Analyzing the Interrelationships between Factors Influencing Entrepreneurship Process Based on Grey DEMATEL

(Case Study: Iran's Food Industries)

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Abstract

In today's societies, entrepreneurship has undeniable effects on economic, social, and technological development of countries. In this regard, the Iranian food industry, which includes many specific features, including the vast domestic and regional consumption market, was considered by the researchers in this study. The purpose of this research is to investigate and identify variables and to explain the effective factors on the individual entrepreneurship process in Iran's food industry. In the first phase of the study, the survey team carried out semi-structured interviews with 13 experts in the domain of food industries. In the second phase of the study, a questionnaire based on the Grey DEMATEL method is available to experts for determining priorities and interrelationships between the factors. Based on the research data, paired comparison analysis questionnai has been used. The findings of the research show that among the six categories – individual, personality, occupation, food industry environment, institutional, and environmental factors – the environmental ones were the most influential factors. Also, the individual ones were the most influenced factors and at the same time the most important factor among the ones influencing the process of entrepreneurship in Iran's food industries.

Keywords

Entrepreneurship process, Grey number, DEMATEL method, Food industries

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Introduction

In recent decades, the business environment has changed drastically the global arena. Entrepreneurship has emerged as a newly established knowledge to help such individuals understand business environment.

Entrepreneurship is a dynamic process of creating wealth. This wealth is created by those taking great financial risks. Better understanding of the inherent dynamicity of entrepreneurship can only be accommodated through understanding its process and the factors influencing it. Thus, studies conducted to investigate the entrepreneurship process require focusing on the factors influencing entrepreneurship and their relationships with different steps within the process and interrelationships among these factors.

An entrepreneur will set up and operate a business, under challenging and competitive conditions, in accordance with the need for success and the aim of improving its performance (Hansemark, 1998; Utsch & Rauch, 2000). This is a unique feature that motivates entrepreneurs to succeed in work and excellence in a challenging way (Atkinson & Raynor, 1974; Grote & James, 1991). For a long time, the dominating opinion about entrepreneurship considered it as a specific individual characteristic and emphasized on its genetically inherited aspects (Levie, 1999). Until now, different studies have been conducted on entrepreneurship process and the factors influencing it (Moroz & Hindle, 2012), factors influencing the success and failure of entrepreneurship process (Cabrera & Mauricio, 2017; Cacciotti et al., 2016). Also, the role of demographic characteristics in the process of entrepreneurship (Sasu & Sasu, 2015), and individual characteristics of entrepreneurs (Smith, 2017; Bredvold & Skålén, 2016) have been studied.

Manufacturing entrepreneurship, as a form of entrepreneurship, is extremely noticeable in Iran. The report, published by GEM[1] states that manufacturing entrepreneurs are most prevalent in Morocco (22%),

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[1] - Global Entrepreneurship Monitor

with Iran and Croatia are also showing relatively high participation rates in this sector, around 18% (Global Entrepreneurship Research Association, 2016-2017). The GCR[1] states that Iran has a nineteenth market size within countries (World Economic Forum, 2016-2017).

Food industries are one of the most important economic sectors which constitutes a significant part of industries in Iran. This sector provides a supply market of raw materials due to the existence of agricultural lands as well as extensive demand market including regional market of neighboring countries. Moreover, food industries, especially in the developing countries are among the most important categories of industry - which play an efficient role in the economic development of countries. Results of some related studies demonstrated that food industries have not been damaged as much in the recent years. While in the past few years, Iran's economy suffered from a recession and a decline in the production of various industries (Einian, 2014). Therefore, development of food industries can play a significant role in resisting economy. Thus, the high potential of Iran's food industries, and on the other hand, the limited number of investigations carried out in the business environment in Iran, particularly in food industries, prompted the researchers to review the factors influencing entrepreneurship process in food industries. Therefore, in this research, Iran's food industry was selected as a case study.

This research tries to adopt related researches by collecting initial data from experts in order to determine the main factors affecting entrepreneurship in the Iranian food industry. Because of the variety of factors that affect the entrepreneurial process, we analyze the factors extracted from experts' opinions altogether, in order to extract more accurate results.

To identify the factors influencing the entrepreneurial process in Iran's food industries, these research questions were addressed by the researchers:
1. What are the factors influencing the process of entrepreneurship in Iran's food industries?

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1 - Global Competitiveness Report

2. What are the most influential and influenced factors on the entrepreneurship process in Iran's food industries?
3. How are the interrelationships and the influence of factors influencing the entrepreneurship process in Iran's food industries?

To conduct the present study and to address the research questions; first of all, a review was performed on the influential factors and steps in the entrepreneurship process. Then, the factors influencing the entrepreneurial process in Iran's food industries were extracted by means of interviews with experts. Finally, the Grey DEMATEL technique was implemented.

Literature Review

Entrepreneurship is the result of an encountering entrepreneur's personal characteristics with the environment where they grew up (Postigo, 2002). Na Mi (2013) explored the similarities and differences in the process of entrepreneurship in terms of starting new independent and organized businesses. He considered effectuation and causal factors as determinants in both individual and corporate entrepreneurship processes. Based on this study the effectuation factors were more significant than the causal ones in terms of establishing independent businesses. Moreover, the factors influencing the process of entrepreneurship could be also divided into macro factors, micro factors, and individual characteristics of entrepreneurs (Wagner & Sternberg, 2004). Other researchers similarly categorized such effective factors into four groups: Individual, behavioral, occupational, and environmental ones (Jafarnejad & Kia Kajoori, 2011).

Kiggundu (2002) found that personal entrepreneurs' characteristics that affect success or failure of entrepreneurial process can be divided into four categories including biographic characteristics, psychological characteristics, job behavioral characteristics, and merits (Kiggundu, 2002). Lerners and Haber (2000) also divided the factors influencing the entrepreneurship process and the success of entrepreneurial companies into four groups including personal and psychological characteristics of entrepreneurs, government financial and counseling

support, environmental attractiveness of the company's place, and the variety of services that can be provided (Lerners & Haber, 2000).

Among three variables including behavioral variables, structural variables, and environmental variables which affect the process of entrepreneurship in Iran, the environmental variables were the most influential in the study conducted by Moghimi (2000).

Bygrave (2006) also considered individual, sociological, environmental, and organizational factors as the ones influencing the entrepreneurship process. Heinonen (2003) found speediness, flexibility, integration, and innovativeness as the occupational factors influencing such process. Sobel and King (2008) found that entrepreneurship is influenced by large-scale economic and political factors which can have an impact on the willingness and ability of individuals when selecting their entrepreneurial activities. Likewise, they illuminated the impact of institutions on entrepreneurship. They also made reference to the perspective of authors such as Kreft and Sobel (2005) that the best way of fostering entrepreneurship is through better institutions, instead of new governmental programs (Sobel & King, 2008, p. 431).

Some researchers have investigated the factors influencing the entrepreneurship process in Iran and categorized these influential factors into four categories: Occupational, environmental, personal and behavioral (Aghajani, 2009; Jafarnejad et al., 2011). It is not surprising to know that a large part of the research in this field has been conducted on entrepreneurial personality, since the entrepreneur plays an essential role in the entrepreneurial process. Many sources have focused on how the psychological factors affect the behavior of entrepreneurs in business creation. For example, Dolton and Makepeace (1990) pointed out that individuals pursue self-employment for personal and social reasons. Individual factors influencing entrepreneurial success can be considered as fitness of the individual entrepreneurs' characteristics including self-discovery, opportunism, autonomy in work, having human capital and social skills (Markman & Baron, 2003).

Jennings et al. (1994) considered seven basic individual factors in

entrepreneurship including risk taking, prosperity, self-seeking, independence, tendency to power, creativity, and fear of failure (Jennings et al., 1994, p.66). Ebrahim (2011) described factors such as gender, age, education, income, job status, and entrepreneurship education as individual factors influencing entrepreneurship. Sanders and Nee (1996) considered social capital and human capital as key factors in self-employment and also affirmed the role of higher education.

In an examination of the entrepreneurial indices, Howard examined the impact of entrepreneurship development by six indicators including independence, risk taking, developmental motivation, internal control, self-confidence, and creativity of entrepreneurship of 450 students. This study concluded that there is a direct relationship between these indices and the entrepreneurial ability of individuals (Howard, 2004).

In Khanifer et al. (2009), conscientiousness, extraversion, openness to accept experiences, adaptability, and neuroticism were featured as the five attributes of entrepreneurs. Envich and Longford in a research entitled "Behaviors of Entrepreneurs: A Gender Comparison" identified the most important behavioral characteristics of entrepreneurs including adaptability, socialization, conscientiousness, consensus and freedom of thought (Envich & Longford, 2003).

Experience is one of the individual factors that influence entrepreneurial intent. The intent of individuals to create a business becomes serious when the individual has self-confidence due to his extensive experiences, appointed goals, and social encouragements (Izquierdo & Buelens, 2008). Scholars such as McClelland, Piaget and Eriksson believe that some early experiences in life play an important role in shaping the orientation, intent and personality of people in the future. Generally, entrepreneurs are people with high degrees of empiricism (Brandstatter, 2011).

Another important factor influencing the entrepreneurial process is occupational factors. Heinonen (2003) considers the factors that influence the entrepreneurial process including flexibility of working

patterns, self-regulation, responsiveness, encouraging rewards, reduction of bureaucracy and innovation (Heinnonen, 2003). Schneider considers the entrepreneurial factors that influence entrepreneurship as financial and budget, customer orientation, decentralized decision making, and stock selling factors (Schneider et al, 1995).

Finally, the entrepreneurial environment consists of factors such as macroeconomic, cultural, social and political factors that influence people's willingness and ability to choose entrepreneurial activities (Russel & Kerry, 2008). Within the three variables of behavioral, structural and environmental factors that influence the entrepreneurial process, Moghimi considered the environmental factors as more influential ones (Moghimi, 2000). Environmental factors contribute to the entrepreneurship as the environmental infrastructure, the degree of environmental perturbation, and the personal environmental experiences of the people (Alvani et al., 2009).

Clemensson and Christensen (2010) expressed that building an enabling environment for youth entrepreneurship and sustainable businesses needs regarding promotion of entrepreneurship culture, improvement of the legal and regulatory environment, introducing entrepreneurship education at different education levels, access to affordable financial resources, relevant business development services and support schemes. Garret and Covin (2007) mentioned that, in business environments, the firms' ability for effective adaption to their changing environments is a strategic imperative for entrepreneurship.

By studying the researches that have been conducted on the business environment in Iran, it can be found that in most of them, the external factors influencing entrepreneurship have a crucial role. And the environmental factors are more influential in the victory or failure of the entrepreneurial process in Iran than internal factors. Hasan Gholipour et al. (2015) considered the factors influencing the food industry environment in Iran as the value chain of the industry, the industry structure, and the industry orientation (Hasan Gholipour et al., 2015).

In this section, the researchers tried to describe the entrepreneurship

process and its associated factors. Also, relevant studies that were reviewed revealed what concepts were important in this domain.

Research Method

In order to evaluate the relationship and the impact of the factors and the steps of the entrepreneurship process, the survey team carried out semi-structured interviews with 13 experts in the domain of food industries. The aim of these interviews was exploring the entrepreneurship process and extracting the factors influencing such process.

To analyze the data obtained from interviews, open, axial, and selective coding (theme analysis methods) were used. Coding process began with open coding. First, the data were divided. Next, the terms were classified with their similar units in order to add concepts to them. At this level of the coding process, obtained factors were compared with the subject literature. Next level (axial coding) included reviewing and differentiation of the classes which were resulted from open coding. From a large number of organized classes, those which seemed more appropriate for detailing were selected (Corbin & Strauss, 2014).

In axial coding, the classes that were more relevant to research questions, were selected through expanded codes and related codes' points. Then, lots of items were probed in the context to describe axial class. Finally, selective coding continued axial coding in a higher level. The purpose of this stage was describing the central class which other relevant classes could be classified around it. The sampling was continued to the adequacy of the data and reaching saturation point. Theoretical saturation, in this research, was reached when from the viewpoint of the researchers there was not any hope to find new data or strategies in future interviews.

In the next step, the research questionnaire was distributed among experts. Although in many articles, the number of experts is not mentioned, some papers mentioned this number for example 8 (Liang et al., 2016), 10 (Aghaee et al., 2016), 12 (Mehregan et al., 2012) or 14

(Soltani et al., 2015). No criterion is mentioned for the number of reference experts. In answering the questionnaire, 10 members participated. Through this questionnaire, developed based on the Grey DEMATEL, the respondents were asked to rate the impact of the extracted influential factors on each other in the process of entrepreneurship. Finally, the data analysis was conducted.

Grey DEMATEL

The methods used to investigate the relationships between two or several variables can be categorized into two groups: Statistical and mathematical. Correlation method and structural equation modeling are two of the most important statistical methods and DEMATEL is one of the most important mathematical ones. The foundation of the statistical methods can be assigned to the collective judgment about one issue or variable. In these methods, a lot of questions in the questionnaire are required to evaluate a wide range of variables. In addition, statistical methods (correlation, regression, etc.) just determine the type of independence or dependence between elements. While, mathematical methods, including DEMATEL measure experts' opinions about one issue or variable. In this method, not only the type of dependence or independence, but the direction and intensity of the impact could be specified (Aghaee et al., 2016).

Statistical methods need to use various tests, including Friedman test in order to prioritize a collection of variables. Whereas, DEMATEL is a comprehensive method for investigating the interrelationships and prioritization through determining the most influential and influenced factors (Aghaee et al., 2016). According to the need for considering a lot of variables and combining the judgments about interrelationships among them, a mathematical method based on evaluating experts' opinions is utilized in this study. The final product of the DEMATEL process presents a picture that respondents use to organize their activities and specify the direction of the interrelationships among the variables.

DEMATEL is one of the decision-making methods based on paired comparison analysis. In this method, by using experts' judgments for extracting system factors and structuring them systematically also by utilizing the principles of Graph Theory, a hierarchical structure of the existing factors in the system along with their cause-and-effect interrelationships can be provided. It also determines the intensity of the given relationships (Agha Ebrahimi Samani et al., 2008).

However, DEMATEL has its weaknesses and limitations. It is unable to deal with uncertainty of situations as well as lack of information or conflict resolution among experts. It also cannot express ambiguous values around a given discrete value. Although some fuzzy methods, such as the Grey one would resolve the shortcomings of the non-fuzzy methods, they suffer from limitations of mapping a membership function. Therefore, this study proposes utilizing a Grey DEMATEL method to solve the problem of integrating group decision-making in a fuzzy environment. The proposed method successfully extends the DEMATEL method by applying both linguistic variables and a fuzzy aggregation method. Hence, it can effectively avoid vague and imprecise judgments and flexibly deal with ambiguity. Particularly, this method can also successfully divide a set of complex factors into the cause or effect groups through a causal diagram. Thus, the complexity of a problem is easier to be captured and profound decisions could be made (Bai & Serkis, 2013, p. 285).

The sources of imprecision include unquantifiable information, incomplete information, non-obtainable information, and partial ignorance. Grey theory proposed by Deng (1982) is a mathematical theory born out of the grey set. It is an effective method used to solve uncertainty problems with discrete data. (Tseng, 2009; 7741). The concept of a grey system is shown in Figure 1.
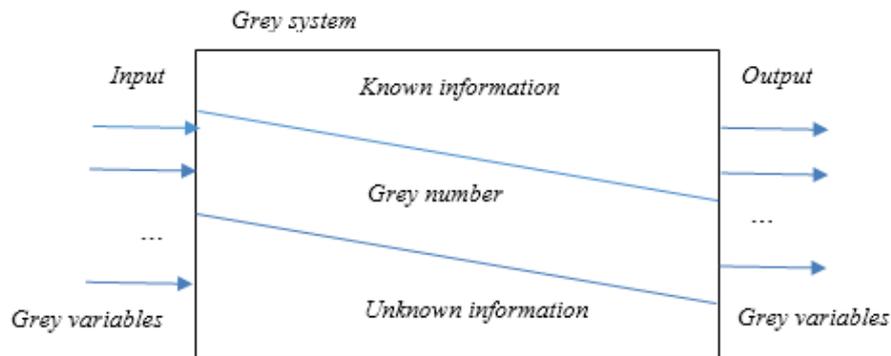
Figure 1. The concept of a grey system (Tseng, 2009; 7741)

Research Findings

Considering the related literature and the results of interviews conducted by experts, the following factors were specified as the major ones which influence the process of entrepreneurship in food industries. Such influential factors were also categorized into six main groups after consultation with experts. Table 1 shows the factors influencing the entrepreneurial process and their constituent elements.

Table 1. Factors Influencing the Entrepreneurship Process in Food Industries

Factors	Constituent components (substrates)
Individual factors (C_1)	Finance and budget, seizing opportunity and entrepreneurial consciousness, social skills, technical skills, managerial and entrepreneurial skills, and family support
Personality factors (C_2)	Personal values, self-realization, need for success (motivation for progress), ambiguity tolerance, self-control, risk-taking, need for independence, and commitment to progress of the process
Occupational factors (C_3)	Occupational backgrounds of entrepreneur in food industries, familiarity with the market of food industries (especially in distribution and sales sector), and related education in food industries
Food industry (operational) environment factors (C_4)	Industry structure, industry life cycle, competition status (competition intensity, power of buyers and suppliers, replacement goods, and introduction of new manufacturers), status of related and supporting industries of food industries, orientation of food industries, access to technology, and the amount of Variety in technology selected for goods' production type in food industries.

Factors	Constituent components (substrates)
Institutional factors (C_5)	Performance of relevant institutions (such as types of taxes, labor rules and regulations, the amount of support for intellectual property, and attitudes of relevant organizations and their staff to entrepreneurs), manner of interactions between supporting institutions and with entrepreneurs, regulations to acquire the necessary permissions especially the licenses by Government agencies and the time-related process of getting legal permissions in food industries
Environmental factors (C_6)	Economic factors (economic growth, inflation, sanctions, etc.), sociocultural factors, the amount of human, social, and psychological capital within society; and political factors (internal and external).

After determining these factors and their classification, the researchers referred back to the experts to evaluate the impact of such factors using the Grey DEMATEL technique whose results will be examined as follows. The extracted factors were submitted to experts within the framework of a DEMATEL questionnaire. Then, the experts tested the impact of various factors on each other according to Table 2.

Table 2. The Grey Linguistic Scale of the Respondents' Assessments (Bai & Sarkis, 2013; Ren et al., 2017)

Linguistic terms	Grey numbers
No influence (N)	[0,0]
Very low influence (VL)	[0,1]
Low influence (L)	[1,2]
High influence (H)	[2,3]
Very high influence (VH)	[3,4]

In order to analyze the data by using the Grey DEMATEL, the following steps were taken to calculate and examine the data interrelationships:

Formation of direct matrix (M)

When the attitudes of several individuals are used, the mathematical

mean of the opinions is employed and it constitutes M.

$$\otimes y_{ij}^k = (\underline{\otimes} y_{ij}^k, \overline{\otimes} y_{ij}^k) \tag{1}$$

$$\otimes \tilde{y}_{ij} = \left(\frac{\sum_k \underline{\otimes} y_{ij}^k}{l}, \frac{\sum_k \overline{\otimes} y_{ij}^k}{l} \right) \tag{2}$$

Table 3 also represents the above-mentioned matrix for the factors influencing the process of entrepreneurship in food industries.

Table 3.Average Grey Relation Matrix for the Factors Influencing the Entrepreneurship Process in Food Industries

Factors	C_1		C_2		C_3		C_4		C_5		C_6	
C_1	0	0	0.5	1.5	1.75	2.75	0	0	0.5	1	0	0.25
C_2	2.25	3.25	0	0	2	3	0.5	0.75	0.5	0.75	0.5	0.75
C_3	1.5	2.5	0.5	1.5	0	0	0.5	0.75	0.5	0.75	0.25	0.5
C_4	1.5	2.5	0.25	0.5	1	2	0	0	0.8	1.7	0.6	1.5
C_5	1	2	0.5	1	1	2	2	3	0	0	1.25	2.25
C_6	1.75	2.75	0.5	1	1	2	2.1	3.1	1.5	2.5	0	0

The matrix formed here is not the final M matrix. Before going to the next step, because of the usage of the Grey numbers, it is necessary to compute the crisp relation matrix from the average Grey relation matrix. This was performed in three steps as follows.

The Grey values are converted into crisp values by modified CFCS method, following a three-step procedure particularized as follows (Rajesh & Ravi, 2015, p. 129):

    a)   Normalization of the grey value

$$\underline{\otimes} \dot{y}_{ij} = (\underline{\otimes} \tilde{y}_{ij} - \min_j \underline{\otimes} \tilde{y}_{ij}) / \Delta_{\min}^{\max} \tag{3}$$

Where $\underline{\otimes} \dot{y}_{ij}$ represents the normalized lower limit value of the grey number $\otimes \tilde{y}_{ij}$

$$\overline{\otimes}\dot{y}_{ij} = (\overline{\otimes}\tilde{y}_{ij} - \min_{j}\overline{\otimes}\tilde{y}_{ij})/\Delta_{\min}^{\max} \tag{4}$$

Where $\overline{\otimes}\dot{y}_{ij}$ represents the normalized lower limit value of the grey number $\otimes\tilde{y}_{ij}$

$$\Delta_{\min}^{\max} = \max_{j}\overline{\otimes}\tilde{y}_{ij} - \min_{j}\underline{\otimes}\tilde{y}_{ij} \tag{5}$$

The performed mathematical operations are shown in Table 4.

Table 4. Normalization of the Grey Value Matrix for the Factors Influencing the Entrepreneurship Process in Food Industries

Factors	C₁		C₂		C₃		C₄		C₅		C₆	
C₁	0	0	0.33	1	0.58	0.92	0	0	0.2	0.4	0	0.11
C₂	0.69	1	0	0	0.67	1	0.16	0.24	0.2	0.3	0.22	0.33
C₃	0.46	0.77	0.33	1	0	0	0.16	0.24	0.2	0.3	0.11	0.22
C₄	0.46	0.77	0.17	0.33	0.33	0.67	0	0	0.32	0.68	0.27	0.67
C₅	0.31	0.62	0.33	0.67	0.33	0.67	0.65	0.97	0	0	0.56	1
C₆	0.54	0.85	0.33	0.67	0.33	0.67	0.68	1	0.6	1	0	0

b) Computing total normalized crisp value

$$a_{ij} = \left(\frac{(\underline{\otimes}\dot{y}_{ij}(1-\underline{\otimes}\dot{y}_{ij}))+(\overline{\otimes}\dot{y}_{ij}\times\overline{\otimes}\dot{y}_{ij})}{(1-\underline{\otimes}\dot{y}_{ij}+\overline{\otimes}\dot{y}_{ij})} \right) \tag{6}$$

The results of these operations are shown in Table 5.

Table 5. Total Normalized Crisp Value Matrix for the Factors Influencing the Entrepreneurship Process in Food Industries

Factors	C₁	C₂	C₃	C₄	C₅	C₆
C₁	0	0.73	0.81	0	0.27	0.01
C₂	0.93	0	0.92	0.18	0.23	0.26
C₃	0.64	0.73	0	0.18	0.23	0.13
C₄	0.64	0.21	0.5	0	0.5	0.46
C₅	0.45	0.5	0.5	0.88	0	0.86
C₆	0.74	0.5	0.5	0.92	0.89	0

c) Calculating the final crisp values

$$a_{ij}^* = (\min \underline{\otimes} \, \tilde{y}_{ij} + (a_{ij} \times \Delta_{\min}^{\max}))\tag{7}$$

$$\& \; M = \left[a_{ij}^* \right]\tag{8}$$

Final direct crisp relation matrix is shown in Table 6.

Table 6 .Final Direct Crisp Relation Matrix For the Factors Influencing the Entrepreneurship Process in Food Industries

Factors	C_1	C_2	C_3	C_4	C_5	C_6
C_1	0	1.1	2.44	0	0.67	0.03
C_2	3.01	0	2.75	0.56	0.57	0.58
C_3	2.09	1.1	0	0.56	0.57	0.3
C_4	2.09	0.32	1.5	0	1.25	1.03
C_5	1.47	0.75	1.5	2.73	0	1.94
C_6	2.4	0.75	1.5	2.86	2.21	0

Calculation the normalized direct relation matrix:

$$N = K * M \tag{9}$$

In this formula, K is calculated as follows. First, the sum of all of the rows and columns are calculated. Then, the reverse of the greatest number of the rows and columns forms K.

$$K = \frac{1}{\max 1 \leq i \leq n (\sum_{j=1}^{n} a_{ij}^*)}\tag{10}$$

According to the above formula, K is equal to 9.72, so normalized direct relation matrix will be as follows in Table 7.

Table 7 .Normalized Direct-Relation Matrix for the Factors Influencing the Entrepreneurship Process in Food Industries

Factors	C_1	C_2	C_3	C_4	C_5	C_6
C_1	0	0.11	0.25	0	0.07	0
C_2	0.31	0	0.28	0.06	0.06	0.06

C$_3$	0.21	0.11	0	0.06	0.06	0.03
C$_4$	0.21	0.03	0.15	0	0.13	0.11
C$_5$	0.15	0.08	0.15	0.28	0	0.2
C$_6$	0.25	0.08	0.15	0.29	0.23	0

Calculation of the total relation matrix:

$$T=N\times(I-N)^{-1} \tag{11}$$

Matrix T is shown in Table 8.

Table 8. Total Relation Matrix for the Factors Influencing the Entrepreneurship Process in Food Industries

Factors	C$_1$	C$_2$	C$_3$	C$_4$	C$_5$	C$_6$
C$_1$	0.21	0.2	0.41	0.1	0.15	0.07
C$_2$	0.59	0.16	0.56	0.2	0.2	0.15
C$_3$	0.41	0.21	0.22	0.15	0.15	0.1
C$_4$	0.49	0.18	0.42	0.17	0.26	0.2
C$_5$	0.56	0.26	0.53	0.49	0.22	0.33
C$_6$	0.68	0.28	0.58	0.52	0.43	0.18

And finally, Table 9 also shows the sequence of elements which influence one another.

Table 9esults of Grey-Based DEMATEL Analysis for All Main Factors and Their Measurement Items

D		R		D+R		D-R	
C6	2.67	C1	2.94	C1	4.07	C6	1.65
C5	2.39	C3	2.73	C3	3.98	C5	0.97
C2	1.87	C4	1.62	C5	3.81	C2	0.57
C4	1.72	C5	1.42	C6	3.69	C4	0.1
C3	1.25	C2	1.30	C4	3.34	C3	-1.48
C$_1$	1.13	C$_6$	1.02	C$_2$	3.17	C$_1$	-1.81

Calculation of threshold value of relations and significant effects:

To determine the significant effects of the factors on each other, it is necessary to calculate the threshold value of relations and extract the notable relationships through this measure (Tzeng et al., 2007). To calculate the threshold value of the relations, it is sufficient to calculate the means of the values for matrix T. After determining the intensity of the threshold value, all the values of the matrix T smaller than the threshold value convert into zero (It means that, this would not be a causal relation). The threshold value according to Table 7 is equal to 0.31. Table 10 shows a significant relation matrix.

Table 10 .Significant Relation Matrix for the Factors Influencing the Entrepreneurship Process in Food Industries

Factors	C_1	C_2	C_3	C_4	C_5	C_6
C_1	0	0	1	0	0	0
C_2	1	0	1	0	0	0
C_3	1	0	0	0	0	0
C_4	1	0	1	0	0	0
C_5	1	0	1	1	0	1
C_6	1	0	1	1	1	0

For example, the personality factors have significant effects on individual and occupational factors. An interesting point here is that personality factors are not significantly influenced by other factors.

Calculation of net influence matrix

It is typical in some research studies based on the DEMATEL technique to calculate the net influence matrix to measure the exact extent of the influence of each factor compared with other factors.

In the following matrix (Table 11), N can be used to evaluate the strength of the effect of one factor on another (Wang et al., 2012):

$N = Net_{ij} = t_{ij} \_ t_{ji}$.

The results of the above mentioned operation are presented in Table 11 as follows.

Table 11. Net Influence Matrix for the Factors Influencing the Entrepreneurship Process in Food Industries

Factors	C_1	C_2	C_3	C_4	C_5	C_6
C_1						
C_2	0.39					
C_3	0.01	-0.35				
C_4	0.39	-0.02	0.27			
C_5	0.42	0.06	0.38	0.22		
C_6	0.61	0.13	0.48	0.32	0.1	

Drawing Causal Diagram:

In this step, a Cartesian coordinate system is drawn. In this system, the horizontal axis shows the value of *D+R* (which indicates the level of significance) and the vertical axis is based on *D-R* (which represents the level of impact). The position of each factor is determined in the system with a point characterized as *(D+R, D-R)*. Thus, a graphic diagram is obtained. Also, the relationship between the given factors is established, using Table 9, which is illustrated in Figure 2.
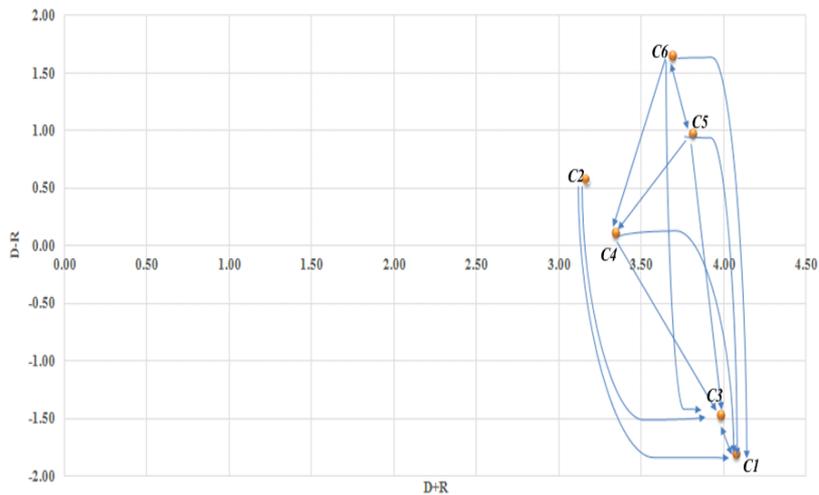
Figure 2. Causal diagram and position of the factors influencing the entrepreneurship process in food industries

Results

According to the previous section and the obtained results, the researchers attempt to address the main research question in this study, the relationship and the impact of the factors influencing the process of entrepreneurship in Iran's food industries.

- The sum of elements in each row *(D)* for each factor represented the degree of the impact of the factor on other factors of the system (amount of impact of the variables). It summarizes both direct and indirect effects that have been given by one factor towards other factors (Rajesh & Ravi, 2015). Thus, the order of factors in terms of their impacts are environmental, institutional, personality, food industry environment, occupation, and individual.

- The sum of elements in column *(R)* for each factor shows the degree that a factor is influenced by other factors in the system (the amount that a factor is influenced by other factors). It summarizes both direct and indirect effects that have been received by one factor from other factors (Rajesh & Ravi, 2015). Thus, the order of factors in terms of the impacts received include individual, occupational, food industry environment, institutional, personality, and environmental.

- *(D+R)* is defined as the prominence, indicating the impact of ith influential factor and its degree of being impacted (Zhou et al., 2017). Considering this, the priority of the factors is in this order: Individual, occupational, institutional, environmental factors, food industry environment, and personality.

- *(D-R)* shows the importance of factors and categorize the ith influential factor in the cause or effect category in the researching system. If *(D-R)>0*, the factor is regarded as a causal factor. If *(D-R)<0*, the factor is an effect factor (Zhou et al., 2017). Regarding this; environmental, institutional, personality, and food industry environment factors were causal factors; while the occupation and individual factors were effected ones. However, the value of factors related to the food industry environment in this section was almost close to zero. It means that, this factor in the cause group has a high possibility of turning into "effect" group. Such factors can be also called linkage group (Ren et al., 2017).

Discussion and Conclusion

The volume of producing raw materials as well as abundant and qualified workforce in Iran, has provided the necessary conditions for entrepreneurship. Such potentials can be converted into successful industries, influenced by different internal and external factors.

As the first step, the present study was conducted to explore the factors influencing entrepreneurship in food industries as one of the significant industries in Iran. The next step included analysis of the interrelationships among such factors. To obtain this end, the DEMATEL technique was employed to analyze the cause or effect interrelationships among the factors.

One of the advantages of DEMATEL technique is the possibility of determining the status of components or parameters in the model. This means that, this technique is structured in a way which can categorize the factors or components into two categories by means of influential or influenced ones. When utilizing this technique, in addition to prioritizing the factors, it allows researchers and decision makers to manage their time and capital to consider the results of the research and continue their work in a guided way. This guidance means, considering obtaining results, when decision makers – based on the research's subject – want to achieve early, but superficial results, they can concentrate on priorities in the set of the influenced factors or components. But when the aim of the decision makers is doing fundamental actions or concentrating on the basis and principle of the subject, they can concentrate on the layer of the influential factors or components or on the causes and codify their plans according to it. This technique, when mixed with the Grey approach is more accurate and reliable and provides more reasonable results.

To address the research questions and according to the results obtained, the factors influencing the process of entrepreneurship in Iran's food industries were categorized into six groups of individual, personality, occupation, food industry environment (operational environment), institutional, and environmental factors. As observed,

the experts put more emphasis on external categories (the ones that are not influenced by the entrepreneurs) than other factors in the entrepreneurship process. The activity context of each firm forms up its conditions of action and a firm's performance is a function of environmental opportunities. The dominating impact of environmental issues compared with other factors influencing businesses has been investigated in Iran in other studies, including the research conducted by Rahman Seresht and Ghodratian Kashan (2010).

Institutional characteristics were among the major parts of experts' concerns, according to the conducted interviews. The supporting role of Institutions has been similarly illuminated in previous studies (Isenberg, 2011; Mason & Brown, 2014). The key role of such institutions in Iran's business atmosphere has been endorsed (Kalantari et al., 2010). This study confirms the weight and importance of institutional problems in advancing or obstructing the business environment in food industries. Such factors influence on the factors associated with the industrial environment, which are impacted by external or macro factors, and consequently increase or lower uncertainty. This uncertainty influences competitive advantages in industrial environment, according to the results of the related literature (Zane & Kline, 2017). The influential impact of personality factors is mentioned in other studies of researchers like De Pillis (2007)

Another point of the study was the role of individual factors as the most important factor and on the other hand the most influenced factor. The role of individual factors has been also mentioned by Pretorius et al. (2005) and Raymond (2003). This factor has strong interactions with other factors and it is influenced by them, too. The influential impact of the occupational factors which is also significantly influenced by other factors is mentioned in previous studies like Jafarnejad et al. (2011).

It can be said that all previous studies have been effectively part of this research. However, this study provided a more integrated and comprehensive attitude to their interrelationships. Also, this study paid attention to the factors influencing the entrepreneurship process in the framework of the given variables simultaneously, through citing the

related literature, which was considered as an advantage overlooked in other studies.

After extracting the degree of the interrelationships among the factors, it became clear that environmental factors were the most influential ones in the business atmosphere of Iran, particularly in food industries. These factors are beyond the power of entrepreneurs to change them. Thus, the responsibility of the government was more highlighted than individuals. The government has taken significant steps to improve the business environment and approved the law for continuous improvement of business environment for more than five years ago. But, it seems that emphasizing this issue by experts as the most influential factor in this field of economy, which is by itself one of the most competitive and transparent industries in Iran, calls for more attention to business atmosphere despite all previous efforts.

The importance given to the individual factors which are simultaneously more influenced by other factors can conclude that by strengthening other mentioned factors, possibly individual factors will be more strengthened and consequently, the entrepreneurship process will be facilitated. This must be considered that each opportunity cannot be processed and implemented by entrepreneurship enthusiasts. Thus, attention to the near and far surrounding environment has priority for an individual or entrepreneur to progress the process based on their own characteristics.

It must be mentioned that, factors influencing the entrepreneurial process have been seen in interaction with each other and in a shape of a network. This means that absence, weakness or strength of a factor influences the strengths or weaknesses of all factors.

Suggestions for Future Research

- This research has a great potential to be pursued and expanded in future studies. The subject of this study could be examined in other industries to achieve a comprehensive model.

- The study was limited to a few experts, particularly industrial experts. Comprehensive outcomes could be found with respect to the pluralistic approach to research and using other experts.
- Each of the factors influencing the entrepreneurship process has different elements that their effects on the process are not equal to each other. To measure their impact on each other, other influential factors and the whole process, it seems that using statistical methods can be useful.
- The current view of the paper assumes that the factors influencing the entrepreneurial process are constant over time. Also, the factors' prioritization has been investigated without considering the dynamics of the process. It can be imagined that, these factors may have different priorities over time and according to different stages of the process. Therefore, it is suggested to study and extract the factors influencing the process, depending on the stage of the entrepreneurship process which is developing.

Acknowledgements

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