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Identifying sustainable rural entrepreneurship indicators in the Iranian context

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ABSTRACT

Sustainable entrepreneurship is a strategy for development, growth, and prosperity that has received the attention of researchers, especially in the fields of economic development and rural businesses. The present study aims to identify the sustainable entrepreneurship indicators in Iranian rural businesses using the Fuzzy Delphi method. The results derived from three phases of the Delphi technique introduced 87 indicators for sustainable entrepreneurship. However, considering the threshold, just 69 indicators were approved by the experts. In the sociocultural dimension, scholars pay special attention to the promotion of social trust and social altruism and empathy among the local people. In the economic dimension, indicators such as utilization of facilities, cost management of products and services for business stability, and market management had higher averages. Finally, major indicators of the ethical dimension include financial business transparency, ethics in using biological resources, and managing human resources. In general, the obtained results highlight the importance of determining the stability of indicators in rural entrepreneurship and the necessity of managers' and politicians' attention toward this sector.

1. Introduction

In today's innovative economy, countries see entrepreneurship as a significant factor in job-creation, technology development and innovation, economic growth, and the economy reformation process (Karimi et al., 2017). Therefore, governments believe that entrepreneurship is a national priority and scholars agree upon the role of entrepreneurship in social and economic development (Kautonen et al., 2017).

Studies indicate that there is a close relationship between rural entrepreneurship and regional development (De Los Ríos-Carmenado et al., 2016). Thus, in recent years, the subject of renovating and reanimating rural areas through promoting and developing entrepreneurship has gained much attention (Shahraki and Movahedi, 2017). Despite all efforts, in recent years, a group of researchers believe that considering the effects of market deficiencies, entrepreneurial activities lead to environmental demise (Pacheco et al., 2010; Kyro, 2014; Shahraki et al., 2016). Particularly, environmental inconsistencies such as pollution, soil erosion, and climatic changes are among the entrepreneurial activities in society (Chick, 2008). Nevertheless, some researchers have argued that, aside from the adverse impact of entrepreneurs on society and the environment, they also play a major role in directing business practices towards sustainability (Tilley and Young, 2009; Hockerts and Wüstenhagen, 2010; Parrish, 2010; O'Neil and Ucbasaran, 2011), especially social and ecological sustainability (Pacheco et al., 2010). Thus, it can be concluded that entrepreneurship development is gradually evolving from a limited subfield into a more extensive area, including economic, social, and environmental entrepreneurship. Nowadays, entrepreneurship is trying to include all these fields for achieving a comprehensive and holistic goal, i.e., sustainable entrepreneurship (Majid and Koe, 2012; Sarango-Lalangui et al., 2018). Moreover, entrepreneurship, as a strategy for the creation, growth, and prosperity of human communities, has become a replacement for the spontaneous

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planning and exposure of all the causes to achieve high social ideals that are the source of positive socio-economic impacts (Ansari et al., 2013; OECD, 2019; Terán-Yépez et al., 2020). The term "sustainable entrepreneurship" is a concept in which sustainable development and entrepreneurship have been enjoined, and it is considered a collective expression for environmental, green, and social entrepreneurship (Gibbs, 2009).

There is significant evidence suggesting that companies try to provide more sustainable performances compared to the rivals, to promote their competitive advantages. Current evidence indicates that a sustainable based performance can strengthen competitive advantages (Willard, 2009; Laszlo and Zhexembayeva, 2011). However, to achieve a sustainability-based performance, as well as sustainable entrepreneurship (especially in rural businesses), aside from the necessity of utilizing and preserving the sustainability-based operation, integrating the sustainable measures and standards (Lans et al., 2014) and the performance management system is greatly important (Schaltegger and Wagner, 2006, 2017). On this basis, the necessity of identifying and explaining a set of measures, indicators, and standards for assessing sustainable performance in entrepreneurial activities becomes trivial. Such indicators can make the concept of sustainable entrepreneurship more understandable for the public (Rosenström and Kyllönen, 2007); therefore, explaining these indicators in the rural business sector seems necessary. In this regard, different features such as the importance of the indicator, understandability, accuracy, and clarity should be considered. Therefore, it can be measured in a few terms (Ciletti and Chadwick, 2012).

Although sustainable entrepreneurship is seen as a key concept in addressing environmental and social issues through entrepreneurial activities, there is a lack of literature on the topic of rural entrepreneurship, especially in the context of Iran (Ebrahimi et al., 2013; Shahraki et al., 2019). There are also a limited number of experimental studies focusing on this topic (Hosseininia and Ramezani, 2016; Belz and Binder, 2017). Since the investigation of sustainable entrepreneurship in rural areas using the fuzzy Delphi method is considered as a new study topic (Cohen and Winn, 2007; Gibbs, 2009; Hall et al., 2010; Shahraki et al., 2016), there is a major gap in our knowledge as to how sustainable entrepreneurship emerges in rural areas of Iran (Rezaei-Moghaddam and Izadi, 2019). Therefore, in this study, the application of fuzzy Delphi method contributes to forming a set of weights for a variety of sustainable entrepreneurship indicators. The Delphi method provides an easy understanding of the group opinions through the provision of the questionnaire. The fuzzy Delphi method can be used to evaluate the entrepreneurship indicators in any organization by explaining the elements of entrepreneurship and encouraging entrepreneurial activities when appropriate (Haris and Rahman, 2017). The fuzzy Delphi method is designed to deal with imprecise and complex problems. In addition, the cognitive framework of the fuzzy method could be exploited by formalizing the human being's interpretation of problems and situations (Malagoli et al., 2007). Therefore, in this study, the application of the fuzzy Delphi method is an accurate methodology to assess the opinions of decision-making managers, experts, and analysts linked to entrepreneurship activities in rural areas of Iran.

According to the above-mentioned issues and works, the paper focuses on the main outcomes of establishing sustainable entrepreneurship in rural areas and how the production of new social movements and the promotion of multifunctional rural businesses should be. Therefore, the present study contributes to providing a framework for assessing sustainable entrepreneurial activities in rural businesses. Furthermore, it attempts to recognize the importance and priority of the indicators and their constructing markers by insisting on the key indicators determining sustainable entrepreneurship in rural businesses. In addition, the proposed model of sustainable entrepreneurship is an inferential reflection of the authors' awareness of the sociological and anthropological notions of (rural) entrepreneurship and the paper's results, based on the analysis of secondary, documentary, and digital resources relevant to the study subject.

2. Theoretical foundations

Although entrepreneurial activities are important for a country's economic growth (Thurik and Wennekers, 2004), they can also have negative impacts upon our world, which require quick compensation and correction (Koe and Majid, 2013). Thus, to reduce the effects of this problem, entrepreneurs tried to present initiatives for manufacturing more sustainable products and services (Maxwell and Van der Vorst, 2003; Young et al., 2010). Entrepreneurship can play an important role in changes toward a more sustainable future (Belz, 2013). Sustainable entrepreneurs not only pay more attention to changes in sustainable products and processes but also achieve particular environmental and social objectives (Choi and Gray, 2008). Then, it is time to pay more attention to sustainable entrepreneurship in the literature. On this basis, many researchers of various educational backgrounds have become interested in such a subject in recent years (Binder and Belz, 2015; Thompson et al., 2011; Nave and Franco, 2019).

2.1. Concept of entrepreneurship in rural areas of Iran

Rural Entrepreneurship seeks to ensure the added value of rural assets in rural areas by engaging vast rural human resources. The issue is essentially uneven development, which is the progression of one region at the cost of improving some other places, accompanied by related issues of underdevelopment. Further obstacles to rural entrepreneurs are posed by the small size of local markets and restricted access to critical resources such as finance, information, and advice. Other challenges include a shortage of suitable business premises, less developed transport and communications infrastructure, and restricted networking and collaboration opportunities. These are mostly the product of rural economies usually being less diverse than urban ones. Consequently, labor forces continue to suffer from low levels of skills, low diversity of skills, and systemic imbalances on the local labor market exacerbated by outward migration of young people, professionals, and well-educated people.

Entrepreneurship is one of the effective factors in rural development of Iran, as it can play an important role in developing the economic state of rural regions through the creation of new jobs and income sources. It is therefore of utmost importance to measure the villagers' entrepreneurship and to attempt to develop and strengthen entrepreneurship through the provision of the necessary infrastructure (Shahraki and Heydari, 2019). Entrepreneurship can act as a tool in its own residence for sustainability, independence, and reduction of villagers' needs (Rezvani and Najarzadeh, 2007). The participation of different rural groups in the implementation of the reforms is a sign of intergroup confidence, and the creation of social capital is the first step towards rural development (Ebrahimi et al., 2013).

In this context, Rezaei-Moghaddam and Izadi (2019) have constructed a framework for rapid-impact enterprises in Iran's rural areas that focuses on social and environmental factors as well as economic factors. They reported that Iran has a formal rural entrepreneurship discourse that creates, regulates, reflects, and modifies the state-oriented ideals about the "entrepreneur of the year". There are currently some organizations in Iran responsible for rural and agricultural entrepreneurship, such as Agriculture-

Jihad, Rural Co-operative Organization (Sazman 'e Taavon 'e Roostae), and Social Welfare, Co-operative, and Labor Organization. According to the Global Entrepreneurship Monitor (GEM), a global report for 2015–2016, Iran's economy is a factor-driven economy with the least entrepreneurship rating. While government organizations support "the entrepreneur of the year" and set up large-scale enterprise events, they all have a top-down bureaucratic structure that ignores the potential dynamics of rural life (Shahraki and Heydari, 2019).

2.2. Aspects and factors of sustainable entrepreneurship in rural areas

Based on a spectrum of the conducted studies, it is deducted that sustainable entrepreneurial activities can be applied through an equal mixture of three factors: local people (how much an organization has been responsible for its actions and operations in social terms), economic interest (interest and loss auditing), and environment (company's method of environmental responsibility). These three important factors form the core of sustainable entrepreneurship. This deduction is derived from the triple bottom line (TBL) concept, which was invented by John Elkington in 1994 aiming to search for a new language to express the development of sustainable values. Elkington (2004) believes that there are three main aspects of value creation in sustainable behaviors, namely: a) economic boom, b) environment quality, and c) social justice. This notion has been developed in the form of the "3P formula", including three components such as "people, planet, and profit", based on the rationality that companies should predict and prepare the triple baselines, treated separately.

The first component (people) points to major values related to the workforce such as employment, selection, putting to work, and training the competent employees to work for observing human rights and providing the needs of all people and the society (Crals and Vereeck, 2004; Richomme-Huet and De Freyman, 2011). It also includes certain facets, such as maintaining a fine working climate for workers and a sense of social mutuality while discussing shared objectives and responsible organizational behavior (Hapenciuc et al., 2015). A responsible integrated insight for society is assumed to be a turning point and an outstanding stage of strategic planning (Bell and Stellingwerf, 2012). The second component (planet) insists on environmental matters that must be taken into account seriously (Schick et al., 2002). Organizations' role in the sustainable consumption of their services and products originates in their life-cycle and value-chain as well as the informational features they provide for their consumers. A TBL company tries to act in favor of natural order as much as possible. At least, it tries to create no harm and minimize environmental effects.

Nevertheless, there is still a lack of empirical studies focusing on the importance of entrepreneurship programs in rural areas and how those programs can contribute to the development of these types of territories (Rei Galvao et al., 2020). Given a change towards the increasing importance of entrepreneurship, there is confusion about the best methods to promote creativity, investment, and, ultimately, new business growth, particularly in rural areas. Those with innovations — or those with creative skills, knowledge, or expertise — would definitely be the catalyst for new business development (Muñoz and Kimmitt, 2019). This interaction between human, social, and entrepreneurial resources creates a creative environment that facilitates sustainable economic growth and development in rural communities (Deller et al., 2019). Sustainable entrepreneurship also offers a conceptual link between sustainable development and business development. A central concept of sustainable development is that natural processes are limited and any attempts to enhance human well-being must be made within those limits. Sustainable entrepreneurs should concentrate on what should be maintained and what should be created (economic, health, and socio-cultural gains) (Gray et al., 2014).

2.3. A new framework for sustainable entrepreneurship in Iran

TBL has been accepted by researchers in conducting studies related to sustainable entrepreneurship according to established literature (Schlange, 2009). However, researchers like O'Neill et al. (2009) found that some essential fields were not included in TBL. In this regard, Shephard and Patzelt (2011) believe that in addition to the three main aspects of sustainable entrepreneurship, cultural factors should also be established. In fact, it is undeniable that culture creates a distinctive society (Shepherd and Patzelt, 2008). Thus, it is necessary to conduct further studies on the effects of the duties and roles of cultural forces in social entrepreneurship as well as sustainable entrepreneurship.

In addition to the cultural aspect, there is another dimension that has come under the focus of the entrepreneurship field in recent years, which is the ethical aspect (Heinrichs et al., 2014). When economic, environmental, and social incentives are integrated into an entrepreneurial business act, monitoring and stewardship, plus ethical responsibilities, are internalized to achieve credible and sustainable entrepreneurship (Withey and Schwartz, 2014). In a value-based framework, entrepreneurial activities should include (construct) normative elements. This can be achieved by manufacturing suitable products through an appropriate method regarding social terms, so as to improve the health and wellbeing of individuals affected by them (Hodgkin, 2002). In recent years, based on the TBL notion, Abdul Majid and Koe (2012) suggested the revised sustainable entrepreneurship model which includes four subfields (economic, social, environmental, and cultural). According to this model, to be recognized as a truly sustainable entrepreneur, all of the four recommended subfields must be given the same priority in the model.

After Saudi Arabia, Iran's $430 billion economy makes it the second-largest in the Middle East. Entrepreneurship is regarded as a big engine of Iran's economy. MacBride (2016) stated that there are many reasons why Iran could become an entrepreneurial powerhouse as follows: 1) the scale of the economy and the removal of world sanctions, 2) highly educated population with 9.4 percent tertiary education and 7.5 million university-educated people, 3) specific capabilities in tech fields where nanotechnology is seen as a nascent growth area, 4) regeneration of the country's infrastructure, and 5) except for rural areas, improvements that are taking place faster than people.

Rural entrepreneurship includes new combinations of local or regional rural resources, which generate value not only for entrepreneurs but also for rural areas (Korsgaard et al., 2015). In Iran, entrepreneurship can be an effective strategy for rural development (Ebrahimi et al., 2013) because different types of entrepreneurship activities in these areas generate more jobs, produce money, assist in the distribution of equal incomes, reduce poverty, and rebuild the economic situation in villages (Chitsaz et al., 2019). Although entrepreneurship can play an important role in rural growth, Iranian rural communities are vulnerable to cultural, social, and environmental side effects (Dadvar Khani, 2012), and many small towns in Iran face severe environmental, economic, and social challenges. More specifically, a number of rural areas suffered population loss because of migration to urban areas (Dadvar Khani, 2012; Aliabadi et al., 2016). That is why entrepreneurial initiatives and plans in rural communities should pay attention to different dimensions of sustainability, and the framework of rural sustainable entrepreneurship should be improved.

2.4. Research arguments

Over the years, the reduction in rural population has been the subject of controversy (Molaei Hashtjin, 2012), and ineffective government intervention, weak infrastructure, and market inefficiency have contributed to the problem. The agriculture sector in Iran should be ready to provide food for a population of about 100 million by 2020 (World Bank, 2013). This can be an incentive for economic growth and aid to reduce poverty. The difference between the present condition of rural growth in rural areas in Iran and the ideal circumstances is so broad that it cannot be filled by the normal steps and preparations. Particular attention should be paid to self-motivated economic activities to include sustainable entrepreneurship in economic planning in rural areas (Goldoost Azari and Allahyari, 2017).

This goal can only be achieved by focusing on the development of entrepreneurship in rural areas and the transformation of Iranian communities into entrepreneurial and knowledge-based societies. When entrepreneurship is accepted as a lifestyle, the community will experience accelerated economic growth and balanced and sustainable national development (Shahraki and Movahedi, 2017). Rural entrepreneurship is considered as an investment to set up a business in rural areas. This investment is based on unique aspects of rural areas that do not exist in cities. Entrepreneurship in rural areas seeks a unique internal and external composition for agricultural activities, livestock, and production resources. Identifying barriers and constraints, as well as key indicators for sustainable entrepreneurship, may lead policymakers to rural development and eliminating their problems and bottlenecks areas (Goldoost Azari and Allahyari, 2017). In this context, Movahedi and Yaghoubi-Farani (2012) have applied the Delphi method to explore obstacles and constraints on rural women's entrepreneurship and have established nine variables: individual, personality and behavior, family, information and education, socio-cultural, accessibility of facilities and services, legal, financial and economic, and geographical and environmental factors.

In the current study, the Delphi technique was selected to obtain and synthesize the opinions of experts. In brief, the present study attempts to answer the following questions: "What are the illustrative indicators for sustainable entrepreneurship in rural businesses?" "How sustainable rural entrepreneurship can play a role in poverty alleviation and development plans as a strategic factor?" "How effective is the Fuzzy Delphi method in determining key indicators for sustainable entrepreneurship?"

3. Research methodology

In Iran, the paradigm for rural development has shifted since 2000 due to the effects of postmodernism and the development of environmentalism. Meanwhile, it can be said that the idea of rurality is characterized by the literature based on (rural) growth, and, as a result, there is a political-economic and practical definition for rural discourse. Unfortunately, the number of qualitative research studies on rural deconstruction or rural entrepreneurship is very limited. One and a half billion dollars have recently been earmarked for rural development in the country, saved by the National Development Fund (www.Irna.ir) (Rezaei-Moghaddam and Izadi, 2019). A recent national plan to provide 4% interest loans to rural entrepreneurs in Iran is a good example of the functional meaning of rurality, on the one hand, and the supply concept of entrepreneurship, on the other, which unifies rural entrepreneurs with high farmers (Rezaei-Moghaddam and Tohidyan, 2019). However, Iran does not benefit from a competitive political system such as India, and the pre-assumed advantages of so-called 'competition' are distributed to a group with the power and the upper hand (Shahraki and Heydari, 2019).

This research seeks to contribute to the literature of Sustainable Entrepreneurship, especially in rural businesses, as this aspect is underdeveloped in current literature. In addition, this study explores a new situation. Iran is a developing country, in which the debate on the impact of new businesses on the local community sustainability is widely pronounced (Shahraki et al., 2016; Shahraki and Movahedi, 2017). This work offers a set of sustainable rural entrepreneurship indicators that can be helpful to all relevant stakeholders, especially government offices of rural businesses, for policy-making and sustainability evaluation and monitoring of rural businesses. To do this, we used an extensive literature review for identifying sustainable entrepreneurship indicators and then applied a Delphi process to identify the best sustainable rural entrepreneurship indicators according to the conditions of rural businesses in Iran.

3.1. Data collection

Fig. 1 summarizes the steps involved in developing a framework to identify the sustainable rural entrepreneurship indicators with details described below. The first stage includes a comprehensive review of the literature on various aspects of sustainable entrepreneurship, including books on research and articles published in national and international peer-reviewed scientific journals, with the focus on the theoretical investigation of scientific information and background on sustainable entrepreneurship, models, and indicators.

3.2. Data analysis

The second stage of this study was conducted qualitatively aiming to detect and explain the aspects and indicators of sustainable entrepreneurship. In this part, for gathering the required information and detecting indicators, the secondary study technique (reviewing documents and published texts), semi-structured interviews, and the fuzzy Delphi method were used. The Delphi method has been widely used in many sustainable studies to reach a consensus among a group of people on the development of sustainable indicators. It is most appropriate to proceed with a group of experts to collect the required information. However, the conventional Delphi method may not be sufficient because of the iterative nature of the Delphi method and the complexity of gathering experts in a single environment, as well as the vagueness and ambiguity of the decision-making process. To deal with this issue, recent studies apply the fuzzy set theory to the Delphi technique that is presented as the fuzzy Delphi method. Zadeh (1965) has developed the fuzzy set theory to address situations which humans can not accurately describe. Kuo and Chen (2008) noted that, as opposed to the conventional Delphi method, the fuzzy Delphi method has the advantage of having only a small number of tests, which in turn can save time and costs in collecting expert opinions.

In this study, scholars and experts are divided into two groups: the first group is made up of managers engaged in sustainable rural and agricultural development; the second group is made up of university professors and researchers specialized in related fields, including sustainable development and rural and sustainable entrepreneurship (Table 1). In addition, four features, including knowledge and experience in the study subject, intention, sufficient time for attendance, and effective communicative skills, were attributed to the population. Sampling was done using the purposive sampling technique. Regarding the sample size, although the size of the respondent panels varies, it has been suggested that ten to fifteen participants may suffice for a homogeneous group of people (Hwang and Lin, 1987). In the panel section of the Delphi

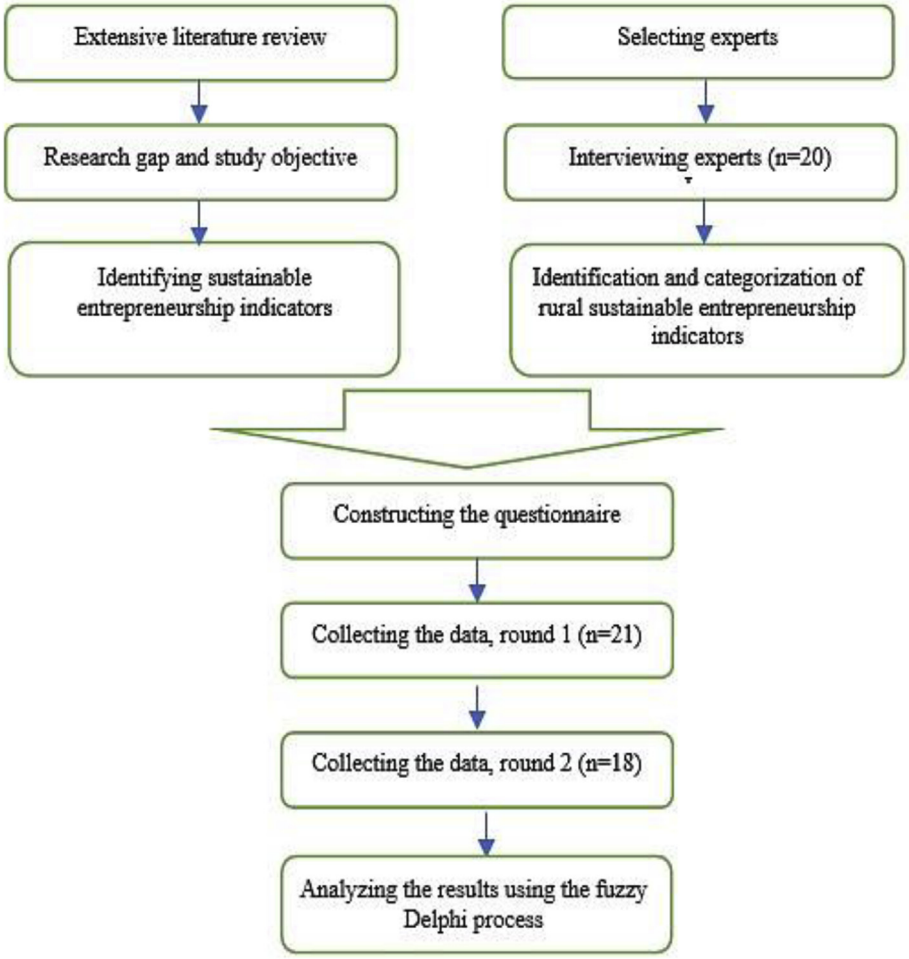

Fig. 1. The proposed framework for the identification of sustainable rural entrepreneurship indicators.

method, two groups of 21 and 18 people attended the first and second rounds of the study, respectively. All these individuals have a Ph.D. in agricultural extension and education, as well as rural and entrepreneurship development. According to the complicated and multi-dimensional nature of sustainable entrepreneurship, in this stage of research, a structural and theoretical guideline, plus the initial indicators were identified using the secondary review technique through reviewing the theoretical literature on sustainable entrepreneurship.

Subsequently, the indicators of sustainable entrepreneurship were extracted and identified using semi-structured interviews based on expert and scientific scholars' opinions. In the next stage, the fuzzy Delphi approach was adopted. Thus, an initial list of sustainable indicators was created in the form of a questionnaire by mixing the indicators identified in the former stages. The fuzzy Delphi questionnaire was designed aiming to collect the experts' opinion on their level of agreement with the suggested indicators, and they expressed their thoughts through verbal variables. In this study, the triangular fuzzy number was applied for including experts' opinions and creating the fuzzy Delphi method. Therefore, the maximum and minimum amounts in the experts' opinions were considered as border points for the triangular fuzzy numbers, and the geometrical average middle-point was used as the membership degree of triangular fuzzy numbers. It was also used for removing the impact of border points (Montazer and Jafari, 2008).

In the present study, the triangular spectrum used for expressing the importance of indicators via the Likert five-point scale is defined by terms such as very important, important, medium, unimportant, and very unimportant. For conducting this method, first, the experts present their opinions through a verbal form. Their opinions' triangular fuzzy amounts are then calculated and turned into fuzzy amounts (Azar and Faraji, 2008). In the next step, experts' opinions are aggregated, for which the fuzzy weighted average method was used in the present study, using formula 1 to calculate the fuzzy average (for triangular fuzzy numbers):

$$F_{AVE} = \frac{\sum l}{n}, \frac{\sum m}{n}, \frac{\sum u}{n} \quad (1)$$

where l, m, and u are the lower, middle, and upper numbers of fuzzy sets, respectively. In other words, l represents the lowest value or lower bound, u is used for upper bound or the highest possible value, m is the middle one or the most probable value, and n is the number of respondents (Akyuz and Celik, 2015). After the fuzzy aggregation of experts' opinions, the obtained amounts should go through a defuzzification process (formula 2). Then, the centroid fuzzy technique was adopted for measuring the crisp number and defuzzification.

$$Crisp = \frac{l + 2m + u}{4} \quad (2)$$

Table 1
Experts' qualification and characteristics.

	Age	Gender	Academic Ranking/Manager	Fields of Study
Experts Participated in Interview (20)				Rural Development (3)
				Geography and Rural Planning (2)
	35-40 (5)		Assistant Professor (7)	Agronomy and Environmental Studies (3)
	41-50 (8)	Male (17)	Associate Professor (5)	Management and Economics (3)
	51-57 (7)	Female (3)	Professor (3)	Social Sciences (2)
			Manager (5)	Agricultural Extension and Education (4)
				Entrepreneurship (3)
Experts Participated in the First Round of Fuzzy Delphi (21)			Instructor (1)	Rural Development (3)
	35-40 (5)	Male (17)	Assistant Professor (7)	Geography and Rural Planning (2)
	41-50 (8)	Female (4)	Associate Professor (5)	Agronomy and Environmental Studies (3)
	51-57 (8)		Professor (3)	Management and Economics (3)
			Manager (5)	Social Sciences (3)
				Agricultural Extension and Education (4)
				Entrepreneurship (3)
Experts Participated in the Second Round of Fuzzy Delphi (18)				Rural Development (3)
	35-40 (5)	Male (15)	Instructor (1)	Geography and Rural Planning (2)
	41-50 (7)	Female (3)	Assistant Professor (6)	Agronomy and Environmental Studies (3)
	51-57 (6)		Associate Professor (4)	Management and Economics (2)
			Professor (3)	Social Sciences (2)
			Manager (4)	Agricultural Extension and Education (3)
				Entrepreneurship (3)

After selecting a suitable method and defuzzification of the numbers, a tolerance threshold should be considered for screening the items. Based on experts' opinion, a threshold of 0.7 was determined (this amount can be different from other researchers' perspectives and from one study to another). If the definite amount resulting from the defuzzification of experts' aggregated opinions is larger than the sufficiency threshold, the indicator is approved. In case this amount is less than the sufficiency threshold, the indicator is removed. Normally, the threshold amount is defined by the mental deduction of the researcher and there is no universal way or law for determining its amount. The threshold amount affects the number of factors being screened. Generally, if:

Mj $\geq$ S: the j indicator is approved.

Mj $<$ S: the j indicator is removed.

where S is the sufficiency threshold and M is the mean of the defuzzification of experts' opinion (i.e., the mean amount resulting from the defuzzification of experts' aggregated opinions), and j is the number of indicators.

4. Results and discussion

4.1. The first round of fuzzy delphi technique

In the first stage, after conducting interviews and extracting the initial indicators, the experts familiar with the subject were asked to assess 77 indicators chosen from the study literature and the results of interviews analysis and to express their opinions in form of approving or disproving an indicator. After collecting the distributed questionnaires, the collected information was analyzed and investigated. Results of this investigation show that all indicators of the study were approved by gaining the approval of most scholars who participated in the research.

4.2. The second round of fuzzy delphi technique

In this round, considering the results of the first round, and also the data collected from reviewing the theoretical foundation of the study, the importance level of each indicator was finalized and investigated in the form of the Likert scale. For analyzing the gathered data, fuzzy averages of all experts were measured for each indicator using formula 1. The numbers resulted from this calculation were fuzzy numbers, and for converting non-fuzzy (definite) numbers via formula 2, the definite average was calculated for each indicator. Finally, based on the definite average and the considered threshold amounts, indicators were approved or disapproved.

4.3. Determining the suitable indicators for sustainable entrepreneurship in rural businesses

Based on the obtained results, the triangular fuzzy amounts of experts' panel were calculated. The fuzzy and defuzzified averages of indicators are presented in Tables 2–5. The Delphi technique literature has not indicated a clear level of experts' opinion for reaching consensus on selecting the final indicators (Mash et al., 2006). There are various opinions in this regard, and the method of reaching consensus differs from one study to another (Rayens and Hahn, 2000). Therefore, it can be stated that the required minimum score level for selecting indicators is determined based on the researcher's discretion (Mash et al., 2006). In the present study, the threshold limit was defined as 0.7 based on experts' opinions. On this basis, each indicator with a fuzzified form larger than 0.7 is approved and accepted. The following tables investigate the status of each indicator. Although there is no prior study identifying sustainable entrepreneurship indicators in rural businesses, the results are similar to the literature in the sustainable entrepreneurship context (e.g., Hsu et al., 2017; Lin et al., 2019; Mondalizadeh et al., 2014).

In the environmental aspect of sustainable entrepreneurship, 17 indicators were given to the experts. Then, considering the results of the questionnaires and using equations (1) and (2), the fuzzy and defuzzified averages of each indicator were calculated (Table 2). Based on the amount of the accepted threshold in this study, and the amount of the defuzzified average amount of each environmental indicator, all indicators were approved by experts' opinions, except for two indicators: observation of air pollution standards in villages and utilization of pollution reducing technologies as well as the contribution toward preserving general cleanliness and hygiene of village environments.

The panel members rated the optimal use of water resources and compliance with fertilizer and chemical pesticide use standards in crop activities as the most important indicators related to the environmental dimension. Agriculture is the world's largest user of water, accounting on average for 70% of total freshwater withdrawals (FAO, 2017). In Iran, a semi-arid country, more than

Table 2
Selection of appropriate environmental indicators.

Indicator	Fuzzy average	Defuzzified average	Indicator status
1. Observance of the standard of fertilizer and chemical pesticide use in crop activities	(0.64, 0.89, 0.98)	0.850	Confirm
2. Optimal use of water resources (in agricultural production, rural businesses, etc.)	(0.70, 0.96, 1)	0.905	Confirm
3. Observance of air pollution standards in the village and using pollution reduction technologies	(0.44, 0.66, 0.89)	0.662	Reject
4. Maintaining the quality of the landscape and traditional village context when building business units	(0.47, 0.72, 0.91)	0.705	Confirm
5. Using sanitation systems and waste disposal and waste recycling	(0.53, 0.77, 0.93)	0.75	Confirm
6. Observance of standards in greenhouse gas emissions	(0.5, 0.75, 0.91)	0.727	Confirm
7. Quantitative and qualitative protection of agricultural land and desert areas	(0.62, 0.87, 0.97)	0.832	Confirm
8. Protecting natural ecosystems and wildlife ecosystems	(0.60, 0.84, 0.98)	0.815	Confirm
9. Protecting and preventing the destruction of forest and rangeland areas	(0.62, 0.87, 0.97)	0.832	Confirm
10. Preservation of river water resources and wetlands	(0.68, 0.94, 0.98)	0.885	Confirm
11. Managing energy efficiency in businesses (Energy-Efficient Technologies and Plans)	(0.62, 0.87, 0.97)	0.832	Confirm
12. The use of environmentally friendly technologies and clean and renewable energy instead of fossil fuels	(0.62, 0.87, 0.97)	0.832	Confirm
13. Use of production, packaging, distribution, and green and environmental friendly advertising	(0.55, 0.80, 0.97)	0.78	Confirm
14. Training employees and customers for environmental protection	(0.60, 0.85, 0.97)	0.817	Confirm
15. Supporting NGOs and social activities to protect the natural environment in the village	(0.53, 0.77, 0.93)	0.75	Confirm
16. Helping to maintain cleanliness and public health of the village environment	(0.44, 0.69, 0.90)	0.68	Reject
17. Attention to preserving indigenous diversity, biodiversity, and genetic diversity in natural ecosystems	(0.53, 0.77, 0.94)	0.752	Confirm

90% of the total water withdrawal is used in the agriculture sector, and the shortage of water is one of the key issues for the policy-makers. Agriculture is also a major source of water pollution from nutrients, pesticides, and other contaminants, which could lead to substantial social, economic, and environmental costs if poorly managed (FAO, 2017). It is, therefore, crucial to conserve and enhance natural resources, such as water, to achieve sustainable rural and agricultural entrepreneurship.

In this regard, Hart (1995) highlighted the importance of environmental indicators (such as waste disposal and recycling, protecting natural ecosystems, and use of environmentally friendly technologies and clean and renewable energy) and the integration of environmental concerns in businesses. He also suggested that businesses can develop their competitive advantage and performance by being more environmentally sustainable. Some studies (Roxas et al., 2017; Schaltegger and Wagner, 2011) indicated that environmental sustainability indicators, including waste management, water conservation, and recycling of wastes, are critical and lead to superior business performance. To remain competitive at the same time, corporations must have ambitious targets aimed at mitigating climate change, protecting the ecosystem, fighting environmental degradation and deforestation, and, above all, promoting sustainable agricultural practices, drinking water, and the environment (Sarango-Lalangui et al., 2018).

Considering the research results on 20 sociocultural indicators of sustainable entrepreneurship (Table 2), various indicators were approved, except for those which had a fuzzified average amount less than the threshold (rejected). The rejected indicators are as follows: affecting the creation of NGOs; affecting the development of social conversations and interactions; avoiding creation and elevation of racial, ethnic, social, and religious differences; investment for preserving the local traditions, customs, and culture; membership of business in social and local networks and institutes; and using appropriate words fitting the local symbols, values, and traditions to create a business brand. Regarding the social dimension of sustainable entrepreneurship, Young and Tilley (2006) explain that indicators such as commitment to society and social responsibility are important elements of the social dimension of sustainable entrepreneurship. According to Table 3, social trust and friendship are the most important indicators of the socio-cultural dimension. Social trust as a component of social capital is a key factor in explaining social responsibility behavior (Chen and Wan, 2019), which can play an important role in developing sustainable entrepreneurship (Bucar et al., 2003; Lang and Fink, 2019) in rural areas. Previous studies suggest that rural communities are places with extremely high levels of social capital that make them the ideal environment for social and sustainable enterprise (Farmer et al., 2008; Munoz et al., 2015; Lang and Fink, 2019). As can be seen in Table 3, some cultural indicators such as valuing the local people's social traditions and customs were approved. As O'Neill et al. (2009) stated, culture influences all aspects of a sustainable entrepreneurship process; therefore, it should be included in the model of sustainable entrepreneurship. However, Shepherd and Patzelt (2008; 2011) have stated the value of preserving the culture of a specific group in order to avoid the loss of personal and community identity.

In the economic dimension of sustainable entrepreneurship, 25 indicators were given to the experts. Considering the results derived from questionnaires and through adopting equations (1) and (2), the fuzzy and defuzzified averages of indicators were calculated (Table 4). Based on the amount of the accepted threshold in this study, and with regard to the defuzzified average amounts, all economic indicators were approved, except for those whose defuzzified averages were less than the threshold (rejected). The rejected indicators are as follows: paying attention to fair pricing principles for products and services and more concentration on forming deals and doing business with the local society.

As mentioned, most economic indicators such as maintaining and sustaining business performance and managing and controlling the costs of production and services for business sustainability were approved. Nonetheless, researchers including Crals and Vereeck (2004), Austin et al. (2006), and Hall et al. (2010) have discussed the value of becoming economically viable to company sustainability, even sustainable businesses. Shepherd and Patzelt (2008; 2011) specifically defined 'economic benefits' as one of the perspectives for sustainable entrepreneurship to be built upon. It is widely accepted that sustainability and the economic element, including market efficiency, are directly related (Matinaro et al., 2019; Bocken et al., 2014). In their meta-analysis, Orlitzky et al. (2003) have studied that the social, environmental performance, and financial performance may be of greater importance than is usually anticipated.

In the field of the ethical indicators of sustainable entrepreneurship, 25 indicators were investigated (Table 5). Based on the accepted threshold amount for this study, the indicators that had deffuzified averages below the threshold were disapproved, while the others were approved by experts' opinions. The rejected indicators are as follows: religious affiliation and obeying the religious law in business, confronting the excessive consumerism ground and culture, observing ethics and transparency in

Table 3
Selection of appropriate sociocultural indicators.

Indicator	Fuzzy average	Defuzzified average	Indicator status
1. Attracting rural businesses to social solidarity programs in local communities	(0.46, 0.70, 0.90)	0.70	Confirm
2. Effect on the establishment and development of popular groups in rural areas	(0.41, 0.66, 0.91)	0.66	Reject
3. Influencing the development of dialogues and social interactions in rural communities	(0.39, 0.64, 0.87)	0.635	Reject
4. Avoiding the creation and increase of ethnic, racial, social, and religious differences	(0.44, 0.69, 0.89)	0.677	Reject
5. Investing to preserve the customs, culture, and local traditions of the village	(0.43, 0.68, 0.87)	0.665	Reject
6. Paying attention to strengthening the sense of belonging to the village among local and young people	(0.54, 0.79, 0.94)	0.765	Confirm
7. Focus on empowerment and social friendship among locals	(0.55, 0.80, 0.98)	0.782	Confirm
8. Helping to strengthen social trust in rural communities	(0.61, 0.86, 0.97)	0.825	Confirm
9. Having social concern and commitment to the problems of the rural community	(0.44, 0.72, 0.93)	0.71	Confirm
10. Valuing the local people's customs and traditions	(0.49, 0.69, 0.91)	0.70	Confirm
11. Helping to create and develop social awareness and empowerment among the people of the village	(0.5, 0.75, 0.94)	0.735	Confirm
12. Membership of business in networks and social and local institutions in the village	(0.41, 0.66, 0.87)	0.65	Reject
13. The use of vocabulary tailored to the symbols, values, and traditions of the local business brand	(0.35, 0.60, 0.82)	0.592	Reject
14. Strengthening the spirit of group and collective work in business	(0.57, 0.82, 0.97)	0.795	Confirm
15. Creating and strengthening the sense of corporate ownership in business staff	(0.46, 0.70, 0.90)	0.70	Confirm
16. Helping to develop local communication and social media in rural communities	(0.46, 0.70, 0.93)	0.70	Confirm
17. Helping to identify and foster human capacities in the countryside	(0.54, 0.79, 0.93)	0.762	Confirm
18. Efforts to gain social acceptance of business in rural society	(0.51, 0.76, 0.93)	0.74	Confirm
19. Helping to stabilize and maintain social security and comfort in rural environments	(0.46, 0.70, 0.93)	0.70	Confirm
20. Culture and investment for the development of social entrepreneurship	(0.54, 0.79, 0.96)	0.77	Confirm

Table 4
Selection of appropriate economic indicators.

Indicator	Fuzzy average	Defuzzified average	Indicator status
1. Maintaining and sustaining business performance (continuity of quality, sales, profitability, and capital)	(0.58, 0.83, 0.97)	0.802	Confirm
2. Helping to sustain the livelihood of business owners and agents	(0.55, 0.80, 0.94)	0.772	Confirm
3. Managing and controlling the costs of production and services for business sustainability	(0.57, 0.82, 1)	0.802	Confirm
4. Market management and promotion of marketing performance in business	(0.57, 0.82, 0.94)	0.787	Confirm
5. Expanding the size and level of activities (business development) with regard to the ecological and natural capacity of the region	(0.51, 0.76, 0.96)	0.747	Confirm
6. The use of the local workforce in the business	(0.53, 0.77, 0.97)	0.76	Confirm
7. Identification and utilization of latent and stagnant assets and capital in the village	(0.53, 0.77, 0.93)	0.75	Confirm
8. Utilizing the resources, inputs, and resources of local and native villages	(0.61, 0.86, 0.98)	0.827	Confirm
9. The maintenance and continuity of product quality and the effectiveness of services in the business	(0.55, 0.80, 0.97)	0.78	Confirm
10. The existence of local and regional institutional network communications in the production chain and the provision of services	(0.46, 0.70, 0.90)	0.70	Confirm
11. Business enhancement of regional and local competitive advantages	(0.55, 0.80, 0.93)	0.77	Confirm
12. Attention to the principles of customer orientation in business	(0.5, 0.73, 0.94)	0.725	Confirm
13. Investing in indigenous knowledge-based innovations	(0.54, 0.79, 0.93)	0.762	Confirm
14. Considering the sustainability of the rural economy and the economic prosperity	(0.55, 0.80, 0.93)	0.77	Confirm
15. Attention to the tastes, needs, and expectations of the rural community	(0.46, 0.70, 0.90)	0.70	Confirm
16. Identification and utilization of the fields of development and completion of production and service chains in the village	(0.53, 0.77, 0.94)	0.752	Confirm
17. Investing in rural youth to create and grow new businesses	(0.58, 0.83, 0.98)	0.805	Confirm
18. Avoiding entry into the context of creating and increasing income disparities among the rural classes	(0.48, 0.73, 0.93)	0.717	Confirm
19. Focus on non-farm business and non-farm services in the countryside	(0.58, 0.83, 0.97)	0.802	Confirm
20. Paying attention to the principles of fair pricing in goods and services	(0.46, 0.70, 0.89)	0.687	Reject
21. Prospecting and forecasting target markets at local, regional, and other levels	(0.5, 0.75, 0.93)	0.732	Confirm
22. Observing resource and energy constraints in rural environments	(0.57, 0.82, 0.94)	0.787	Confirm
23. Rational risk and foresight in economic decision making	(0.5, 0.75, 0.94)	0.735	Confirm
24. Having long-term business strategies in business	(0.57, 0.82, 0.94)	0.787	Confirm
25. Focusing more on trading and trading with people and the local rural community	(0.37, 0.62, 0.87)	0.62	Reject

relationships and institutional cooperation, observing ethics based on the local traditions and culture, following professional work ethics and commitment to the field of modern and virtual technologies, valuing different tastes, expectations, and culture of the local people, and lack of using the public resources and facilities of villages for gaining personal interest. In this sense, Racelis (2014) stated that entrepreneurship is an inescapable ethical activity, and entrepreneurial action has powerful ethical dimensions and implications. He believes that sustainable businesses need to pay attention to some ethical indicators like human dignity and human rights issues and honesty in the production, marketing, and sales processes.

5. Conclusion

In the current study, a spectrum of indicators was identified in

Table 5
Selection of appropriate ethical indicators.

Indicator	Fuzzy average	Defuzzified average	Indicator status
1. Fairness and justice in determining the price and selling products and services	(0.48, 0.73, 0.91)	0.712	Confirm
2. Religious adherence and observance of religious issues in business	(0.43, 0.68, 0.89)	0.67	Reject
3. Observance of justice and meritocracy in attracting and employing manpower	(0.48, 0.72, 0.89)	0.702	Confirm
4. Moral primacy over short-term economic interests	(0.48, 0.73, 0.91)	0.712	Confirm
5. Avoiding self-reliance and emphasis on collaborative decision making in business management	(0.47, 0.72, 0.91)	0.705	Confirm
6. Transparency in business finance	(0.58, 0.83, 0.97)	0.802	Confirm
7. Observing ethical standards in attracting, training, employing, and managing human resources	(0.55, 0.80, 0.94)	0.772	Confirm
8. Commitment to ethics and honesty in the marketing, competition, advertising, and sales process	(0.55, 0.80, 0.97)	0.78	Confirm
9. Observance of standard health indicators in the production and supply of goods and services	(0.51, 0.73, 0.90)	0.717	Confirm
10. Observing the principles of intellectual property in your own business and others' businesses	(0.47, 0.72, 0.91)	0.705	Confirm
11. Confronting the culture and the fields of extreme consumerism and creating false needs in rural society	(0.36, 0.61, 0.85)	0.607	Reject
12. Observing ethical principles and transparency in institutional communication and co-operation	(0.41, 0.66, 0.90)	0.657	Reject
13. Observing ethical principles based on the local culture and culture of the village	(0.43, 0.68, 0.89)	0.67	Reject
14. Correct performance of business organizational commitments (repayment of debt, loans, taxes, duties, etc.)	(0.5, 0.75, 0.96)	0.74	Confirm
15. Adherence to the legal requirements for setting up and managing a business	(0.53, 0.77, 0.93)	0.75	Confirm
16. The commitment of business owners and agents to professional commitments and responsibilities	(0.51, 0.76, 0.94)	0.742	Confirm
17. Respect for the ethics and professional commitment to work in the field of modern and virtual technology	(0.44, 0.69, 0.93)	0.687	Reject
18. Orbital ethics in the use of biological resources, dealing with nature, and so on	(0.58, 0.82, 0.93)	0.787	Confirm
19. The presence of transparency in the supply of goods and services information (information type and quality of the product, terms of service, production practices, and prices)	(0.48, 0.72, 0.91)	0.707	Confirm
20. Commitment to continuity and improvement of the quality of products and services	(0.48, 0.73, 0.93)	0.717	Confirm
21. Valuing the tastes, expectations, and culture of indigenous and local people	(0.37, 0.62, 0.86)	0.617	Reject
22. Lack of utilization of public resources and public facilities for personal gain	(0.44, 0.68, 0.89)	0.672	Reject
23. Contributing to the creation and strengthening of individual conscience and discipline in the staff	(0.53, 0.77, 0.96)	0.757	Confirm
24. Attention to employees' mental security and relaxation in the workplace	(0.48, 0.73, 0.91)	0.712	Confirm
25. Paying attention to the dimensions of the physical and mental health of our customers in the production of goods and services	(0.51, 0.76, 0.94)	0.742	Confirm

different economic, sociocultural, environmental, and ethical fields, which is a state-of-the-art task in its kind, especially in the rural and agriculture sector, and it can present an appropriate guideline for the activists and decision-makers of this sector. Thus, entrepreneurs and authorities must pay attention to sustainable propagation programs, as well as sustainable assessment and ranking ones in entrepreneurial businesses, particularly in rural areas.

The findings of this study and the proposed model in rural areas will provide technical knowledge and human capital in the fields of formal and indigenous knowledge, resources, financial capital, and cooperative entrepreneurship. Using the gained results in the study in rural development and the expansion of entrepreneurship, the creation of a market management area in villages can be stepped up. The findings of the study highlighted that sustainable rural entrepreneurship is a strategy for empowering and building capacity in rural areas to change the current pattern of life to an optimal human pattern, reduce the urban-village gap, and create economic, social, environmental, and institutional equality.

Considering the research findings, to develop sustainability in rural entrepreneurial businesses in form of ecological indicators, it is vital to optimize the usage of water resources, preserve the rivers and ponds, observe the standard consumption of fertilizers and chemical pesticides, utilize environment-friendly technologies plus clean and renewable energies, preserve forests and meadows and prevent them from degradation, and also pay attention to qualitative and quantitative preservation of agricultural soils and desert fields. In the economic indicators section, using local facilities, livestock, and production resources of rural areas, investing in village youngsters for creating and developing new businesses, managing and controlling the manufacturing and services costs for business sustainability, focusing on income resources derived from non-agricultural jobs and services in villages, obeying the limitations of resources and energy in rural areas, market management, and promotion of marketing performance are more important, and they must be insisted upon in the programs on sustainable propagation for entrepreneurial businesses in rural areas.

Based on the results, achieving sustainable entrepreneurship requires the attention of businesses to various grounds such as promoting social trust, collective and teamwork spirit, social empathy and altruism, sense of belonging to the village, creating culture and investments for developing the grounds of social entrepreneurship, and contribution toward identifying and expanding the human potentials in rural areas. A number of ethical indicators are more important for gaining more attention from rural businesses for achieving sustainability, including transparency in financial affairs; being ethics oriented in using the biological resources; behavior with nature; affiliation to ethics and honesty in the marketing, competition, advertisement, and sales processes; following ethical merits in the acquisition, training, employment, and managing human resources; and finally,

contribution toward creating and reinforcing personal conscience and work discipline in employees.

As policy implications and guidelines for future research, the theoretical model of sustainable rural entrepreneurship and fuzzy aggregation of experts' opinions are presented as the main proposal of the paper to rethink rural entrepreneurship. An entrepreneurial theoretical model is needed to help develop rural communities, which themselves require recognition of dependent variables and the relationship between them. Overall, the development of the economic and social environment in villages is very effective in the recruitment of young and skilled workers and specialists, as well as the expansion of agricultural jobs as a key strategy for the development and strengthening of rural entrepreneurship in the context of sustainable development in these areas. It should be understood that rurality is the product of the inhabitants' living experience, and then the subjective issues of the upper hand, so that future studies can pay adequate attention to the qualitative methodology concerned with issues such as fluidity, subjectivity, agency, and grounded narratives.

In this study, the weights of values of all experts were considered equal, which can also be viewed as different fuzzy or grey numbers to accurately capture the weights of judgments based on the experts' experience and expertise. In addition, stakeholders such as entrepreneurs and rural business owners may also participate in the research to produce more accurate results. Assessment of sustainability in rural entrepreneurial activities can be also considered in future studies based on the presented indicators. Another suggestion for future research is the identification of measurement scales and units of measurement for each indicator. Finally, indicators on top of the rank may become key indicators for rural entrepreneurship policymakers and administrators. Given this study's contributions to the field, it is not without limitations. First, since this study focuses on the identification of sustainable rural entrepreneurship indicators in developing countries, the findings are limited to a specific context in developing countries. Exploring and developing sustainable rural entrepreneurship in different countries may require the use of different indicators concerning the agricultural and rural environment. Therefore, future studies should undertake specific surveys to capture international and multicultural perspectives on the sustainable growth of rural entrepreneurship in different countries. Next, to track efficiently the sustainability of rural entrepreneurship, future studies should establish a realistic procedure that can be implemented effectively based on the findings of this study. Developing a long-term monitoring system to evaluate sustainable rural entrepreneurship is important in order to track the early environmental effects of rural enterprises and to implement management strategies and action plans.

This study employed the fuzzy Delphi method to identify and rank sustainable rural entrepreneurship indicators; however, the method still displays weaknesses and limitations. Considering that some of the sociocultural and ethical indicators were rejected, a possible explanation could be that the fuzzy Delphi method might not be very appropriate for identifying and measuring sociocultural and ethical indicators. Therefore, it is recommended to use other techniques to measure these dimensions of sustainable entrepreneurship in future studies. To do so, other weighting and ranking techniques such as AHP, TOPSIS, and VIKOR can also be used and combined with fuzzy Delphi method. The combination of these methods might increase the perceived validity of the results. Therefore, the technique's reliability is dependent on a confirmation from experts, which may have induced bias in the study results due to their unique expertise, experience, and awareness of the sector. It is therefore recommended that multiple samples be used and that the number of respondents in future studies be increased to prevent biases impacting the final result. In this research, the measures proposed were taken from the literature and used by expert consultants, both of which may restrict the comprehensiveness of the system. Future studies should identify other related indicators (e.g., criminality, corruption, deliberate dishonesty, and inherent self-interest) that may have been overlooked in this study and add them to the existing framework to deepen the present work.

Credit author statement

Atieh Soleymani performed the study and developed the main text; Ahmad Yaghoubi Farani, Saeid Karimi and Hossein Azadi provided instruction and comments for the research design and approaches; Halil Nadiri and Jürgen Scheffran helped the others address the reviewers' comments and enrich the main text.

Declaration of competing interest

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

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