Employing Interpretive Structural Modeling (ISM) to Identify and Prioritize Factors Affecting the Development of Enterprises with the Help of ANP

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Abstract

Purpose: This study aims to present a practical model using the Interpretive Structural Modeling (ISM) approach for the development of small and medium-sized enterprises (SMEs) in industrial parks and prioritize the factors affecting their development using the Analytic Network Process (ANP) technique. Small and medium units with a focus on innovation, especially in developing countries, play an important role in today's economy. The results of this research reveal the status of active small and medium enterprises in East Azerbaijan province in the direction of further development and growth of these units according to the effective criteria for their better management. Therefore, manufacturing companies as well as educational and research centers related to this field of study can be beneficiaries of the possible results of this research.

Design/methodology/Approach: The research method is qualitative. In the qualitative part, with the help of a systematic review, the factors influencing the development of small and medium enterprises were identified, and then with the help of the VOXA questionnaire, they were exposed to the judgment of several knowledgeable experts in the industry, until the strategic factors were identified with the help of MICMAC analysis and Matlab software. In the current research, purposeful and judgmental sampling was used, because only a number of experts had the appropriate information to answer the questions of the questionnaire. These people are those who have at least 10 years of work, study and research experience in the fields related to small and medium enterprises. For this purpose, the model process continued until the theoretical saturation stage. To determine the reliability of the measurement tool, the value of the ICC coefficient was confirmed in terms of consistency and absolute agreement.

Findings: The research results indicate that factors such as: 1. cultural factors and sanctions, 2. infrastructure development and technological development, 3. availability of raw materials at reasonable prices, 4. safety and welfare of employees have been identified in three rounds of Delphi technique. Other results show that in the analysis of the MICMAC, it is possible in terms of influence and dependence on criteria such as: 1- innovation in human resources (C1), 2- time management (C4), 3- use of resources (C5), 4 - The main competitor (C6) and 5- Primary capital (C9) which are of dependent type. These variables have strong dependence and weak direction, and basically they have high effectiveness and little impact on the system. The rest of the criteria are interface type. These variables have high effectiveness and high impact power, in other words, the effectiveness and impact of these criteria are very high, and any small change on these variables causes fundamental changes in the system. And in the last step to determine the weight and rank of the criteria using the ANP method, in this section, based on the results of the ISM method, which is the internal relationships between the criteria, their weight and rank was determined using the ANP method. Based on this, first, the stratified research model was drawn in the SuperDecision software, which is shown in (Figure 5) In this figure, the SuperDesicion model1 is designed based on the levels obtained in ISM. After completing the pairwise comparisons by experts and entering them into the SuperDecision software, the weight of the criteria was obtained, which is given in (Table 7) Based on this, the two criteria of using resources (C5) and the central competitor (C6) have both won the first rank with a weight of 0.125. Time management (C4) and political stability (C28) have been ranked second and third respectively.

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Introduction

One of the essential conditions for achieving sustainable success in today's global economy is the expansion of small and medium-sized enterprises (SMEs). These businesses play a crucial role in stabilizing incomes, driving economic growth, and generating employment within communities. In fact, the economies of developed countries are primarily built upon a foundation of SMEs (Villa & Taurino, 2019). Furthermore, SMEs serve as a significant source of employment, absorbing a large portion of the population and providing training for a skilled workforce. They effectively supply the specialized human resources needed by larger companies. Based on the experiences of many countries, SMEs have the potential to form the basis of economic and regional development, facilitating the mobilization of national resources. This, in turn, results in increased income and job creation at both national and regional levels (Pérez-Elizundia et al., 2020). The importance of SMEs has grown in recent years, particularly since 2007, with a focus on promoting increased growth (Martínez et al., 2023). Today, SMEs are recognized as the primary drivers of economic development in countries. However, one of the key challenges they face in their pursuit of development is the acquisition of key technologies. Technology strategy is considered one of the most critical needs for businesses and industries. Due to the profound impact of this strategy on other business strategies, some researchers and experts have positioned it at a higher level than other operational strategies within an organization. Given that technology strategy represents an organization's overarching interpretation of technology, guiding its approach to achieving and maintaining a competitive advantage, its formulation is a vital and strategic undertaking (Mohammadi & Babaei, 1400).

Small and medium-sized enterprises (SMEs) face greater survival obstacles compared to larger businesses. Innovation is a crucial characteristic for smaller companies to overcome these hurdles, as it positively influences their performance, competitiveness, and ability to operate in the long term (Ciulk et al., 2021). The literature on SMEs is extensive, leading to various definitions across different countries. These definitions vary based on factors such as age structure, population, culture, and the degree of economic development. SMEs are inherently innovative. Given that small and medium-sized industries often possess numerous relative advantages over large industries in many sectors, they are able to react more quickly and efficiently to increasing global transformations. Moreover, due to their significant flexibility and ability to adapt to market changes and customer preferences, they enjoy undeniable advantages (Woźniak et al., 2019). SMEs bring about societal transformation across four dimensions: social (by increasing employment), economic (by enabling a more equitable distribution of income), political (by appropriately distributing opportunities among people), and personal (by providing a suitable space for the expression of creativity) (Saqib et al., 2018). Transformation in these four dimensions is also accompanied by an increase in dynamism and flexibility in the face of global changes. Many governments are convinced that they need to provide a growth environment for SMEs in the form of technology incubators, industrial parks, and technology parks, supporting them until they can enter the market as independent companies (Lopes de Sousa Jabbour et al., 2019).

Therefore, numerous factors can influence the growth and development of an SME. Considering the importance of these enterprises in the social and economic fabric of various societies, identifying and examining the factors affecting them is crucial. In this regard, this article aims to address the research problem and highlight its necessity and significance.

Problem Statement:

Small and medium-sized enterprises (SMEs) represent the most prevalent type of business globally. Within the European Union, SMEs are not only the dominant form of enterprise but also the primary drivers of employment, Gross Domestic Product (GDP), and innovation. Innovation empowers companies to enhance their productivity and boost overall performance. However, SMEs encounter numerous obstacles, particularly in accessing financial assets, as they are perceived as riskier investments compared to larger corporations. Consequently, public subsidies can provide crucial support to SMEs, enabling them to secure financial resources, implement innovative methods, expand their businesses into new markets, and ultimately achieve substantial growth rates (Martínez et al., 2023).

Small and medium-sized enterprises (SMEs) are a leading solution for reducing unemployment, alleviating poverty, and bolstering economic growth. Consequently, the factors determining the survival and success of SMEs have garnered increasing attention in recent years (Albalushi & Naqshbandi, 2022). SMEs face more significant survival obstacles compared to larger businesses. Innovation is a crucial characteristic for smaller companies to overcome these hurdles, as it positively influences their performance, competitiveness, and ability to operate in the long term (Ciulk et al., 2021).

The development of SMEs encompasses a set of measures that lead to increased employment and production within these units. In essence, the ultimate goal of these units is to improve business conditions and the overall economy by emphasizing innovation and high-yield entrepreneurship (Gbadabo, 2020). Moreover,

the development of SMEs has resulted in economic growth and increased employment levels in emerging economies (Ozgava, 2019).

In addition to the points mentioned above, SMEs, with their focus on innovation, play a crucial role in today's economy, particularly in developing countries (Alhakimi & Mahmood, 2020). Innovation encompasses all effective and creative actions aimed at generating innovative products. Small and medium-sized manufacturing companies tend to be more creative in innovation compared to large companies. Their relative advantages over large companies in the realm of innovation lie in their flexibility and speed of response. Consequently, these companies typically play a valuable economic and social role due to their innovative capabilities (Tariq et al., 2019).

Given the significant and key role that small and medium-sized enterprises (SMEs) play in the Iranian economy, which is classified as a developing country, networking, including project networks, professional learning networks, national scientific networks, knowledge networks, business networks, and social networks, has an impact on the international performance of SMEs. In other words, by improving and enhancing networking, the international performance of SMEs is greatly improved. Companies need networks for their development and internationalization, as well as for acquiring knowledge and market expertise. Companies that utilize networks gain access to a wider range of markets. Furthermore, companies can leverage networks to achieve market dominance and influence, leading to improved performance and overall satisfaction (Jahandar & Vaziri Gohar, 1401).

Table 1. The background of foreign and domestic research

Researchers	Year	Research Title	Conclusion
Martinez et al.	2023	Unraveling the relationship between SMEs and growth: A review of the literature with the collaboration of several European universities	This study identifies six factors influencing SME financial performance: 1- Size, 2- Age, 3- Internationalization, 4- Network, 5- Public Institutions, and 6- Capital Structure. These elements are significantly associated with smaller firms and growth.
Albalushi & Naqshbandi	2022	Factors affecting the success and survival of SMEs in the Middle East (Oman)	The findings of this study can help policymakers to undertake appropriate interventions at different levels to enhance the survival and success of SMEs in Oman.
Andalib Ardakani & Hosseini	1402 (2023)	Analysis of factors affecting the evaluation of sustainable development performance in small and medium industries	The findings related to the analysis of factors affecting the evaluation of sustainable development performance in this study indicate that in most small and medium industries of Yazd province, health and safety, quality, and non-use of hazardous materials are important factors.
Jahandar & Vaziri Gohar	1401 (2022)	Presenting a networking model in the international performance of SMEs in industrial parks of Garmsar city	The target population was supervisors and experts in international marketing of small to medium-sized export companies in the industrial parks of Garmsar city, who had export activities from 1396 (2017) to 1399 (2020). Using Cochran's formula, 87 of them were selected as a sample using the available method.
Researchers	Year	Research Title	Conclusion

This research aims to achieve the following objectives:

Primary Objective: The objective of this study is to identify and prioritize the factors influencing the development of Small and Medium-sized Enterprises (SMEs) in East Azerbaijan Province, Iran, by employing a combination of Interpretive Structural Modeling (ISM) and Analytic Network Process (ANP) techniques. In this regard, the researchers seek to answer the following question: How can a practical model be developed to identify and prioritize the factors affecting the development of small and medium-sized manufacturing enterprises in industrial parks?

Given that the ultimate goal of this research is to present an applied model, after reviewing the research literature with a focus on the development of small and medium-sized enterprises (SMEs) and the role of factors involved in their development, the final research model will be presented. However, at this stage, according to preliminary investigations and considering the literature and previous research reviewed so far, it can be predicted that the criteria affecting the development of SMEs are factors such as entrepreneurship orientation, characteristics of small and medium industries, the importance of the role of management, market approach, resources and finance, technology, innovation, and competitiveness, which can have a key and influential role in the development of small and medium-sized enterprises. Therefore, the general model of the research is shown in Figure (1).
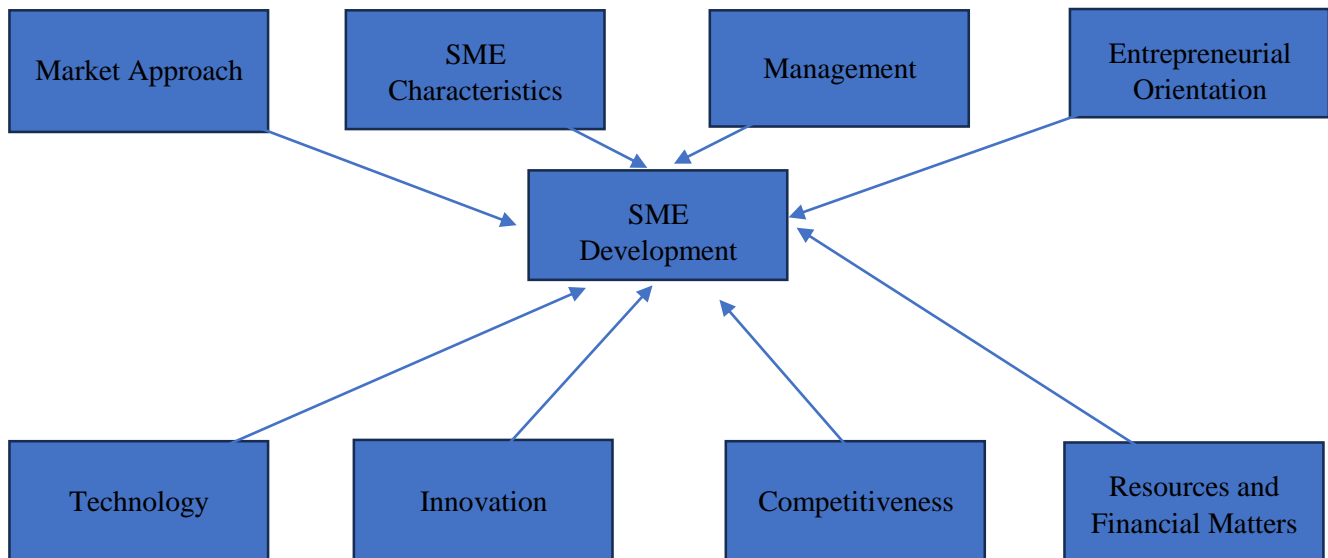
Figure 1. Research Conceptual Model

Methodology

The research method employed in this study is a mixed-methods approach, combining qualitative and quantitative techniques. In terms of data collection, this research is descriptive and survey-based. It involves qualitative interviews with experts for interpretive structural modeling (ISM) to develop a conceptual framework. Subsequently, quantitative questionnaires will be used to prioritize and weight the factors using a multi-criteria decision-making approach (ANP method). Additionally, correlation analysis will be employed to examine the relationships between variables within the conceptual model.

Furthermore, this research is applied in terms of its purpose and nature. It is also descriptive in that it describes and interprets what exists as it is, without considering conditions or relationships regarding prevailing opinions in current processes, observable effects, or developing trends.

This research was conducted by surveying several experts, including university professors who are also active in the industrial sector, and experts in the field of industry and production in East Azerbaijan Province, Iran. They were selected using a purposive sampling method. To assess the validity of the measurement tool, content validity will be used, and the questionnaire will be provided to professors and experts to confirm the accuracy of the questions. In the purposive sampling for this study, judgmental sampling will be employed, as only a limited number of experts and knowledgeable individuals possess the appropriate information to answer the questionnaire. Moreover, the selected individuals in this study will be those who have at least 10 years of experience working, studying, or teaching in fields related to small and medium-sized enterprises (SMEs). For this purpose, sampling will continue until theoretical saturation is reached. Furthermore, to determine the reliability of the measurement tool, the Intraclass Correlation Coefficient (ICC) value will be confirmed in terms of consistency and absolute agreement. To collect the desired data and measure the research

indices, a qualitative VOXA questionnaire specifically designed for interpretive structural modeling with a matrix structure will be used in the qualitative section. In the quantitative section, a pairwise comparison questionnaire designed for network analysis will be utilized. Initially, a thorough review of the research literature will be conducted through library studies and a systematic review to identify the factors influencing the development of small and medium-sized enterprises (SMEs). Before being included in the questionnaire for the survey, the indicators were subjected to the scrutiny of several knowledgeable experts in the field from universities and industrial research centers. The finalized, agreed-upon questionnaire was then used as a tool for data collection and model design. The questionnaire followed a pre-designed template for the ISM model, with evaluation indicators derived from a review of the theoretical literature. After

identifying the indicators for the research model, the quantitative section employed a multi-criteria decision-making approach, specifically the ANP method with a quantitative questionnaire, to prioritize the criteria. In the ANP technique, pairwise comparison techniques are used to prepare the questionnaire. In pairwise comparisons, it is sufficient to compare the existing elements in pairs. For this purpose, pairwise comparison is usually performed based on a 9-point Saaty scale, and if two elements are equally important, the number 1 is selected.

To identify the indicators affecting the development of SMEs, the Delphi technique is used, and to rank these indicators, the Interpretive Structural Modeling (ISM) technique is employed. The general steps of the Delphi method are shown in Figure 1.
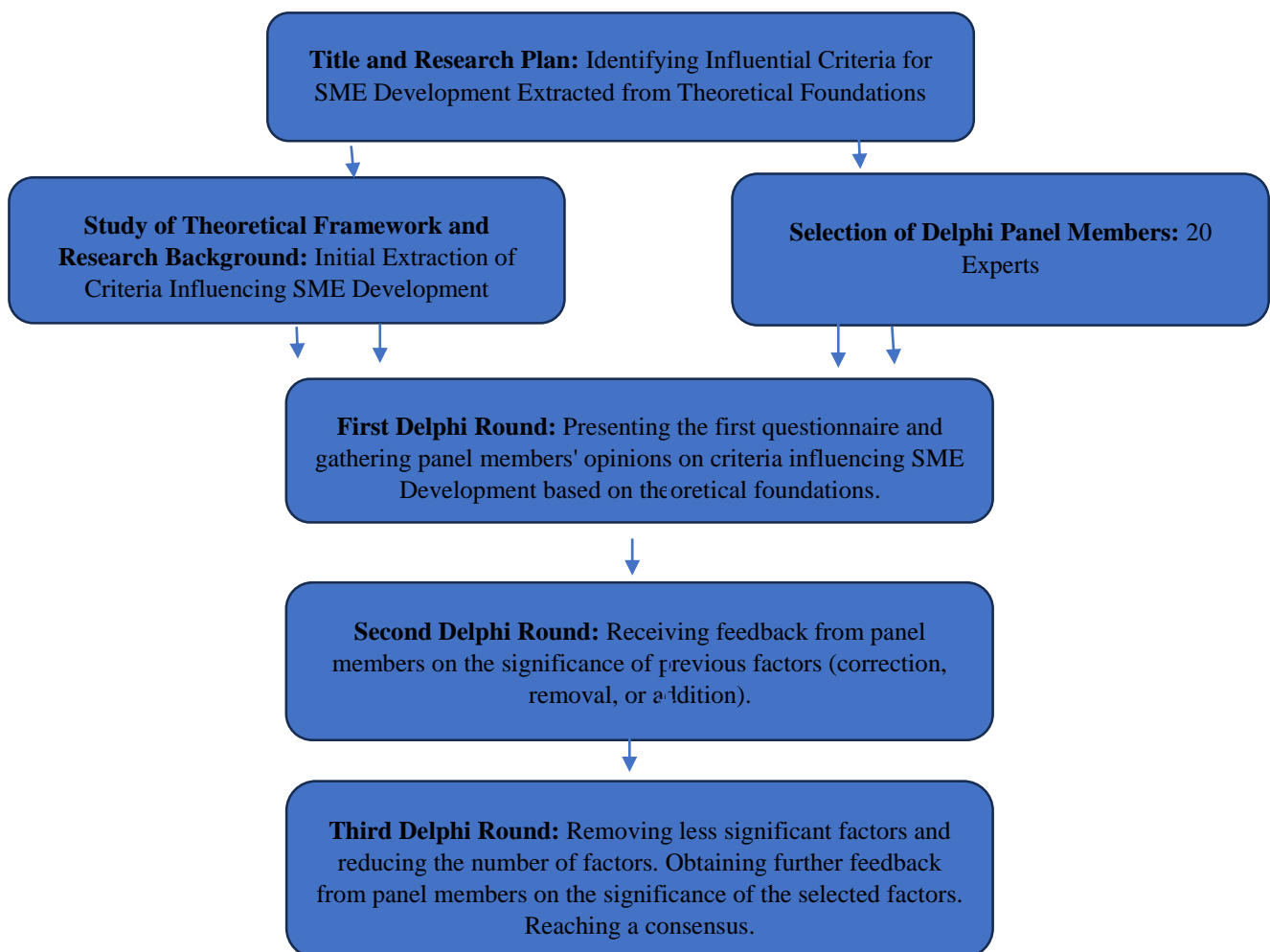

Figure 2. Delphi Method Steps

The Interpretive Structural Modeling (ISM) approach is used in this study to examine the interrelationships among the enablers and the influence of each on the others. The ISM approach is an expert opinion-based method. It is an effective and efficient method for subjects where qualitative variables, with varying levels of importance, have mutual effects on each other. By employing this technique, the connections and dependencies between the qualitative variables of the problem can be identified (Ramzanian et al., 2015). This method helps significantly in organizing the complex relationships between the elements of a system. Additionally, ISM can identify and prioritize the elements of a system, which greatly assists managers in better implementing the designed model. This method examines the order and direction of the complex relationships between the elements of a system. In other words, it is a tool that a group can use to overcome the complexity between elements (Azar & Bayat, 2008). Some of the features of this method include its comprehensibility for a wide range of users, its integration in combining expert opinions, and its applicability in studying complex systems with multiple components. The ISM approach introduces various methods for determining the conceptual relationships between each pair of variables. In this study, expert opinions were used to determine the conceptual relationships between the indices. Logical relationships formed the basis of expert theories regarding the conceptual relationships between the indices. The steps of the ISM method are outlined below.

1. Formation of the Structural Self-Interaction Matrix (SSIM):

The identified enablers are entered into the Structural Self-Interaction Matrix (SSIM). This matrix consists of the dimensions of the enablers and their comparisons. To determine the type of relationship between the enablers in this matrix, the following relationships are used: V, A, X, and O.

2. Formation of the Initial Reachability Matrix (RM): This matrix converts the relationship symbols of the SSIM matrix into binary digits (zero and one). The rules for this conversion are explained in Table 2.

Table 2. Converting conceptual relationships into numbers (Takar et al., 2007)

Conceptual Symbol	i to j	j to i
V	1	0
A	0	1
X	1	1
O	0	0

3. Formation of the Final Reachability Matrix: This matrix is formed by applying the transitivity relations that exist among the variables. In this matrix, secondary relationships between the dimensions of the indices are checked. A secondary relationship exists when index i leads to index j, and index j leads to index k; therefore, index i will also lead to index k. If this condition is not met in the reachability matrix, the matrix needs to be modified, and the missing relationships should be added. In this way, some of the zero elements will be

converted to ones, which is represented as. By identifying secondary relationships and modifying the initial matrix, the final reachability matrix is obtained .

4. Determining the Level and Priority of Variables: After determining the reachability set and the antecedent set for each element and identifying the intersection set, the variables are leveled. The reachability set for each element is the set in which the rows of the final reachability matrix appear as 1, and the antecedent set is the set in which the columns appear as 1. By obtaining the intersection of these two sets, the intersection set is obtained. The elements where the intersection set is identical to the reachability set are assigned the first level of priority. By removing these elements and repeating this step for the remaining elements, the level of all elements is determined.

5. Drawing the Interpretive Structural Model: This model is drawn based on the final reachability matrix and the determined levels.

6. Influence-Dependence Analysis (MICMAC Method): The sum of the rows in the final reachability matrix for each element represents its **dependence power** Based on these two factors, four groups of elements can be identified: **Autonomous factors:** These have weak driving and dependence power and are relatively independent of other factors. Dependent factors: These have weak

driving power but strong dependence on other factors. **Linkage factors:** These have strong driving and dependence power. Essentially, any action on these factors will likely trigger changes in other factors, and vice-versa. They are interconnected and influential within the system.

Independent factors: These have strong driving power and weak dependence. These are often referred to as **key factors** because they exert significant influence on the system while being relatively independent of its influences. Key factors typically fall into either the independent or linkage groups.

Data Analysis (Delphi Method Results): Initially, the criteria influencing the development of SMEs were finalized using the Delphi method over three rounds. Based on this, an initial questionnaire was developed, including the criteria listed in Table 1. This questionnaire was distributed to 20 panel members who were asked to rate each criterion on a 5-point Likert scale (1-5) and to suggest any additional criteria they deemed relevant.

Table 3. Effective criteria for the development of SMEs extracted from the theoretical foundations of research

Factor Name		Source
Entrepreneurship Orientation	Human Resource Innovation	Keh et al. (2007); Islam et al. (2011); Setyanti et al. (2013); Kozubíková et al. (2015); Esmaeilpour et al. (1398/2019)
	Proactive Attitude of Human Resources	
	Risk-Taking Attitude	
SME Characteristics	Firm Size	Fatoki & Asah (2011); Dong & Men (2014); Njanike (2019); Sharifzadeh (1387/2008)
	Firm Age	
	Ownership Structure	
	Management Style	

Management	Time Management	Sikalieh et al. (2016); Oladele & Akeke (2016); Shakib & Mogharab (1395/2016)
	Resource Utilization	Hosseinipour & Seyedjavadin (1387/2008)
Market Orientation	Competitor Orientation	Lin (2015); Bamfo & Kra (2019); Ahmadi et al. (1393/2014)
	Customer Orientation	
	Cross-functional Coordination	
Resources and Finance	Initial Capital	Osano & Languitone (2016); Omidi et al. (1396/2017); Kamali Seyedbiglou & Taghizadeh (1396/2017); Sales Bahri et al. (1395/2016); Doroudi (1394/2015)
	Liquidity	
	Economic Stability	
Technology	Access to Skilled Labor	Ebrahimi & Mir Berg Kar (2017); Kamali Seyedbiglou & Taghizadeh (1396/2017)
	Facilities and Equipment	
Innovation	Product Innovation	Setyanti et al. (2013); Ebrahimi & Mir Berg Kar (2017); Tariq et al. (2019)
	Process Innovation	
	Management Innovation	
Competitiveness	Focus	Lin (2015); Matinaro et al. (2019); Bahramzadeh (1387/2008)
	Differentiation	
	Cost Leadership	

The findings from the first round of the Delphi study indicate that, in addition to the factors identified in Table 3, 13 other criteria were suggested by the experts, which are listed below:

- Cultural factors and sanctions
- Infrastructure and technological development
- Availability of raw materials at reasonable prices
- Employee safety and well-being
- Government support for the development of exports by domestic producers
- Networking of manufactured products and removal of administrative barriers (drafting appropriate regulations to eliminate administrative barriers)
- Labor unions
- Inflation and government tax policies
- Exchange rate fluctuations and government tariffs
- Political conditions
- Agility
- Political stability
- Organizational planning environment

Furthermore, at the end of the first round of the Delphi study, 6 criteria were eliminated due to insufficient scores. The process of selecting or eliminating criteria involved calculating the arithmetic mean of the scores given to each criterion by the 15 experts. Any criterion with a mean score less than 3 was removed.

1. Risk-taking attitude
2. Firm size
3. Firm age
4. Ownership structure
5. Focus
6. Differentiation

After three rounds of the Delphi technique, a consensus was reached among the panel members. The final results, shown in Table 3, indicate that 28 criteria were confirmed and selected as influential factors in the development of SMEs.

Table 4. The results of the third round of Delphi (the final result of the selection of factors)

Criterion	Factor Name	Index Code	Frequency of Respondents					Average (%)	Confirmation Status
			Very Much (%)	- Much (%)	- Medium (%)	- Low (%)	- Very Low (%)		
C1	Human Resource Innovation	C1	70	30	0	0	0	94	Yes
C2	Proactive Attitude of Human Resources	C2	25	55	20	0	0	81	Yes
C3	Management Style	C3	55	25	20	0	0	87	Yes
C4	Time Management	C4	30	65	0	5	0	84	Yes
C5	Optimal Use of Resources	C5	40	50	10	0	0	86	Yes
C6	Competitor Orientation	C6	20	45	30	5	0	76	Yes
C7	Customer Orientation	C7	50	40	10	0	0	88	Yes
C8	Cross-functional Coordination	C8	15	65	10	10	0	77	Yes
C9	Initial Capital	C9	20	50	30	0	0	78	Yes
C10	Liquidity	C10	40	40	15	5	0	83	Yes
C11	Economic Stability	C11	75	20	5	0	0	94	Yes
C12	Access to Skilled Labor	C12	80	10	5	0	5	92	Yes
C13	Facilities and Equipment	C13	40	40	20	0	0	84	Yes
C14	Product Innovation	C14	55	35	10	0	0	89	Yes
C15	Process Innovation	C15	40	40	20	0	0	84	Yes
C16	Management Innovation	C16	40	40	15	5	0	83	Yes
C17	Cost Leadership	C17	35	50	15	0	0	84	Yes

C18	Cultural Factors and Sanctions	C18	55	25	10	10	0	85	Yes
C19	Infrastructure Development and Technology Development	C19	35	35	30	0	0	81	Yes
C20	Availability of Raw Materials at Reasonable Prices	C20	30	40	20	5	5	77	Yes
C21	Employee Safety and Well-being	C21	30	45	20	5	0	80	Yes
C22	Government Support for the Development of Exports of Domestic Producers	C22	20	40	30	5	5	73	Yes
C23	Labor Union	C23	20	45	25	10	0	75	Yes
C24	Inflation and Government Tax Policies	C24	40	35	15	5	5	80	Yes
C25	Changes in Exchange Rates and Government Tariffs	C25	85	10	5	0	0	96	Yes
C26	Political Conditions	C26	25	40	25	0	10	74	Yes
C27	Agility	C27	35	30	20	10	5	76	Yes
C28	Political Stability	C28	20	40	25	15	0	73	Yes

Based on the findings in Table 3, which presents the results of the final Delphi round (round three), all criteria were confirmed, as the average for all criteria exceeded the threshold value (3).

Findings of the technique:

In this study, the Structural Self-Interaction Matrix (SSIM) is created first. The SSIM utilizes symbols that were described in Step 1. Expert opinions were used to develop this matrix, which is shown in Table 2. Then, based on Table 2, the Initial Reachability Matrix (RM) is formed using binary digits (zero and one). Subsequently, transitivity relations are established, and the Final Reachability Matrix is formed, as presented in Table 3. All the entries

marked as in this table had a value of zero in the initial matrix. Next, based on Step 4, the reachability set and antecedent set are extracted from the Final Reachability Matrix, and the criteria are leveled, as shown in Table 4. In this step, the criterion with the highest level is the one whose reachability set is equal to its intersection set. After identifying this variable or variables, its row and column are removed from the table, and the process is repeated for the remaining criteria. The outputs and inputs are extracted from the adjusted Initial Reachability Matrix (Table 5). For this purpose, the number of ones in each row represents the output, and the number of ones in each column represents the input. The final Interpretive Structural Model of the research is shown in Figure 1. The research model consists of 9 levels. Level nine, which includes two criteria, "Facilities and Equipment (C13)" and "Government Support for Export Development (C22)," contains the most influential criteria. The reasons for the influence of these two criteria are outlined below:

1. Facilities and Equipment: This criterion is the most influential due to its importance in the production and delivery of products and services to customers. Small and medium-sized enterprises (SMEs), due to financial constraints, are often unable to acquire the necessary equipment and facilities for optimal production. Therefore, supporting these industries by providing them with adequate facilities and equipment can ensure improved performance.

Government Support for Export Development: Government support for export development is the second most influential criterion due to its potential to increase sales and revenue. Many SMEs in developing countries lack optimal facilities and equipment and struggle to compete with large, international companies. Therefore, expanding exports can help them broaden their market reach and increase revenue. In this regard, government support for export development can ensure improved performance for SMEs.

The two criteria at level nine directly influence the three criteria at level eight: Management Style (C3), Access to Skilled Workforce (C12), and Labor Unions (C23). The reasons for this influence are explained below:

The two criteria, "Facilities and Equipment" and "Government Support for Export Development," can impact the following three criteria:

1.Management Style: Adequate facilities and equipment can facilitate the improvement of management styles in SMEs. For example, the availability of appropriate facilities and equipment can help managers select the best practices and strategies for managing their operations and resources.

2.Access to Skilled Workforce: Improved facilities and equipment, coupled with government support for export development, can attract a skilled workforce. Increased access to a skilled workforce can improve the performance and efficiency of SMEs and, through enhanced production and export capabilities, amplify the influence of these two criteria on the other three.

3.Labor Unions: Government support for the export development of domestic producers can help strengthen the role of labor unions in SMEs. Labor unions can influence the improvement of working conditions and workers' rights, as well as enhance production and export capabilities. Therefore, government support for export development can lead to a stronger role for labor unions and consequently increase the influence of the "Labor Unions" criterion. According to Figure 1, this ISM model demonstrates a hierarchical structure where criteria influence each other from the bottom up. The two criteria at the first level, Innovation (C1) and Time Management (C4), are the most influenced.

Table 5. Structural Self-Interaction Matrix (SSIM)

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22	C23	C24	C25	C26	C27	C28
C1		V	A	O	A	O	A	V	A	O	A	A	O	O	O	O	A	O	A	A	O	A	O	A	A	O	A	O
C2			A	V	A	O	X	O	A	V	O	A	A	A	O	A	A	A	A	X	A	A	O	A	O	A	O	O
C3				V	V	O	V	O	V	O	V	V	O	V	V	V	O	V	V	O	A	O	V	V	A	O	O	O
C4					V	A	O	A	O	O	O	A	A	A	O	A	A	A	A	O	A	A	O	A	A	O	A	O
C5						O	O	O	A	A	A	O	A	A	A	A	A	A	O	A	O	A	A	O	A	O	A	O
C6							A	O	A	A	A	A	A	O	A	O	A	O	A	A	A	A	O	A	A	O	A	O
C7								A	O	V	A	A	X	A	A	O	A	O	A	O	A	O	O	A	A	O	X	X
C8									O	V	O	O	O	V	O	V	O	V	V	O	V	A	A	A	A	O	O	O
C9										X	A	A	A	A	A	A	A	A	O	A	O	A	O	A	A	O	O	O
C10											X	V	O	V	V	V	O	A	A	A	A	A	V	A	A	O	O	O
C11												V	O	V	O	V	V	A	X	A	O	X	X	O	X	X	O	O
C12													O	V	V	O	O	A	O	A	O	A	O	X	O	X	O	X
C13														V	O	V	A	O	V	V	O	X	O	O	A	O	O	O
C14															V	O	V	A	A	O	O	A	O	A	A	O	X	O
C15																V	O	X	A	A	V	O	O	X	A	O	A	O
C16																	V	O	A	X	V	A	O	V	X	O	X	O
C17																		A	O	A	V	A	O	A	A	O	X	O
C18																			V	V	O	A	O	A	V	O	X	X
C19																				O	V	A	O	A	A	O	O	O
C20																					O	A	X	A	A	A	A	A
C21																						O	O	A	O	O	O	O
C22																							O	V	V	O	X	O
C23																								O	O	X	O	O
C24																									V	X	X	O
C25																										O	X	O
C26																											X	O
C27																												O
C28																												

Table 6. Adapted Initial Access Matrix

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22	C23	C24	C25	C26	C27	C28	Power influence
C1	1	1	·	*١	·	·	*١	1	·	1*	1*	·	·	1*	·	1*	·	1*	1*	·	1*	·	·	·	·	·	·	·	12
C2	*١	1	·	1	*١	*١	*١	1	*١	١*	١	١*	·	١*	·	١*	١*	١*	١*	·	١	١*	١*	·	١*	١*	·	·	21
C3	١	١	١	١	١	١	*١	١	*١	١	١	١*	١	١	١	١*	١	١	١	١*	١*	١*	١	١	١*	١*	١*	١*	28
C4	*١	*١	·	١	١	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	4
C5	١	١	·	*١	١	·	·	*١	·	·	·	١*	·	·	·	·	·	·	·	·	١*	·	·	·	·	·	·	·	7
C6	·	·	·	١	*١	١	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	3
C7	١	١	·	*١	*١	١	١	*١	*١	١	١*	١*	١	١*	١*	١*	١*	١*	١*	١*	١*	١*	١*	١*	١*	١*	١	١	27
C8	*١	١	·	١	*١	*١	١	١	*١	١	١*	١*	١*	١	١*	١	١*	١	١	١*	١	·	١*	١*	١*	·	١*	١*	25
C9	١	*١	·	*١	١	١	·	*١	١	١*	١*	·	١*	١*	١*	·	·	·	·	·	·	·	١*	·	·	·	·	·	14
C10	*١	١	·	*١	١	·	*١	*١	١	١	١	١	·	١	١	١	١*	١*	١*	١*	١*	١*	١	١*	١*	١*	١*	١*	26
C11	١	*١	*١	*١	١	١	١	*١	١	١	١	١	١*	١	١*	١	١	١*	١	١*	١*	١	١	١*	١	١	١*	١*	28
C12	١	*١	*١	١	*١	١	١	*١	١	١*	١*	١	١*	١	١	١*	١*	١*	١*	١*	١*	·	١*	١	١*	١	١*	١	27
C13	*١	١	*١	١	١	١	١	*١	١	١*	١*	١*	١	١	١*	١	١*	١*	١	١	١*	١	١*	١*	١*	·	١*	١*	27
C14	*١	١	·	١	*١	١	١	*١	١	١*	١*	·	١*	١	١	١*	١	١*	·	١*	١*	١*	·	١*	١*	١*	١	١*	24
C15	*١	١	*١	*١	١	١	١	*١	١	١*	١*	١*	١*	١*	١	١	١*	١	١*	١*	١	·	·	١	١*	١*	١*	١*	26
C16	*١	*١	*١	١	١	*١	*١	*١	١	١*	١*	١*	١*	١*	١*	١	١	١*	١*	١	١	١*	١*	١	١	١*	١	·	27
C17	١	١	·	١	١	١	١	*١	١	١*	١*	·	١	١*	١*	١*	١	١*	١*	١*	١	١*	·	١*	١*	١*	١	١*	25
C18	*١	١	*١	١	١	*١	*١	*١	١	١	١	١	١*	١	١	١*	١	١	١	١*	١*	١*	١*	١	١*	١	١		28
C19	١	١	·	١	*١	١	١	*١	*١	١	١	١*	١*	١	١	١	١*	١*	١	١*	١	١*	١*	١*	١*	١*	١*	١*	27
C20	١	١	١	*١	١	١	*١	*١	١	١	١	١*	١*	١	١	١*	١*	١	١*	١*	١	١*	١	١*	١*	١*	١*	١*	28
C21	*١	١	·	١	*١	١	١	*١	*١	١	١*	١*	١*	١*	١*	١*	·	·	·	·	١	·	١*	·	·	·	١*	١*	19
C22	١	١	*١	١	١	١	*١	١	١	١	١	١	١	١	١*	١	١	١	١	١	١*	١	١*	١	١	١*	١	١*	28
C23	*١	١	*١	*١	١	*١	*١	١	*١	١*	١	١*	·	١*	١*	١*	١*	١*	١*	١	١*	١*	١	١*	١*	١	١*	·	26
C24	١	*١	١	١	*١	١	١	١	١	١	١*	١	١*	١	١	١*	١	١	١	١	١	١*	١*	١	١	١	١	١*	28
C25	١	١	١	١	١	١	١	١	١	١	١	١	١*	١	١	١	١	١*	١	١	١*	١*	١*	١*	١	١*	١	١*	28

C26	*۱	*۱	*۱	*۱	*۱	*۱	*۱	۱	*۱	۱*	۱	۱	.	۱*	۱*	۱*	۱*	۱*	۱*	۱	۱*	۱*	۱	۱	۱*	۱	۱	۱*	27
C27	۱	۱	*۱	۱	۱	۱	۱	*۱	*۱	۱*	۱*	۱*	۱*	۱	۱	۱	۱	۱	۱*	۱	۱*	۱	۱*	۱	۱	۱	۱	۱*	28
C28	*۱	*۱	*۱	*۱	*۱	*۱	۱	.	*۱	۱*	۱*	۱	۱*	۱*	۱*	۱*	۱*	۱	۱*	۱	.	.	۱*	۱*	۱*	۱*	۱*	۱	25
Dependency ratio	27	27	15	28	27	25	24	25	24	25	26	22	19	25	23	25	22	23	22	21	24	18	21	21	22	20	22	20	

Figure 3. Leveling Model of Indicators

MICMAC Analysis

The research model can also be represented in terms of driving power and dependence power, as shown in Figure 2. Based on this analysis:

Dependent Variables: The criteria of Workforce Innovation (C1), Time Management (C4), Use of Resources (C5), Competitor Orientation (C6), and Initial Capital (C9) are classified as dependent. These variables have strong dependence and weak driving power, meaning they are highly influenced by the system but have a limited impact on it.
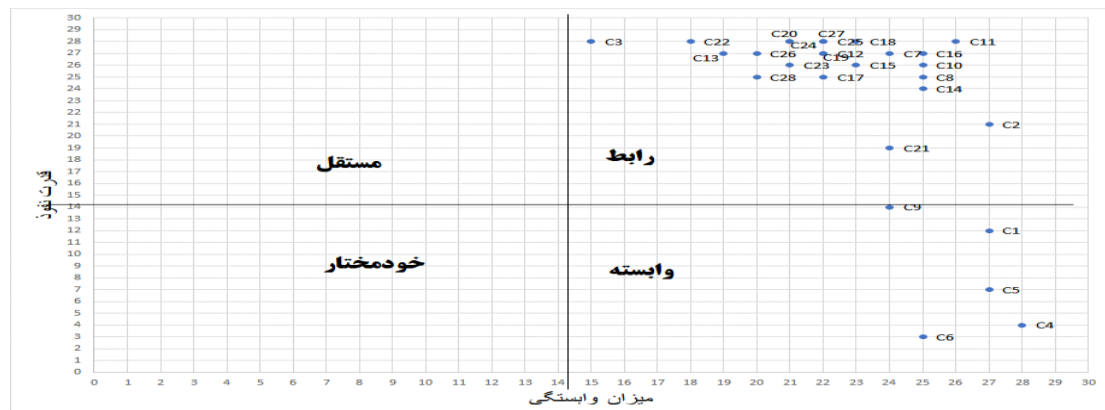

Figure 4. Penetration Power and Dependency Matrix

Determining Weights and Ranking Criteria with the ANP Method

In this section, based on the results of the ISM method, which reveals the inner relationships among the criteria, we proceed to determine their weights and rankings using the Analytic Network Process (ANP) method. To achieve this, the leveled model of the research is first drawn in the SuperDecisions software, as shown in Figure 5. This figure depicts the SuperDecisions model designed based on the levels obtained through the ISM method.
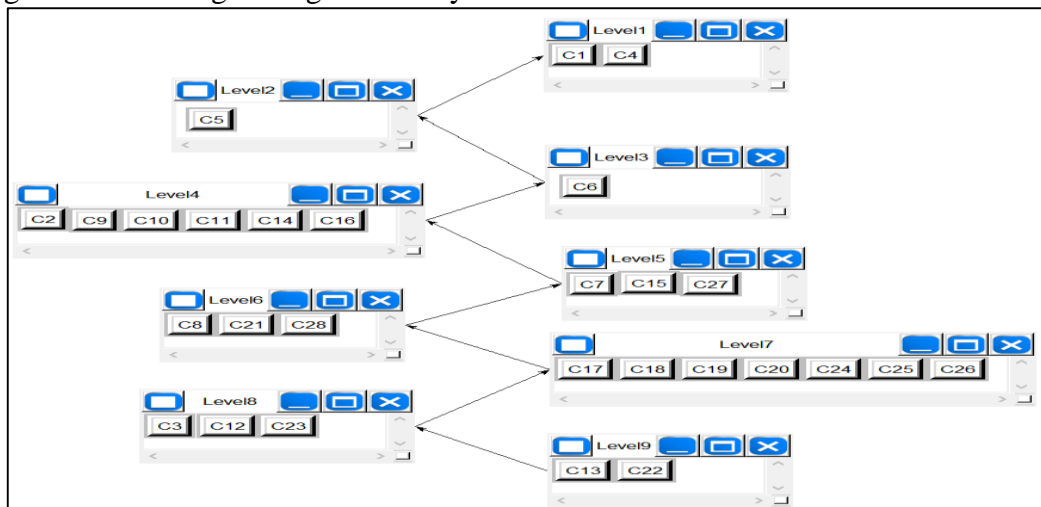

Figure 5. Research network model in Superdesign software

After the pairwise comparisons were completed by the experts and entered into the software, the weights of the criteria were obtained, as shown in Table 7. Based on these results, both "Optimal Use of Resources (C5)" and "Competitor Orientation (C6)" tied for first place with a weight of 0.125. "Time Management (C4)" and "Political Stability (C28)" ranked second and third, respectively.

Table 7: Final Weights and Ranking of Criteria

Criterion Code	Criterion Name	Final Weight	Final Rank
C1	Human Resource Innovation	0.0338	10
C2	Proactive Attitude of Human Resources	0.0331	11
C3	Management Style	0.0461	7
C4	Time Management	0.0912	3
C5	Resource Utilization	0.125	1
C6	Competitor Orientation	0.125	1
C7	Customer Orientation	0.0321	12
C8	Cross-functional Coordination	0.0381	9
C9	Initial Capital	0.0074	26

C10	Liquidity	0.0141	22
C11	Economic Stability	0.0184	20
C12	Access to Skilled Labor	0.0206	19
C13	Facilities and Equipment	0	27
C14	Product Innovation	0.0276	13
C15	Process Innovation	0.0411	8
C16	Management Innovation	0.0245	15
C17	Cost Leadership	0.0133	23
C18	Cultural Factors and Sanctions	0.0174	21
C19	Infrastructure Development and Technology Development	0.0094	25
C20	Availability of Raw Materials at a Reasonable Price	0.0114	24
C21	Employee Safety and Well-being	0.0217	18
C22	Government Support for the Development of Exports of Domestic Producers	0	27
C23	Labor Union	0.0583	5
C24	Inflation and Government Tax Policies	0.025	14
C25	Changes in Exchange Rates and Government Tariffs	0.0244	16
C26	Political Conditions	0.0242	17
C27	Agility	0.0519	6
C28	Political Stability	0.0652	4

Based on the results of the ANP method, Competitor Orientation, Optimal Use of Resources, and Time Management ranked first, second, and third, respectively, in terms of their importance for SME development. These three criteria alone accounted for over 34% of the total importance. The reasons for their significance are outlined below:

1. Competitor Orientation
   Understanding Competitors: Knowing the strengths and weaknesses of competitors allows businesses to develop more effective strategies. By analyzing their competitors' offerings, pricing, and marketing tactics, SMEs can identify opportunities to differentiate themselves and gain a competitive advantage.
   Differentiation: Small businesses can differentiate themselves by learning from the market and their competitors. This differentiation could be in terms of product features, quality, pricing, customer service, or branding. By understanding what competitors offer, SMEs can identify gaps in the market and tailor their offerings to meet unmet customer needs.

2. Optimal Use of Resources
   Efficiency: Effective management of resources, such as financial, human, and physical resources, can lead to increased productivity. By optimizing the use of available resources, SMEs can minimize waste, reduce costs, and improve overall efficiency. This includes implementing effective inventory management, streamlining processes, and investing in employee training and development.
   Efficiency: Effective management of resources, such as financial, human,

and physical resources, can lead to increased productivity. By optimizing the use of available resources, SMEs can minimize waste, reduce costs, and improve overall efficiency. This includes implementing effective inventory management, streamlining processes, and investing in employee training and development.
Growth: Access to resources and their optimal allocation are essential for growth and expansion. By effectively managing and allocating resources, SMEs can invest in new opportunities, expand their operations, and achieve sustainable growth. This includes securing funding, attracting and retaining talent, and acquiring the necessary technology and infrastructure.

3. Time Management

  Rapid Decision-Making: In today's fast-paced business world, speed in decision-making can create a competitive advantage. Effective time management allows SME leaders to quickly assess situations, gather necessary information, and make informed decisions without delays. This agility can be crucial in responding to market changes, seizing opportunities, and addressing challenges effectively.

Prioritization: Time management helps prioritize activities based on their importance. By identifying high-priority tasks and focusing on them, SMEs can ensure that their efforts are directed towards activities that generate the greatest impact. This prevents time being wasted on less critical tasks and improves overall productivity.

Efficiency: Businesses can increase the efficiency of their employees and resources through effective time management. By

implementing time management techniques, such as scheduling, delegation, and avoiding procrastination, SMEs can optimize their workflows, reduce wasted time, and improve overall productivity.

Furthermore, based on the ANP results, the two criteria "Government Support for Export Development" and "Facilities and Equipment" received a weight of zero. This is because these two criteria were among the highest-level and most influential criteria in the ISM model. In the ANP model, criteria that are more influenced by others receive higher weights. The fact that these two criteria have a weight of zero does not imply that they are unimportant. Rather, it signifies that in these models, we need to pay more attention to the "effect" criteria (those that are influenced by others) due to their inherent nature. These criteria are constantly changing based on the influence of other factors. However, when determining policies and strategies for these influential criteria, which hold significant importance in the ANP model, it is crucial to consider the criteria that influence them.

Discussion and Conclusion:

The development of small and medium-sized enterprises (SMEs) is a topic of significant strategic importance, impacting employment, economic growth, and local development. These enterprises play a vital role as crucial economic building blocks in the process of sustainable production and service delivery. In this context, a fresh perspective on strategies and opportunities to enhance the development of these enterprises can contribute to solving current challenges and improving the overall economic conditions of communities. Therefore, a thorough analysis of these challenges and the presentation of practical and effective solutions to facilitate the development of SMEs appear to be vital

and essential. To foster the development of SMEs, it is necessary to first identify the factors that influence them and then offer suggestions based on the impact of these factors. In this research, the influential indices for SME development were identified and leveled using the ISM method. Based on the findings of this study, the following recommendations are presented:

Implement training programs to enhance employees' specialized skills in areas required by the enterprise. These programs can include both in-person and online training courses. For example, a technology-focused manufacturing company could offer training programs to improve programming, software testing, and project management skills. Online training tools, such as virtual learning platforms, and in-person tools like workshops and classes can be utilized.

1.Implement training programs to enhance employees' specialized skills in areas required by the enterprise. These programs can include both in-person and online training courses. A blended learning approach, combining online and in-person elements, can be particularly effective. For example, a technology-focused manufacturing company could offer training programs to improve programming, software testing, and project management skills. Online training tools, such as virtual learning platforms (e.g., Coursera, Udemy, edX) and interactive simulations, can provide flexible and accessible learning opportunities. In-person workshops, mentoring programs, and hands-on training sessions can foster collaboration, knowledge sharing, and practical application of skills.

2.Foster a culture of intrapreneurship and employee-driven innovation to encourage the generation of creative ideas. This can involve: **Recognizing and rewarding**

innovative contributions: Implement a robust system for recognizing and rewarding employees who contribute innovative ideas, regardless of their role or position. This recognition should extend beyond ideas that lead to immediate commercial success and include those that improve processes, enhance efficiency, or solve internal challenges.

3. Leveraging time management tools and software for efficient scheduling, accurate time estimation, and effective activity monitoring. This can include utilizing calendar and planning applications like Google Calendar or Trello, alongside project management software, electronic calendars, and various apps for Android and iOS devices.

4. Defining overarching goals and effectively allocating time based on priorities and specific objectives. For instance, using time management techniques such as the Eisenhower prioritization method and tools for time management techniques, specialized prioritization tools.

a. Conducting a SWOT analysis to identify strengths and weaknesses, opportunities and threats, and optimize the use of resources, which is done with the help of SWOT analysis tools and strategy management software.

5. Conducting research and upgrading work processes and methods to improve efficiency and reduce waste of resources, which is done by implementing ERP systems to integrate processes and improve productivity. Also using process optimization software and customer relationship management (CRM) systems.

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HOW TO CITE THIS ARTICLE:

Radmanesh,Y , Valizadeh,A, Ooshak Saraie, M Employing Interpretive Structural Modeling(ISM) to Identify and Prioritize Factors Affecting the Development of Enterprises with the Help of ANP, International Journal of Finance, Accounting and Economics Studies, 6(1): 95-117.

Journal homepage: https://sanad.iau.ir/journal/ijfaes