Entrepreneurship resilience and Iranian organizations: application of the fuzzy DANP technique

Hemad Hamedi and Amir Mehdiabadi
Department of Management, Islamic Azad University of South Tehran, Tehran, Iran

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Abstract

Purpose – The purpose of this paper is to find and prioritize human factors affecting entrepreneurial resilience.

Design/methodology/approach – The statistical population consists of prominent Iranian university professors in this field, and the statistical sample is ten of them randomly. A researcher-made questionnaire was used for data collection. After a comprehensive review of the theoretical foundations, the research model was formed with 5 main indices and 21 sub-indices. Fuzzy decision-making trial and evaluation laboratory (DEMATEL)-based (DANP) technique and MATLAB software was used for analysis.

Findings – Indicators of Values and Beliefs (A3) and Motivation Index (E5) as Influential Indicators and indicators of personal attributes (S1), formal and informal relationships (R^2) and human capital (C4) are effective indicators of entrepreneurial resilience. In the final rankings, formal and informal relationships had the highest weight with 0.263 and the lowest with priority and motivation index with 0.080. In addition to the final rankings of the sub-indices, the indicators of first-hand experience, recognition of opportunities and consulting services were given the highest weight.

Practical implications – This study proposes that resilience is a real-life process and not just a list of each characteristic. All human beings have an innate ability to be resilient, but resilience is a learned and learned behavior, and the emphasis of experts is on the learning of various resilience skills.

Originality/value – This study contributes to the field of entrepreneurship by examining the institutional backgrounds of entrepreneurship resilience.

Keywords Resilience, Entrepreneurial resilience, Human factors, Fuzzy DANP

Paper type Research paper

Introduction

In the third wave book, according to Toffler (1980), the history of human societies is divided into three categories: traditional society, industrial society, and information society. In the meantime, the information society is divided into three categories: digital revolution (wireless and satellite systems), internet revolution, and entrepreneurial revolution. Kuratko and Hodgetts (1989) believe that the entrepreneurial revolution can be far more important than the industrial revolution. Because in today's complicated and difficult conditions, the link between entrepreneurship and adaptation to change is inevitable. Entrepreneurship has

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largely been characterized in relation with the identification and exploration of business opportunities (Bhattacharyya and Kumar, 2020). Gartner in 1988 has defined entrepreneurship as "the creation of new organizations"(Chhabra *et al.*, 2020). In most research, they have found entrepreneurship to be helpful to communities, regions or economies (Boettke *et al.*, 2007). Entrepreneurs are the pioneers of business success in the present age (Ayala and Manzano, 2014). They play an important part in any country's economy in terms of leadership, management, innovation, efficiency, job creation, competitiveness, productivity, and startups. One of the most important characteristics of entrepreneurship that is critical to their success. Stress tolerance and rapid adaptation to environmental uncertainty (Cooper *et al.*, 2004; London, 1993). It is the concept of resilience that drives an entrepreneur in such a situation (Korber and McNaughton, 2018). This has been proven in many studies (Ayala and Manzano, 2010; Markman *et al.*, 2005). The resilience structure is linked to entrepreneurship in two respects (Korber and McNaughton, 2018): First, scientists often use resilience synonymously with topics such as fitness, tenacity, sustainability or self-efficacy to explain why some entrepreneurs and their organizations do better than others who are not resilient. Second, it is argued that cognitive and behavioral entrepreneurial characteristics and distinct forms of entrepreneurship, such as social entrepreneurs, enhance firms' ability to adapt to new conditions and give to long-term sustainability through innovation (Biggs *et al.*, 2010). Entrepreneurial activities may be affected by economic shocks and some areas may keep up higher levels of entrepreneurial activity, indicating entrepreneurial resilience (Huggins and Thompson, 2015). Entrepreneurial resilience has been recognized in recent years as a key element in explaining entrepreneurial behavior overcoming discomfort, coping with uncertainty, and learning from past failures. Therefore, resiliency development is essential for entrepreneurs to keep up their businesses (Lee and Wang, 2017). However, the application of decision-making techniques in recent years have also had a significant impact on the results in this area. Using fuzzy cognitive mapping (Branco *et al.*, 2019; Gray *et al.*, 2015); fuzzy resilience index (Rajesh, 2019); fuzzy methods and rules (Muller, 2012); fuzzy BWM and GMo-RTOPSIS (Gan *et al.*, 2019); fuzzy programming (Hamidieh *et al.*, 2018); fuzzy TOPSIS (Haldar *et al.*, 2014); interval-valued fuzzy sets (Foroozesh *et al.*, 2017); fuzzy control (Cardenas *et al.*, 2016); multi-objective programming (Sahebjamnia *et al.*, 2018); and AHP-TOPSIS-QFD under a fuzzy environment (Pramanik *et al.*, 2016).

Theoretical framework and model development

Resiliency is a dynamic process and can be developed or inhibited because of the interaction between protective factors and risk (Bonanno, 2004; Masten, 2001). According to Rutter (1990) protective factors point to "effects that change, improve, or change a person in response to some environmental hazard that may result in an adverse outcome." Protective factors work to help resilience (Lee and Wang, 2017). In contrast, the presence of risk factors indicates a higher likelihood of a mental disorder related to person, family, and environmental aspects (Masten and Garmezy, 1985). Protective and risk factors interact in a similar way to driving and controlling forces in force field analysis, which results in individuals' mental and physical resilience (Bonanno, 2004). Researchers in psychology tend to focus on reducing or eliminating risk factors. The difficulties that entrepreneurs endure are not similar to the traumatic events experienced by participants in traditional resilience studies (Lee and Wang, 2017). Apart from the financial impact and overall sense of loss, entrepreneurs may also experience limited social communication and even physiological effects such as insomnia or fear of business failure (Singh *et al.*, 2007). Numerous studies

have examined the relationship between entrepreneurship and resilience (Schutte and Mberi, 2020; Schippers *et al.*, 2019; Muslim *et al.*, 2019; Herbane, 2018; Lafuente *et al.*, 2018; Fatoki, 2018; Branicki *et al.*, 2018; Kim, 2018). Therefore, the factors affecting entrepreneurship resilience should be taken into account in general.

Interpersonal factors

Personal traits. Among the inherent characteristics of entrepreneurs, self-efficacy (or confidence) is the most common determinant of entrepreneurial success or failure (Lee and Wang, 2017). Self-efficacy makes entrepreneurs realize their strengths. As a result, entrepreneurs are not too confident about the risk of failure, expecting positive results and achieving business growth (Holienka *et al.*, 2016; Pollack *et al.*, 2012; Rauch and Frese, 2007; Trevelyan, 2008; Yang and Danes, 2015). Self-efficacy has a significant impact on entrepreneurs and their jobs. When entrepreneurs lose their self-efficacy, they tend to lose their social identity, which ultimately affects their relationships and social networks (Jenkins *et al.*, 2014). When social networks are affected, entrepreneurs are likely to have less access to resources or emotional support, which may make their business more vulnerable. On the other hand, empirical evidence also elucidated the consequences of overconfidence. That is, overconfidence has a negative impact on business success.

Motivation. In addition to the things as they are, as discussed above, motivation has a great impact on entrepreneurial intention and behavior. In this regard, the need for intrinsic achievement and motivation to start a business (Caliendo and Kritikos, 2008; Rauch and Frese, 2007) is positively associated with committed entrepreneurial behaviors, which increases the likelihood of their business success (Przepiorka, 2016, 2017). In addition, as observed by Yamakawa *et al.* (2013): entrepreneurs inherently learn from failure, start another job and make higher growth.

Human capital. Empirical evidence suggests that human capital plays a key role in building an organization and business success. The characteristics of overall human capital, such as education level and entrepreneurial competence, are significant drivers of success (Coleman *et al.*, 2013; García and Carlos, 2014; Williams and Shepherd, 2016). The more entrepreneurs receive, the better they are at employing their knowledge and skills in managing their businesses. In addition to the knowledge and skills gained from training, an entrepreneur has strong social relationships, such as alumni or professional networks. Most importantly, high-level training is considered as an indicator of the ability of the investment team, thus increasing the chances of investors being attracted to investment (Cope *et al.*, 2004).

Getting started experience. Much has been cited in the literature as an important reason in entrepreneurial success and a factor in successful exit from failures (Amaral *et al.*, 2011; Coleman *et al.*, 2013; Lafontaine and Shaw, 2016; Monsson and Jorgensen, 2016; Omri and Frikha, 2011; Williams and Shepherd, 2016; Zhang, 2011). As an adult learner, doing an entrepreneur can learn a lot (Lee and Wang, 2017). In other words, from their previous experience of investing in startups, whether they succeed or fail, entrepreneurs may learn to take a positive view of business failure, acquire the skills to run businesses and to start a new company and make a profit and gain a deeper understanding of the complex and challenging nature of business (Politis, 2008).

Values and beliefs. Entrepreneurs' attitudes and views on life have major effects on their behavior.

Positive attitudes to life, such as optimism and hope. This improves entrepreneurs' commitment to business (Przepiorka, 2016, 2017; Yang and Danes, 2015). Because they see the future as bright and promising, entrepreneurs are likely to put more effort into their business and feel more satisfied with their achievements. Similarly, seeing entrepreneurial

competence as a flexible reason is positively associated with business success (Pollack *et al.*, 2012). Flexibility is especially effective in dealing with threats. Because entrepreneurs have a flexible mind and believe that their ability to change is, they can easily respond to external environmental problems. A positive outlook on life enables entrepreneurs to move forward with optimism and hope. Especially when entrepreneurs look at their past experiences and current status negatively, they make less effort in their business (Przepiorka, 2016, 2017).

Attribution. Taking or losing responsibilities in your business is the cause of failure. High levels of internal attribution due to failure increase critical thinking (Eggers and Song, 2015). Entrepreneurs can be more resilient by reflecting on past mistakes and avoiding failure as a cost of learning from previous experience. This may help entrepreneurs deal with stress and negative emotions. However, transferring responsibility to others is an ineffective way to learn from failure (Yamakawa and Cardon, 2014).

Spirituality (or epic). Another reason to note. Spirituality can define as "inner awareness of something beyond the person" (Singh *et al.*, 2015). Spirituality may not perceive as a value or belief in its traditional sense, but it does affect social and entrepreneurial goals and shares values with increased awareness (Pavlovich and Corner, 2013). For this reason, we have classified spirituality into "values and beliefs". Spirituality encourages failed entrepreneurs to overcome negative feelings of sadness, regret, and self-stimulation by participating and reflecting on the experience failure, viewing failure as a larger program and ultimately accepting failure and finding its positive meanings (Singh *et al.*, 2015).

Interpersonal factors. Social support helps entrepreneurs become more flexible when it comes to emotional support, valuable information, financial resources and communication with others (Khelil, 2016; Newbert and Tornikoski, 2012; Omri and Frikha, 2011). In addition to informal relationships with families and acquaintances, entrepreneurs are also affected by more formal relationships such as team members, funders and professional networks.

Informal relationships with family and acquaintances. The supportive family is the main source of funds and raw materials for startups as well as psychological capital (Powell and Eddleston, 2013; Wing-Fai, 2015). In particular, the commitment and encouragement of spouses are important for entrepreneurial success (Yang and Danes, 2015). Alumni, like the family, can enjoy emotional and material support as well as be a bridge to wider networks.

Formal relationship with professional groups. A lot of material resources and high ability is needed to make an investment. Investor support is considered to be the most important factor in the start-up phase or when businesses are at risk (Cope *et al.*, 2004; Hsu, 2007; Zhang, 2011). VCs are not only a source of financial support but also give business advice and connect entrepreneurs to other social networks based on their industry experience and ability (Bocken, 2015). But if VCs are credible and try to control the business, it can affect the trust, which is essential to increase the motivation and commitment of entrepreneurs (Duffner *et al.*, 2009).

Workgroup. The quality of the investment team is the main criterion for investment decision-making (Duffner *et al.*, 2009). In a very interactive and relaxed team, members take responsibility for each other and cover up others' mistakes. This interaction affects business growth (Brinckmann and Hoegl, 2011). Strategic consensus by members (Vissa and Chacar, 2009) can help the team find goals, find the resources needed and find how to use the team's external networks. If a team fails to foster a collaborative culture, business is unlikely to continue. As Van Gelderen *et al.* (2011) research has shown, business interruption is often not due to problems faced by entrepreneurs, but rather by entrepreneurial teams, especially inexperienced people.

Finally, after a comprehensive review of the theoretical foundations, the research model is extracted as follows in Figure 1:

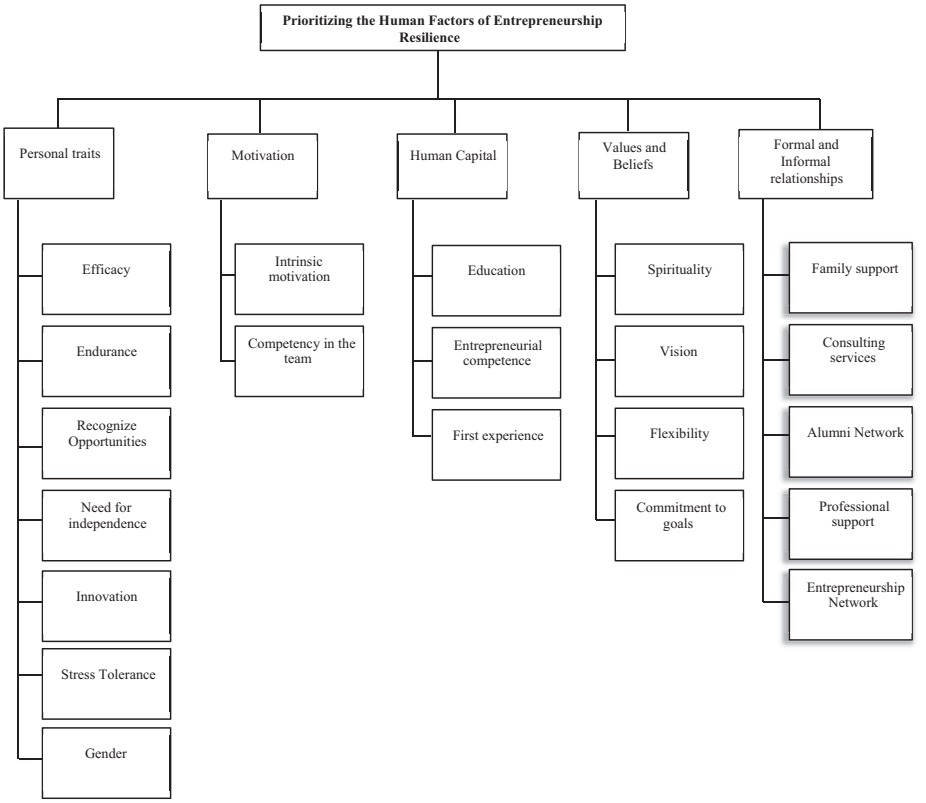

Figure 1.
Research model

Methodology

The present research aims at identifying and prioritizing the human factors of entrepreneurship resilience, of a descriptive and applied type. Phase I: research identifies entrepreneurial resilience indicators and model outlines and phases II: Determine the total relationships between dimensions and components and find the intensity and effectiveness of the components and rank them using Fuzzy DANP Method (MATLAB software was used at this stage).

Fuzzy DEMATEL-based ANP. The decision making trial and evaluation laboratory (DEMATEL)-based analytic network process (ANP) method, as a combination of techniques, DEMATEL and ANP, was introduced by Yang *et al.* (2008). In 2008 and is a suitable method for solving problems with dependent or feedback criteria (Chiu *et al.*, 2013). In the traditional and classical methods for solving the hybrid model of DEMATEL and ANP, these steps were followed by using the DEMATEL method to calculate the total communication matrix, then the threshold value, and then the relationships between the threshold value and the total communication matrix. Criteria and sub-criteria were extracted and analyzed by ANP and pairwise comparisons were performed, and the weight of the criteria and sub-criteria was calculated (one of the disadvantages of this method is that many internal relationships are eliminated by taking the threshold value). But in this method, no more than the threshold value is taken from the communication matrix) this will

keep up all the internal relationships (and with the same total impact numbers, the first super matrix is formed and then balanced and reaches infinite power. Calculate the last weight of the criteria and sub-criteria. The fuzzy DEMATEL method examines the structure of impacts among criteria and tries to solve the problem facing organizations and improve it by applying group decision-making in fuzzy conditions. The steps of this method are as follows (Tzeng *et al.*, 2010):

Step 1: Create a fuzzy direct relation matrix by determining the impact of the criterion i on j in Table 1.

Step 2: Normalize the direct relationship matrix through Relationships 1 and 2:

$$\widetilde{X} = K.\ \widetilde{X} \tag{1}$$

$$k = min\left[\frac{1}{max_{1\le i\le n}\sum_{j=1}^{n}\widetilde{A}_{ij}}, \frac{1}{max_{1\le i\le n}\sum_{i=1}^{n}\widetilde{A}_{ij}}\right]\ i,\ j = 1,\ 2\ldots n \tag{2}$$

Step 3: Calculate the matrix of general relationships with Relationship 3.

$$\widetilde{T} = \widetilde{X}(I - \widetilde{X}) - 1 \tag{3}$$

Step 4: Determine the vector R˜and D˜through Relationships 4 to 6:

$$\widetilde{T} = \left[\widetilde{t}_{ij}\right] n \times n, \qquad i,\ j = 1,\ 2\ldots\ n \tag{4}$$

$$\widetilde{R} = \left[\sum_{j=1}^{n}\widetilde{t}_{ij}\right] = \left[\widetilde{t}_i\right]\ n \times 1 \tag{5}$$

$$\widetilde{D} = \left[\sum_{i=1}^{n}\widetilde{t}_{ij}\right] = \left[\widetilde{t}_j\right] 1 \times n \tag{6}$$

Step 5: Calculate ($\tilde{R} + \tilde{D}$) and ($\tilde{R} - \tilde{D}$) and plot the impact relationships on the coordinate axis. In this study, the steps of combining DEMATEL and ANP are as follows to find the evaluation of weights.

Step 1: Develop a non-weight super matrix. In this step, we normalize the sub-criteria general relations matrix obtained through DEMATEL to form the non-weighted criteria

Fuzzy numbers	Fuzzy value	Verbal variable
(0.75,0.75,1)	$\widetilde{4}$	Effect too high
(0.5,0.75,1)	$\widetilde{3}$	High effect
(0.25,0.5,0.75)	$\widetilde{2}$	Low effect
(0,0.25,0.5)	1	Very low effect
(0,0,0.25)	0	No effect

Source: Lu *et al.* (2013)

Table 1.
Linguistic scales for pairwise comparisons

matrix$\left(\mathrm{T}_{\mathrm{c}}^{\alpha}\right)$. To this end, we divide the column elements by the sum of the column elements corresponding to its cluster. This matrix is used in the formation of the super-matrix to show the internal relation of each surface.

$$T_c^{\alpha} = \begin{bmatrix} T_c^{\alpha 11} & \cdots & T_c^{\alpha 1j} & \cdots & T_c^{\alpha 1n} \\ \vdots & & \vdots & & \vdots \\ T_c^{\alpha i1} & \cdots & T_c^{\alpha ij} & \cdots & T_c^{\alpha i1} \\ \vdots & & \vdots & & \vdots \\ T_c^{\alpha n1} & \cdots & T_c^{\alpha nj} & \cdots & T_c^{\alpha nn} \end{bmatrix} \tag{7}$$

where $T_c^{\alpha 11}$ is obtained by the following formula:

$$d_{ci}^{11} = \sum_{j=1}^{m_1} T_{cij}^{11} \quad i = 1, 2 \ldots \ m1 \tag{8}$$

$$T_c^{\alpha 11} = \begin{bmatrix} t_{c11}^{11}/d_{c1}^{11} & \cdots & t_{c1j}^{11}/d_{c1}^{11} & \cdots & t_{c1m_1}^{11}/d_{c1}^{11} \\ \vdots & & \vdots & & \vdots \\ t_{ci1}^{11}/d_{ci}^{11} & \cdots & t_{c11}^{11}/d_{ci}^{11} & \cdots & t_{cim_1}^{11}/d_{ci}^{11} \\ \vdots & & \vdots & & \vdots \\ t_{cm_11}^{11}/d_{cm_1}^{11} & \cdots & t_{cm_1j}^{11}/d_{cm_1}^{11} & \cdots & t_{cm_1m_1}^{11}/d_{cm_1}^{11} \end{bmatrix}$$

$$= \begin{bmatrix} t_{c11}^{\alpha 11} & \cdots & t_{c1j}^{\alpha 11} & \cdots & t_{c1m_1}^{\alpha 11} \\ \vdots & & \vdots & & \vdots \\ t_{ci1}^{\alpha 11} & \cdots & t_{cij}^{\alpha 11} & \cdots & t_{cim_1}^{\alpha 1} \\ \vdots & & \vdots & & \vdots \\ t_{cm_11}^{\alpha 11} & \cdots & t_{cm_1j}^{\alpha 11} & \cdots & t_{cm_1m_1}^{\alpha 11} \end{bmatrix}$$

Then the balanced matrix W^c c is formed as follows:

$$W^c = \begin{bmatrix} W^{11} & \cdots & W^{i1} & \cdots & W^{n1} \\ \vdots & & \vdots & & \vdots \\ W^{1j} & \cdots & W^{ij} & \cdots & W^{nj} \\ \vdots & & \vdots & & \vdots \\ W^{1n} & \cdots & W^{in} & \cdots & W^{nn} \end{bmatrix} \tag{9}$$

Step 2: Forming a hyperbolic super matrix. Convert the balanced super-matrix through the relation $\lim_{\mathrm{K}\to\infty}\left(W^{\alpha}\right)^{\mathrm{K}}$ to form a super-limit matrix and finally determine the final weights by the DANP method. Finally, the research process is outlined in the following diagram, Figure 2:

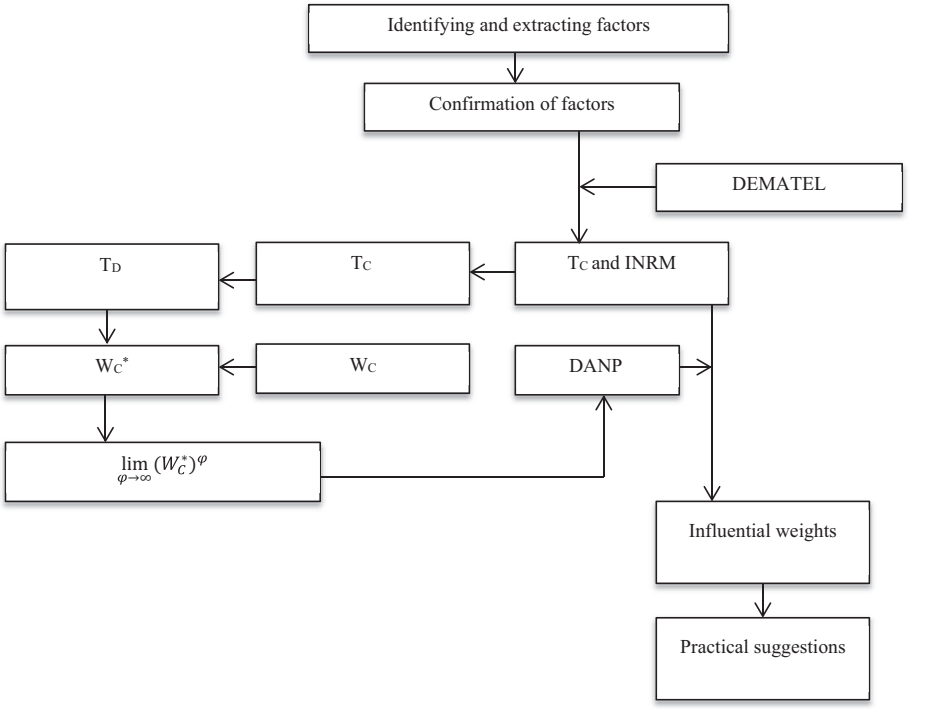

Figure 2.
Model procedure of the current research

In international articles up to 2018 (Si *et al.*, 2018), the combination of DEMATEL with different methods is as follows: 44.5% combination of DEMATEL and ANP, 18.2% Fuzzy DEMATEL, 30.3% Classic DEMATEL, 3.5% Gray DEMATEL, and 3.5% combination of other methods with DEMATEL has been reported. The statistical population of the present study consists of professors in the field of entrepreneurship who have ideas and ideas in the field of entrepreneurship resilience. According to Saaty (2002), ten experts are enough for pairwise comparative studies. Content validity was used to confirm the validity of the questionnaire. The research questionnaires were provided to several experts, and they verified and validated them. The researcher has provided enough explanations without personal orientation to make sure that the experts understand exactly what the researcher intended. In addition, after obtaining the results at each stage, these results were communicated to the experts for their final approval.

Case study in Iran

To find the most important factors influencing the selection of effective human factors for entrepreneurship resilience, various articles were used and the indices were extracted. The 5 main criteria along with 21 sub-criteria eventually formed the hierarchical model of the researcher (Table 2).

Fuzzy comments were integrated into the ten experts and the direct relationship matrix ($\tilde{A}$) was formed for the criteria and sub-criteria. The normalized matrix of direct relations ($\tilde{X}$) and general relations ($\tilde{T}$) was calculated. This is not due to the limitations on the number of pages and the results of impact ($\tilde{R}+\tilde{D}$) and net impact ($\tilde{R}-\tilde{D}$) are provided for the criteria and sub-criteria (Table 3).

Personal traits (S_1)	S_{11}	Efficacy
	S_{12}	Endurance
	S_{13}	Recognize opportunities
	S_{14}	Need for independence
	S_{15}	Innovation
	S_{16}	Stress tolerance
	S_{17}	Gender
Formal and informal relationships (R_2)	R_{21}	Family support
	R_{22}	Consulting services
	R_{23}	Alumni network
	R_{24}	Professional support
	R_{25}	Entrepreneurship network
Values and beliefs (A_3)	A_{31}	Spirituality
	A_{32}	Vision
	A_{33}	Flexibility
	A_{34}	Commitment to goals
Human capital (C_4)	C_{41}	Education
	C_{42}	Entrepreneurial competence
	C_{43}	First experience
Motivation (E_5)	E_{51}	Intrinsic motivation
	E_{52}	Competency in the team

Table 2.
Effective indicators in selecting human factors in effective entrepreneurship resilience

Index and sub-index	$\widetilde{R}$	$\widetilde{D}$	$\widetilde{R}+\widetilde{D}$	$\widetilde{R}-\widetilde{D}$
Personal traits	2.43	3.362	5.792	−0.93
Efficacy	0.318	0.252	0.569	0.066
Endurance	0.264	0.296	0.559	−0.03
Recognize opportunities	0.352	0.347	0.699	0.005
Need for independence	0.18	0.298	0.478	−0.12
Innovation	0.258	0.28	0.539	−0.02
Stress tolerance	0.224	0.293	0.518	−0.07
Gender	0.24	0.217	0.457	0.023
Formal and informal relationships	3.064	3.521	6.585	−0.46
Family support	0.188	0.217	0.405	−0.03
Consulting services	0.153	0.209	0.362	−0.06
Alumni network	0.242	0.212	0.454	0.03
Professional support	0.271	0.24	0.511	0.031
Entrepreneurship network	0.199	0.176	0.375	0.023
Values and beliefs	3.391	2.42	5.811	0.971
Spirituality	0.228	0.133	0.361	0.095
Vision	0.131	0.161	0.293	−0.03
Flexibility	0.108	0.19	0.298	−0.08
Commitment to goals	0.187	0.17	0.356	0.017
Human capital	2.71	2.94	5.65	−0.23
Education	0.165	0.104	0.269	0.061
Entrepreneurial competence	0.086	0.164	0.25	−0.08
First experience	0.165	0.148	0.313	0.017
Motivation	1.771	1.123	2.894	0.649
Intrinsic motivation	0.073	0.053	0.126	0.02
Competency in the team	0.05	0.07	0.12	−0.02

Table 3.
$\widetilde{R}$ and $\widetilde{D}$ values for the index and sub-index

The results shows, the highest R for the main index of "values and beliefs" indicates the highest impact of this index on other indices, and the highest D for the "formal and informal relationships" index, this indicates the severity of the impact of this indicator on other indicators of the system. According to the results shown in Table 8, the largest $D^{\sim} + R^{\sim}$ is related to the main index of "formal and informal relations," which is highly correlated with other indices and the lowest $D^{\sim} + R^{\sim}$ to the main index. It is "motivation" that this index has the least correlation with other indicators. An indicator with a positive $D^{\sim} - R^{\sim}$ به definitely shows the effectiveness of this indicator and an indicator with a negative $D^{\sim} - R^{\sim}$ ، is the definitive impact of this index on other indicators. Therefore, "values and beliefs" are the most influential indicators and "personal traits" are the most influential indicators. In general, $D^{\sim} - R^{\sim}$ positive is the causal index, and $D^{\sim} - R^{\sim}$ negative is the affective index of effect. In the following, network relationship map (NRM) is plotted with values of R + D and R − D (Figure 3).

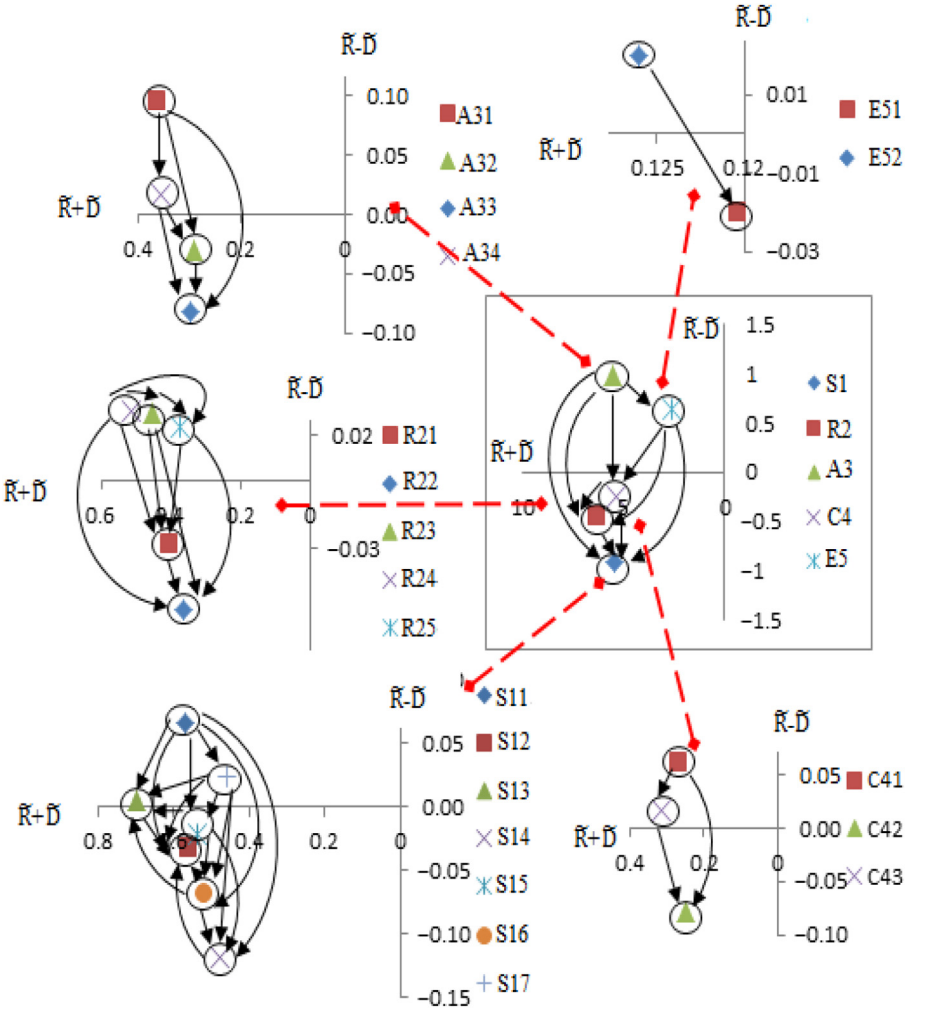

Figure 3.
Network relations map

As Table 8 shows, the degree of influence of the factors on each other varies. Therefore, according to Yang and Tzeng (2011), the use of traditional normal methods is irrational. In this study, we joined FDEMATEL. Thus, the matrix was normalized. Initially, the impact of the relationship between the criteria was compared based on the NRM. Finally, the limitation supper matrix converged in five power and overall weight of all criteria, and their ranks are shown in Table 4.

Results

In this study, a fuzzy multi-criteria decision-making model with DEMATEL based on ANP (fuzzy DANP) method was used to find and rank human factors affecting entrepreneurship resilience; to help investors and decision-makers make decisions; and all research target groups can make the best use of it. Resilience is a real-life process and not just a list of each characteristic. All human beings have an innate ability to be resilient, but resilience is a learned and learned behavior, and the emphasis of experts is on the learning of various resilience skills. Some have inner resilience features, but others can flourish by nurturing them in resilient environments such as home and school. In fact, promoting resilience through its application and its benefits in societies plays an important role that governments need to pay attention to. Indicators of Values and Beliefs (A3) and Motivation Index (E5) as Influential Indicators and indicators of personal attributes (S1), formal and informal relationships (R^2) and human capital (C4) are effective indicators of entrepreneurial resilience. In the personal traits group, opportunity recognition with 0.232 had the highest weight, and sex with 0.094 had the lowest weight. In the formal and informal relations

Indicators and sub-indices	Relative weight	Ultimate weight
Personal traits	0.250	
Efficacy	0.153	0.038
Endurance	0.14	0.035
Recognize opportunities	0.232	0.058
Need for independence	0.124	0.031
Innovation	0.124	0.031
Stress tolerance	0.131	0.032
Gender	0.094	0.023
Formal and informal relationships	0.263	
Family support	0.187	0.049
Consulting services	0.218	0.057
Alumni network	0.194	0.051
Professional support	0.205	0.054
Entrepreneurship network	0.194	0.051
Values and beliefs	0.183	
Spirituality	0.226	0.041
Vision	0.251	0.046
Flexibility	0.280	0.051
Commitment to goals	0.241	0.044
Human capital	0.222	
Education	0.228	0.050
Entrepreneurial competence	0.223	0.049
First experience	0.548	0.122
Motivation	0.080	
Intrinsic motivation	0.578	0.046
Competency in the team	0.421	0.033

Table 4.
Weight and rank of influential indicators

group, counseling services with 0.218 had the highest weight, and family support with 0.187 had the lowest weight. In the values and beliefs group, flexibility with 0.280 had the highest weight, and spirituality with 0.226 had the lowest weight. In the human capital group, the first experience with 0.548 had the highest weight, and the entrepreneurial competence with 0.223 had the lowest weight. In the motivational group, intrinsic motivation with 0.578 had the highest weight, and competency in the team with 0.421 had the lowest weight. In the last rankings, formal and informal relationships had the highest weight with 0.263, and the lowest with priority and motivation index with 0.080. In addition to the last ranking of the sub-indices, the indicators of first-hand experience, recognition of opportunities and consulting services were given the highest weight. Therefore, it can be concluded that who with what personal characteristics tend to start a new business and become an entrepreneur. Identifying these people helps to highlight the role of entrepreneurs in economic development. On the other hand, first-hand experience in creating risky jobs and identifying opportunities is crucial. A good entrepreneur is one who turns threats into opportunities in addition to past lessons and recognizing an opportunity.

Limitations and future research

As with all research, several limitations of this study should be noted. First, our research is based on survey data from a single source at a single point in time. Although it would be challenging, a longitudinal study would be a more valuable approach to refine the proposed model and unequivocally determine the causal sequence of our model. Further studies on the entrepreneurship resilience and Iranian organizations processes over time would be valuable to obtain a deeper understanding of the interacting factors. Second, this study was conducted exclusively in a single country; this approach is valid and useful due to the significant variation in institutional quality within a single country (Bruton *et al.*, 2010). To strengthen the generalizability and the empirical rigor of our results, future work could use cross-country samples within the same research setting. Lastly, as recommended by Welsh *et al.* (2014) and Kazumi and Kawai (2017), future research may theoretically and empirically investigate how basic institutional support measures, such as job training programs, entrepreneurial education, entrepreneurship resilience, and enhance the entrepreneurial identity in the long run.

Conclusion

The results of this study confirm that organizations need to improve their resilience.

Today, there is growing interest in the development of corporate resilience, which includes crisis planning and gives companies the ability to survive and thrive despite adverse conditions. Many organizations and companies face many problems, and overcoming crisis situations and organizational resilience is one of the most important things in life, rehabilitation or development. On the other hand, resilience building elements seem to lead to entrepreneurial action. It is the organization's capacity to respond positively or minimally to disruptions that shows that there is not only resistance to external shocks but also the capacity for adaptation and learning.

Considering that, first, today we regret to see the failure of some Iranian entrepreneurs and businesses, as well as their high rate of exit from entrepreneurial activities.

Second, the results of some studies show that Iran's business environment is low capacity and institutionally weak and has legal, political and economic institutional weaknesses.

Third, in the context of such a business environment, the conditions of international sanctions and economic crises in recent years have been further exacerbated.

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Corresponding author
Amir Mehdiabadi can be contacted at: amir.mehdiabadi@gmail.com