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ARTICLE

Identifying and Prioritizing Barriers to Implementing a Strategic Innovation Ecosystem Based on Corporate Sustainability in the Food Industry (Including a Case Study)

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Abstract

Strategic innovation leading to corporate sustainability is a difficult, continuous and challenging process in business. Corporate sustainability plays an important role in establishing a balance between social, economic and environmental goals, as well as improving the competitive position by using opportunities; therefore, many businesses seek to innovate their processes and actions in line with corporate sustainability. The main objective of this research is to identify and prioritize the obstacles to the implementation of a strategic innovation ecosystem based on corporate sustainability in the food industry (case study: confectionery and chocolate sector). The present research is of an applied-developmental purpose, descriptive in terms of data collection and quantitative in terms of the nature of the data; and it includes four main parts. In the first part, using the research literature, the obstacles to the implementation of a strategic innovation ecosystem based on corporate sustainability were identified. To obtain the indicators, after reviewing the theoretical literature, 3 main criteria and 8 sub-criteria were identified, which were finalized after two stages of surveying supply chain experts in Shahd Arang Food Industries Company using the fuzzy Delphi method. Finally, 3 suitable criteria for intra-organizational barriers, 3 suitable criteria for extra-organizational barriers, and 2 criteria for environmental barriers were identified. Then, the fuzzy Savaray method was used to weight and prioritize the criteria. The results of the research showed that the criterion of lack of networking and strategic communication with a weight of 0.249 has obtained the first rank. The lack of internal and external stakeholders with a weight of 0.2 and the lack of a purposeful organizational culture with a weight of 0.160 have obtained the second and third ranks, respectively. Finally, the influence of each factor has been investigated using a one-sample t-test. Based on the results of this method, it was shown that intra-organizational, extra-organizational and environmental barriers are effective barriers in the implementation of the strategic innovation ecosystem based on corporate sustainability in the food industry. It is also worth noting that the sub-components of intra-organizational, extra-organizational and environmental barriers also have a significant impact on the implementation of the strategic innovation ecosystem based on corporate sustainability in the food industry. Considering the barriers to the implementation of the strategic innovation ecosystem based on corporate sustainability in this study, managers and owners of various industries and businesses can take steps to select appropriate factors and benefit from its benefits, according to the findings of this study.

Keywords: Strategic Innovation Ecosystem; Corporate Sustainability; Fuzzy Riding; Fuzzy Delphi; Structural Equations

1. INTRODUCTION

Strategic innovation is a dynamic and evolving topic that is used to modify an organization's strategies over time. Strategic innovation is a specific type of change and strategy development through which companies redesign their processes to improve performance and profitability in the long term [1] The redefinition of company processes with the aim of influencing long-term opportunities is what

distinguishes strategic innovation from other conceptualizations of strategic development and change, such as strategic mergers or eliminations. In fact, strategic innovation aims to create continuous changes to stabilize the company's position, and creating short-term profits is not one of the goals of strategic innovation. Accordingly, the concept of strategic innovation is applied to existing companies that have already established a core business, market position, and core processes to gain competitiveness to exploit opportunities through the support of key players in the business ecosystem [2]. Innovation is considered a strategic change that takes place at all levels of the organization and is necessary to re-implement processes, strategies, and activities. In fact, strategic innovation is a type of strategic change that allows organizations to change their path dependencies by changing their direction and capabilities [3]. In fact, the need for renewal in the organization never ends and is created as a permanent process in strategic management operations and in interaction with the environment. In strategic innovation, businesses must not only consider the complex and pervasive business ecosystem, but also seek new opportunities from a sustainability perspective. In fact, an organization can meet the expectations of its stakeholders if it continuously adapts its strategies and processes to unsustainable environmental, social, and economic conditions. Implementing corporate sustainability is a laborious process that requires continuous review and innovation. The concept of sustainability was first introduced in response to concerns about environmental degradation due to poor resource management, and it has evolved in line with the principles of sustainable development and its various applications. Corporate sustainability is considered a subset of sustainability that can be considered the implementation of sustainable development goals within an organization. In the present study, corporate sustainability is also expressed on this basis and strategic innovation is considered in order to achieve this type of sustainability. On the other hand, as mentioned, creating sustainability in the business environment has become inevitable and new activities are necessary for innovation, strategies and processes of the company, in order to move towards sustainability. Most organizations face the challenges of maintaining their position and standing in uncertain conditions, strategic innovation is a way to apply innovation and the continuity of the life of organizations. Strategic innovation provides the infrastructure for the organization's long-term continuity and prosperity to reduce the likelihood of organizational failure over time. In most studies, strategic innovation has focused on the interaction between the organization and the environment, but intra-company interactions have made the implementation of this process challenging. On the other hand, corporate sustainability and its development require organizations that perform differently from others and can create more value from fewer resources. Given that the Iranian economy is currently facing many challenges and these challenges can have devastating social and environmental impacts, it is necessary for organizations to move towards sustainability and consider economic, social, and environmental dimensions. The complexity of business requires managers to consider both sustainability aspects and look beyond internal networks to their business. The ecosystem perspective creates a network that includes all factors and stakeholders effective in implementing strategic modernization. The interconnected relationships between stakeholders and the firm have been studied under various theoretical frameworks, such as value chains, networks, systems, platforms, and ecosystems. These relationships become more complex when connections are formed not only between the firm and stakeholders, but also between different stakeholders; the ecosystem perspective considers the different elements of the value chain as networks that are mutually dependent on each other for effectiveness and survival. Ecosystems have similar characteristics and interact to form the same goals, resources, structure, and culture. The ecosystem paradigm stems from the application of biological and ecological logic to the business environment, and an ecosystem is an economic community supported by business elements. The ecosystem phenomenon is relatively new in the literature and various conceptualizations have emerged over the course of definitions; for example, the concept of an ecosystem has been defined as a structure of activities or a set of networks and the relationships between them. Despite the different conceptualizations of an ecosystem, all definitions point to the fact that ecosystems are composed of a similar set of key elements and actors that are the basis for advancing the organization's goals in line with the value proposition. In general, the nature of ecosystems is complementary, which means that no value will be created unless all the components of the ecosystem are present.

1.1. Importance and Necessity of Research

The largest and most successful companies in the world always face challenges that lead to making big decisions so that they can be considered as the most successful companies in the world today. In turbulent and dynamic environmental conditions, organizations are faced with strategies that are not effective and lead to a decrease in organizational performance. Organizations' attention to comprehensive and strategic plans has increased, so that the only way for managers to be efficient and effective is to use strategic planning, which leads to foresight and forecasting of distant horizons. Implementing and implementing strategic plans leads to fundamental changes in the organization Organizations can make changes to address these problems and adopt flexible and dynamic methods, in line with the organization's strategies and strategies. One of the most important tools for achieving this is strategic innovation. Strategic innovation, as a core skill, plays a fundamental role in maintaining the long-term survival and well-being of organizations. Strategic innovation is usually applied to strategy, structure, systems, and organizational culture. One of the concepts that takes into account the dynamic and nonlinear nature of start-up businesses is strategic innovation, which can be considered the process of changing business components for corporate survival and sustainability. One of the goals of strategic modernization is to create value for the business by improving the competitive position, so companies need strategic modernization to be sustainable in the business life cycle and to reach the stages of growth and stability. Strategic modernization allows decision makers to create value for all stakeholders by creating a broad perspective of the business. Due to the important role that companies play in being responsible towards society, corporate sustainability has received a lot of attention from researchers, while today many businesses, which are among the most important components of business in society, have faced changes and developments towards a sustainable development from a traditional business development. On the other hand, one of the processes of changing business components for corporate survival and sustainability is strategic innovation. Strategic innovation is one of the concepts that takes into account the dynamic and nonlinear nature of businesses. Some researchers consider the capabilities of an organization to maintain and maintain the capabilities of the organization in pursuing innovations and using the capabilities of strategic innovation correctly and optimally. Creating value for the business by improving competitive conditions is also one of the goals of strategic innovation. Also, strategic innovation, by showing a broad perspective of the business, enables decision makers to create value for all stakeholders. The implementation of strategic innovation is of significant importance in many organizations in the country, especially in the food industry. Food industries have been left out of the global competitive environment and are far from their competitors in terms of performance, technology and finance. Policies have been implemented in the field of privatization of organizations, and politicians have also decided to eliminate and adjust supports and tariffs that will protect organizations from competitive pressures from foreign competitors. If the above-mentioned policies are implemented, the food industry will be in greater need of strategic modernization, and if strategic modernization is ignored, these organizations will be pushed into the abyss of destruction. In order to move from the current situation to the desired situation, the food industry will seek industry-oriented development, partnership with strategic non-governmental partners, simultaneous development of hardware and software of target industries, diversification of financing methods, demand-oriented development of new applied technologies, and interaction and influence on the approval of laws and regulations. Currently, the food industry is facing numerous challenges, and most of the organization's plans have encountered problems and are not making progress. Therefore, in order to advance the organization's plans and finance, it is necessary to identify and prioritize the obstacles to the implementation of a strategic innovation ecosystem based on corporate sustainability, so that by adapting the concepts of strategic innovation to the requirements, needs, and missions of the organization, a new vision for the organization can be achieved. Given that previous studies have not examined the identification and prioritization of obstacles to the implementation of a strategic innovation ecosystem in the food industry, the present study will help to develop the literature in the field of research in addition to covering the existing research gap. Due to the aforementioned issues, this study is important and necessary.

1.2. Background research

Baghipour Sarami et al. [4] in a research, studied Modeling of Nurses' shift Work schedules According to Ergonomics: A case study in Imam sajjad (As) Hospital of Ramsar. Damert & Baumgartner [5] in a research, studied External pressures or internal governance what determines the extent of corporate responses to climate change. Gandolfo & Lupi [2] in a research, studied Circular economy, the transition of an incumbent focal firm: How to successfully reconcile environmental and economic sustainability? Kaipainen & Aarikka- Stenroos [1] in a research, studied How to renew business strategy

to achieve sustainability and circularity? A process model of strategic development in incumbent technology companies. Miller & Lehman [3] in a research, studied Strategy restoration. Long Range Planning. Moller & Halinen [6] in a research, studied Managing business and innovation networks—from strategic nets to business fields and ecosystems. Taghipour et al. [7] in a research, studied Evaluating Project Planning and Control System in Multi-project Organizations under Fuzzy Data Approach Considering Resource Constraints(Case Study: Wind Tunnel Construction Project). Teece [8] in a research, studied Strategic renewal and dynamic capabilities. Khodakhah Jeddi et al. [9] in a research, studied The Analysis of Effect Colour Psychology on Environmental Graphic in Childeren Ward at Medical Centers. Mahboobi et al. [10] in a research, studied Competitive Opinion Influence Maximization in Social Networks. Hassan Beigi et al. [11] in a research, studied Presenting a fuzzy mathematical programming model for allocating and scheduling parts in a flexible manufacturing system (FMS) and the impact of repairs and maintenance on product.

1.3. Research Questions

The present study was conducted to identify and prioritize the barriers to the implementation of a strategic innovation ecosystem based on corporate sustainability in the food industry (case study: confectionery and chocolate sector). This study was conducted to answer these questions:

1.3.1. Main research question

How are the barriers to the implementation of a strategic innovation ecosystem based on corporate sustainability in the food industry (case study: confectionery and chocolate sector) identified and prioritized?

1.3.2. Main research question

1- What are the factors affecting the barriers to the implementation of a strategic innovation ecosystem based on corporate sustainability in the food industry?

2- How are the barriers to the implementation of a strategic innovation ecosystem based on corporate sustainability in the food industry prioritized?

3- Does the designed model of barriers to the implementation of a strategic innovation ecosystem based on corporate sustainability in the food industry have a good validity?

4- How is the impact of assessing the barriers to the implementation of a strategic innovation ecosystem based on corporate sustainability in the food industry assessed?

2. RESEARCH METHOD

In terms of research classification by purpose, this research is an applied research. The main subject of the research is identifying and prioritizing the obstacles to the implementation of a strategic innovation ecosystem based on corporate sustainability in the food industry (case study: confectionery and chocolate sector). This research is considered a quantitative research in terms of type. The study population consists of experts and senior experts with more than five years of experience and at least a master's degree in the food industry. Since one of the methods used in multi-criteria decision-making techniques is the use of the experts' perspective, it is better to first consider criteria for expertise and then identify and select individuals who are qualified for expertise in a targeted manner; therefore, in this study, the purposive sampling method was used for sampling. In the t-test method, the statistical population of the research, 217 employees of the Shahd-Arang confectionery and chocolate sector, was analyzed. In this study, simple random sampling method and Morgan table were used to determine the sample size. This study can be conducted in 3 stages. First, the most important barriers to the implementation of the strategic innovation ecosystem based on corporate sustainability are identified using literature and interviews with experts and monitored using the fuzzy Delphi method. Then, all factors are weighed and prioritized using the opinions of experts; and finally, the effectiveness of the barriers to the implementation of the strategic innovation ecosystem based on corporate sustainability was measured using the t-test.

2.1. Statistical population, statistical sample and sampling method

The statistical population of the study includes Shahd-Arang Food Industries Company. In order to collect the required data about the people of the community and also to save on costs, manpower and time, the method of sampling the whole number of people from the community and collecting data is used; therefore, given the limited number of people in the statistical population according to this sampling method, it is necessary to evaluate all 15 people to reach the saturation point. In this case, the designed

questionnaire was provided to all senior managers, university professors and experts active in the field of strategic modernization ecosystem in Shahd-Arang Food Industries Company who have the expertise requirements of at least 35 years of age, at least 10 years of experience and at least a bachelor's degree.

2.2. Data analysis tools

In this study, Excel and SPSS software were used to perform the necessary calculations.

2.3. Fuzzy Delphi method

This technique is a survey method based on the opinions of experts. In this study, the fuzzy Delphi method was used to verify and screen the identified indicators. This method is a combination of the Delphi method and fuzzy set theory, which was presented by Ishikawa et al. The steps of the fuzzy Delphi method are:

1- Identifying research indicators using a comprehensive review of the theoretical foundations of the research

2- Collecting the opinions of decision-making experts: In this step, after identifying the criteria, a decision-making group consisting of experts related to the research topic is formed and questionnaires are sent to them to determine the relevance of the identified indicators to the main research topic and screening, in which the linguistic variables in Table 1 are used to express the importance of each indicator. In this study, triangular fuzzy numbers were used.

Table 1. Linguistic expressions and fuzzy Delphi numbers

Triangular fuzzy numbers	Language phrases
(0,0,0.25)	Very little
(0,0.25,0.5)	Little
(0.25,0.5,0.75)	Average
(0.5,0.75,1)	A lot
(0.75,1,1)	Very much

3- Verification and screening of indicators: This is done by comparing the acquired value of each indicator with the threshold value $\tilde{S}$. The threshold value is determined by the decision maker's subjective inference and will directly affect the number of factors that are screened. There is no simple and legal way to determine the threshold value. In this study, the value of 0.7 has been considered as the threshold value.

2.4. Ranking of indicators using the fuzzy SWARA method

The algorithm of this technique is the same as the SWARA method, but it is used in a fuzzy environment. The goal of the SWARA method is to calculate the weight of the factors, so it is of particular importance. Therefore, by implementing this method in a fuzzy environment, the ambiguities in the words of the respondents are eliminated and the results will be more accurate. The steps of the fuzzy SWARA method are given below:

Step 1- We sort the research factors in descending order of their importance.

Step 2- Based on the spectrum of Table 2, we calculate the relative importance of factor j compared to factor j-1, which has a higher importance, until we reach the last factor. After determining all the relative importance scores of all experts, we obtain the geometric mean of the corresponding scores to integrate their judgments. The output of this step is the calculation of Sj.

Table 2. Fuzzy SWARA linguistic expressions and numbers

Triangular fuzzy numbers	Linguistic expressions
(1, 1, 1)	Equal
(1.5, 1, 0.67)	Relatively little
(0.67, 0.5, 0.4)	Little
(0.4, 0.33, 0.286)	Very little
(0.286, 0.25, 0.22)	Very little

Step 3-Calculate the coefficient Kj.

Step 4-Calculate the fuzzy weights (qj).
Step 5-Calculate the relative weights.

2.5. Evaluating the effectiveness of indicators using one-sample t-test

In this part of the research, the effect of barriers to the implementation of a strategic innovation ecosystem based on corporate sustainability in the food industry was examined using an independent one-sample t-test. In this method, we first calculate values using specific formulas and then compare them with standard values. If the results of the calculations show that the observed differences are greater than those that could have occurred by chance, the null hypothesis (which says there is no difference) is rejected.

2.6. Statistical population in one-sample t-test

In this research, 217 people were selected from 500 employees of Shahd Arang Company using the Morgan table by simple random method.

3. ANALYSIS

3.1. Demographic Characteristics of Respondents

In this section, in order to get acquainted with the number of respondents to the paired comparison questionnaire, the demographic characteristics of the respondents will be described in terms of: gender, age, work experience, and education.

3.1.1. Descriptive Findings of Gender of Experts

Table 3. Gender distribution of respondents

Percentage	Abundance	Gender
86.67	13	Male
13.33	2	Female
100	15	Plural

According to Table 3, 86.67 percent of the respondents were male and 13.33 percent were female.

In a similar way, other factors can be examined, including: the level of education of experts, the age of experts, and the work experience of experts.

3.2. Introduction to research factors

In this study, the Fuzzy Delphi technique was used to identify and finally confirm the factors affecting the barriers to the strategic innovation ecosystem based on corporate sustainability, which was extracted from the literature review.

3.2.1. First round of Fuzzy Delphi

In this round, a questionnaire was provided to 15 research experts to rate each of the indicators based on a fuzzy range of 1 to 5. The initial results of the experts' opinions are given in Table 4.

Table 4. Results of expert opinions

Importance					Sub-criterion	Criteria	Row
Too much	A lot	Medium	Low	Very little			
6	5	3	1	0	Lack of participatory management and leadership	Internal barriers External barriers	1
11	1	1	2	0	Lack of purposeful organizational culture		2
6	4	5	0	0	Lack of organizational structure management		3
8	7	0	0	0	Lack of internal and external stakeholders	Internal barriers External barriers	4
10	3	2	0	0	Lack of strategic networking and communication		5
7	5	2	1	0	Lack of dynamic capability		6
7	6	2	0	0	Lack of environmental uncertainty	Internal barriers	7
8	5	1	1	0	Lack of environmental conditions and regulations (economic, social and environmental)		8

Table 4 shows the count of experts' opinions on the research indicators. To fuzzify the numbers, we first convert them into fuzzy numbers, then the fuzzy average of the scores is obtained, and then the fuzzy average is converted into a definite number. The results of all fuzzification calculations in the first stage of Delphi are given in Table 5. In this study, the threshold number is considered to be 0.7, which shows that all indicators are confirmed, and the results are given in Table 3.

Table 5. Results of the first stage of Fuzzy Delphi

Status	Non-fuzzy average	Fuzzy average	Sub-criterion	Criteria	Row
Confirm	0.733	(0.517,0.767,0.917)	Lack of participatory management and leadership	Internal barriers External barriers	1
Confirm	0.789	(0.6,0.85,0.917)	Lack of purposeful organizational culture		2
Confirm	0.733	(0.517,0.767,0.917)	Lack of organizational structure management		3
Confirm	0.839	(0.633,0.883,1)	Lack of internal and external stakeholders	Internal barriers External barriers	4
Confirm	0.828	(0.633,0.883,0.967)	Lack of strategic networking and communication		5
Confirm	0.721	(0.55,0.8,0.933)	Lack of dynamic capability		6
Confirm	0.794	(0.583,0.833,0.967)	Lack of environmental uncertainty	Internal barriers	7
Confirm	0.789	(0.583,0.833,0.95)	Lack of environmental conditions and regulations (economic, social and environmental)		8

4. RESULTS

4.1. Results of the second stage of the Fuzzy Delphi

In this stage, the first stage Delphi questionnaire was provided to the experts. Also, in this round, the definitive average of the first round was also provided so that the experts would be informed of the average of each indicator in the previous stage. The results of the second stage of the Fuzzy Delphi are given in Table 6.

Table 6. Results of the second round of Fuzzy Delphi

Consensus status	Disagreement	First-stage non-fuzzy average	Second-stage non-fuzzy average	Second stage fuzzy average	Sub-criterion	Criteria	Row
✔	0.0833	0.733	0.817	**(0.6,0.85,1)**	Lack of participatory management and leadership	Internal barriers External barriers	1
✔	0.0667	0.789	0.856	**(0.667,0.917,0.983)**	Lack of purposeful organizational culture		2
✔	0.0167	0.733	0.750	**(0.533,0.783,0.933)**	Lack of organizational structure management		3
✔	0.0222	0.839	0.861	**(0.667,0.917,1)**	Lack of internal and external stakeholders	Internal barriers External barriers	4
✔	0.0444	0.828	0.872	**(0.683,0.933,1)**	Lack of strategic networking and communication		5
✔	0.0444	0.761	0.806	**(0.6,0.85,0.967)**	Lack of dynamic capabilities		6
✔	0.0287	0.794	0.822	**(0.617,0.867,0.983)**	Lack of environmental uncertainty	Internal barriers	7
✔	0.05	0.739	0.789	**(0.583,0.833,0.95)**	Lack of environmental conditions and regulations (economic, social and environmental)		8

Table 6 shows the fuzzy and definite averages of the second stage of the Fuzzy Delphi. Also, the difference between the definite averages of the second and first stages is given in this stage. According to Cheng Lin and his colleagues, if the difference between the two stages of the survey is less than a very low threshold (0.1), the survey process stops, meaning that we have reached consensus; Table 4 shows that in all indicators, the average difference is less than 0.1, so we have reached consensus and the Fuzzy Delphi stages are ended.

4.2. Results of Prioritization of Fuzzy SWARA Method

In this section, the weight and importance of indicators are determined using the fuzzy SWAARA method. The first step in this method is to sort the indicators based on their importance in descending order (from high to low); this process is done using the average scores given in Table 6, which is also summarized in Table 7.

Table 7. Descending order of criteria

Average comments	Indicator	Row
0.872	Lack of networking and strategic communication	1
0.861	Lack of internal and external stakeholders	2
0.856	Lack of purposeful organizational culture	3
0.750	Lack of organizational structure management	4
0.822	Lack of environmental uncertainty	5
0.817	Lack of participatory management and leadership	6
0.806	Lack of dynamic capability	7
0.789	Lack of environmental conditions and regulations (economic, social and environmental)	8

Then, the relative importance of each criterion j should be expressed with criterion j-1 based on the spectrum 1 to 5, the fuzzy Swara spectrum table, which is the same step as calculating Sj. The results are given in Table 7. Then, we calculate the weight of the criteria based on the opinions of each expert. The results are given in Table 8. The Wj column is the weight of the criteria.

Table 8. Weight of criteria

Non-fuzzy wj	Fuzzy wj	qj	Kj	Sj	Criteria
0.249	(0.233,0.248,0.267)	(1,1,1)	(1,1,1)	-	Lack of networking and strategic communication
0.200	(0.181,0.198,0.219)	(0.778,0.8,0.82)	(1.22,1.25,1.286)	(0.22,0.25,0.286)	Lack of internal and external stakeholders
0.160	(0.141,0.159,0.18)	(0.605,0.64,0.672)	(1.22,1.25,1.286)	(0.22,0.25,0.286)	Lack of purposeful organizational culture
0.120	(0.101,0.119,0.14)	(0.432,0.481,0.522)	(1.286,1.33,1.4)	(0.286,0.33,0.4)	Lack of organizational structure management
0.096	(0.078,0.096,0.114)	(0.336,0.385,0.428)	(1.22,1.25,1.286)	(0.22,0.25,0.286)	Lack of environmental uncertainty
0.077	(0.061,0.076,0.094)	(0.261,0.308,0.351)	(1.22,1.25,1.286)	(0.22,0.25,0.286)	Lack of participatory management and leadership
0.058	(0.043,0.057,0.073)	(0.187,0.232,0.273)	(1.286,1.33,1.4)	(0.286,0.33,0.4)	Lack of dynamic capability
0.047	(0.034,0.046,0.06)	(0.145,0.185,0.224)	(1.22,1.25,1.286)	(0.22,0.25,0.286)	Lack of environmental conditions and regulations (economic, social and environmental)

According to Table 8, the criterion of lack of networking and strategic communication with a weight of 0.249 has obtained the first rank. The lack of internal and external stakeholders with a weight of 0.2 and the lack of a purposeful organizational culture with a weight of 0.160 have obtained the second and third ranks, respectively.

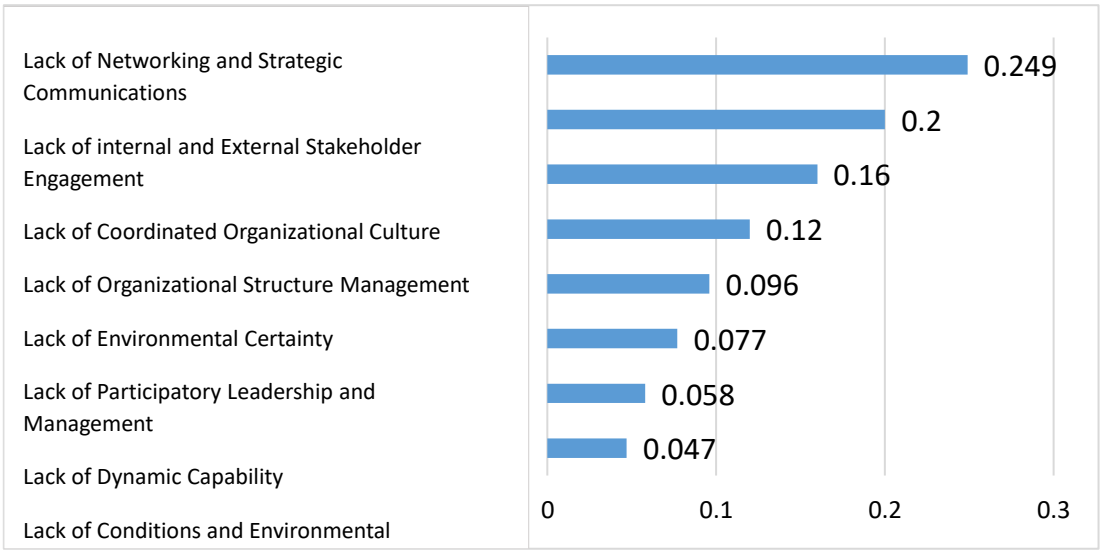

Figure 1. Weight and final ranking of criteria

4.3. Results of the impact of barriers to strategic innovation ecosystem based on corporate sustainability using structural equations

In this section, it is first necessary to examine the suitability of each of the identified dimensions using exploratory factor analysis. Bartlett's test is the correlation matrix of the single observation variables. This test confirms that the variables are not related to each other.

Table 9. Bartlett and KMO test results

Bartlett test		
0.773	KMO statistic value	
5.404	Chi-square statistic	Bartlett's spherical test
28	Degree of freedom	
0.000	Meaningfulness	

According to Table 9, the significance level is less than 0.05 and the KMO index value is 0.773, so the data in question are suitable for factor analysis. In order to identify the factors that probably underlie the 8 variables and also its simple structure, the Varimax rotation method was used with a minimum factor loading of 1.6, and three eigenvalue indices, the percentage of variance explained, and the rotated eigenvalue diagram were examined.

Table 10. Extraction of the initial set of factors

Eigenvalues of the correlation test			The sum of the extracted factors is not rotated.			The values of the extracted factors after rotation			Components
Aggregation percentage	Percentage variance	Total	Cumulative Percentage	Percentage variance	Total	Aggregation percentage	Percentage variance	Total	Agents
35.94	35.94	2.87	45.504	45.504	3.64	45.50	45.40	3.64	1
62.98	27.04	2.16	63.25	17.74	1.42	63.25	17.74	1.42	2
76.02	13.03	1.04	76.025	12.77	1.022	76.025	12.77	1.022	3
						83.21	7.18	0.757	4
						90.029	6.81	0.545	5
						94.90	4.87	0.390	6
						98.28	3.37	0.270	7
						100	1.72	0.138	8

5. DATA ROTATION

Data rotation is performed to maximize the relationship between variables and factors. Interpreting the factors of a rotated matrix is much easier than interpreting the factors of an unrotated matrix. Using the Varimax command in SPSS, the factors are rotated to maximize the correlation between variables and factors and to facilitate analysis. Table 11 shows the rotated components in relation to the relevant questions**.**

Table 11. Rotated component matrix

Factor 3	Factor 2	Factor 1	Question number
		0.877	1
		0.854	2
		0.825	3
	0.148		4
	0.830		5
	0.826		6
0.170			7
0.982			8

As the results of Table 11 show, the first factor, which is intra-organizational barriers, includes three questions (lack of participatory management and leadership, lack of purposeful organizational culture, and lack of organizational structure management). The second factor, which includes extra-organizational barriers, includes three questions (lack of internal and external stakeholders, lack of

networking and strategic communications, and lack of dynamic capabilities). The third factor, which includes environmental barriers, includes two questions: lack of environmental uncertainty and lack of environmental conditions and regulations (economic, social, and environmental). To verify the validity of the designed model, second-order factor analysis was used using LISREL software, and the results are listed below.

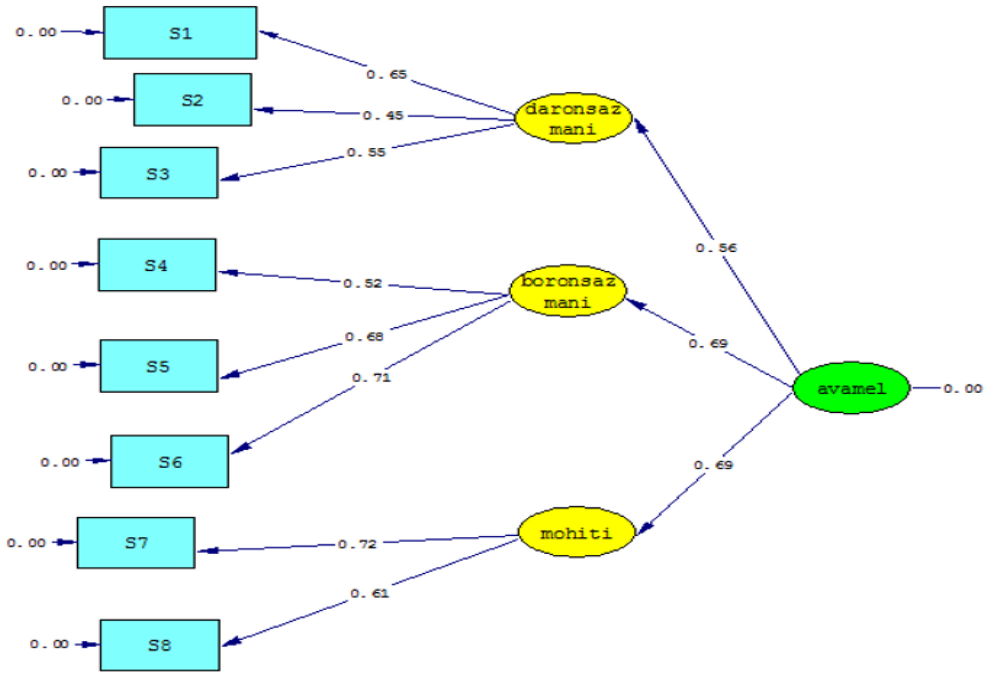

Figure 2. Research model in standard coefficients mode

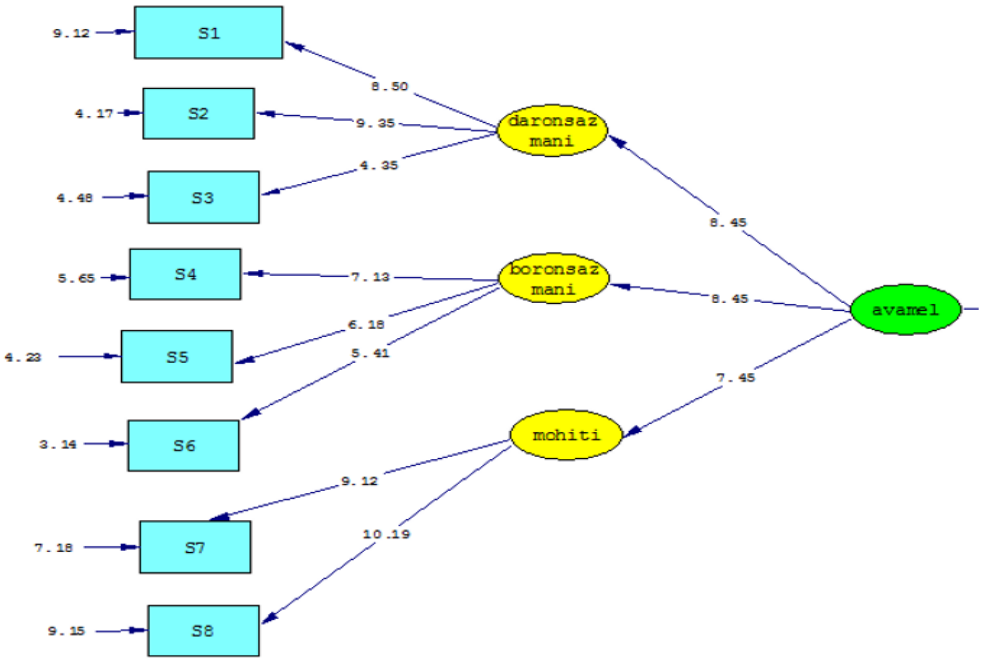

Figure 3. Research model in the case of significant coefficients

There are several fit characteristics for evaluating the confirmatory factor analysis model. In this study, goodness of fit index (GFI), adjusted goodness of fit index (AGFI), normalized fit index (NFI), comparative fit index (CFI), incremental fit index (IFI), and the very important index root mean square error of approximation (RMSEA) were used to evaluate the confirmatory factor analysis model. The GFI criterion indicates a measure of the relative amount of variances and covariances explained by the model. This criterion is a variable between zero and one, and the closer it is to one, the better the model fits the observed data. The GFI value reported for this model is 0.91.

To examine how well a particular model performs in explaining a set of observed data compared to other possible models, the values of the smoothed fit index (NFI), the unsmoothed fit index (NNFI), the incremental fit index (IFI), and the comparative fit index (CFI) are used. Values above 0.9 of these indices indicate a very good fit of the designed model compared to other possible models. Finally, to examine how the model combines fit and parsimony, the very powerful index of the root mean square error of approximation (RMSEA) is used. The RMSEA index is the root mean square error of approximation. This index is 0.54 and less for good models; Therefore, since the value of the RMSEA index is less than 0.08, it indicates a proper explanation of the covariances, and it can be concluded that the present model combines fitness and economy very well. As a result, the data of this study have a good fit with the factor structure and theoretical foundation of the study, and this indicates that the questions are aligned with the theoretical structures. As can be seen in the table below, the values of NNFI, NFI, AGFI, GFI, and CFI are more than 0.9, and for all models, the value of the division of the chi-square statistic by the degree of freedom is less than 2 and the value of RMSEA is also less than 0.08, so it can be concluded that the aforementioned models have a good fit.

Table 12. Structural Model Fitting Components

Acceptable amount	Amount	Full name of the fitness index	Abbreviation symbol
Greater than 0.8	0.91	Goodness of fit	GFI
Greater than 0.8	0.95	Adjusted Goodness of Fit	AGFI
Greater than 0.8	0.93	Normed Fit Index	NFI
Greater than 0.8	0.94	Non- Normed Fit Index	NNFI
Greater than 0.8	0.91	Comparative Fit Index	CFI

In this part of the research, the effect of barriers to the implementation of a strategic innovation ecosystem based on corporate sustainability in the food industry was examined using an independent sample t-test. This test is used when we intend to compare the average of a community with an assumed and theoretical average. This assumed or theoretical average can be a common or common value, a standard value, or an expected value, which in this research we consider the number 3, which is the middle of the range of questions 1 to 5. If the average scores of individuals for each of the barriers are greater than the numerical value of 3 (the middle of the 5-option Likert scale), it means that that barrier has had a significant impact on the implementation of the strategic innovation ecosystem based on corporate sustainability in the food industry. If the average scores of individuals for each of the barriers are less than the numerical value of 3, it can be concluded that the impact of that barrier on the implementation of the strategic innovation ecosystem based on corporate sustainability in the food industry is not significant.

Statistically, we will test the following hypothesis:

H0 hypothesis: The average scores of individuals for the aforementioned variable are equal to 3.

H1 hypothesis: The average scores of individuals for the aforementioned variable are not equal to 3.

The results of examining the impact of barriers on the implementation of the strategic innovation ecosystem based on corporate sustainability in the food industry are given in the table below.

Table 13. Assessing the effectiveness of barriers to the implementation of a strategic innovation ecosystem based on corporate sustainability in the food industry

Result	95% confidence interval of the mean difference		Average difference	Significance level	T value	Average	Variable
	Upper limit	Lower limit					
Confirmed	1.72	1.51	1.613	0.000	30.224	4.61	Lack of participatory management and leadership
Confirmed	1.64	1.41	1.521	0.000	26.016	4.52	Lack of purposeful organizational culture
Confirmed	1.63	1.40	1.516	0.000	25.774	4.52	Lack of organizational structure management
Confirmed	1.07	0.81	0.940	0.000	14.173	3.94	Lack of internal and external stakeholders
Confirmed	0.98	0.68	0.829	0.000	10.757	3.83	Lack of networking and strategic communications
Confirmed	1.00	0.71	0.853	0.000	11.690	3.85	Lack of dynamic capability
Confirmed	0.87	0.58	0.724	0.000	9.688	3.72	Lack of environmental certainty
Confirmed	0.81	0.53	0.673	0.000	9.610	3.67	Lack of environmental conditions and regulations
Confirmed	1.6430	1.4568	1.54992	0.000	32.810	4.54	Intra-organizational barriers
Confirmed	0.9908	0.7573	0.87404	0.000	14.751	3.87	External barriers
Confirmed	0.8154	0.5809	0.69816	0.000	11.732	3.69	Environmental barriers

As can be seen in the table above, the significance level of the test regarding internal organizational barriers was calculated with a t-statistic of 32/81 equal to 0.00 and less than the 5 percent error level. (t=32.81, p=0.00<0.05, mean=4.54). Therefore, it is inferred that the null hypothesis of the independent one-sample t-test is rejected and the opposite hypothesis of the test that the average scores of internal organizational barriers are opposite is confirmed with the number 3. Since the average of internal organizational barriers is reported to be 4.54 and more than 3, and also the upper and lower limits of the difference between the average of internal organizational barriers and the expected average (3) are positive values, it can be concluded that internal organizational barriers are one of the effective barriers in the implementation and implementation of the strategic innovation ecosystem based on corporate sustainability in the food industry.

The significance level of the test regarding external barriers was calculated with a t-statistic of 14.751 equal to 0.00 and less than the 5 percent error level. (t=14.751, p=0.00<0.05, mean=3.87). Therefore, it is inferred that the null hypothesis of the independent one-sample t-test is rejected and the opposite hypothesis of the test that the mean scores of external barriers are opposite to the number 3 is confirmed. Since the mean of external barriers is reported to be 3.87 and more than 3, and also the upper and lower limits of the difference between the mean of external barriers and the expected mean (3) are positive values, it can be concluded that external barriers are one of the effective barriers in the implementation and implementation of the strategic innovation ecosystem based on corporate sustainability in the food industry.

The significance level of the test regarding environmental barriers was calculated with a t-statistic value of 11.732 equal to 0.00 and less than the 5 percent error level. (t=11.732, p=0.00<0.05, mean=3.69). Therefore, it is inferred that the null hypothesis of the independent one-sample t-test is rejected and the opposite hypothesis of the test that the mean of environmental scores is opposite to the number 3 is

confirmed. Since the environmental mean is 3.69 and more than 3, and the upper and lower limits of the difference between the mean of environmental barriers and the expected mean (3) are positive values, it can be concluded that environmental barriers are also one of the effective barriers in the implementation and implementation of the strategic innovation ecosystem based on corporate sustainability in the food industry.

It is worth noting that the subcomponents of intra-organizational, extra-organizational, and environmental barriers also have a significant impact on the implementation and execution of the strategic innovation ecosystem based on corporate sustainability in the food industry ($P<0.05$).

6. DISCUSSION

In general, the aim of this study was to identify and prioritize the barriers to the implementation of a strategic innovation ecosystem based on corporate sustainability in the food industry (case study: confectionery and chocolate sector). In this study, data related to the period 2023 to 2024 of Shahd Arang Company are evaluated and analyzed. In the first stage, 15 experts were identified who had expertise and experience in the field under study. Then, a questionnaire containing effective factors of obstacles to the implementation of a strategic innovation ecosystem based on corporate sustainability, which was extracted from the literature review, was provided to the members of the expert group using the fuzzy Delphi method. They were asked to express their opinion about each criterion in the form of verbal variables included in the questionnaire. Accordingly, all criteria were approved. Then, in the next stage, the results of the fuzzy regression showed that the criterion of lack of networking and strategic communication with a weight of 0.249 ranked first, the lack of internal and external stakeholders with a weight of 0.2 ranked second, the lack of a purposeful organizational culture with a weight of 0.16 ranked third, the lack of organizational structure management with a weight of 0.12 ranked fourth, the lack of environmental uncertainty with a weight of 0.096 ranked fifth, the lack of participatory management and leadership with a weight of 0.077 ranked sixth, the lack of dynamic capability with a weight of 0.058 ranked seventh, and the lack of environmental conditions and regulations (economic, social, and environmental) with a weight of 0.047 ranked eighth.

Then, the effectiveness of the barriers to the implementation of the strategic renewal ecosystem based on corporate sustainability was carried out, and the results of the t-test showed that the significance level of the test regarding internal organizational barriers was calculated with a t-statistic value of 32.81 equal to 0.00 and less than the 5 percent error level. ($t=32.81$, $p=0.00<0.05$, mean=4.54). Therefore, it is concluded that the null hypothesis of the independent one-sample t-test is rejected and the opposite hypothesis of the test that the average scores of internal organizational barriers are opposite to the number 3 is confirmed. Since the average of internal organizational barriers is 4.54 and more than 3 was reported, and also the upper and lower limits of the difference between the average of internal organizational barriers and the expected average (3) were positive values, it can be concluded that internal organizational barriers are one of the effective barriers in the implementation and implementation of the strategic innovation ecosystem based on corporate sustainability in the food industry. The significance level of the test regarding external barriers is calculated with a t-statistic value of 14.751 equal to 0.00 and less than the 5 percent error level. ($t=14.751$, $p=0.00<0.05$, mean=3.87). Therefore, it is concluded that the null hypothesis of the independent one-sample t-test is rejected and the opposite hypothesis of the test that the mean scores of external barriers are opposite to the number 3 is confirmed. Since the mean of external barriers is 3.87 and more than 3 was reported, and also the upper and lower limits of the difference between the mean of external barriers and the expected mean (3) were positive values, it can be concluded that external barriers are one of the effective barriers in the implementation and implementation of the strategic innovation ecosystem based on corporate sustainability in the food industry. The significance level of the test regarding environmental barriers is calculated with a t-statistic value of 11.732 equal to 0.00 and less than the 5 percent error level. ($t=11.732$, $p=0.00<0.05$, mean=3.69). Therefore, it is concluded that the null hypothesis of the independent one-sample t-test is rejected and the opposite hypothesis of the test that the mean of environmental scores is opposite to the number 3 is confirmed. Since the environmental mean is 3.69 and more than 3, and the upper and lower limits of the difference between the mean of environmental barriers and the expected mean (3) are positive values, it can be concluded that environmental barriers are also one of the effective barriers in the implementation

and execution of the strategic innovation ecosystem based on corporate sustainability in the food industry. It should be noted that the subcomponents of intra-organizational, extra-organizational and environmental barriers also have a significant effect on the implementation and execution of the strategic innovation ecosystem based on corporate sustainability in the food industry ($P<0.05$).

7. CONCLUSION

We know Strategic innovation in an ecosystem seeks to promote sustainable economic growth policies and increase corporate responsibility. Strategic innovation in the direction of corporate sustainability is a difficult and challenging process in business; but since corporate sustainability plays an important role in balancing social, economic, and environmental goals and also improving competitive position by using opportunities and managing risks, many businesses are seeking to innovate their processes and actions in the direction of corporate sustainability. On the other hand the strategic innovation ecosystem based on corporate sustainability is designed to create strategic changes and improve corporate sustainability in an organization. This ecosystem includes actions and processes that help a company improve its financial, social, and environmental performance and achieve long-term sustainability. The aim of this study was to identify and prioritize the barriers to the implementation of a strategic innovation ecosystem based on corporate sustainability in the food industry (case study: confectionery and chocolate sector). In the present study, after reviewing the literature, the barriers to the implementation of a strategic innovation ecosystem based on corporate sustainability were identified and prioritized. In order to identify these factors, by studying and referring to research conducted domestically and internationally, the most important obstacles to the implementation of a strategic innovation ecosystem based on corporate sustainability were extracted in the form of 8 sub-criteria (lack of participatory management and leadership, lack of purposeful organizational culture, lack of organizational structure management, lack of internal and external stakeholders, lack of networking and strategic communications, lack of dynamic capabilities, lack of environmental uncertainty, lack of environmental conditions and regulations (economic, social, and environmental)) and 3 main criteria under the headings (intra-organizational obstacles, external obstacles, and environmental obstacles). Therefore, in this study, we have identified the factors affecting the implementation of the strategic innovation ecosystem based on corporate sustainability and ranked these factors and indicators using a decision-making tool (Fuzzy Sora method). Based on the analyses conducted after holding regular meetings with experts, the following indicators have been selected as indicators affecting the implementation of the strategic innovation ecosystem based on corporate sustainability.

8. ANSWERING THE RESEARCH QUESTIONS

1- What are the factors affecting the implementation of the strategic innovation ecosystem based on corporate sustainability in the food industry?

In this study, the indicators and sub-indices were identified based on a review of the literature and research background and were confirmed by 15 experts using the Fuzzy Delphi method. In this study, 3 indicators (intra-organizational barriers, external barriers, environmental barriers) and 8 sub-indicators (lack of participatory management and leadership, lack of purposeful organizational culture, lack of organizational structure management, lack of internal and external stakeholders, lack of networking and strategic communications, lack of dynamic capabilities, lack of environmental uncertainty, lack of environmental conditions and regulations (economic, social, and environmental)) were examined to identify barriers to the implementation of a strategic innovation ecosystem based on corporate sustainability.

2- How is the prioritization of barriers to the implementation of a strategic innovation ecosystem based on corporate sustainability in the food industry?

The results of the fuzzy regression showed that the criteria of lack of networking and strategic communication with a weight of 0.249 ranked first, lack of internal and external stakeholders with a weight of 0.2 ranked second, lack of purposeful organizational culture with a weight of 0.16 ranked third, lack of organizational structure management with a weight of 0.12 ranked fourth, lack of environmental uncertainty with a weight of 0.096 ranked fifth, lack of participatory management and leadership with a

weight of 0.077 ranked sixth, lack of dynamic capability with a weight of 0.058 ranked seventh, and lack of environmental conditions and regulations (economic, social, and environmental) with a weight of 0.047 ranked eighth.

3- How is the impact of evaluating the implementation barriers to the implementation of a strategic innovation ecosystem based on corporate sustainability in the food industry?

The results of the t-test showed that the significance level of the test regarding internal organizational barriers was calculated with a t-statistic of 32.81 equal to 0.00 and less than the 5 percent error level. ($t=32.81$, $p=0.00<0.05$, mean=4.54). Therefore, it is inferred that the null hypothesis of the independent one-sample t-test is rejected and the opposite hypothesis of the test that the average scores of internal organizational barriers are opposite to the number 3 is confirmed. Since the average of internal organizational barriers is reported to be 4.54 and more than 3, and also the upper and lower limits of the difference between the average of internal organizational barriers and the expected average (3) are positive values, it can be concluded that internal organizational barriers are one of the effective obstacles in the implementation and implementation of the strategic innovation ecosystem based on corporate sustainability in the food industry.

The significance level of the test regarding external barriers was calculated with a t-statistic of 14.751 equal to 0.00 and less than the 5 percent error level. ($t=14.751$, $p=0.00<0.05$, mean=3.87). Therefore, it is inferred that the null hypothesis of the independent one-sample t-test is rejected and the opposite hypothesis of the test that the mean scores of external barriers are opposite to the number 3 is confirmed. Since the mean of external barriers is reported to be 3.87 and more than 3, and also the upper and lower limits of the difference between the mean of external barriers and the expected mean (3) are positive values, it can be concluded that external barriers are one of the effective barriers in the implementation and implementation of the strategic innovation ecosystem based on corporate sustainability in the food industry.

The significance level of the test regarding environmental barriers was calculated with a t-statistic value of 11.732 equal to 0.00 and less than the 5 percent error level. ($t=11.732$, $p=0.00<0.05$, mean=3.69). Therefore, it is inferred that the null hypothesis of the independent one-sample t-test is rejected and the opposite hypothesis of the test that the mean of environmental scores is opposite to the number 3 is confirmed. Since the environmental mean is 3.69 and more than 3, and the upper and lower limits of the difference between the mean of environmental barriers and the expected mean (3) are positive values, it can be concluded that environmental barriers are also one of the effective barriers in the implementation and implementation of the strategic innovation ecosystem based on corporate sustainability in the food industry.

It is worth noting that the subcomponents of intra-organizational, extra-organizational, and environmental barriers also have a significant impact on the implementation and execution of the strategic innovation ecosystem based on corporate sustainability in the food industry ($P<0.05$).

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REFERENCES

1. Kaipainen, J., & Aarikka- Stenroos, L. (2022). How to renew business strategy to achieve sustainability and circularity? A process model of strategic development in incumbent technology companies. Business Strategy and the Environment, 27(1), 3-26.
2. Gandolfo, A., & Lupi, L. (2021). Circular economy, the transition of an incumbent focal firm: How to successfully reconcile environmental and economic sustainability? Business Strategy and the Environment, 30(7), 3297-3308.
3. Miller, K. D., Gomes, E., & Lehman, D. W. (2019). Strategy restoration. Long Range Planning. 52(5), Article 101855, https://doi.org/10.1016/j.lrp.2018.10.005
4. Baghipour Sarami F, Bozorgiamiri A, Mououdi MA, Taghipour M. (2016). Modeling of Nurses' shift Work schedules According to Ergonomics: A case study in Imam sajjad (As) Hospital of Ramsar. Iranian Journal of Ergonomics. 10;4(1):1-2.
5. Damert, M., & Baumgartner, R. J. (2018). External pressures or internal governance what determines the extent of corporate responses to climate change. Corporate Social Responsibility and Environmental Management, 25(4), 473-488.
6. Moller, K., & Halinen, A. (2021). Managing business and innovation networks-from strategic nets to business fields and ecosystems. Industrial Marketing Management, 67(1), 5-22.
7. Taghipour .M; Shamami .N; Lotfi .A; Parvaei Maryan .S. (2020). Evaluating Project Planning and Control System in Multi-project Organizations under Fuzzy Data Approach Considering Resource Constraints (Case Study: Wind Tunnel Construction Project). Management, International Technology and Science Publications (ITS), Vol 3, Issue 1, 29-46. https://doi.org/10.31058/j.mana.2020.31003
8. Teece, D. J. (2019). Strategic renewal and dynamic capabilities. Strategic Renewal, 21-51. https://doi.org/10.4324/9780429057861-2
9. Khodakhah Jeddi, L.; Kasrayee, F.; Khodakhah Jeddi, S.; Taghipour, M. (2016). The Analysis of Effect Colour Psychology on Environmental Graphic in Childeren Ward at Medical Centers. Psychology and Behavioral Sciences,5(2) : 51-61.
10. Mahboobi.M; Pishvaee M. S; Agha Mohammad Ali Kermani .M; Haji Mohammad Ali Jahromi .M; Taghipour, M. (2025). Competitive Opinion Influence Maximization in Social Networks". International Journal of Engineering, Vol 39, Issue 3, 677-693. https://doi.org/10.5829/ije.2026.39.03c.10
11. Hassan Beigi . J, Jahromi, M, Taghipour, M. (2024). Presenting a fuzzy mathematical programming model for allocating and scheduling parts in a flexible manufacturing system (FMS) and the impact of repairs and maintenance on product". Journal of Quality Engineering and Management, Vol 14, Issue 2, 105-126. https://doi.org/10.48313/jqem.2024.215017