.66,5.13,9)	(0.33,4.59,9)	(0.33,4,9)
A5	(0.11,2.70,9)	(0.11,2.37,9)	(1.66,7.08,9)	(0.11,3.72,9)	(1,4.21,9)	(0.33,4.66,9)	(0.33,5.67,9)	(0.33,4.66,9)

Table 6. The table of options distance from positive ideals

	C1	C2	C3	C4	C5	C6	C7	C8
d(A1,A*)	6.133	6.559	4.269	5.856	4.641	5.594	5.001	5.193
d(A2,A*)	6.501	6.621	5.521	5.977	6.261	5.855	6.278	6.513
d(A3,A*)	5.671	5.801	3.708	5.468	4.531	5.073	4.427	5.081
d(A4,A*)	6.564	6.402	5.357	6.040	5.715	4.786	5.613	5.777
d(A5,A*)	6.288	6.402	4.375	5.966	5.381	5.594	5.359	5.594

Table 7. Table of options distance from negative ideals

	C1	C2	C3	C4	C5	C6	C7	C8
d(A1,A-)	5.430	5.238	6.552	5.542	5.938	5.594	5.891	5.666
d(A2,A-)	5.252	5.215	5.384	5.461	5.155	5.375	5.148	5.073
d(A3,A-)	5.603	5.510	6.410	5.784	6.092	5.799	6.276	5.790
d(A4,A-)	5.236	5.295	5.552	5.423	5.483	5.771	5.576	5.433
d(A5,A-)	5.346	5.295	6.198	5.541	5.497	5.594	5.879	5.594

Table 3 showed the criteria to cluster customers through experts' opinions. The bottom column showed the combined fuzzy number. Now, Latin symbols of C₁ to C₈ (criteria) and D₁ to D₆ (Decision maker) in most multi-criteria decision making books to introduce the criteria of decision making and decision makers use respectively.

C₁ = customers' age

C₂ = Educational degree

C₃ = Income

C₄ = Average number of times to do banking affairs through week

C₅ = Using facilities banking guarantees, and credit cards,

C₆ = Using ATM through week

C₇ = Using shopping terminals during day

C₈ = Using new services such as e-bank, telephone bank and mobile-bank

The experts' opinions about customers' clusters mentioned in Table 4.

Table 5 indicated the embedded decision making criteria, embedded decision making matrix through combining the experts' opinions.

Finally, Tables 6, 7 and 8 presented as follow:

According to Table 8, the options priorities got as follow:

Table 8. The closeness coefficients for options of issue

CC1	0.515
CC2	0.459
CC3	0.543
CC4	0.486
CC5	0.500

$$A_3 > A_1 > A_5 > A_4 > A_2$$

The findings showed that third cluster had the highest point, then first cluster is in the second rank

4.4 Evaluate the Customers' needs through Kano Model

Now, the cluster needs should be recognize through Kano model. After that, a questionnaire included Kano model-26 items- distributed. The customers presented information about their needs and demands. The items consisted of different needs and demands of customers and help researchers to consider responses and classify

Table 9. Questionnaire of Kano Model

Items	Clusters				
	1	2	3	4	5
Accountability and appropriate behavior with customers,	O	O	O	O	O
Speed and accuracy in employees' responsibilities in banking operations	O	O	O	O	O
Knowledge and expertise workers to the assigned works	O	A	O	O	O
Employees' appearance	A	A	A	O	O
Educated managers and employees	I	I	A	O	I
Adequate security system (protection system, camera)	O	M	O	O	O
The right place to ease of access to have park lot	O	A	O	O	O
Information center and getting financial consultation by experts in banks	O	A	A	A	O
Allocate separate places in bank to pay, receive, electronic services	A	A	O	O	O
Amenities like branch , counting system bill, the ventilation system, water coolers , the internet and ...	O	M	O	O	O
Reduced fee of coded checks, bank checks	O	O	O	O	O
Increase the maximum of savings facilities and services (Now, 15000000)	O	O	O	O	O
Reduce the period to pay	O	O	O	O	O
Increase the period of repayment facilities (an increase in the number of installments)	O	O	O	O	O
issuing letters of guarantee types of bank	I	I	I	I	I
Increase ATM and shopping terminals in all branches of the city	O	A	O	O	O
Several possible link to an ATM card	O	A	A	A	A
Use of ATM card as fuel card , and city bus card	O	A	A	A	A
Providing gift cards in favorite issues and other cards immediately in all branches	A	O	O	O	O
Supportive information from the customer (in order to avoid the fines and returned check)	O	O	O	O	O
Invite customers to take part in seminars and training courses in free	I	I	A	A	I
Supportive plans especially for students and soldiers	A	A	O	O	A
Establish the institutes and invite donors to appreciate	I	A	A	A	A
Send messages of congratulations to customers in different ceremonies	O	A	O	A	O
A place to consider complaints and critics	O	O	O	O	O
Using high quality and attractive in deposits and ATM cards	O	A	O	O	A

Indifferent: I Attractive: A Operational: O Necessary need: M

them into four needs as: Trivial, basic, performance and attractive, so they could get the customers' satisfaction and loyalty.

In Table 9, customers asked to answer 26 items due to Kano model. Determining the kind of each need done through most frequency and evaluative table of Kano model. For instance, the customers of first cluster were 65, if a need considered as necessary, mentioned in the following table.

5. Discussion and Conclusion

The present study attempted to cluster and prioritize customers regards to the profit they make, so the classification done to meet their needs and demands

and get to loyalty and satisfaction. The researchers used clustering combining, Fuzzy TOPSIS and Kano model in the Mehr Iran Bank. The population included all customers of the bank and the sample selected. The results showed that 5 clusters separated in appropriate way and the clusters prioritized as: Third, first, fifth, fourth and second cluster, respectively. Then, they considered through questionnaire of Kano model and the needs determined. The customers' needs and demands were different regards to Kano model.

The customers of third cluster were in the first, so providing their needs were in the first priority. These customers had acceptable age, income and educational degree, therefore the needs of customers in the third cluster are more emphasized, because of their age range

and make loyalty and satisfaction through next years. Also, they have high income and high financial flow, finally it cause to increase the bank profits and sources. The educated customers, also uses new services more than others such as e-bank and mobile-bank. They use ATM and shopping terminals regularly-average 3-4 times through week- and this is considered as an important factors to reduce some banking costs such as cost of keeping money in bank branches, and providing direct services in branches.

The next priority allocated to customers in first cluster. They were similar to the customers of third cluster and this is the reason to make trust and attract the younger individuals. They had high income and use the bank facilities more and more. Also, they had lower educational degree-at most A.A. level, had good financial flow and use ATM-3-4 times- and shopping terminals-1-2 times-during week. In fact, they were in trade and business. But they use new services such as e-bank lower than previous group and tried to do their exchanges directly or in ATM and shopping terminals. These customers expected to get good services and high quality and their needs were considered as performance regards to Kano model as well as customers in third cluster, especially in cases related to the direct attending of customers. Their responses to items such as the personal's appearance, obvious parts of the bank, supportive plans especially for students and provide the gift cards in favorite sentences and in at least time had some attractions and emphasized, so banks may motivate customers by presenting such services and making loyalty.

The customers of fifth cluster were in third priority. They were in age range 30-40 years and had educational degree over diploma or A.A level and had income between 1500000-2000000 toman. Their average banking activities were so more-3 or 4 times in week-, also they used bank facilities one or two times. These customers used ATM-3 to 4 times- and shopping terminals-3 to 4 times- through week but didn't use new services. It can be claim that the experts preferred thses customers' than two remained clusters because of their income, and use of ATM and shopping terminals. Banks should be motivate them because of their age range to use new banking services. Perhaps they were the employees in government and private sector, and maybe workers. Their social statue were not determined. They may interested in some new services such as making link to some accounts to a card,

using ATM card as other cards, using supportive plans especially for students, establish the welfare institutes and using some facilities in cards. Their response to items such as increase the maximum of the savings facilities, reduce the expectations to pay facilities, and increase the time of facilities repay were considered as performance needs, in other words this showed their emphasize to get facilities, and banks should consider provide services to such customers. The customers of this cluster had great statue to get facilities.

The customers of fourth cluster were in age range between 20-30 years, they had educational degrees over B. A. level, and had income between 1000000-1500000 toman. They did their banking activities one to two times through week and used new services regularly such as ATM and shopping terminals, but didn't use banking facilities, at most one time. In other words, they were employees who were graduated from university recently and had little job experiences. While they hadn't high financial flow than above clusters, but they were so emphasized because they had high educational degree and used electronic banking facilities and services. Moreover, they were important because they entered to business and job recently, and motivated to have loyalty and satisfaction through next years.

The second cluster was the fifth priority. The customers of second had educational degree in lower diploma, diploma and may be diploma, and they had income between 500000-1000000 toman. They had banking activities at most two times weekly, but didn't use facilities. Also, they used ATM-once or two times- and shopping terminals -rarely or once- and didn't use new banking services such as internet bank. Most customers were students who were undergraduates, had low income and needed to some supportive plans for students and soldiers-performance needs-, so this caused to make satisfaction among such customers.

Now, the customers were prioritized and their needs and demands determined through Kano model, so their needs should be met. The customers are the main sources of making profits, and keeping them is so difficult. Banks should allocate sources to attract and keep customers and pay attention to their needs. At the first, clustering and prioritize customers help to find a way to allocate financial sources and get the customers' satisfaction, then banks can make competition and loyalty. Kano model may provide opportunities to understand the customers'

needs and cluster them and meet them. Although this cannot indicate all things, and customers' needs are beyond, it may help to be better.

There are some common needs and demands of customers in all clusters called performance demands, and refers to allocate services. Some expectations such as reduce the expected time to allocate services, increase the period of repayment services, increase the maximum amount of facilities, which resulted by some challenges in getting services in banks. According to the statistics of the Central Bank, the Islamic Republic of Iran, the outstanding money in domestic banks is very high, and they prevent to allocate less facilities to customers or pay in low risk. So, in order to pay facilities and provide such services, banks don't pay attention to customers who have no enough financial flow, and sometimes request precious bails and needs much time.

Although banks rate and cluster the customers, then allocate facilities and services, the fact that this cannot perform accurately and sometimes they cannot recognize their customers, so it may cause to delay in payment and lost the opportunities to pay.

Customers usually pay attention to some services to get their satisfaction, so the problems should be solved. Revising the system of payment and customers' needs should be preferred. Because these services are parts of the bank services, and there are others to be revised and get the customers' satisfaction. In fact, the above questionnaire considered some of them.

6. Suggestions

Some suggestions to conduct future studies are mentioned as follows:

- The proposed model may use in other banks and financial institutes, then compare the results.
- The present study used K-means to cluster the customers, and other techniques such as hierarchical clustering algorithm in other studies.
- Instead of making priority through Fuzzy TOPSIS, other decision making techniques may be use such as AHP, and Vikor.
- The researchers used the criteria and items of Kano questionnaire, but they can use in specialized manner. For instance, the services and facilities, electronic services and virtual banking use.
- The current study used fuzzy triangular numbers, but fuzzy trapezoidal numbers may be use, too.

- The range of fuzzy numbers may be develop, in fact more than 5 spectral range can be used.
- Kano model used to measure the satisfaction, but other techniques can be used in other studies such as Serokoval and Fernel.

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