

# Investigation Of Entrepreneurship Development Barriers In The Field Of Renewable Energies Technologies In Developing Countries: A Case Of Iran

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**Abstract:** With respect to the importance of the development of entrepreneurship and employment in renewable energies technologies, the present research investigated the obstacles of developing entrepreneurship in renewable energies in Iran. The methodology utilized in this paper involved two complementary methods: 1) a series of semi-structured interviews with 15 renewable energy entrepreneurs and 2) a questionnaire survey. The participants were identified via SATBA. Through the use of a simple random sampling method, 97 people were selected as sample. The results indicated that the most important barrier of entrepreneurship development in the field of renewable energies was inadequate access to institutional finance, inadequate government or policy support and the power of incumbents which were into the first, second and third ranks, respectively. According to the findings, sociocultural and individual barriers explain about 30% of the obstacles entrepreneurs are faced with, that have been neglected in previous studies. Entrepreneurship in the field of renewable energies is considered to be one of the most exclusive solutions for unemployment. In order to solve the problems faced by renewable energies entrepreneurs, the barriers which exist in the way of these activities should be identified and removed. Therefore, this study will take a useful upward step in order to identify these barriers and, eventually, provide the best functional suggestions.

**Index Terms:** Renewable energies technologies, entrepreneurship, job creation, inadequate access to institutional finance, Inadequate government or policy support, barriers, Iran.

## INTRODUCTION

Energy is the main force and the basis for human life. Various eras of human civilization have been formed based on the innovations and ways of consuming different energy resources. Energy can be defined as the cornerstone of social life and as the determining factor in industrial and economic development [1]. Today, the global energy system is so heavily dependent on fossil fuels that it accounts for the production of about 78.4% of the electric power required globally [2]. These fuels include different kinds of toxic and dangerous pollutants which enter the environment and the human food chain in various ways. Although fossil fuels have multiple environmental effects on surface and underground water, soil, air, vegetation, etc., the most significant ones are air pollution, greenhouse effect, and cooling effects. The combustion of fossil fuels releases a huge amount of greenhouse gases, such as sulfur oxides, nitrogen, carbon monoxide, and carbon dioxide into the air [3]. Furthermore, fossil fuels have increasing adverse effects on the health and financial condition of the society. This issue makes renewable energies the center of attention [4].

Due to the existing crisis which resulted from the overuse of fossil fuels, such as environmental pollutions and irreparable damages to the ecosystem, along with getting closer to the end of fossil fuel resources, renewable energy is considered to be a necessary source of energy. Iran is located in the southern part of the Caspian Sea. The population of Iran is around 80 million with an area of 1648195 km<sup>2</sup>. Iran consists of both arid and semi-arid regions, with average temperature of 19-38°C in summer and 10-25°C in winter [5]. According to the International Energy Agency statistics, as shown in Figures 1 and 2, Iran has the world's fourth-largest crude oil reserves and the world's second-largest natural gas reserves [6].

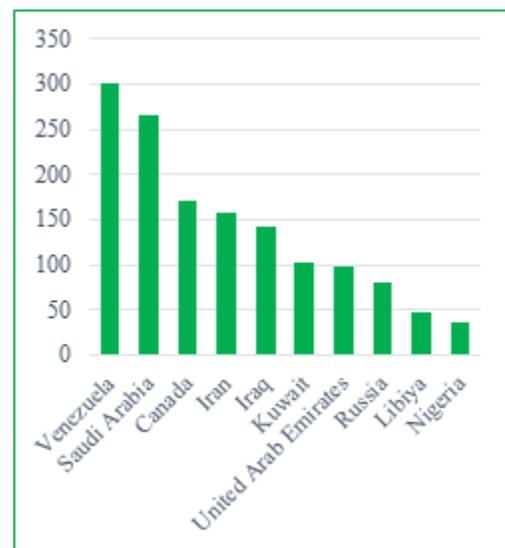
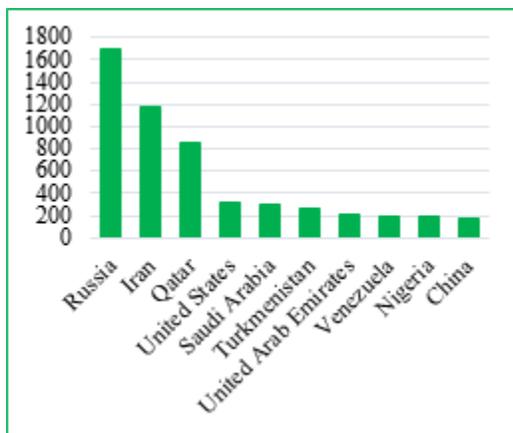


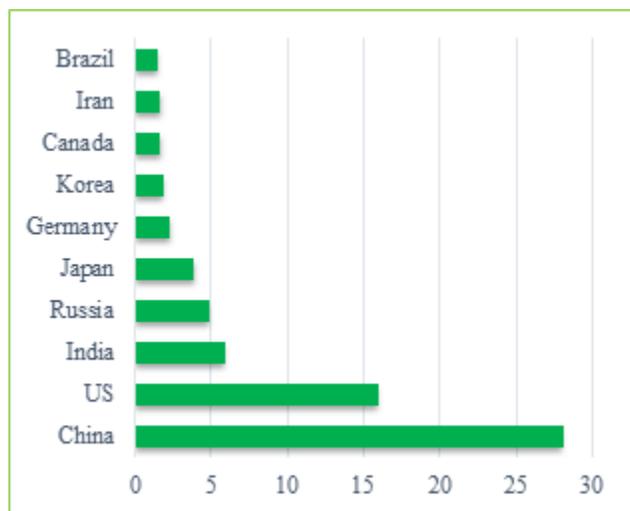
Fig 1 Top 10 crude oil reservoir countries

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**Fig2** Top 10 natural gas reservoir countries

Also, 85% of carbon dioxide emissions in the world are through fossil fuels. In 2017, there was an increase in CO<sub>2</sub> emissions by 1.4%, and this amount was an unexpected 460 million tons (MT). As shown in Figure 3, according to (IEA), Iran is the ninth country in the release of this gas [7].

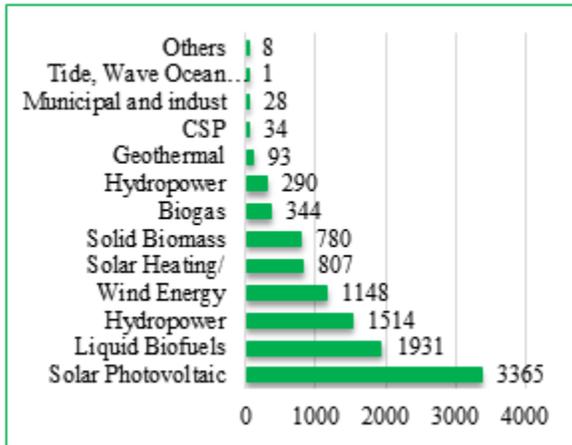


**Fig 3** Top 10 CO<sub>2</sub> emissions release countries

Fortunately, as one of the developing countries, Iran has a high potential for renewable energies. Iran is situated on the Sun Belt and receives more than 2800 h of sunlight annually. The potential for exploiting solar energy in Iran is so high that devoting one percent of its total area would satisfy the entire national demand for energy [8]. Also, with studies conducted by the German Aerospace Centre (DLR), in an area of over 2000 square kilometers; it is possible to install more than 60000 MW of solar thermal power plants. Furthermore, as a result of the presence of windy areas in Iran, there is a suitable platform for expanding the operation of wind turbines. Also, based on the information received from 60 stations in different regions of the country, the nominal capacity of sites is about 60,000 megawatts. Also, based on studies, geothermal energy in Iran has been identified in more than 10 regions. At the end of 2017, these energies accounted for 19.3% of the global energy consumption [9]. However, despite these potentials, renewable energies constitute a mere 0.01% of the

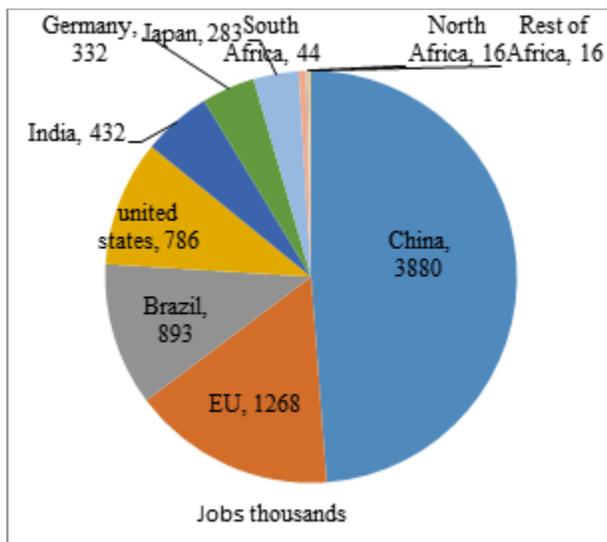
consumed energy in Iran [10]. However, in the past, new energies were only an alternative to other energy resources. Nowadays, the alternative energies have turned into obligatory options, a fact that requires serious and active attention unlike before. Considering their significant environmental benefits in reducing CO<sub>2</sub> emissions, alternative energies can be a stimulus for economic growth through job creation. Job creation as a special solution can save the world from the economic downturn. Nowadays, overcoming unemployment and the creation of new businesses has become more prominent. Meanwhile, developing the use of renewable energies plays an important role in creating new job opportunities [11]. In recent years, increased job losses have been recorded in the traditional energy sector. For example, oil and gas industries are facing employment losses, such that 440000 people were unemployed in 2015 and 2016. Of course, there is no exception for Iran. As a result of the decrease in crude oil exports because of sanctions, there has been an increasing decline in employment in this sector. However, recent studies have shown that renewable energy projects can compensate for job losses in the fossil fuel sector [5]. Employment in the clean energy sector, or so-called "Green Jobs", has become a way of reducing unemployment towards a sustainable economy [1]. According to a new report by the International Renewable Energy Agency (IRENA), renewable energies will be cheaper than fossil fuels by 2020. In fact, electricity generated from renewable sources will soon be cheaper than fossil fuels [13]. Renewable energy is an attractive option for developing economies as it relies on locally available energy resources, alleviates environmental concerns and preserves the environment [14]. Nowadays, increasing attention to renewable energies, with both developed and developing countries trying to diversify energy resources, reduce the dependence on one form of energy, and also takes the environment into consideration. Planning for renewable energies would result in reduced environmental costs, energy security, technological advances, economic and investment profit compared with fossil fuels. Also, renewable energies are capable of creating more jobs per any installed unit [15]. Employment in the renewable energy production sector has several benefits, in terms of health and working conditions. Working in this sector means new opportunities to increase the quality of jobs when compared to the traditional energy sector. This does not only mean more employment but better and decent working conditions. Of course, as the demand for energy from renewable sources increases, it is expected that there will be a decrease in the demand for traditional ones [11]. The jobs associated with renewable energies are in three classes: 1) direct, 2) indirect, and 3) dependent. The direct jobs generally concern the main activities such as production, manufacturing, construction, development, installing, implementing, and maintenance. The indirect jobs include those related with distributing and supporting renewable energy industries: extraction and processing of raw materials (e.g. production of copper and steel), marketing and sale (e.g. trade fair), counselling and research companies and the dependent jobs are the results of economic ventures in the renewable energy industry [16]. Currently, the jobs generated from renewable energies technologies exceeds that associated with the technologies

of fossil fuels and the latest estimates indicate that about 10.3 million people are employed in renewable energies industries either directly or indirectly. As shown in Figure 4, solar photovoltaics account for the greatest number of employees (3.4million) who are mainly active in the manufacturing of photovoltaic cells [18].



**Fig 4** Renewable energy employment by technology

To increase, yet much of it is limited to few countries such as China, Brazil, USA, India, Germany, and Spain while photovoltaics are mainly centered in Bangladesh, Japan, Malaysia, and Australia. As shown in Figure 5, the latest report from the International Energy Agency says that China has the highest number of employees (3.8 million) in renewable energies globally [18].



**Fig 5** Renewable energy employment in selected countries

According to the latest report by the Global Entrepreneurship Index issued by the Global Entrepreneurship Monitor (GEM), Iran ranks 72nd among 137 countries globally and 11th among 15 Asian countries as of 2018[19]. Studies have shown that by 2030, the global employment rate of the renewable energy sector will reach 20 million; with the largest share belonging to biofuels (12 million jobs), followed by solar (6.3 million) and wind (2.1

million) [20]. However, if countries remain dependent on fossil resources, considering the increase in human resource productivity over time, there will be a decrease in the number of jobs in the global energy sector by about half a million by 2030. Currently, renewable energy technology projects in Iran have generated a total of 44,115 direct and indirect employment opportunities nationwide [5]. Therefore, this technology is capable of mitigating unemployment through job creation. As a social problem, unemployment severely affects all economic and social aspects and occasionally leaves irrevocable consequences. The unemployment rate in Iran is 12.1%, according to the latest dates issued by the Statistical Centre of Iran [21]. As such, promoting entrepreneurship in the renewable energy sector can play a vital role in job creation and revenue generation. It also contributes to social and economic progress. In recent years, there have been increased employment in the renewable energy sector globally [19]. With respect to the high potentials for renewable energy resources in Iran, developing entrepreneurship in renewable energy industries creates jobs and reduces unemployment. The role of entrepreneurship, as a vehicle of economic and societal transformation, is not new in the economic literature [22, 23, 24, 25]. The development of renewable energy technologies as well as green energy production will not happen without the involvement of entrepreneurs [11]. Entrepreneurs are pillars of sustainable growth. Many economists claim that entrepreneurship is an important determinant of economic growth and development [26]. Several authors have already studied the link between resolving global problems and entrepreneurship [22, 23, 24, 25]. In this context, entrepreneurship has been cited as an important channel towards sustainable products and services, and new projects are underway as a solution for many environmental and social concerns. For instance, Cohen and Winn [26] proved that four types of market imperfections contribute to environmental pollution and considered it as a source of significant entrepreneurial opportunities to start the basics for an evolving model of sustainable entrepreneurship by decelerating the degradation and even progressively improving the earth's ecosystems. Similarly, York and Venkataraman [27] proposed entrepreneurship as an explanation rather than a reason for environmental degradation. They built a model that embraces the potential of entrepreneurship to supplement regulation, corporate social responsibility, and activism in resolving environmental problems. Recently, numerous prestigious journals in this area, like the Harvard Business Review, Journal of Business Venturing, and MIT Sloan Management Review, among others, have forwarded the idea that entrepreneurship could be a solution for numerous environmental and social preoccupations [28, 29]. Also, in the documents of international organizations e.g. UE Strategy (2020), both, i.e. entrepreneurship and sustainability, have been considered to guarantee the future development of the entire society [30]. Factors like the current competitive, market-based economy, rapid international changes as well as the exponential transience from an industrial society to the information society and knowledge-based society have led to this notion that entrepreneurship is the driving force behind development. In developing countries (e.g. Iran), renewable energies

entrepreneurs experience multiple challenges such as no access to financial institutions, the high cost of renewable energies technologies, lack of skilled workforce, inadequate physical infrastructure and insufficient state support [31]. Despite the existing advantages and potentials of renewable energies, entrepreneurs and entrepreneurship have remained unsupported in this field, leading to problems such as unemployment in Iran. As such, entrepreneurship is now assumed to be one of the unique solutions to unemployment. But before having any successful entrepreneurship, the problem and challenges must be addressed, identified and dealt with. The present article tries to give a full account of the challenges in the development of entrepreneurship in renewable energies. Despite the remarkable progress of Renewable Energy Technologies (RETs) over the past two decades all over the world, only a small fraction of their potential has been deployed especially in developing countries. The development of entrepreneurship in renewable energies has enormous benefits; however, it faces several challenges. Mahboobi et al. [32] explored the effect of economic, educational, institutional-organizational, infrastructural, technical and individual challenges in developing entrepreneurship. The results show that the most important obstacles in agricultural entrepreneurship are: insufficient knowledge of new marketing techniques (educational problem), lack of sufficient capital and investments (economic problem), lack of a defined body or institution to support producers (institutional-organizational), high costs of fuel, water, electricity and gas (infrastructural), lack of technical and engineering counseling (technical) and non-constructive competition among producers (individuals). Engelken et al. [33], in a research entitled "Comparing drivers, barriers, and opportunities of business models for renewable energies: A review" argued business models for renewable energies, between developing and industrialized countries. The barriers were categorized into three levels: industrialized countries, developing countries,

and general. Developing countries were faced with shortcomings in legal frameworks, lack of management skills, lack of entrepreneurship support barriers while industrialized countries struggle with fierce competition to existing technologies, cognitive barriers, high costs of batteries, high upfront investments challenges and in general, lack of long-term planning, security incentives not designed to meet locally varying requirements, long and uncertain development cycles, lack of skilled people, lack of knowledge and information, interests of incumbents to maintain the status quo, low energy density of renewables were identified. Pueyo [34], in a work entitled "what constrains renewable energy investment in Sub-Saharan Africa? A comparison of Kenya and Ghana revealed that Ghana's key constraints to investment in renewable energy were macroeconomic inequities, untrustworthy off-taker, regulatory ambiguity, pressures to keep prices down, as well as inadequate financial support. On the other hand, Kenya offers substantial returns to investment in renewables but faces a lot of challenges; for example, a low demand for produced energy, lack of infrastructures and problems of social acceptance, worsened by uncertain land property rights. These barriers may share some similarities all over the world. In this research, the constraints identified by Gabriel [35] and Gabriel et al. [31] have been adopted as an appropriate framework for analysis. The mentioned barriers were generally classified into the following broad categories: Inadequate access to institutional finance, the price of technologies, lack of skilled labor, underdeveloped physical infrastructure and logistics, power of incumbents and inadequate government or policy support. Thereafter, these barriers were tested for content validity through a series of semi-structured interviews with 15 renewable energy entrepreneurs and they added some barriers namely sociocultural and individual barriers and mixed some items in Gabriel et al.'s [13] framework. The finalized barriers and items are listed in Figure (6).

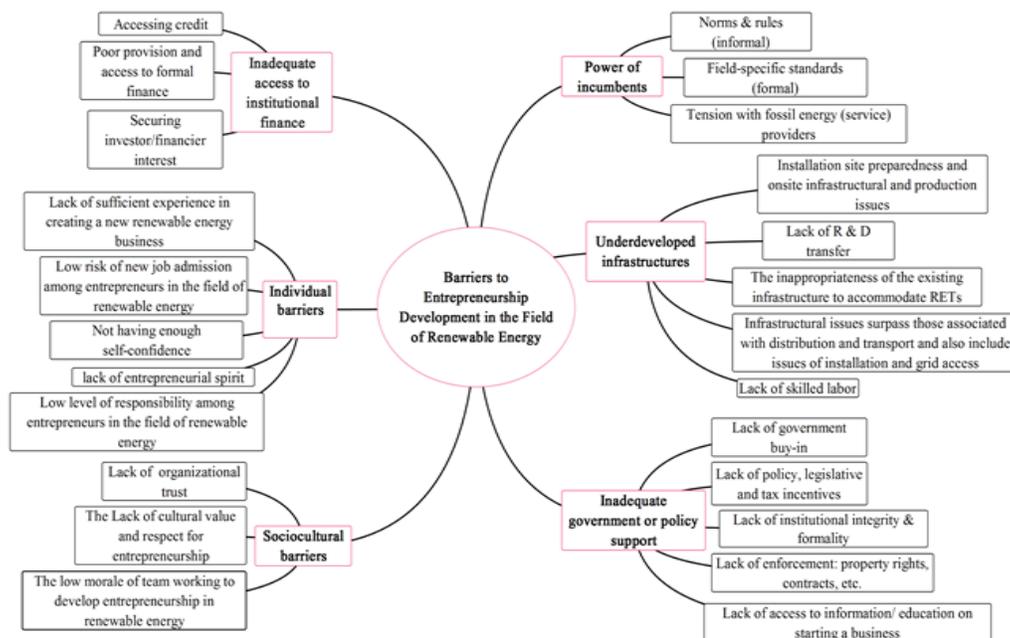


Fig 6 Barriers to entrepreneurship development in the field of renewable energies technologies

## MATERIALS AND METHOD

The methodology utilized in this paper consisted of two complementary methods: 1) to confirm the identified barriers from literature reviews, a series of semi-structured interviews with renewable energy entrepreneurs was carried out. Samples were selected using the snowball sampling technique and the work of selecting samples continued to reach theoretical saturation. The interviews were conducted in person and each interview had an average duration of about 20 min. In order to increase the accuracy and simplicity of the interview, after obtaining permission from the interviewee, interviews were recorded electronically. This helped in the writing of the transcript of the interview, and then the transcript was converted to qualitative software. In this research, advanced mind mapping software for Windows was used (Figure (6)) .2) for identifying the status of the barriers; questionnaire survey was used. Participants were identified via SATBA (130 renewable energy entrepreneurs). By using Krejcie and

Morgan's (1970) table and simple random sampling method, 97 people were selected as sample. Before conducting the survey, a pilot study was undertaken by sending the questionnaire to a small population of selected participants. The objectives of this pilot run were to determine those items in the questionnaire that needed improvement, particularly regarding conceptual modifications, rewording or reordering. After several modifications, the final questionnaire was used for data collection in the field. The questionnaire consisted of a set of statements addressing the constraints faced by renewable energy entrepreneurs. The survey consisted of 24 questions which were categorized into six parts, namely, inadequate access to institutional finance (3 questions), inadequate government and policy support(5 questions), power of incumbents(3 questions), Individual barriers (5questions), underdeveloped infrastructures(5 questions), and sociocultural barriers (3 questions) (Table No. 1).

**Table 1** Barriers to entrepreneurship development in the field of renewable energy Adopted from Gabriel [35] and Gabriel et al. [31]

Category	Barriers	Cronbach's Alpha
<b>Inadequate access to institutional finance</b>	Accessing credit, poor provision and access to formal finance, securing investor/financier interest.	0.81
<b>Individual barriers</b>	Lack of sufficient experience in creating a new renewable energy business Low risk of new job admission among entrepreneurs in the field of renewable energy, Not having enough self-confidence, lack of entrepreneurial spirit and Low level of responsibility among entrepreneurs in the field of renewable energy	0.70
<b>Sociocultural barriers</b>	Lack of organizational trust, Lack of cultural value and respect for entrepreneurship, The low morale of team working to develop entrepreneurship in renewable energy	0.75
<b>Underdeveloped infrastructures</b>	The inappropriateness of the existing infrastructure to accommodate RETs, infrastructural issues surpass those associated with distribution and transport and also include issues of installation and grid access, installation site preparedness andesite infrastructural and production issues, Lack of R & D transfer, Lack of skilled labor.	0.70
<b>Power of incumbents</b>	Norms & rules (informal), field-specific standards (formal), tension with fossil energy (service) providers.	0.72
<b>Inadequate government or policy support</b>	Lack of policy, legislative and tax incentives, lack of access to information/ education on starting a business, lack of enforcement: property rights, contracts, etc., lack of government buy-in, lack of institutional integrity & formality.	0.88

The questions were formulated in a neutral statement to minimize the possibility of biased answers. The respondents could then give their answers by circling one of the five options using a Likert-type scale, ranging from strongly disagree=1 to strongly agree=5.

## RESULTS AND DISCUSSION

The answers to the questionnaire provide useful information about the relative importance of each of the 24 barriers considered, which might serve as a guide to promote entrepreneurship development in the field of renewable energy. Based on the results, 94 (95.9%) out of 97 respondents were men and 3 (4.1%) were female. Most of them were in the age range of 23 to 33 years (57.7%) and most of them 84 (86.6%) had 1 to 15 years of work experience. The mean work experience was 8 years. The

number of employees in the selected companies ranged from 1 to 91 with a mean of 13. Regarding their education, most of the respondents had a master degree (Table No. 2).

**Table2** Respondents' descriptive statistics

Variable	Category	Frequency	Percentage	Mean
Gender	Male	94	95.9	-
	Female	3	4.1	
Age (years) Max=70 Min=23	$23 \leq X < 33$	56	55.7	35
	$33 \leq X < 43$	24	24.7	
	$43 \leq X < 53$	11	11.3	
	$53 \leq X < 63$	5	5.2	
	$X \geq 63$	1	1	
No of Employees Max=91 Min=1	$1 \leq X < 20$	92	94.8	13
	$20 \leq X < 40$	3	3.1	
	$40 \leq X < 60$	1	1	
	$60 \leq X$	1	1	
Experience Max=50 Min=1	$1 \leq X < 15$	84	86.6	8
	$15 \leq X < 30$	11	11.3	
	$30 \leq X$	2	2.1	
Educational degree	Bachelor	34	35.1	-
	Master	54	55.7	
	Ph.D.	9	9.3	

## RANKING OF THE BARRIERS

### Inadequate access to institutional finance

The most important barrier in this category was "accessing credit" with the highest average 4.24, the second one was "Poor provision and access to formal finance" with the average 4.10 and the lowest one was "securing investor/financier interest" with 3.91 as the mean value.

### Individual barriers

The most important barrier in this category was "Lack of sufficient experience in creating a new renewable energy business" with the highest average being 3.40, the second one was "Low risk of new job admission among entrepreneurs in the field of renewable energy" with 3.16 as the average, the third barrier was "Not having enough self-confidence" with the average 3.12, the fourth one was "lack of entrepreneurial spirit" with the average 3.10 and "Low level of responsibility among entrepreneurs in the field of renewable energy" with the lowest average (3.06).

### Underdeveloped infrastructures

The most important barrier in this category was "installation site preparedness and onsite infrastructural and production issues" with the highest mean 4.11, the second one was "with average Lack of R andD transfer" with the average 3.57, the third barrier was "inappropriateness of the existing infrastructure to accommodate RETs" with 3.10 as the average, the fourth one was "infrastructural issues surpass those associated with distribution and transport, this also includes issues of installation and grid access" with the average (2.96) and the lowest average was "Lack of skilled labor" (2.77).

### Sociocultural barriers

The most important barrier in this category was "Lack of organizational trust" with the highest average 3.89, the second one was "The Lack of cultural value and respect for entrepreneurship" with average of 3.65 and the lowest one was "The low morale of team working to develop entrepreneurship in renewable energy" with the mean value of 3.43.

### Power of incumbents

The most important barrier refers to "norms and rules" with the highest average 4.19, the second rank was allocated to field-specific standards (formal) (3.95) and the lowest position belongs to "tension with fossil energy (service)" (3.19).

### Inadequate government or policy support

The most important barrier in this category was "lack of government buy-in" with the highest average 4.20, "lack of policy, legislative and tax incentives" placed in the second rank with average 4.10, the third barrier was "identified as Lack of institutional integrity and formality" with average 3.93, "lack of enforcement: property rights, contracts, etc." with average 3.86 and "lack of access to information/ education on starting a business" had the lowest average (3.48). The average score, ranking, and standard deviation for each of the barriers are summarized in (Table No. 3).

**Table3** Ranking of the Barriers

Category	Barriers	Mean	SD	Rank
Inadequate access to institutional finance	Accessing credit	4.24	0.84	1
	Poor provision and access to formal finance	4.10	0.96	2
	Securing investor/financier interest	3.91	1.11	3
Individual barriers	Lack of sufficient experience in creating a new renewable energy business	3.40	1.28	1
	Low risk of new job admission among entrepreneurs in the field of renewable energy	3.16	1.23	2
	Not having enough self-confidence	3.12	1.19	3
	lack of entrepreneurial spirit	3.10	1.28	4
	Low level of responsibility among entrepreneurs in the field of renewable energy	3.06	1.14	5
Underdeveloped infrastructures	Installation site preparedness and onsite infrastructural and production issues	4.11	0.92	1
	Lack of R & D transfer	3.57	0.96	2
	The inappropriateness of the existing infrastructure to accommodate RETs	3.10	1.31	3
	Infrastructural issues surpass those associated with distribution and transport and also include issues of installation and grid access	2.96	1.38	4
	Lack of skilled labor	2.77	1.15	5
Sociocultural barriers	Lack of organizational trust	3.89	1.06	1
	The Lack of cultural value and respect for entrepreneurship	3.65	1.24	2
	The low morale of team working to develop entrepreneurship in renewable energy	3.43	1.29	3
Power of incumbents	Norms & rules (informal)	4.19	0.88	1
	Field-specific standards (formal)	3.95	0.96	2
	Tension with fossil energy (service) providers	3.19	1.24	3
Inadequate government or policy support	Lack of government buy-in	4.20	1.04	1
	Lack of policy, legislative and tax incentives	4.10	0.99	2
	Lack of institutional integrity & formality	3.93	1.05	3
	Lack of enforcement: property rights, contracts, etc.	3.86	1.00	4
	Lack of access to information/ education on starting a business	3.48	1.10	5

### The Status of Barriers faced by entrepreneurs in the field of renewable energies technologies

The average score ranges from 3.06 to 4.24, with an overall mean score of 3.66, implying that all of these barriers are somehow relevant. The most important factor include "inadequate access to institutional finance", with the highest mean value of 4.08, followed by "inadequate government or policy support" (3.91), "power of incumbents" (3.77), "Sociocultural barriers" (3.65), "underdeveloped infrastructures" (3.43) and "Individual barriers" (3.16) (Table4)(Figure 7). It should be mentioned that among all the 24 items, Accessing credit(4.24) had the highest mean, Lack of government buy-in(4.20) occupied the second place and norms and rules (4.19) was placed third between different barriers facing with entrepreneurs. According to Table (4), the sociocultural and individual barriers explain about 30% of the obstacles entrepreneurs are faced with that have been neglected in previous studies (Table No. 4) (Figure 7).

**Table 4.** The status of barriers faced by entrepreneurs in the field of renewable energy

Row	Barriers	Mean	Percent
1	Inadequate access to institutional finance	4.08	18.54
2	Inadequate government or policy support	3.91	17.77
3	Power of incumbents	3.77	17.13
4	Sociocultural barriers	3.65	16.59
5	Underdeveloped infrastructures	3.43	15.59
6	Individual barriers	3.16	14.38
<b>Total</b>		22	100

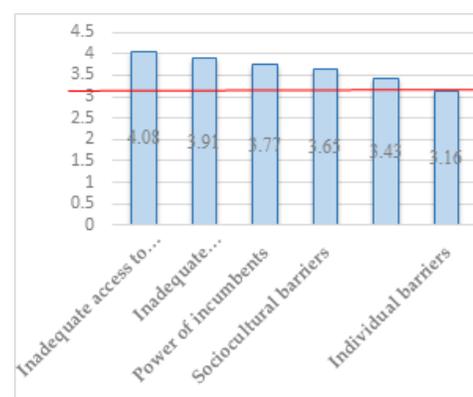
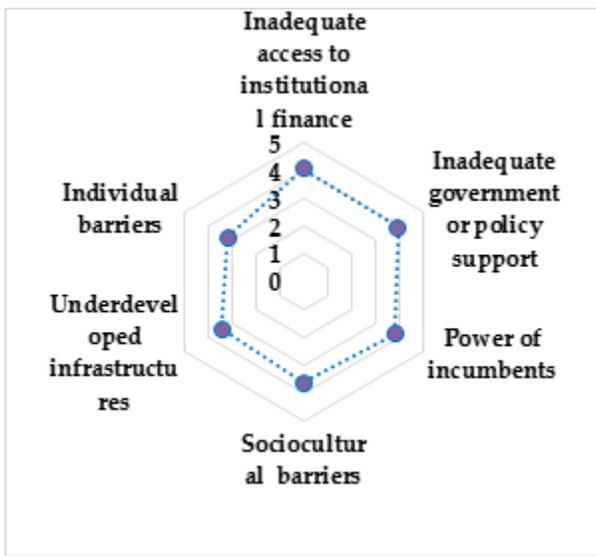
**Fig 7** The status of barriers faced by entrepreneurs in the field of renewable energy

Figure 8 shows the Kite diagram of barriers faced by entrepreneurs in the field of renewable energy (Figure 8).



**Fig 8** Kite diagram of the barriers to entrepreneurship development in the field of renewable energy

Regarding the geographical situation and other strategic resources of Iran, there is a good potential for expansion of production and consumption of renewable energies. Many challenges are associated with the use of renewable energy technologies in Iran. Since Iran has benefited from adequate employment opportunities because of the presence of a young population and a large number of job-seekers, investment and entrepreneurship in this field can take advantage of the job opportunities, but there are lots of constraints facing renewable energies enterprises. The understanding of constraints is most important to entrepreneurs, and may be useful in helping development organizations to better arrange and prioritize their efforts. The findings may also assist start-up incubators with interests in Iran to better develop and tailor their service offerings to the needs of entrepreneurs. However, this paper showed six specific barriers to renewable energy entrepreneurs in Iran. The most important problems were related to inadequate access to institutional finance (this includes accessing credit, poor provision, access to formal finance and securing investors). It has a negative effect on entrepreneurship and its applications. Also, in Iran, the limited foreign investment due to sanctions and furthermore, limited access to bank credit resources, has caused many problems for entrepreneurs, regarding the expansion of renewable energy use and entrepreneurial activities. These results match those of Wijayatunga et al. [36], Hung et al. [37], Nasirov et al. [38], Shukla et al. [39], Pueyo [34] and Maier and Gemenetzi [40]. Regarding inadequate policy support barrier, the most important problems were lack of government buy-in and lack of policy, as well as legislative and tax incentives. Insufficient state support makes the associated entrepreneurs change their decisions and attitudes and sometimes they relinquish their projects. These results match Hung et al. [37], Luthra et al. [41], Zafar et al. [42] and Gasbarro et al. [43]. Constrain "power of incumbents" (existing players on the energy market) occupies the third place among different factors. In

this factor, barriers such as norms and rules (informal) and field-specific standards (formal) were identified. Unlike large firms with sophisticated marketing and public relations departments, entrepreneurs lack the power of incumbents to engage individually in political activities. It is not surprising, then, that collectors of interests such as associations play a central role in this field. These results match those of Smink et al. [44] and Heiskanen et al. [45]. The most important problems in the underdeveloped infrastructures barrier include installation site preparedness and onsite infrastructural and production issues. As a result of the complexity of equipment and technologies related to renewable energy sources, investors face numerous difficulties to install, start up and maintain them which reduce the tendency of entrepreneurs to invest in this field. Therefore, it is necessary to plan for the establishment and operation of more qualified and efficient companies in the country. These results match those of Glemarec [46], Mahama [47], Luthra et al. [41], Shukla et al. [39] and Palmas et al. [48].

## CONCLUSION

The existence of massive oil and gas resources in Iran, on one hand, and the ever-increasing energy consumption in this country as well as the Iranian economy's heavy reliance on the sale of these resources, on the other hand, make it necessary to use alternative and renewable energies in order to export a larger portion of domestic production and thereby increase the national income. In addition, it must be noted that the recent policies of developed countries in replacing fossil fuels with alternative energies will lead to a significantly reduced dependence on fossil fuel in the upcoming years. With a comprehensive and proper study of alternative energies, Iran can also reduce the demand for fossil fuels in all provinces and even progress toward exporting energy to neighboring countries. Also, with respect to the variety of applications of renewable energies, Iran can enjoy plenty of opportunities to boost economic activities, create new businesses (entrepreneurship) and develop this sector. Given the enormity of the young population seeking employment, it is possible to develop entrepreneurship in the field of renewable energy and take a decisive action towards solving unemployment in the country. Due to insufficient financial institutions support, investors have identified the lack of finance and also poor investments, as the major problems facing entrepreneurs in the field of renewable energy. Thus, it appears that lack of adequate financial support and inadequate support by government and the banking system are the main factors in creating the status quo. Therefore, it is essential to offer low-interest loans and arrange less complicated procedures in operating banks for entrepreneurs. Also, with regard to the high cost of investment, it is recommended that loan offers be simpler and more robust and new financial support networks be created. In this context, crowd funding as a strategy can play a central role so that crowd funding, along with incubators and venture investments, help transform scientific and technological ideas into technology-driven businesses and ultimately to a boom in technological entrepreneurship. In respect of the inadequate political or governmental support, the government, together with the participation of all ministries and major public

service/private entities, establish Entrepreneurship Management Units and Support Funds for entrepreneurs in the renewable energy sector, and also enact supportive policies for renewable energies including the feed-in tariff scheme, phasing out fossil fuel subsidies and the creation of the renewable Electrification Authority, in order to support entrepreneurship in renewable energy sector. The power of incumbents can be seen as an opportunity. They can be joined together to elevate their skills and experiences. It is suggested to get involved in the new renewable energy technologies through various forms of cooperation. For instance, the incumbent enter into multiple technology partnerships and participate in a joint venture. The relatively high costs of renewable energy technologies (which are explained by the fact that they are unable to compete with the cost of producing fossil fuels) have created a certain problem for investors and entrepreneurs. Here, the government can take actions by offering investment incentives for employment and entrepreneurship in renewable energy technologies and limit subsidies for fossil fuels producers which raise revenue for the federal government while also benefiting the environment. Lack of organizational trust, the inappropriate culture of respect entrepreneurship and the low morale of team working were identified as major obstacles which have not been seen in previous studies and can be enhanced through team building training courses. Thus, it is recommended that counseling centers be created and training courses be conducted in order to encourage investors and entrepreneurs for team working and also raise the public awareness to improve entrepreneurial culture. Also, it is recommended to investigate factors affecting entrepreneurial culture in organizations for future studies. With respect to lack of suitable infrastructures (which is the result of not being prepared for establishing the site, other infrastructural facilities and unbalanced production), it is recommended that necessary platforms and incentives be provided in this field, and suitable conditions for the establishment and operation of companies in this sector be provided so that companies can offer maintenance and counseling services for installing and using renewable energy equipment. The last but not least was the individual barrier; it should be mentioned that the role of this barrier has not been seen in previous studies. We saw the relationship between the ability of individuals such as self-confidence and self-concept as well as entrepreneurship and career success. Therefore, creating centers to enhance these individual capabilities can be effective.

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