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Business Value model in Omnichannel Marketing with Customer Relationship Approach: A Fuzzy Study

Moslem MahmoodiSabooki[1], Jahanbakhsh Rahimi Baghmalek[2,*], Mohammad Bahrami Saifabad[3]

[1] *Ph.D. Student, Department of Management, Yasuj Branch, Islamic Azad University, Yasuj, Iran. moslem.sabooki@gmail.com*
[2]*Assistant Professor, Department of Management, Gachsaran Branch, Islamic Azad University, Gachsaran, Iran Iran. (Corresponding Author) jahanbakhsh_rahimi@yahoo.com, 0000-0002-9635-8140.*
[3]*Assistant Professor, Department of Management, Yasuj Branch, Islamic Azad University, Yasuj, Iran. bahramim944@gmail.com*

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ABSTRACT

The purpose of the research is to create a business value model through omnichannel based on customer relationship management based on a fuzzy interpretive structural approach. This research is exploratory in terms of practical purpose. The study population of this research was Sepeh Bank managers. Through purposeful sampling, of criterion-oriented type, the desired sample was selected and sampling continued until the theoretical saturation of data was reached. Therefore, the participants in the research included 12 professors and administrators. The research tool was a researcher-made questionnaire. In data processing, fuzzy Delphi method was used in MATLAB software and analysis of structural mutual effects and MICMAC software were used. Based on the results obtained, indicators of individual characteristics, bank digitalization, service quality, information and communication technology, cyber security, channel efficiency, training, improving customer orientation, innovation and creativity, profitability, technological knowledge, strong support system, word of mouth marketing and Beneficial virulence and association with the channel were confirmed in three Delphi rounds. A 7-level model was formed based on the fuzzy interpretive structural model. **©authors**.

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1. Introduction

The business value creation model through omnichannel, as one of the new approaches in the field of marketing and business management, focuses on customer experience in all communication channels and distribution of products and services (Gasparin et al, 2022; Rezaei and Sanyaei, 2021). This model allows businesses to provide a seamless and coordinated experience across multiple channels. In this approach, regardless of the chosen channel, customers have a coordinated and integrated experience that increases their satisfaction and creates more value for the business (Jindal et al, 2021). Omnichannel means the simultaneous and coordinated use of several communication and distribution channels to communicate with customers. These channels include physical stores, websites, mobile applications, social networks, call centers and even SMS and emails (Bijmolt et al, 2022). In this model, the focus is on providing a unified experience to customers in all these channels, so that customers have a similar and harmonious feeling at every point of contact with the brand. Coordination and continuity between channels leads to the creation of value for businesses, which ultimately leads to increased customer satisfaction, loyalty and greater profitability (Yrjölä et al, 2018).

One of the most important factors in creating value through omnichannel is customer experience (Hossain et al, 2020). In this model, the customer is in the center of attention and the business tries to satisfy his needs and desires in every channel in the best possible way. A unified experience means that the customer has access to the same and coordinated information, products or services regardless of the channel used. This approach makes customers feel that they are supported at any point of the purchase path, and the purchase process is simple and frictionless for them (Alexander and Cano, 2019). Technology plays a key role in creating and developing the omnichannel model. The use of new technologies such as artificial intelligence, data mining and predictive analytics help businesses to gain more accurate information about customer behavior and preferences. This information allows businesses to create personalized experiences for customers. In addition, data management tools and customer relationship management (CRM) systems help businesses manage and present customer information seamlessly across all channels (Kondo & Okubo, 2022).

One of the main benefits of omnichannel for businesses is to create a competitive advantage. Providing a distinct and integrated experience to customers makes them more loyal to the brand and become long-term customers. This model also helps businesses to better adapt to market developments and customer needs (Cassab & MacLachlan, 2009; Kabadayi et al, 2017). In addition, businesses that use the omnichannel model are able to quickly and more accurately Respond to changes in customer behavior and update your strategies. Despite all the advantages of the omnichannel model, its implementation also brings challenges. One of these challenges (Schumpeter, 1934) is the need for full coordination between all channels and systems (Hosseinzadeh et al, 2021). Businesses must ensure that customer information is up-to-date and accurate across all channels. In addition, managing customer data and ensuring the security of their information are among other important challenges of this model. Also, the high costs of technology and the need to invest in appropriate infrastructure for omnichannel implementation are other obstacles to this approach (Shi et al, 2020; Chang & Li, 2022).

Due to the rapid growth of technology and changes in customer behavior, the omnichannel model has a bright future in the business field. Businesses that properly implement this model (Sousa and Voss, 2006). They can benefit from increased customer satisfaction, revenue growth, and customer loyalty. Especially in industries like retail and services, omnichannel has become one of the main pillars of marketing and sales strategies. Finally, the success of omnichannel implementation depends on the

ability of businesses to take advantage of technology, manage data and create a unique experience for customers (Zaki, 2019; Dalla Pozza, 2023).

The business value creation model through omnichannel based on customer relationship management (CRM) in banks and using the fuzzy interpretive structural approach is a new and effective approach to improve performance and increase customer satisfaction (Riegger et al, 2021; Akter et al, 2019; Berman & Thelen, 2018). This model is designed with the aim of integrating different communication and service channels in banks and uses advanced technologies and fuzzy analysis to provide better services to customers. Omnichannel in the banking industry means the simultaneous use of different communication channels such as physical branches, websites, mobile applications, ATMs, call centers, and social networks, all of these channels must provide a unified and coordinated experience to customers. In modern banking, omnichannel focuses on improving interaction and improving service quality by emphasizing better customer communication management (Pellicelli & Garrone, 2023). With this approach, banks can create more value for their customers and increase their satisfaction and loyalty (Lemon & Verhoef, 2016; MacInnis, 2011).

Customer relationship management (CRM) is one of the key elements in the successful implementation of omnichannel in banks. CRM allows banks to manage customer information and interactions across all channels and improve the customer experience. Through this approach, banks can better analyze the needs, preferences, and behaviors of customers and use this data to provide personalized offers and improve service processes (Rahmna et al, 2022). Especially in banking, CRM helps improve communication and respond faster to customer problems, which results in increased customer satisfaction. Fuzzy Interpretive Structural Modeling (Fuzzy Interpretive Structural Modeling) is an analytical method used to model complex relationships between different factors in a system. In banks, this approach can help to analyze and manage relationships between variables affecting value creation through omnichannel (Gerea et al, 2021). Since many factors related to customer relationship management in banks are vague and fuzzy in nature. are, it is very efficient to use this fuzzy method to obtain a more detailed understanding of these relationships. In this model, qualitative and quantitative data are used in combination to create a map of relationships between variables (Costa Climent et al, 2022; Zhang et al, 2018).

In the process of implementing the fuzzy interpretive structural approach in banks, first the main factors related to customer relationship management and omnichannel are identified (Khanturayev & Adilova, 2023). These factors may include service quality, information technologies, customer experience, and data management. Then, using fuzzy techniques, the relationships between these factors are analyzed and modeled (Singh and Jang, 2022). These analyzes help banks to determine their service improvement priorities and strategies based on practical realities and customer needs. Especially in banking, this approach can help to optimize management decisions and create new values (Verhoef et al, 2015).

The implementation of omnichannel in banks based on CRM faces challenges such as the need for advanced technological infrastructure, managing a large amount of customer data, and coordinating between different channels (Zeithaml, 1988). However, its benefits are significant, including increased customer satisfaction, improved customer experience, increased speed and accuracy in service delivery, and reduced operating costs. This model allows banks to use customer data and information to personalize their services and create a better experience for customers, which will ultimately lead to increased customer loyalty and improved financial performance. Due to the ever-increasing developments in the field of digital banking technologies and the increasing use of new technologies such as artificial intelligence and big data analysis, omnichannel and CRM models in banks have a bright future. Banks that use these models correctly can create a distinct and

unique experience for their customers and at the same time help their business grow and develop. The use of the fuzzy interpretation structural approach will also play an important role in this evolution as a powerful tool for managing the complexities in modern banking. Therefore, the research is looking for an answer to the question, what is the business value creation model through omnichannel based on customer relationship management based on the fuzzy interpretative structural approach?

2. Literature Review

New technologies play a vital role in implementing the omnichannel model. Tools such as customer relationship management (CRM) systems, data mining, artificial intelligence, and data analytics help businesses better understand the needs and behaviors of their customers and offer services and products in a more targeted manner. Also, technology provides the possibility of tracking and harmonizing customer data and information in all channels. For example, by using CRM, customer information is integrated across all channels and the business can better manage customer interactions and provide a seamless experience (Gao et al, 2020).

The omnichannel model brings many benefits to businesses and customers. Among these benefits, we can mention increasing customer satisfaction, improving interactions, increasing customer loyalty and improving financial performance. However, the implementation of this model also has challenges. Among the important challenges, we can mention the need for coordination between different channels, data management, and ensuring the security of customer information. Also, investing in technology infrastructure to provide a unified experience in all channels is another challenge of this model (Ibáñez-Sánchez et al, 2022).

Omni channel

Omnichannel is an approach to integrating different communication and sales channels that helps businesses provide a seamless, seamless experience to their customers. In this model, customers can interact with the business through multiple channels, including physical stores, websites, mobile apps, social networks, and contact centers, without feeling that there is a change in their service, information, or experience across these channels. has been In omnichannel, the main goal is to create a unified and connected customer experience where all communication channels work harmoniously and without boundaries. Omnichannel means providing customers access to a brand's products and services through multiple channels simultaneously. This approach goes beyond multichannel where each channel works separately. In the omnichannel model, all channels are connected in a coherent and integrated way, and the main goal is for the customer to experience a similar experience at every point of their interaction with the brand. This approach allows businesses to have more effective interactions with their customers and provide a better user experience (Vargo and Lusch, 2016).

One of the key principles of omnichannel is to focus on the customer experience. In today's world, customers expect brands to be able to access services easily and seamlessly from any channel they want. If the customer receives information in one channel and wants to continue his interaction in another channel, it should be possible to continue the process without any defects. For example, a customer can order an item online and then pick it up at a physical store. This level of integration and coordination between channels increases customer satisfaction and improves their overall experience (Mainardes et al, 2020; Akter et al, 2019).

Omnichannel and business value

Omnichannel is a new approach in customer relationship management that focuses on the coordination and integration of all communication and sales channels (Payne and Frow, 2005). The main goal of this model is to create a seamless and consistent experience for customers at all points of contact with the business. (Hussein and Kais, 2021). Due to the increasing variety of communication channels and customers' need for quick and easy access to

services, omnichannel has become one of the main tools for creating value for businesses. This approach not only increases customer interactions, but also has the ability to create economic and social value for businesses (Trenz et al, 2020).

Omnichannel means full coordination between different channels that businesses use to communicate with their customers, including websites, mobile applications, physical stores, call centers, social networks, and even SMS (Polo and Sese, 2016). In this model, all these channels work in such a way that customers have a homogeneous and integrated experience regardless of which channel they use. This integration leads to increased customer satisfaction, improved interactions and increased overall business value. Business value in this model is created through creating greater customer loyalty, increasing sales and improving operational efficiency (Patrício et al, 2008).

One of the most important benefits of omnichannel is creating economic value for businesses. By providing a seamless and consistent experience, customers become more willing to use business products and services. This leads to increased direct and indirect sales. Also, by taking advantage of the data obtained from customer interactions in different channels, businesses can better understand the needs and preferences of customers and provide personalized offers. This type of precise targeting increases conversion rates and repeat sales, which in turn creates economic value (Herrero-Crespo et al, 2022).

In addition to creating economic value, omnichannel can also create social value. When businesses offer a coordinated and integrated experience (Miquel-Romero et al, 2020). Customers trust these brands more and the probability of their loyalty to the business increases. A positive customer experience across multiple channels increases the likelihood of introducing the brand to others, which itself is a form of social value. These positive interactions over time lead to the formation of a strong and authentic image of the brand in society. Hence, omnichannel not only attracts new customers, but also strengthens loyalty and word-of-mouth advertising (Jo et al, 2021).

Despite the many advantages of omnichannel, its implementation also brings challenges. One of the main challenges is the need for precise coordination between different channels and customer data management. Also, creating a strong technological infrastructure to support this model also requires significant investment and resources. However, the future of omnichannel in businesses is very bright as customers increasingly expect to be able to access services from any channel and receive a seamless and seamless experience. Businesses that can respond to this need well will create more value for their customers and shareholders (Moriarty and Moran, 1990). More recently, Verhoef et al. (2015), defined omnichannel management as "the synergistic management of multiple existing channels and customer touchpoints with the aim of optimizing customer experience and performance across channels" (Klaus and Nguyen, 2013).

In Table 1, the research in line with the purpose of the research has been reviewed:

Table 1. *An overview of domestic and foreign researches*

Authors	Title	Conclusion
Hosseinzadeh et al. (2021)	Providing a system dynamics model to investigate time, cost and customer satisfaction in omni-channel distribution channels (with a case study)	With the values approaching the fourth scenario, i.e. the increase in the market competition factor indicators, user return rate, marketing costs, technology..., as well as reducing the cost of maintaining the product in the distribution center, it is possible to find the best strategy to obtain the highest amount of customer satisfaction. And the lowest amount of cost and delivery time of the goods arrived.
Rezaei and Sanyaei (2021)	Designing an omnichannel marketing model for the formation of customers' behavioral intentions, with the role of mediating the perceptual dimensions of brand equity; Case study: Agricultural Bank (headquarters and branches in the west of Tehran	The dimensions of omnichannel marketing in the Bank of Agriculture include integration between bank channels and integration between bank channels and customers, personalization of bank channels, coordination between bank channels, and expanding the reach of bank channels.
Bashkoh (2019)	Identifying and examining the requirements for forming the composition of multiple distribution	The strategies of forming the composition of distribution channels are: alignment of distribution channels, customer life cycle management, ease of using the channel, willingness to buy again, customer satisfaction and

Authors	Title	Conclusion
	channels	customer trust.
Bijmolt et al (2022)	Challenges at the marketing-operations interface in omnichannel retail environments	For each area, key decisions that affect or involve the customer journey and product flow are first identified. Next, for each decision, the marketing and operational objectives and the tensions that arise when these objectives are not perfectly aligned are described.
Ali et al. (2022)	Innovation and Next Aspects of the Omnichannel Retail Business Model	The findings of this study suggest four main dimensions resulting from digitalization and technological advancements in omnichannel retailing, namely omnichannel intensity, integration of organizational structure, supply chain management operations and innovation, data analytics, and intelligence.
Wolf & Fischer (2022)	Customers' channel choice factors in an omnichannel environment: a systematic literature review	Perceived channel characteristics, customer needs, and situational or contextual factors directly affect customers' channel choice, and customer characteristics and characteristics of products or services indirectly affect it.

Any effort to optimize business value, customer experience and contribute to successful omnichannel management requires a complete and multifaceted understanding of customers' channel choice processes. To date, many existing studies on multi-channel and omni-channel research have not been able to obtain an integrated and comprehensive combination of factors involved in business improvement. The existing body of research on channel selection in multi-channel and omni-channel environments includes a diverse range of heterogeneous studies, conceptual papers, and other types of scholarly works. We can therefore consider this topic to be research mature, which means that it is well suited for a full research that both synthesizes and extends it. Surveys show the absence of an integrated model in the field of omnichannel marketing. The inductive approach adopted by the thematic content analysis described in this research provides a conceptual framework for use by researchers and practitioners as an aid to their comprehensive understanding of business value and customer relationship management. Second, the research, based on descriptive and thematic analysis of relevant published work, presents a broad research agenda including contexts, theories, methods, and especially channel selection factors for research in this area (Patton, 2002). Finally, it defines a number of concepts for channel management.

3. Method

In terms of practical purpose, this research is exploratory based on mixed methods (qualitative and quantitative). Documentary studies and fuzzy Delphi method have been used in the preparation of components that affect the privacy of internet customers in the bank sector. The selection of the Delphi team was based on a judgmental purposeful sampling method. In the qualitative part of the society studied in this research, there were managers of Sebpe Bank. 20 people were identified as interviewees based on the purposeful sampling method in qualitative analysis. The bank manager was asked a question and finally the fourteenth person introduced the bank manager. Then the supervisor was interviewed and finally 6 people were selected in the university environment. 14 people had master's degrees and 6 people had doctor's degrees. All of them had more than 10 years of experience in business, banking and management.

Fuzzy MICMAC (Fuzzy Matrice d'Impacts Croisés Multiplication Appliquée à un Classement) is a structural analysis method used to identify and examine the relationships between variables or influencing factors in a complex system. This method is particularly useful in studies of social, economic, industrial, and technological systems and is applied to analyze the mutual influences between factors.

Steps in Fuzzy MICMAC

1. *Identifying Variables*: First, the key variables or factors of the system to be analyzed are identified. These variables can be economic, social, technical, or environmental factors.

2. *Analysis of Mutual Influences*: In this step, the relationships between variables are determined by assessing how much each variable influences the others. In Fuzzy MICMAC, these influences are expressed in fuzzy terms (such as weak, moderate, strong) instead of precise numbers, allowing for

better modeling of uncertainties and ambiguities.

3. *Constructing the Fuzzy Cross-Impact Matrix*: The results from the previous step are presented in the form of a matrix called the "cross-impact matrix," which shows how each variable affects the others.

4. *Analyzing the Matrix and Categorizing Variables*: Using this matrix and fuzzy calculations, the variables are divided into four general categories:

- Variables that have little influence on others and are not significantly influenced by other variables.
- Variables that have little influence on others but are highly affected by other variables.
- Variables that both have a strong influence on others and are strongly influenced by them. These are often the key factors in the system.
- Variables that exert a strong influence on others but are minimally influenced by them.

The use of the fuzzy approach in this method helps decision-makers analyze the relationships between variables more accurately in the face of imprecise data and uncertain conditions.

In information processing, structural interaction analysis method was used in MICMAC software. As a result of monitoring variables, 14 components have been identified and clustered based on library studies (Table 2).

Table 2. *Component notation*

Component	Symbol
Individual characteristics	C01
Bank digitization	C02
Quality of service	C03
Information and communication technology	C04
Cyber security	C05
Channel efficiency	C06
Education	C07
Improving customer service	C08
Innovation and creativity	C09
profitability	C10
Technological knowledge	C11
Strong support system	C12
Profitable word of mouth and viral marketing	C13
Communication with the channel	C14

The fuzzy spectrum of Delphi is specified in Table 3:

Table 3. *The spectrum of seven fuzzy degrees for the evaluation of indicators*

Fuzzy number scale	Fuzzy value	Linguistic variable
(0, 0, 0.1)	$\tilde{1}$	Totally unimportant
(0, 0.1, 0.3)	$\tilde{2}$	very unimportant
(0.1, 0.3, 0.5)	$\tilde{3}$	unimportant
(0.3, 0.5, 0.75)	$\tilde{4}$	average
(0.5, 0.75, 0.9)	$\tilde{5}$	important
(0.75, 0.9, 1)	$\tilde{6}$	Very important
(0.9, 1, 1)	$\tilde{7}$	Totally important

4. Finding

In this research, fuzzy Delphi technique was used to evaluate and fit 14 identified components. The opinion of 20 experts about each indicator is shown in Table 5:

Table 5. *Fuzzification of the opinion of the expert panel for each of the research indicators*

Fuzzification	Expert 1	Expert 2	Expert 3	...	Expert 20
C1	(0.75, 0.9, 1)	(0.75, 0.9, 1)	(0.3, 0.5, 0.75)	...	(0.9, 1, 1)
C2	(0.1, 0.3, 0.5)	(0.5, 0.75, 0.9)	(0.9, 1, 1)	...	(0.9, 1, 1)
C3	(0.75, 0.9, 1)	(0.9, 1, 1)	(0.9, 1, 1)	...	(0.9, 1, 1)
C4	(0.5, 0.75, 0.9)	(0.9, 1, 1)	(0.9, 1, 1)	...	(0.9, 1, 1)

Fuzzification	Expert 1	Expert 2	Expert 3	...	Expert 20
C5	(0.5, 0.75, 0.9)	(0.9, 1, 1)	(0.5, 0.75, 0.9)	...	(0.5, 0.75, 0.9)
C6	(0.1, 0.3, 0.5)	(0.5, 0.75, 0.9)	(0.75, 0.9, 1)	...	(0.75, 0.9, 1)
C7	(0.75, 0.9, 1)	(0.9, 1, 1)	(0.9, 1, 1)	...	(0.9, 1, 1)
C8	(0, 0, 0.1)	(0.5, 0.75, 0.9)	(0.9, 1, 1)	...	(0.75, 0.9, 1)
C9	(0.75, 0.9, 1)	(0.5, 0.75, 0.9)	(0.1, 0.3, 0.5)		(0.75, 0.9, 1)
C10	(0.75, 0.9, 1)	(0.3, 0.5, 0.75)	(0.9, 1, 1)		(0.5, 0.75, 0.9)
C11	(0.75, 0.9, 1)	(0.5, 0.75, 0.9)	(0.75, 0.9, 1)		(0.9, 1, 1)
C12	(0.75, 0.9, 1)	(0.9, 1, 1)	(0.75, 0.9, 1)		(0.9, 1, 1)
C13	(0.9, 1, 1)	(0.75, 0.9, 1)	(0.9, 1, 1)		(0.9, 1, 1)
C14	(0.9, 1, 1)	(0.9, 1, 1)	(0.75, 0.9, 1)	...	(0.9, 1, 1)

In the next step, the opinion of the experts should be gathered. In this study, the surface center method is used for defuzzification as follows:

$$DF_{ij} = \frac{\left[(u_{ij} - l_{ij}) + (m_{ij} - l_{ij})\right]}{3} + l_{ij}$$

Three rounds of Delphi were conducted. Finally, no questions were asked in the third round, which is a sign for the end of the Delphi rounds. In general, one approach to the end of the Delphi is to compare the average scores of the questions of the last two rounds. If the difference between the two stages is smaller than the very low threshold (0.2), then the survey process is stopped.

Table 6. *The difference between the second and third round results*

	The result of the second round	The result of the third round	Difference	Result
C1	0.776	0.744	0.032	Acceptance
C2	0.904	0.794	0.11	Acceptance
C3	0.738	0.925	0.187	Acceptance
C4	0.928	0.875	0.053	Acceptance
C5	0.777	0.776	0.001	Acceptance
C6	0.803	0.904	0.101	Acceptance
C7	0.847	0.738	0.109	Acceptance
C8	0.827	0.928	0.101	Acceptance
C9	0.896	0.777	0.119	Acceptance
C10	0.752	0.803	0.051	Acceptance
C11	0.932	0.890	0.042	Acceptance
C12	0.872	0.918	0.046	Acceptance
C13	0.892	0.866	0.026	Acceptance
C14	0.928	0.932	0.004	Acceptance

Based on the results listed in Table 6, it was determined that in all cases the difference is less than 0.2, so the Delphi rounds can be completed. The Kendall coefficient for fuzzy Delphi was obtained as 0.901, indicating high strength and confirming its validity.

In the following, the interpretive structural modeling method was used in MICMAC software for data analysis. Designing an Interpretive Structural Model (ISM) is a method to investigate the effect of each variable on other variables; This design is a comprehensive approach to measure communication and this design is used to develop the framework of the model so that the general objectives of the research are possible.

The first step in structural-interpretive modeling is to calculate the internal relationships of the indicators. Experts' point of view is used to reflect the internal relationships between indicators. The matrix obtained in this step shows which variables a variable affects and from which variables it is affected. Conventionally, symbols like Table 7 are used to identify the relationship pattern of elements.

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Table 7. *Modes and signs used in expressing the relationship between variables*

UN	LR	FR	SR	AR	Symbol
Irrelevant	Low relevant	Relatively relevant	Highly relevant	Totally relevant	**Relationship**
(0.25, 0, 0)	(0.5, 0.25, 0)	(0.75, 0.5, 0.25)	(1, 0.75, 0.5)	(1, 1, 0.75)	**Triangular number**

The structural self-interaction matrix consists of the dimensions and indicators of study and their comparison using four modes of conceptual relations. The resulting information is formed based on the method of interpretive structural modeling of summation and the final structural self-interaction matrix. According to the signs listed in Table 7, the structural self-interaction matrix will be as Table 8.

Table 8. *Received matrix of research variables*

C14	C13	C12	C11	C10	C09	C08	C07	C06	C05	C04	C03	C02	C01	SSIM
AR	SR	LR	LR	SR	SR	SR	SR	AR	LR	LR	SR	SR	AR	C01
LR	SR	LR	LR	SR	AR	SR	LR	LR	LR	LR	LR	AR	UN	C02
LR	SR	LR	LR	SR	SR	SR	AR	LR	LR	LR	AR	FR	UN	C03
SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	AR	FR	FR	FR	C04
SR	SR	AR	AR	SR	SR	SR	SR	SR	AR	UN	FR	FR	FR	C05
AR	SR	LR	LR	SR	SR	SR	SR	AR	UN	UN	FR	FR	FR	C06
LR	SR	LR	LR	SR	SR	SR	AR	UN	UN	UN	FR	FR	UN	C07
LR	SR	LR	LR	SR	LR	AR	UN	UN	UN	UN	UN	UN	UN	C08
LR	SR	LR	LR	SR	AR	FR	UN	UN	UN	UN	UN	FR	UN	C09
AR	LR	LR	LR	AR	UN	UN	UN	UN	UN	UN	UN	UN	UN	C10
SR	SR	AR	AR	FR	FR	FR	FR	FR	FR	UN	FR	FR	FR	C11
SR	SR	AR	FR	FR	FR	FR	FR	FR	FR	UN	FR	FR	FR	C12
LR	AR	UN	UN	FR	UN	UN	UN	UN	UN	UN	UN	UN	UN	C13
AR	FR	UN	UN	FR	UN	FR	FR	FR	UN	UN	FR	FR	FR	C14

The received matrix is obtained by transforming the structural self-interaction matrix into a two-valued matrix of zero and one. In the received matrix, the principal diameter is equal to one. Therefore, the received matrix of the ISM technique is presented in Table 9.

Table 9. *Structural self-interaction matrix of SSIM*

C14	C13	C12	C11	C10	C09	C08	C07	C06	C05	C04	C03	C02	C01	SSIM
(1, 1, 0.75)	(1, 0.75, 0.5)	(0.5, 0.25, 0)	(0.5, 0.25, 0)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 1, 0.75)	(0.5, 0.25, 0)	(0.5, 0.25, 0)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 1, 0.75)	**C01**
(0.5, 0.25, 0)	(1, 0.75, 0.5)	(0.5, 0.25, 0)	(0.5, 0.25, 0)	(1, 0.75, 0.5)	(1, 1, 0.75)	(1, 0.75, 0.5)	(0.5, 0.25, 0)	(0.5, 0.25, 0)	(0.5, 0.25, 0)	(0.5, 0.25, 0)	(0.5, 0.25, 0)	(1, 1, 0.75)	(0.25, 0, 0)	**C02**
(0.5, 0.25, 0)	(1, 0.75, 0.5)	(0.5, 0.25, 0)	(0.5, 0.25, 0)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 1, 0.75)	(0.5, 0.25, 0)	(0.5, 0.25, 0)	(0.5, 0.25, 0)	(1, 1, 0.75)	(0.75, 0.5, 0.25)	(0.25, 0, 0)	**C03**
(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 1, 0.75)	(0.75, 0.5, 0.25)	(0.75, 0.5, 0.25)	(0.75, 0.5, 0.25)	**C04**

C14	C13	C12	C11	C10	C09	C08	C07	C06	C05
(1, 1, 0.75)	(0.5, 0.25, 0)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 1, 0.75)	(0.5, 0.25, 0)	(0.5, 0.25, 0)	(0.5, 0.25, 0)	(1, 1, 0.75)	(1, 0.75, 0.5)
(0.75, 0.5, 0.25)	(1, 1, 0.75)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(0.5, 0.25, 0)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 0.75, 0.5)
(0.25, 0, 0)	(0.25, 0, 0)	(1, 1, 0.75)	(1, 1, 0.75)	(0.5, 0.25, 0)	(0.5, 0.25, 0)	(0.5, 0.25, 0)	(0.5, 0.25, 0)	(0.5, 0.25, 0)	(1, 1, 0.75)
(0.25, 0, 0)	(0.25, 0, 0)	(0.75, 0.5, 0.25)	(1, 1, 0.75)	(0.5, 0.25, 0)	(0.5, 0.25, 0)	(0.5, 0.25, 0)	(0.5, 0.25, 0)	(0.5, 0.25, 0)	(1, 1, 0.75)
(0.75, 0.5, 0.25)	(0.75, 0.5, 0.25)	(0.75, 0.5, 0.25)	(0.75, 0.5, 0.25)	(1, 1, 0.75)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 0.75, 0.5)
(0.25, 0, 0)	(0.25, 0, 0)	(0.75, 0.5, 0.25)	(0.75, 0.5, 0.25)	(0.25, 0, 0)	(1, 1, 0.75)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 0.75, 0.5)
(0.75, 0.5, 0.25)	(0.25, 0, 0)	(0.75, 0.5, 0.25)	(0.75, 0.5, 0.25)	(0.25, 0, 0)	(0.75, 0.5, 0.25)	(1, 1, 0.75)	(1, 0.75, 0.5)	(1, 0.75, 0.5)	(1, 0.75, 0.5)
(0.75, 0.5, 0.25)	(0.25, 0, 0)	(0.75, 0.5, 0.25)	(0.75, 0.5, 0.25)	(0.25, 0, 0)	(0.25, 0, 0)	(0.25, 0, 0)	(1, 1, 0.75)	(1, 0.75, 0.5)	(1, 0.75, 0.5)
(0.75, 0.5, 0.25)	(0.25, 0, 0)	(0.75, 0.5, 0.25)	(0.75, 0.5, 0.25)	(0.25, 0, 0)	(0.25, 0, 0)	(0.25, 0, 0)	(0.25, 0, 0)	(1, 1, 0.75)	(1, 0.75, 0.5)
(0.25, 0, 0)	(0.25, 0, 0)	(0.75, 0.5, 0.25)	(0.75, 0.5, 0.25)	(0.25, 0, 0)	(0.25, 0, 0)	(0.25, 0, 0)	(0.25, 0, 0)	(0.25, 0, 0)	(1, 1, 0.75)
(0.25, 0, 0)	(0.25, 0, 0)	(0.25, 0, 0)	(0.25, 0, 0)	(0.25, 0, 0)	(0.25, 0, 0)	(0.25, 0, 0)	(0.25, 0, 0)	(0.25, 0, 0)	(0.25, 0, 0)
(0.75, 0.5, 0.25)	(0.25, 0, 0)	(0.75, 0.5, 0.25)	(0.75, 0.5, 0.25)	(0.25, 0, 0)	(0.25, 0, 0)	(0.25, 0, 0)	(0.75, 0.5, 0.25)	(0.75, 0.5, 0.25)	(0.75, 0.5, 0.25)
(0.75, 0.5, 0.25)	(0.25, 0, 0)	(0.75, 0.5, 0.25)	(0.75, 0.5, 0.25)	(0.25, 0, 0)	(0.75, 0.5, 0.25)	(0.25, 0, 0)	(0.75, 0.5, 0.25)	(0.75, 0.5, 0.25)	(0.75, 0.5, 0.25)
(0.75, 0.5, 0.25)	(0.25, 0, 0)	(0.75, 0.5, 0.25)	(0.75, 0.5, 0.25)	(0.25, 0, 0)	(0.25, 0, 0)	(0.25, 0, 0)	(0.25, 0, 0)	(0.75, 0.5, 0.25)	(0.75, 0.5, 0.25)

In this part, the de-fuzzification of the matrix is discussed first. In this research, like the Delphi part, the center of gravity technique is used. The index i refers to the expert. so that

X_{ij}: the evaluation value of the ith expert from the jth criterion

L_j: the minimum amount of evaluations for the jth criterion

M_j: the geometric mean of the experts' assessment of the performance of the jth criterion

U_j: the maximum amount of evaluations for the jth criterion

Fuzzy average method is used in this study. It is usually possible to sum up the average of triangular and trapezoidal fuzzy numbers by a definite value which is the best corresponding average. This operation is called de-fuzzification. There are several methods for defuzzification. In most cases, the following simple method is used for de-fuzzification:

$$\pi_{ij} = \frac{L_j + M_j + U_j}{3}$$

$$if\ \pi_{ij} \geq t \rightarrow \pi_{ij} = 1, \pi_{ji} = 0$$

$$if\ \pi_{ij} < t \rightarrow \pi_{ij} = 0, \pi_{ji} = 1$$

Therefore, the received matrix of research variables is presented in Table 10.

$$A + I$$

$$M = (A + I)^n$$

Matrix A is the initial access matrix, the same matrix and the final access matrix. The operation of exponentiation of the matrix is done according to Boolean rules.

1×1=1; 1+1=1

Therefore, secondary relationships should be controlled to be sure. That is, if A leads to B and B leads to C, then A must lead to C. That is, if direct effects should have been included based on secondary relationships, but did not occur in practice, Table 9 should be corrected and the secondary relationship should also be shown. The final access matrix of research variables is presented in Table 10.

Table 10. *The final access matrix of research variables*

C14	C13	C12	C11	C10	C09	C08	C07	C06	C05	C04	C03	C02	C01	SSIM
1	1	0	0	1	1	1	1	1	0	0	1	1	1	**C01**
0	1	0	0	1	1	1	0	0	0	0	0	1	0	**C02**
0	1	0	0	1	1	1	1	0	0	0	1	1	0	**C03**
1	1	1	1	1	1	1	1	1	1	1	1	1	1	**C04**
1	1	1	1	1	1	1	1	1	1	0	1	1	1	**C05**
1	1	0	0	1	1	1	1	1	0	0	1	1	1	**C06**
0	1	0	0	1	1	1	1	0	0	0	1	1	0	**C07**
0	1	0	0	1	0	1	0	0	0	0	0	0	0	**C08**
0	1	0	0	1	1	1	0	0	0	0	0	1	0	**C09**
1	0	0	0	1	0	0	0	0	0	0	0	0	0	**C10**
1	1	1	1	1	1	1	1	1	1	0	1	1	1	**C11**
1	1	1	1	1	1	1	1	1	1	0	1	1	1	**C12**
0	1	0	0	1	0	0	0	0	0	0	0	0	0	**C13**
1	1	0	0	1	0	1	1	1	0	0	1	1	1	**C14**

Determining relationships and leveling dimensions and indicators

To determine the relationships and leveling of the criteria, the set of outputs and the set of inputs for each criterion should be extracted from the received matrix.

 Access set (row elements, outputs or effects): Variables that can be accessed through this variable.

 Prerequisite set (column elements, input or effects): variables through which this variable can be reached.

The set of outputs includes the criterion itself and the criteria that are affected by it. The set of inputs includes the measure itself and the measures that affect it. Then, the set of two-way relations of the criteria is specified.

Table 11. *Set of inputs and outputs to determine the level*

Row	Component	Output	Input	Common	Level
1	C01	C1-C2-C3-C6-C7-C8-C9-C10-C13-C14	C4-C5-C6-C11-C12-C14	C1-C6-C14	3
2	C02	C2--C8-C9-C10-C13	C1-C2-C3- C4-C5-C6-C7-C9-C11-C12-C14	C2-C9	5
3	C03	C2-C3--C7-C8-C9-C10-C13	C1-C3- C4-C5-C6-C7-C11-C12-C14	C3-C7	4
4	C04	C1-C2-C3-C4-C5-C6-C7-C8-C9-C10-C11-C12-C13-C14	C4	C4	1
5	C05	C1-C2-C3-C5-C6-C7-C8-C9-C10-C11-C12-C13-C14	C4-C5-C11-C12	C5-C11-C12	2
6	C06	C1-C2-C3-C6-C7-C8-C9-C10-C13-C14	C4-C5-C6-C11-C12-C14	C1-C6-C14	3
7	C07	C2-C3-C7-C8-C9-C10-C13-	C1-C3- C4-C5-C6-C7-C11-C12-C14	C3-C7	4
8	C08	C8-C10-C13	C1-C2-C3- C4-C5-C6-C7-C8-C9-C11-C12-C14	C8	6
9	C09	C2-C8-C9-C10-C13	C1-C2-C3- C4-C5-C6-C7-C9-C11-C12-C14	C2-C9	5
10	C10	C10-C13	C1-C2-C3-C4-C5-C6-C7-C8-C9-C10-C11-C12-C13-C14	C10-C13	7
11	C11	C1-C2-C3-C5-C6-C7-C8-C9-C10-C11-C12-C13-C14	C4-C5-C11-C12	C5-C11-C12	2
12	C12	C1-C2-C3-C5-C6-C7-C8-C9-C10-C11-C12-C13-C14	C4-C5-C11-C12	C5-C11-C12	2
13	C13	C10-C13	C1-C2-C3-C4-C5- C6-C7-C8-C9-C10-C11-C12-C13-C14	C10-C13	7
14	C14	C1-C2-C3-C6-C7-C8-C9-C10-C13-C14	C4-C5-C6-C11-C12-C14	C1-C6-C14	3

Based on the leveling performed in MicMac software, 7 levels have been specified for the identified components. In the figure, the output of the Mac software is shown. Based on the arranged leveling figure, the interpretive structural model is stated.

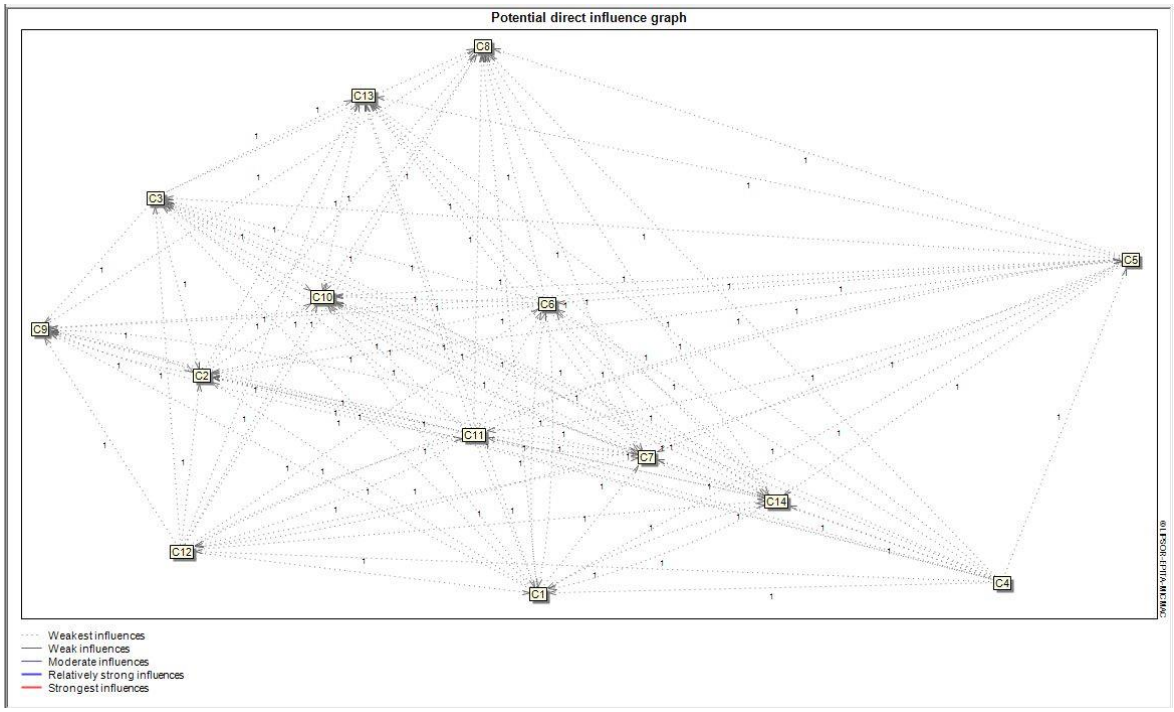

Figure 1. *Interpretive structural model of Mic Mac output*

So (C10-C13) is the last or dependent level. After identifying the first level variable(s), these variable(s) are removed and the set of inputs and outputs is calculated without

considering the first level variables. The common set of identification and the variables whose commonality is equal to the set of inputs are selected as the second level variables.

According to the output of ISM calculations, the variable in the form of C8)) is the sixth level. To determine the elements of the third level, the variables of the second level are removed and once again the set of inputs and outputs is calculated without considering the variables of the second level. Based on the common set of identification and the variables whose share is equal to the set of inputs are selected as the third level variables. According to the output of ISM calculations, variables (C03) and (C07) are the fifth level. Also, variables (C02) and (C09) were placed at the fourth level. Variables (C01), (C06) and (C10) are on the third level, and variables (C11), (12) and (C05) are on the second level. Finally, (C04) is the most fundamental element of the model. The final pattern of the levels of the identified variables is shown in the figure below. In this diagram, only the meaningful relationships of the elements of each level on the elements of the lower level, as well as the meaningful internal relationships of the elements of each row, are considered.

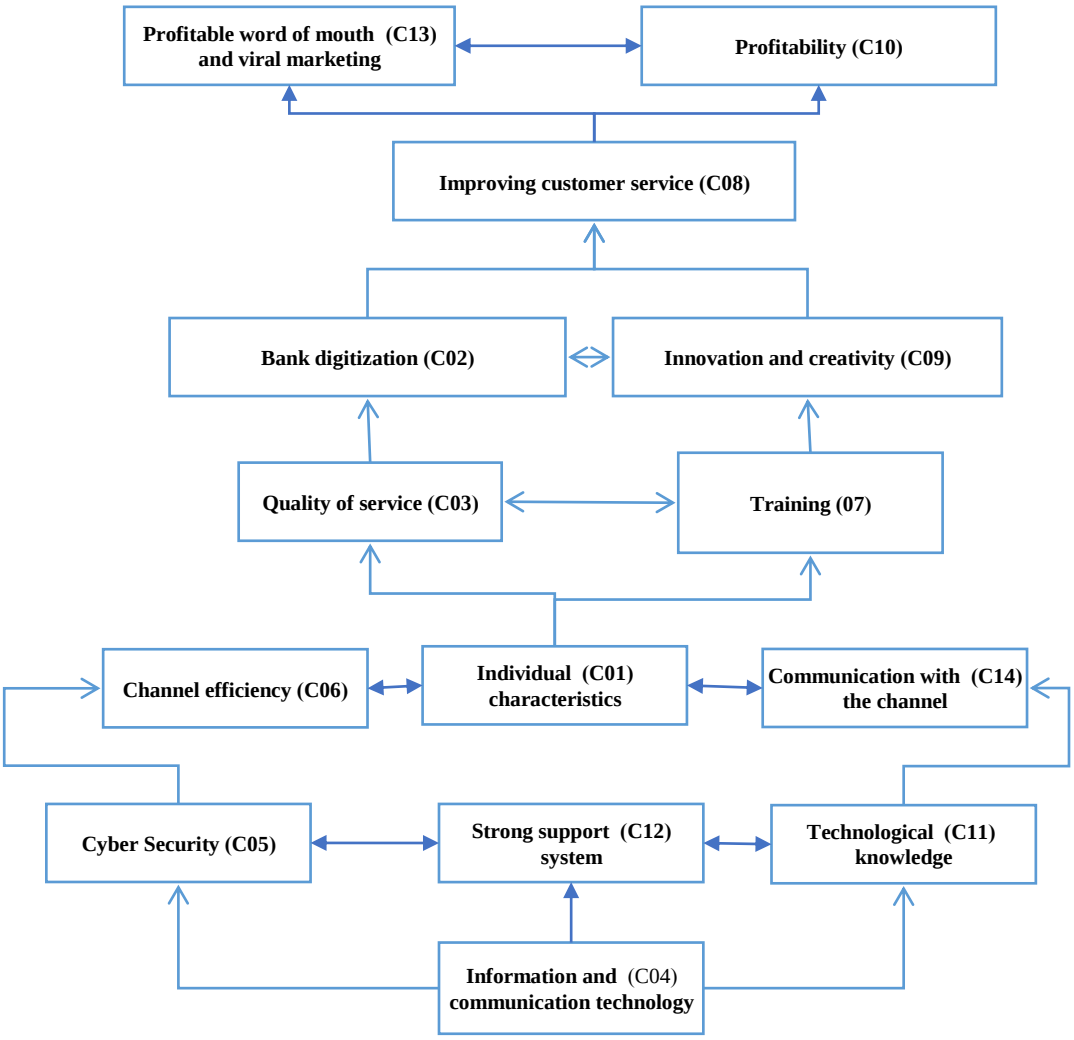

Figure 2. *Comprehensive pattern of the model*

The element of the lower level (C04) has the most influence in the model, and in the same way, the amount of influence is reduced in the next levels, and the variables of the same level, that is, they interact with each other.

Analysis of influence-dependence power (MICMAC chart)

In the (ISM) model, the interrelationships and influence between the criteria and the relationship of the criteria of different levels are well shown, which leads to a better understanding of the decision-making space by the relevant managers. In order to determine the key criteria, the power of influence and the dependence of the criteria are formed in the final access matrix. The power-dependence diagram for the studied variables is shown in Figure 3. Based on the MICMAC analysis, the priority of the components is determined based on their influence in the model.

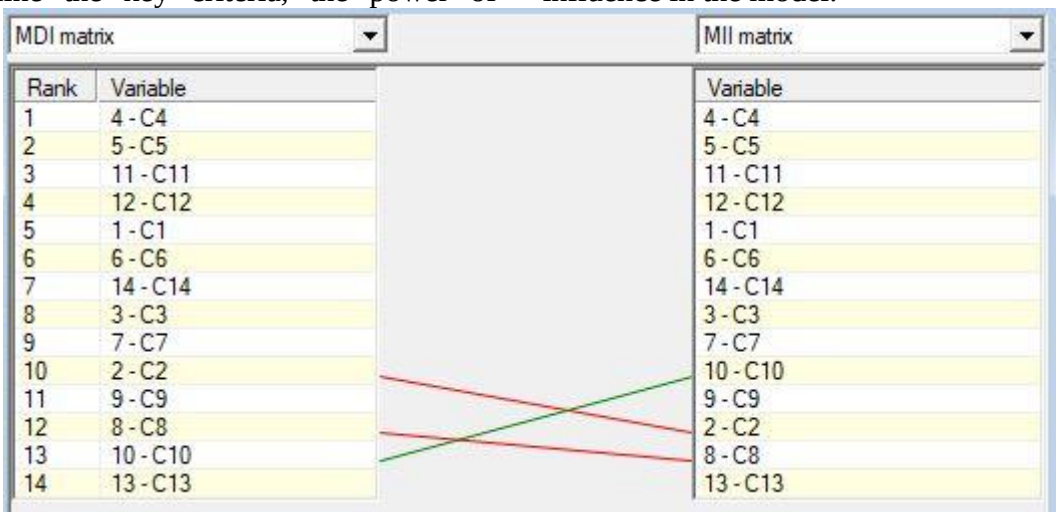

Figure 3. *Priority of components based on penetration rate*

Based on the mix-and-match analysis performed in Figure 4, the priority of the components is determined based on their effectiveness in the model.

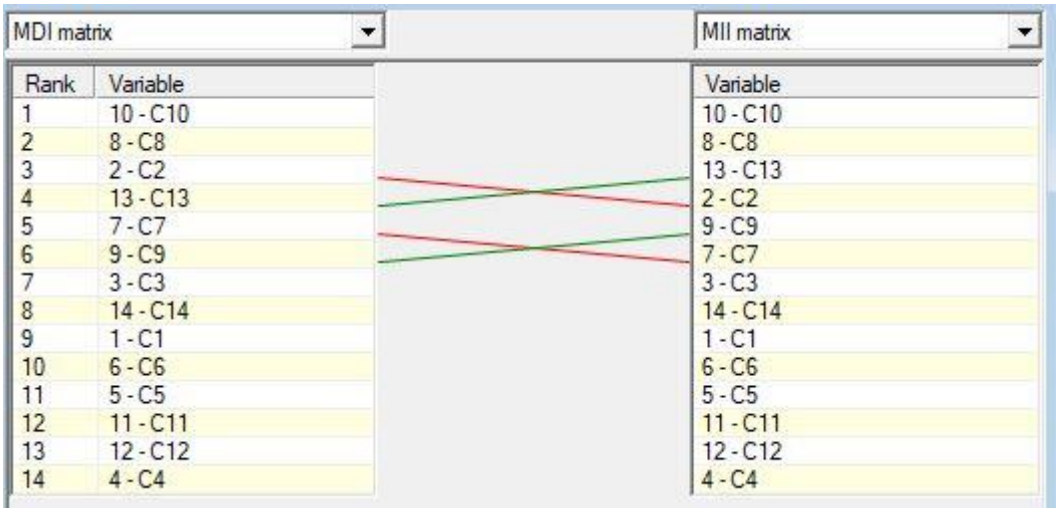

Figure 4. *The priority of the components based on the level of influence*

In the table, the power of penetration and the degree of dependence of the research components are stated.

Table 12. *Power of influence and degree of dependence of research components*

Row	Component	Line	Column
1	Individual characteristics	9	6
2	Bank digitization	4	10
3	Quality of service	6	8
4	Information and communication technology	13	0
5	Cyber security	12	3
6	Channel efficiency	9	6
7	Education	6	9
8	Improving customer service	1	11
9	Innovation and creativity	3	9
10	profitability	1	12

11	Technological knowledge	12	3
12	Strong support system	12	3
13	Profitable word of mouth and viral marketing	1	10
14	Communication with the channel	8	7
row	total	97	97

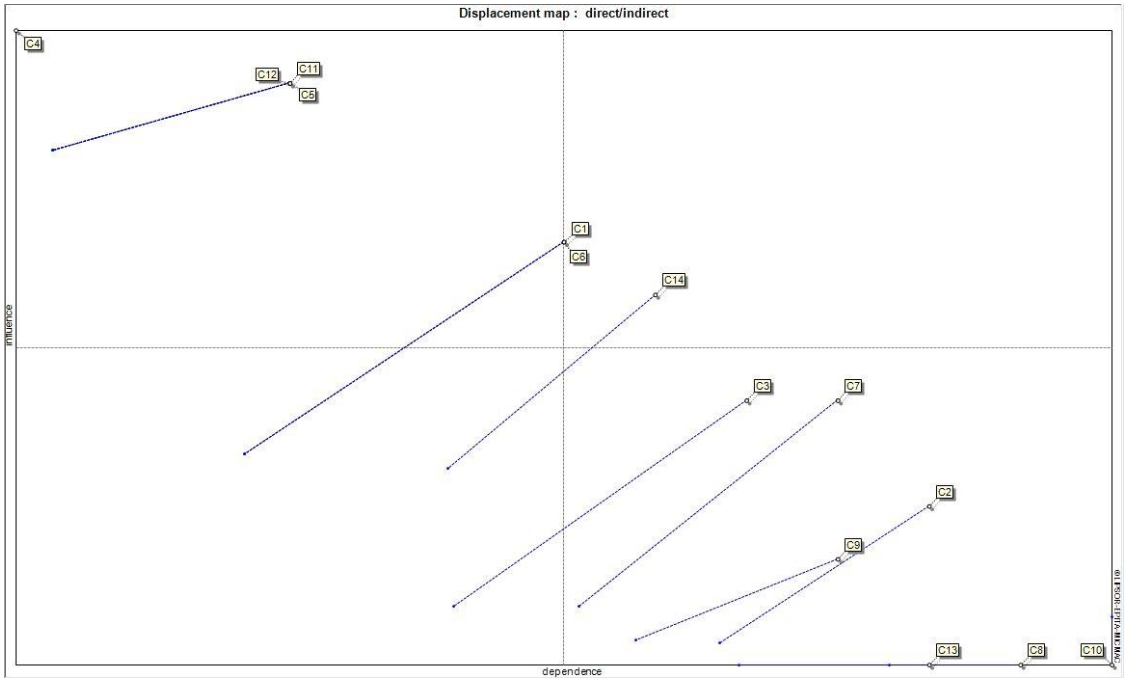

Figure 5. *Diagram of penetration power and degree*

5. Discussion

Based on the results obtained, indicators of individual characteristics, bank digitalization, service quality, information and communication technology, cyber security, channel efficiency, training, improving customer orientation, innovation and creativity, profitability, technological knowledge, strong support system, word of mouth marketing and Beneficial virulence and association with the channel were confirmed in three Delphi rounds. A 7-level model was formed based on the fuzzy interpretive structural model. The business value creation model through omnichannel based on customer relationship management (CRM) using a fuzzy interpretive structural approach, analyzes and examines various factors influencing the success of this approach in banks and helps to identify the relationships between them. By using criteria such as individual characteristics, bank digitalization, service quality, information and communication technology, cyber security, channel efficiency and training, a comprehensive conclusion can be reached.

One of the most important factors in the successful implementation of the omnichannel model is the individual characteristics of employees and customers. Employees who have the necessary abilities to use new technologies and are well trained play a significant role in creating value through this model. Also, customers who receive a favorable user experience from various bank channels and actively use digital facilities create higher added value for the bank. Therefore, individual characteristics as one of the main components in this model have a direct impact on customer satisfaction and system efficiency.

Bank digitization is another key factor that plays an important role in increasing omnichannel efficiency and creating value for business. Banks that have updated and fully digitized their systems and processes are able to provide faster, more accurate and more integrated services to customers. This leads to improved customer experience and

increased overall system productivity. Bank digitization plays a vital role in omnichannel success by facilitating communication between different channels and improving customer data.

Service quality, as an important criterion in creating value through omnichannel, has a direct impact on customer satisfaction. Providing quality, consistent and timely service across all communication channels can create a positive experience for customers and increase business value. Also, information and communication technology (ICT) is an infrastructure without which the implementation of the omnichannel model is not possible. By using advanced technologies in the field of communication, banks can manage customer data in all channels in an integrated manner and use this information to provide better and personalized services.

Another important component in the successful implementation of the omnichannel model is cyber security. Customers need to be sure of the security of their personal and financial information, and any failure in this regard can cause a decrease in trust and, as a result, a decrease in business value. In addition, channel efficiency is also important as a key measure in omnichannel success. The high efficiency of various communication channels in the bank, including mobile applications, websites and physical branches, leads to improved customer experience and increased operational efficiency of the bank.

Finally, training plays a key role in omnichannel success. Employees who are well trained and familiar with new technologies and processes can provide better services and help the successful implementation of this model. Also, continuous training to customers regarding the use of digital channels and new bank facilities leads to increased system interaction and productivity.

The business value creation model through omnichannel based on customer relationship management (CRM) using a fuzzy interpretive structural approach, analyzed the relationships between key factors for the success of this approach and according to criteria such as improving customer orientation, innovation and creativity, profitability, knowledge Technologically, strong support system, profitable word of mouth and viral marketing and communication channels provide a comprehensive conclusion. Customer orientation, as one of the main principles in any business, plays a vital role in the omnichannel model. The omnichannel approach leads to an increase in customer satisfaction by providing an integrated and coordinated experience in all channels. This seamless experience facilitates improvement in customer interactions and responsiveness to their needs. As a result, this approach increases customers' trust in the brand and strengthens their loyalty. Improving customer orientation through detailed analysis of customer data and personalization of services based on the needs of each customer creates more value for the business. Innovation and creativity play an important role in the success of the omnichannel model and customer relationship management. Banks and companies that are constantly improving and innovating in providing services and using new technologies will be able to provide a distinct and competitive experience to customers. Innovation in this model can include updating information systems, creating new channels to interact with customers, and offering new services. These innovations not only attract the attention of new customers but also increase the satisfaction of existing customers.

One of the most important goals of businesses is profitability, which can be significantly improved through omnichannel and customer relationship management. Creating a unified and accurate user experience through all available channels leads to increased sales, reduced costs, and optimized processes. In addition, due to the improvement of

customer satisfaction and loyalty, customers are more inclined to repeat purchases and introduce services to others, which leads to increased profitability. Also, accurate analysis of customer behavior and their needs through data obtained from different channels allows businesses to make better business decisions.

Technological know-how and a strong support system are essential for the successful implementation of the omnichannel model. Using new technologies such as artificial intelligence, data analysis and customer relationship management (CRM) systems to personalize and improve services helps banks and businesses to adapt their services to the daily needs of customers. Also, a strong support system to meet the needs of customers in each channel is of particular importance. This system can help solve customers' problems quickly and ultimately lead to increased satisfaction and a better user experience.

Profitable word-of-mouth and viral marketing are other factors that are enhanced through omnichannel. Providing customers with a positive experience across all channels encourages them to share their experience with others. This word-of-mouth advertising can help attract new customers and strengthen the brand's position in the market. Besides this, communication with channels plays an important role in improving customer experience and optimizing internal business processes. Coordination between different channels, including physical stores, mobile apps, websites and social networks, allows businesses to offer their services seamlessly.

The model of creating business value through omnichannel based on CRM and using a fuzzy interpretive structural approach, by focusing on improving customer orientation, strengthening innovation and creativity, increasing profitability, promoting technological knowledge, creating a strong support system and taking advantage of word of mouth and viral marketing, to It allows businesses to provide a unique and coordinated experience to their customers and create significant value in the market.

6. Conclusion

The model of creating business value through omnichannel in banks, based on customer relationship management (CRM) and using a fuzzy interpretative structural approach, analyzes the complexities and interactions between various factors that contribute to improving the performance of banks and increasing customer satisfaction. This model uses a system approach that aims to create a unified and coordinated user experience in all communication channels of the bank, including digital, physical and telephone spaces. Omnichannel improves interaction with customers by integrating different communication channels of banks. Customers expect to receive their financial services seamlessly and seamlessly at any time and through any channel they choose. CRM allows banks to centrally collect and manage customer data from all communication channels and use it to improve customer experience. By analyzing this data, banks can provide personalized services tailored to each customer's needs. As a result, increasing customer satisfaction and their loyalty to the bank can be realized through this approach.

The omnichannel and CRM approach, along with the fuzzy interpretive structural approach, helps to improve the operational efficiency of banks. By using advanced technologies and comprehensive information systems, banks are able to optimize processes and reduce operational costs. For example, cloud technologies, artificial intelligence and data mining help banks to better predict customer behavior and provide optimal services. These technologies also increase accuracy and speed in providing services and reduce human errors. Therefore, by improving the efficiency and quality of services, more added value is created for the bank and customers.

Using the omnichannel model based on CRM can lead to an increase in banks'

profitability. By providing better services and a favorable user experience, banks can attract more customers and increase the retention rate of existing customers. Also, analyzing customer data and their behaviors through digital tools allows banks to target their products and services more precisely and optimally. This increases efficiency in marketing and selling banking products, which ultimately increases the bank's profitability. Additionally, taking advantage of this approach creates a competitive advantage for banks as customers look for a fast, efficient and seamless experience.

One of the main concerns in digital banking and the use of omnichannel is cyber security and risk management. Considering that customer data is collected and managed from multiple channels, information security and privacy protection are very important. In the fuzzy interpretive structural approach, various aspects of cyber security and risk management are taken into consideration and banks can benefit from advanced security solutions to maintain the security of customer information and build trust in them.

As a result, the omnichannel business value creation model based on CRM and fuzzy interpretive structural approach enables banks to improve customer experience, increase operational efficiency, achieve greater profitability, while maintaining security and risk management. to improve This model increases value for customers and banking businesses by creating integrated interaction in all channels and using new technologies.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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