Women entrepreneurship in developing countries: Simulation based Fuzzy Topsis approach

Yousaf Ali[1], Muhammad Sabir[2], Zounash Khan[2] and Antonella Petrillo[4,*]

[1,2,3]Ghulam Ishaq Khan Institute of Engineering Sciences & Technology, Department of Management Science & Humanities, Topi, Swabi, KPK, Pakistan
[2]University of Napoli "Parthenope", Department of Engineering, Isola C4 – Centro Direzionale Napoli, 80143 Napoli, Italy

*Corresponding author. Email address: antonella.petrillo@uniparthenope.it

Abstract

Business is still male-dominated in the twenty-first-century despite women being contributing to every field of day-to-day life. In developing countries, women's participation in economic activities is even worse. Women entrepreneurs face unique challenges in developing countries to grow and sustain their growth. The purpose of this study is to identify and rank the major challenges that obstruct women entrepreneur's growth in developing countries like Pakistan. A Fuzzy Technique for Order Performance by Similarity to Ideal Solution (FTOPSIS) is proposed. Thus, using simulation based fuzzy TOPSIS technique, the decision criteria are quantitatively evaluated. As a result, the approach generates decision-making knowledge, and thereafter, the model can be adopted and at the same time if necessary, modified by decision makers. To demonstrate the applicability of the proposed approach, data was collected through questioner from women entrepreneurs in Pakistan and the results analyzed.

Keywords: Simulation approach; Women entrepreneurship; developing countries; Fuzzy TOPSIS; strategic decisions.

1. Introduction

Entrepreneurship is linked to economic growth. Entrepreneurship creates employment, new business, brings innovations, new technologies and thus contributes to the productive capacity of the country that ultimately leads to economic growth in a long time. This implies entrepreneurship is a fundamental component for growth in developed and developing economies (Dheer et al., 2019). At the same time, labor and capital is also a factor of production that contributes to the output of a country. It is interesting to observe that Global labor participation is on the decline since the 1990s (ILO, 2018). Also, women's participation in the labor force in high-income countries increased by about 4 percentage points during the 1990-2018 period reaching its peak but it is expected to start declining in the post-2020 period. But in developing economies the women participation rate declined by 5 percentage points during the same 1990-2018 period. On the other hand, for every 10 male entrepreneurs, there are only 7 women entrepreneurs globally, with an expectation to six countries namely, Indonesia, Thailand, Panama, Qatar, Madagascar and Angola where this ratio is equal (Bosma and Kelley, 2019). Women participation in the labor force and as an entrepreneur can contribute towards higher economic growth and prosperity, in particular in developing economies, because that will not only increase the labor force in total, and also can contribute to employment generation through entrepreneurial activities. Additionally, if women are entrepreneurs then most probably, they will be financially more independent and thus can contribute more towards the wellbeing of their families and kids, and they do not have to be

dependent on the male partner for earnings. However, it is never an easy task for women to become entrepreneurs in developing countries where they face the male-centered business world (Jennings and Brush, 2013). Women entrepreneurs face may challenge and barriers that affect the growth and success rate of their business. There is a lot of scholarly literature that does discuss hurdles and challenges that women entrepreneurs face and is discussed in the subsequent section. It is important to mention that the literature do study women entrepreneurship in details but there are some literature gaps such as the ranking of challenges faced by the women entrepreneurs and is the use of the fuzzy environment for women entrepreneur's decision making rather than using deterministic statistical or interview-based descriptive methods. Therefore, the current study intends to fill up these gaps. In fact, the purpose of this study is to identify and rank the factors that are challenging women entrepreneurs in developing countries like Pakistan. A fuzzy TOPSIS technique is applied to investigate which factor is affecting the growth rate the most to the least (Ortiz-Barrios et al., 2020). The four alternatives that affect the success of their business the most are the lack of moral support they get, their access to limited funding, the social norms and culture of the society, and other miscellaneous factors affecting their opportunity to grow for example the lack of knowledge respectively. The contribution of the study is the application of fuzzy TOPSIS in women entrepreneur's literature and ranking the challenges faces by the women entrepreneurs in developing countries like Pakistan. The rest of the paper is organized as follows: Section 2 presents the literature review. Section 3 describes the proposed the simulation based fuzzy TOPSIS in the study. Section 4 presents main results and discussion. Finally, Section 5 summarizes the main contribution of the research.

2. State of the art

The literature focusing on women entrepreneurship or the challenges faced by women entrepreneurs is not uncommon. There are many focused areas of the women entrepreneurship scholarly literature. For example, Henry, et al. (2016) in their study proposed a systematic literature review of articles published in about 20 journals for three decades on the topic of gender and entrepreneurship. According to Henry, et al., 2016, during 1983-1992 majority of scholarly work in the subject area was of foundational nature and focused more on descriptive, exploratory nature and lacking in knowledge about feminist theories and gender. During 1993-2002, the scholarly literature on women entrepreneurship was still conventional but with more focus on measurable items (such as performance) and contrasting between male and female entrepreneurs. Finally, the period of 2002-2015 evident significant growth in the literature of women entrepreneurship especially in Africa, Asia, Sub-Sahara, and Middle East region but there was still more

focus on "performance" and increased scope to networking activities, entrepreneurial orientation, risk, entrepreneurial capital, and new venture growth. Similarly, Poggesi et al., (2016) proposed a review study based on a thematic approach being applied to 250 research articles published during 2000-2014. Their study includes several themes among others financing, managerial practices, strategies, networking, etc., for women entrepreneurship. Furthermore, a review study based on 30 years of published research work from topmost journals of entrepreneurship is developed by Foss, et al., 2019. The research aimed at studying the policy implications and differential theoretical perspectives of women entrepreneurship. It is worth noting that there is abundant scholarly work on the challenges faced by women entrepreneurs. These studies can be classified based on the countries it covers, types of challenges women entrepreneurs face, the time within which these studies are undertaken, comparison of challenges faced by developed and developing countries women entrepreneurs, the comparison of man and women entrepreneurship issues, etc. For instance, Zgheib (2018) studied 102 Lebanese and American women entrepreneurs through extensive in-depth interviews to explore the push-pull drive for entrepreneurship. She concluded that Lebanese women have forced push entrepreneurship whereas, US businesswomen have voluntary pull entrepreneurship. Javadian & Singh (2012) investigated the success factors of Irani women entrepreneurs using their newspapers-based interview. Using about 30 newspaper interviews of women entrepreneurs and the common questions among these interviews, this study identified the common challenges faced by these successful Iranian women entrepreneurs. These factors include self-efficacy, risk-taking, stereotyping, societal culture and tradition on Iranian women entrepreneurs. They concluded that negative stereotypes and Iranian traditions are the major barriers for successful Iranian women entrepreneurs to overcome. A similar kind of study could be found from Maden (2015) for Turkish women entrepreneurs using 10 semi-structured interviews from four different organizations in Turkey. The study concluded that Turkish women entrepreneurs share common personality traits as they were being persistent, determined, patient, mentally strong, visionary and innovative. Additionally, finding and managing finances were the most important challenges for Turkish women entrepreneurs. Some similar kind of studies includes: Lerner, et al. (1997); Hisrich & Ayse Öztürk (1999); Roomi & Parrott (2008); Jamali (2009); Rehman & Azam Roomi (2012); Khan & Jantan (2018); etc. Some studies are focused on a single factor that influences entrepreneurial intentions. For instance, religion may encourage or discourage entrepreneur intentions in particular in conservative environments. In this regard, Rehan, et al. (2019) studied the influence of Islamic values and practices on entrepreneurship intentions using about 1,900 Pakistani university students sample using structural equation models and

concluded that Islamic practices and values positively influence entrepreneurial intentions. However, it may be noted that Rehan, et al. (2019) were based on both, male and female university students. While, Balachandra, et al. (2017) studied the impacts of investors stereotyping behavior using men-and-women owned ventures while studying about 200 pitches of 1-minute duration for venture capital undertaken during the 2007-2008 period in a top-tier northeastern university in India. The study concluded that investors' behavior is partially driven by gender-based stereotyping (Balachandra, et al., 2017). Studies that combines various kind of factors and challenges for women entrepreneurs are or studies that discuss the success factors of women entrepreneurs are also plentiful. For example; AW (2017) developed a review study that discusses the challenges faced by women entrepreneurs in developing and developing countries using studies from literature on subject matter covering developing (like Bangladesh, India, Pakistan, etc.) and developed countries (like Australia, Norway, Singapore, etc.). The study concluded that the challenges are faced by women entrepreneurs in developing and developed countries. In countries like Canada and USA it is the stress, limited business experience and access to capital, whereas in countries like Bangladesh and Pakistan it is harassment from government and private sector, women stereotyping to be the best for housework rather than business, etc., are some of the major challenges that hinder women entrepreneurial growth. A rather not very recent review study by Buttner & Moore (1997) studied 129 women entrepreneurs that left the organizations for becoming entrepreneurs. Accordingly, the most important success factor was their desire to challenge and self-determination to balance work and family responsibilities. Additionally, the women switch from job to becoming entrepreneurship due to issues like discrimination, blockage of career development and organization dynamics. Tripathi & Singh (2018) used 125 academic papers that were published during 1980-2017 in top-ranked Journals of entrepreneurship and identified 15 barriers that women entrepreneurs confront in India. These 15 barriers were further reduced to 10 barriers after feedback from the industry expert and later on, it was ranked using Decision-making trial and evaluation laboratory (DEMATEL). Accordingly, these barriers include, lack of motivation, financial and business experience, access to infrastructure and technology, balancing work and family life, etc. There are many studies that discuss either one or more barriers to women entrepreneurship covering different geographic regions around the world. Some of these studies include: multiple barriers (Sharma, 2013; Chawla & Sharma, 2016)), risk-taking by women entrepreneurs, finances (Brindley, 2006; Irwin & Scott, 2010; Sandhu, et al., 2012), career progression (Ismail & Ibrahim, 2008; Chovwen, 2007), ICT (Mathew, 2010), are few studies on similar theme. In the context of Pakistan, there are scholarly studies that do discuss the challenges that women entrepreneurs face. For example, Roomi & Parrott (2008) studied the gender-related factors, in particular, that of associated with veil and honor that may influence Pakistani women's entrepreneurial capabilities. The study was based on data of about 250 women entrepreneurs across five major cities of Pakistan and was based on their in-depth and one-to-one semi-structured interviews. The study concluded that the female face gender-neutral challenges such as lack of management skills, restrictive government regulations, access to capital at initial phase of business (Coleman, 2002) reported similar kind of findings along with studying the risk behavior of women entrepreneurs in the UK) along with gender-based additional challenges such as veil, honor, in addition to discriminatory attitude by the financial institution in provision of capital for business. At the growth stage of business, the big challenge for women entrepreneurs was to prove their credibility to both their customers and suppliers. In another study, Roomi, (2006) also reported similar kind of challenges for women entrepreneurs in Pakistan in addition to including lack of access to ICT, training, production inputs and assistance from government departments. Other issues that also may influence women entrepreneurs in Pakistan include lack of encouragement from family members, in particular, the male, networking that is based on religious beliefs that men are superior to women. Goheer, (2003) developed a report based on 150 Pakistani women entrepreneurs' surveys that were running a business from dedicated business premises with employing at least 5 employees and were located in one of the three cities namely Islamabad, Lahore, and Rawalpindi. The study among other things also highlighted the challenges and constraints faced by the women entrepreneurs in Pakistan. Accordingly, these constraints include, gender-bias such as people not being cooperative towards women, the aptitude of male towards working women, marketing issues such as attracting customers, family and social issues such as not supportive family and household engagement, finances constraints like lack of capital availability, and government regulations not being supportive. This is evident from the above discussion that the literature on women entrepreneurship and also the barriers to women entrepreneurship are abundant, however, there are still some literature gaps such as: mostly the earlier studies are based on qualitative interviews discussing cases of women entrepreneurs and based on that identifies the factors that are challenging for them. Furthermore, the earlier studies that are based on quantitative statistical methods, treat gender as a variable had also limitations (Wu, et al., 2019). Also, in qualitative/quantitative studies once the various challenges were identified there is no way to rank these challenges, thus making it less useful in setting priority for policies in a specific direction for improving the entrepreneurial eco-system in a particular country or region. In the context of the methodologies of the studies applied in literature, in particular, those using

gender as a variable (the quantitative studies), ignore the context and issues associated to the entrepreneurial environment and using only deterministic approach (Wu, et al., 2019). The use of the deterministic approach is not suitable given that women's entrepreneurial environment is uncertain and unclear. The use of the Fuzzy environment approach may be more efficient in uncertain environments (Wu, et al., 2019). The use of a fuzzy environment approach is not new to the entrepreneurship literature. For instance, Kraus, et al. (2018) proposed a review study on the application of fuzzy-set qualitative comparative analysis in the field of entrepreneurship and innovation during 2005-2016 based on 77 published journal articles. However, the application of fuzzy theory in conjunction with multicriteria decision methods (MCDM) is not so common. Some scholarly studies that are based on fuzzy MCDM and are focused on entrepreneurship and gender issues include (Crespo, 2017; Amrita, et al., 2018; Wu, et al., 2019). The fuzzy set theory was applied by Crespo (2017) for studying cross-culture differences in the entrepreneurial activity of men and women while using data of 77 different countries. The study concluded that there is not a single culture that promotes entrepreneurship. Furthermore, different level of economic development in a combination of national culture encourages different configurations that may lead to higher entrepreneurial activities. Amrita, et al. (2018) studied to identify the critical success factors of women entrepreneurship in India. The study employed a fuzzy analytical hierarchal method to rank the critical success factors of women entrepreneurship. The study identified the critical success factor of women entrepreneurship in India using existing literature and through the application of the fuzzy AHP method validate it through industry experts. The factors are group under seven dimensions and concluded that the individual, management, and government dimensions are of more importance compared to women's aim for becoming entrepreneurship. Wu, et al., (2019) aimed the link between the four women's entrepreneurial barriers namely, motherhood, entrepreneurial perceptions, customs, and finances low female entrepreneurial rate and consequently the barriers faced by the female entrepreneurs in a global and complex context. The study applied -fuzzy-set qualitative comparative analysis and compared women entrepreneurship across 28 countries to conclude that high initial funding and entrepreneurial perceptions are two major factors that lead to low women entrepreneurial participation rates in the studied countries. None of the Fuzzy MCDM based studies use fuzzy TOPSIS technique. The ones that are using fuzzy MCDM are mainly limited to the success factor that also being limited to the application of fuzzy AHP. This particular study adds to the existing literature on fuzzy MCDM applications to women entrepreneurship area in a few unique ways. First, it is an addition to the limited existing literature in the fuzzy MCDM domain on women entrepreneurship. Secondly, the study applies Fuzzy TOPSIS methods for identifying, analyzing, and validating the major challenges to women entrepreneurship in developing countries. Fuzzy TOPSIS has not been applied in this kind of study earlier. Thirdly, the study focuses on a developing country Pakistan, that has not been the center of such research till this study.

3. Materials and Methods

3.1. Proposed simulation based fuzzy TOPSIS approach

The literature review identified a lot of challenges and success factors associated with women entrepreneurs in developing countries and Pakistan also. The challenges identified from the literature review and after discussion with experts on women entrepreneurs, this study listed 16 challenges combined under four main headings all as major challenges for the women entrepreneurs in developing country as shown in Figure 1. These include limited funding access, social norms, moral support, and others. Within these four challenges like limited access to capital from family, friends, network or financial institution, etc. This study employs multicriteria decision making (MCDM). MCDM is a popular technique that has been used extensively in many fields of decision making. For example, energy (Ali, et al., 2018), environment (Ali, et al., 2019a), supply chain management (Ali, et al., 2019b), risk assessment (Ali, et al., 2019c), medical (Sabir, et al., 2018), etc. In the MCDM technique, multiple criteria conflict with each other and this technique helps to rank them according to the weights that are assigned by different decision-makers.
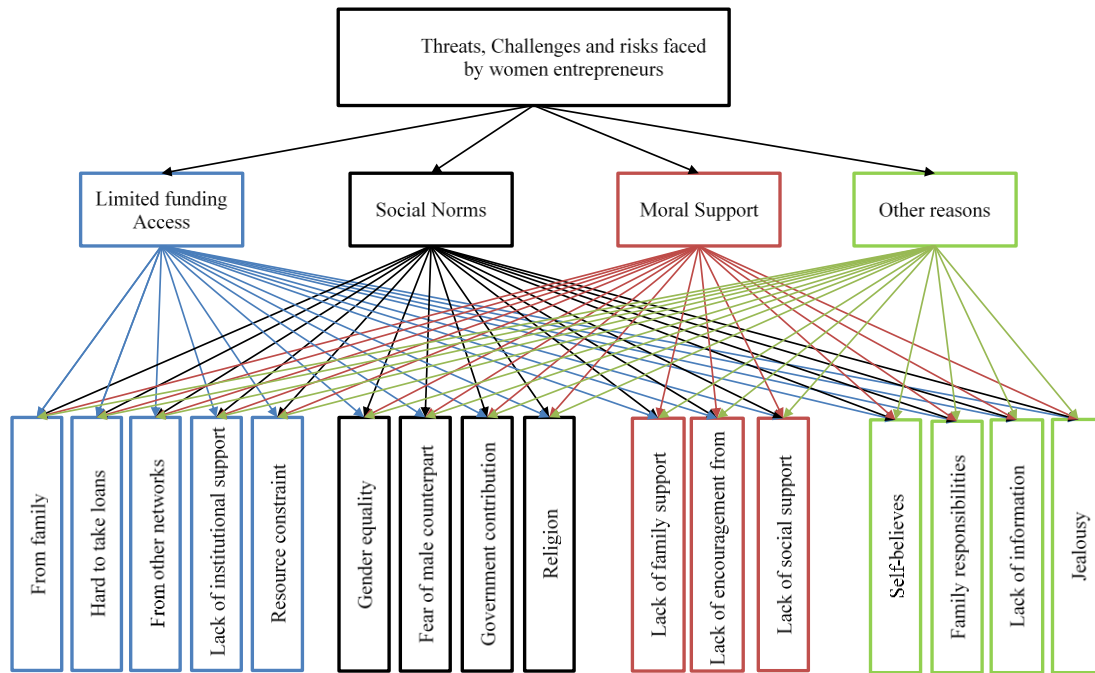
Figure 1. Theoretical model.

We live in an environment in which the objectives, the consequences and the constraints of the problem are not known with certainty. In such a situation, the Fuzzy models of MCDM (i.e., Fuzzy MCDM or FMCDM) can be applied. In FMCDM the decision-makers can deal with uncertain or incomplete information. The use of Fuzzy theory is more appropriate for the entrepreneurial environment given that it is a complex phenomenon (e.g., women entrepreneurship) and not each and everything associated with it is certainly known (Wu, et al., 2019). In this regard, Bellman and Zadeh (1970) introduced the Fuzzy MCDM theory that can apply to decisions in the fuzzy environment. In these methods, the decision-makers make the judgment of each criterion in natural language, use of words (e.g. Such criteria will have a very high or low impact on a particular alternative), the linguistic variables are further converted to fuzzy numbers (Zadeh, 1970). Fuzzy numbers (FN) most often used are triangular FN, trapezoidal FN and Gaussian FN (Moral Ávila, et al., 2017).

3.2. Fuzzy TOPSIS

TOPSIS is the Technique for Order of Preference by Similarity to Ideal Solution used in multi-criteria decision making which was introduced by Hwang and Yoon in 1981 (Hwang and Yoon, 1981) and was further developed by (Hwang, et al., 1993). Chen, (2000) extended TOPSIS technique by introducing fuzzy numbers. It is a technique based on the concept of the shortest geometric distance from the positive ideal solution and the longest distance from the negative ideal solution. The longer the distance from the ideal solution for a particular criterion the higher it is ranked

and thus it helps to identify the most problematic criterion among all criteria under study. Furthermore, this technique can be used to evaluate multiple alternatives. The fuzzy TOPSIS method is applied as follows.

Step 1: Assigning rating and weighting

In this step the decision-makers rate and assign weights to various criteria and in natural language. i.e., If K is the number of decision-makers, Ai is alternative and Ci is the criteria then fuzzy rating and weighting for criteria, respectively are given as:

$$X_{ij}^k = (a_{ij}^k, b_{ij}^k, c_{ij}^k) \tag{1}$$

$$W_{ij}^k = (w_{j1}^k, w_{j2}^k, w_{j3}^k) \tag{2}$$

Step 2: Linguistic variables to fuzzy numbers

The fuzzy numbers are assigned to weight and rate from the responses collected. Weighting is undertaking using a weighting scheme given in Table 1 as introduced by (Chen, 2000).

Table 1. Linguistic variables for the importance weight and rating of each criterion

Linguistic Variables	Weighting	Rating
Very Low	(0.0, 0.0, 0.1)	(0,0,1)
Low	(0.0, 0.1, 0.3)	(0,1,3)
Medium Low	(0.1, 0.3, 0.5)	(1,3,5)
Medium	(0.3, 0.5, 0.7)	(3,5,7)
Medium High	(0.5, 0.7, 0.9)	(5,7,9)
High	(0.7, 0.9, 1)	(7,9,10)
Very High	(0.9, 1, 1)	(9,10,10)

Fuzzy ratings and weights are aggregated as follows:

$$a_{ij} = \frac{1}{k}\left(a_{ij}^1 + a_{ij}^2 \ldots + a_{ij}^k\right) \tag{3}$$

$$b_{ij} = \frac{1}{k}\left(b_{ij}^1 + b_{ij}^2 \ldots + b_{ij}^k\right) \tag{4}$$

$$c_{ij} = \frac{1}{k}\left(c_{ij}^1 + c_{ij}^2 \ldots + c_{ij}^k\right) \tag{5}$$

and

$$W_j = \frac{1}{k}\left(w_{j1} + w_{j2} \ldots + w_{jk}\right) \tag{6}$$

This could be explained through an example for aggregating criteria as follows: for example, a_{ij}^k is the rating of Kth decision-maker, against alternatives i and criteria j. Similarly, w_{jk} is the weight of Kth decision-maker against j criteria.

Step 3: Compute the normalize fuzzy decision matrix

The fuzzy decision matrix with fuzzy weight in matrix form is constructed as follows:

$$
\begin{array}{c|cccc}
 & C1 & C2 & \ldots & C3 \\
\hline
A_1 & X_{11} & X_{12} & \ldots & X_{1n} \\
A_2 & X_{21} & X_{22} & \ldots & X_{2n} \\
A_n & X_{m1} & X_{m2} & \ldots & X_{mn}
\end{array}
\tag{7}
$$

Where, weight is $W_j = (w_1, w_2, \ldots w_n)$ and xij represents the fuzzy number; $xij = aij, ij, cij$

Step 4: Compute weighted normalize fuzzy matrix

The next step is to compute the weighted normalized fuzzy matrix as follows:

$$R = \left[r_{ij}\right]_{m \times n} \tag{8}$$

$$r_{ij} = \left(\frac{a_{ij}}{c * j}, \frac{b_{ij}}{c * j}, \frac{c_{ij}}{c * j},\right) \tag{9}$$

$$C * j = Max_{ij} \tag{10}$$

The normalizing decision matrix could be then written as:

$$U = \left[u_{ij}\right]_{m \times n} \tag{11}$$

Where i=1,2,3,.....m and j=1,2,3,.....n and $U_{ij} = r_{ij} \times w_{ij}$

Step 5: Compute fuzzy positive ideal solution (FPIS) and fuzzy negative ideal solution (FNIS)

The fuzzy positive ideal solution F^* and Fuzzy Negative ideal solution F^- can be computed as follows:

$$F^* = u_1^*, u_2^*, \ldots \ldots u_n^* \tag{12}$$

$$F^- = u_1^-, u_2^-, \ldots \ldots u_n^- \tag{13}$$

Where $u_j^* = (1,1,1)$ and $u_j^- = (0,0,0)$

Step 6: Computes the closeness Coefficient of each alternative

In this step calculation of closeness coefficient (CC) for each alternative is calculated as follows:

$$CC = \frac{D^-}{D^* + D^-} \tag{14}$$

Step 7: Rank the alternatives

The alternative with the highest closeness coefficient represents the best alternative among the all.

3.3. Data and its sources

This study requires field data. The data was collected based on a questionnaire that was distributed among 23 women entrepreneurs (decision-makers). The questionnaire contained questions related to different types of challenges faced by the women entrepreneurs in Pakistan and what of the particular success factors were of more importance. The rating of different criteria was undertaking using a 1 to 7 scale where 1 was from having very low affect to 7 with having the highest effect on business. In total there were 16 criteria and four alternatives as shown in Figure 1. The survey was conducted via the internet using google docs survey tool. The data was collected in two weeks period. In total, 19 women entrepreneurs filled up the questioner completely so that was included in the final analysis. The data was then transformed to the Microsoft excel and the fuzzy TOPSIS was applied as per the above-stated steps.

4. Findings and Discussion

4.1. Results and Findings

There were in total of 16 criteria that were used to rank four alternatives namely, limited funding access, social norms, moral support, and other reasons affecting women entrepreneur's growth in developing countries. The theoretical model is presented in Figure 1. The fuzzy TOPSIS method is applied using the seven-steps procedure described earlier. The results of weighting and based on that ranking of each criterion by the women entrepreneurs are presented below in Table 2. Gender inequality is considered as the major obstacle for women entrepreneurs in developing economies, followed by the self-believes on own decisions, and lack of family support as second and third most important obstacles, respectively. The rest of the ranking for the remaining obstacles is also given in the last column of Table 2 below.

Table 2. Ranking of criteria in the form of crisp values.

Criteria	Weight	Ranked
Limited funding access from family	0.70	7
Hard to take loans	0.74	6
Limited funding from other networks	0.77	4
Lack of institutional support	0.62	10
Resource constraint	0.57	11
Gender equality	0.87	1
Fear of male counterparts	0.77	4
Religion	0.69	8
Government contribution	0.76	5
Lack of family support	0.80	3
Lack of social support	0.69	8
Lack of encouragement from the country	0.77	4
Belief in one's decision	0.81	2
Lack of information	0.80	3
Family responsibilities	0.65	10
Jealousy among other female competitors in the region	0.66	9

Table 3 provides the ranks of four alternatives based on Fuzzy TOPSIS. It is clear from the ranking that moral support is using the technique fuzzy TOPSIS the ranking of the alternatives is done for which the entire calculations were done using Microsoft Excel. The closeness coefficient driven for the alternatives is provided in Table 3. The results show that moral support is considered as most important challenge followed by limited excess to funding, and social norms as the second and third most important challenges for the growth of the women entrepreneurs in developing countries like Pakistan.

Table 3. Ranking of criteria in the form of crisp values.

Alternatives	Closeness Coefficient	Ranking
Limited funding access	0.5150	2
Social norms	0.5138	3
Moral support	0.5264	1
Other reasons affecting the opportunity to grow	0.5025	4

4.2. Discussion

The result clearly shows that among all criteria weighted by the women entrepreneurs ranked gender equality as a major challenge. As per the survey, about 80 percent of women entrepreneurs ranked gender equality either high or very high challenge. This implies that everything else comes afterward, women entrepreneur face gender discrimination the most. The gender inequality exists because of many reasons such as social structure, less empowerment of women, misinterpretation of religion within male-dominated society, lesser hours being available to work for women (keeping in mind family life and kids) are just a few possible explanations for the gender bias within Pakistani community and being one of the major challenge for women entrepreneur to overcome for their venture growth in Pakistan. The second most important challenge for women entrepreneurs is self-believe. This refers to the women entrepreneur's confidence in their decisions. Again, there could be few explanations to it. For instance, in a combined family male slabbing preferential treatment compared to his female slabbing and as a result female, in general, are less self-confident. The other explanation could be the lesser knowledge of the women in developing economies due to a lack of opportunities for education and training that led them to be skeptical about the decisions they made while starting or running a business. Thus, making to doubt the decisions they made and hence becoming one of the biggest challenges to overcome while becoming an entrepreneur. Yet, another explanation could be the fact that in developing economies mostly women-run an informal or small business for which they are not technically equipped and hence resulting in loss of self-believes. This finding is consistent with earlier literature that confirms that women lack confidence compared to male and due to this confidence gap men are dominating the business world. In developing economies like Pakistan, in general, it is not easy for middle-class women to go out and start their business due to religion, culture, traditions, lack of opportunities, early age marriages, parents' control over the life of women, etc. The one biggest issue is that despite these all and many more issues if a woman dares to choose a path of entrepreneurship, she "has to earn" support from family. Our study reveals the fact that women entrepreneurs find a lack of family support as the third most important challenge for their successful entrepreneurship journey. The country overall environment may also influence women in entrepreneurial activities. As the results indicate, Pakistani women found the country overall environment being lesser supportive of their growth and they ranked it as the fourth major challenge for the growth of women entrepreneurship. And, the role of government cannot be denied the overall conducive or otherwise environment for women entrepreneurship. The result is consistent that women entrepreneurs also think that women's policies are not supported for their growth and ranked it as the fifth most important contest for their growth. The availability of loans from either financial institutions or from family sources is ranked respectively 6th and 7th important hurdles by women entrepreneurs. It is interesting that availability of financial resources is ranked lower compared to the issues like the supportive country environment, government policies, gender neutrality, etc., implying that it is not the earlier issues that hamper women entrepreneurship growth but the later issues that affect the growth of women entrepreneurship in developing countries. There are some other factors too, such as lack of social support, being jealous of other females, family responsibilities and resource constraints that also are hurdle for women entrepreneurship growth in Pakistan, however, given the factors such as gender equality, support from family, government regulations, etc., these are of lesser importance as far

as Pakistani entrepreneurs are concerned. The application of Fuzzy TOPSIS to ranks various alternatives reveals that its moral support that is the biggest challenge for women entrepreneurs in Pakistan than the limited access to financial resources and social support. This finding is consistent with the earlier studies of (Diaz, 2007) and (Vadnjal and Vadnjal, 2013) that also reported that family and friend support matters the most for women entrepreneurs. Similarly, lack of access to financial resources is also a big challenge for women entrepreneurs but it is ranked lower compared to the moral support from family and friends. This is an interesting findings and it reveals that the biggest hurdle for women in developing countries to become entrepreneur is not access to financial resources (as one would think for developing countries due to low per capita income) but the moral support of the family and that could obviously be provided with educating the male family members for the importance of women participation in economic activity and being emphasizing and preaching that they could be equally good given the opportunity. The fund limitation being the second issue, meanwhile, should not be taken for granted. No business could be run without funds availability and given the finding of this study and many others as cited in the literature review, financial resource availability for women entrepreneurs turns out to be the second important challenge for women entrepreneurs in Pakistan. The findings that the second important challenge for women entrepreneurs is limited access to financial resources is quite plausible and consistent with literature (e.g., (Maden, 2015)) and also given that financial sector in Pakistan is not fully developed as according to State Bank of Pakistan report less than 50 percent of total population has access to bank service (SBP, 2019). The rural sector women, in particular, have limited access to financial services and given that they are mostly less educated and had hardly formal training for running the business, the issue of funds availability becomes a two-tier problem. First, on the part of financial institutions and government to reach to those women entrepreneurs who need their services and second, the women entrepreneurs who hardly knows the complex financial systems of modern times that could help them to establish their start-ups.

The social norms remained the third important hurdle for women entrepreneurs in Pakistan. Being a developing country, that has been created in the name of religion (Islam) and at the same time being affected by about 2 decades-old war on terror (WOT), Pakistani society becomes more male-dominated, less tolerant and lesser conducive for business activities being own, run and managed by women. Women, in general, get lesser exposure, lesser opportunity, they are treated not as equal to their male counterparts (especially, in rural areas), thus making social norms and culture as one of the third major hurdles for women entrepreneurs in Pakistan. There are several limitations of this study that may be placed for readers and policymakers. First, this study is based on a limited number of women entrepreneurs working in Pakistan, and given that every region is unique, therefore, too much generalization of this study in various contexts may be not accurate. Secondly, women entrepreneurs in Pakistan mostly start informally and operate at a low scale, and they may lack motivation for growing a bigger business and only committed to meet the limited needs that they could. Finally, Pakistani culture, in general, does not allow the required mobility to women compared to men, thus that place an additional constraint on the study design.

5. Conclusion

Women entrepreneurs face a lot of hurdles and obstacles through their journey towards success in both developed and developing countries. Though, in developed countries among other things women are treated as equal gender and the nature of their problems is somehow different compared to developing countries. In contrast, in developing countries like Pakistan issues of gender equality, male-dominated society and lack of women formal education and opportunity make it more challenging to become an entrepreneur. The current study is based on studying the various challenges that women entrepreneurs face in Pakistan. The unique feature of the study is that it uses the Fuzzy TOPSIS method that is a powerful multicriteria decision-making technique and had never been applied in the context of the women entrepreneurship scholarly studies. The study uses women entrepreneurship filled up questionnaire-based data from Pakistan, and with the help of Fuzzy TOPSIS not only rank the 16 challenges that are faced by the Pakistani women entrepreneurs but also based on this analysis ranks the four major alternatives namely, limited fund access, social norms, moral support and other reasons that may affect opportunity to grow. It was found that, although all of them are up to some extent of comparable importance, it is not the limited access to financial resources that block the growth of women entrepreneurship in Pakistan but instead the moral support via family and friends that matter the most for their growth. The findings have several applications. The most important issue is the moral support from family and friends. Additionally, the absences of gender equality are the biggest challenge for women entrepreneurship. Therefore, the government should focus on policies that can pave the path for having a more accommodating society in which women have equal rights to men. For this purpose, an awareness campaign could be initiated. The engagement of electronic, social and print media could add more value to these efforts at a lower cost. The second important issue is the availability of funds for women entrepreneurship, in that aspect the government may set some policy guidelines to commercial banks for preretinal treatment for women entrepreneurs for credit needs. Some such efforts are

already on its way through both formal and informal channels with programs like Akhwat, national rural support program, provincial rural support programs. However, given that Pakistan has a big population with many more are still out of the reach of these mentioned financial services, in particular to the women, these efforts (both from government and private sector) clearly needed to be multiplied in order to increase access to financial resources by all women who want to step forward and want to become an entrepreneurs.

Appendix A.

See FPIS/FNIS for alternatives.

References

Ali, Y. et al., (2019c). Risk assessment of China-Pakistan Fiber Optic Project (CPFOP) in the light of Multi-Criteria Decision Making (MCDM). Advanced Engineering Informatics, Volume 40, pp. 36-45.

Ali, Y., Awan, M., Socci, C. & Binte Saleem, S., (2018). Can Coal Replace Other Fossil Fuels to Fulfil the Energy Demand in Pakistan? An Environmental Impact Analysis. Asia-Pacific Journal of Regional Science, Volume https://doi.org/10.1007/s41685-018-0096-y, pp. 1-26.

Ali, Y. et al., (2019a). A VIKOR based approach for assessing the social, environmental and economic effects of "smog" on human health. Science of the Total Environment, 650(2), pp. 2897-2905.

Ali, Y. et al., (2019b). Integration of green supply chain management practices in construction supply chain of CPEC. Management of Environmental Quality: An International Journal.

Amrita, K., Garg, C. & Singh, S., (2018). Modelling the critical success factors of women entrepreneurship using fuzzy AHP framework. Journal of Entrepreneurship in Emerging Economies, 10(1), pp. 81-116.

AW, S., (2017). Female entrepreneurs in developing countries: A comparative with developed countries as explorative study. Arabian Journal of Business and Management Review, 7(5), pp. 331-336.

Balachandra, L., Briggs, T., Eddleston, K. & Brush, C., (2017). Don't pitch like a girl! How gender stereotypes influence investor decisions. Entrepreneurship Theory and Practice, 43(1), pp. 1-22.

Bellman, R. & Zadeh, L., (1970). Decision-making in a fuzzy environment. Management Science, 17(4), pp. 141-164.

Bosma, N. & Kelley, D., (2019). Global Entrepreneurship Monitor Global Report 2018/2019, Global Entrepreneurship Research Association, London Business School: Regents Park, London NW1 4SA, UK.

Brindley, C., (2006). Barriers to women achieving their entrepreneurial potential. International Journal of Entrepreneurial Behavior & Research, 11(2), pp. 144-161.

Buttner, E. H. & Moore, D. P., (1997). Women's organizational exodus to entrepreneurship: self-reported motivations and correlates with success. Journal of small business management, 35(1), pp. 34-46.

Chawla, S. & Sharma, R., (2016). How women traverse an upward journey in Indian industry: multiple case studies. Gender in Management, 31(3), pp. 181-206.

Chen, C., (2000). Extension of the TOPSIS for group decision-making under fuzzy environment. Fuzzy Sets and Systems, 114(1), pp. 1-9.

Chovwen, C., (2007). Barriers to acceptance, satisfaction and career growth. Women in Management Review, 22(1), pp. 68-78.

Coleman, S., (2002). Constraints faced by women small business owners: Evidence from the data. Journal of Developmental Entrepreneurship, 7(2), pp. 151-174.

Crespo, N., (2017). Cross-cultural differences in the entrepreneurial activity of men and women: a fuzzy-set approach. Gender in Management: An International Journal, 32(4), pp. 281-299.

Diaz, G., (2007). How does gender influence entrepreneurial intention? in: International Entrepreneurship – stimulating smarter successful small businesses world-wide: Conference Proceedings (CD ROM).. s.l., Harrogate: ISBE.

Foss, L., Henry, C., Ahl, H. & Mikalsen, G. H., (2019). Women's entrepreneurship policy research: a 30-year review of the evidence. Small Business Economics, 53(2), pp. 409-429.

Goheer, N. A., (2003). Women Entrepreneurs in Pakistan, ILO, Islamabad: International Labour Office, Geneva.

Henry, C., Foss, L. & Ahl, H., (2016). Gender and entrepreneurship research: A review of methodological approaches. International Small Business Journal, 34(3), p. International Small Business Journal.

Hisrich, R. & Ayse Öztürk, S., (1999). Women entrepreneurs in a developing economy. Journal of Management Development, 18(2), pp. 114-125.

Hwang, C., Lai, Y. & Liu, T., (1993). A new approach for multiple objective decision making. Computers & operations research, 20(8), pp. 889-899.

Hwang, C. & Yoon, K., (1981). Methods for multiple attribute decision making. In Multiple attribute decision making. Springer, Berlin, Heidelberg., pp. 59-191.

ILO, (2018). Labour Force Estimates and Projections (LFEP) 2018, International Labour Organization:

Geneva, Switzerland.

Irwin, D. & Scott, J., (2010). Barriers faced by SMEs in raising bank finance. International Journal of Entrepreneurial Behavior & Research, 16(3), pp. 245-259.

Ismail, M. & Ibrahim, M., (2008). Barriers to career progression faced by women. Gender in Management, 23(1), pp. 51-66.

Jamali, D., (2009). Constraints and opportunities facing women entrepreneurs in developing countries: A relational perspective. Gender in management: an international journal, 24(4), pp. 232-251.

Javadian, G. & Singh, R., (2012). Examining successful Iranian women entrepreneurs: an exploratory study. Gender in Management, 27(3), pp. 148-164.

Jennings, J. E. & Brush, C. G., (2013). Research on women entrepreneurs: Challenges to (and from) the broader entrepreneurship literature? The Academy of Management Annals, 7(1), pp. 663-715.

Khan, G. N. R. & Jantan, A., (2018). Status of wonder women: Challenges for young future women entrepreneurs in Pakistan. International Journal of Experiential Learning & Case Studies, 3(1), pp. 97-109.

Kraus, S., Ribeiro-Soriano, D. & Schüssler, M., (2018). Fuzzy-set qualitative comparative analysis (fs QCA) in entrepreneurship and innovation research – The rise of a method. International Entrepreneurship and Management Journal, 14(1), pp. 15-33.

Lerner, M., Brush, C. & Hisrich, R., (1997). Israeli women entrepreneurs: An examination of factors affecting performance. Journal of business venturing, 12(4), pp. 315-339.

Maden, C., (2015). A gendered lens on entrepreneurship: women entrepreneurship in Turkey. Gender in Management, 30(4), pp. 312-331.

Mathew, V., (2010). Women entrepreneurship in Middle East: Understanding barriers and use of ICT for entrepreneurship development. International Entrepreneurship and Management Journal, 6(2), p. 163–181.

Moral Ávila, M., Chiclana Parrilla, F., Tapia García, J. & Herrera-Viedma, E., (2017). Fuzzy TOPSIS: A General View. Information Technology and Quantitative Management (ITQM 2017), Volume 91, p. 823 – 831 .

Poggesi, S., Mari, M. & De Vita, L., (2016). What's new in female entrepreneurship research? Answers from the literature. International Entrepreneurship and Management Journal, 12(3), p. 735–764.

Rehan, F., Block, J. H. & Fisch, C., (2019). Entrepreneurship in Islamic communities: How do Islamic values and Islamic practices influence entrepreneurship intentions? Journal of Enterprising Communities: People and Places in the Global Economy, Issue http://dx.doi.org/10.2139/ssrn.3405196, pp. 1-32.

Rehman, S. & Azam Roomi, M., (2012). Gender and work-life balance: a phenomenological study of women entrepreneurs in Pakistan. Journal of Small Business and Enterprise Development, 19(2), pp. 209-228.

Roomi, M., (2006.) Women entrepreneurs in Pakistan: Profile, challenges and practical recommendations. Doctoral Researcher Paper, School of Management Royal Holloway, University of London, London, 17(1), pp. 59-72.

Roomi, M. & Parrott, G., (2008). Barriers to development and Progression of Women Entrepreneurs in Pakistan. J. Entrepreneurship, 17(1), pp. 59-72.

Sabir, M., Ali, Y. & Muhammad, N., (2018). Forecasting incidence of dengue and selecting best method for prevention. The Journal of the Pakistan Medical Association, 68(9), pp. 1383-1386.

Sandhu, N., Hussain, J. & Matlay, H., (2012). Barriers to finance experienced by female owner/managers of marginal farms in India. Journal of Small Business and Enterprise Development, 19(4), pp. 640-655.

SBP, 2019. Annual Report FY (2018), State Bank of Pakistan, Karachi: Pakistan.

Sharma, Y., (2013). Women Entrepreneur in India. IOSR Journal of Business and Management, 15(3), pp. 9-14.

Tripathi, K. A. & Singh, S., (2018). Analysis of barriers to women entrepreneurship through ISM and MICMAC. Journal of Enterprising Communities: People and Places in the Global Economy, 12(3), pp. 346-373.

Vadnjal, J. & Vadnjal, M., 2013. The role of husbands: Support or barrier to womens entrepreneurial start-ups? African Journal of Business Management, 7(36), pp.3730-3738., 7(36), pp. 3730-3738.

Wu, J., Li, Y. & Zhang, D., (2019). Identifying women's entrepreneurial barriers and empowering female entrepreneurship worldwide: A fuzzy-set QCA approach. International Entrepreneurship and Management Journal, 15(3), p. 905–928.

Zadeh, L., (1970). The concept of a linguistic variable and its application to approximate reasoning - I. Information Sciences, Volume 8, pp. 199-249.

Zgheib, P., (2018). Multi-level framework of push-pull entrepreneurship: comparing American and Lebanese women. International Journal of Entrepreneurial Behavior & Research, 24(3), pp. 768-786.

Appendix A.

Table A.1. FPIS/FNIS for alternatives

Alternative 1 (Limited Funding Access)

Weight of Matrix			D *		D–	
0.31	0.59	0.87	0.52	0.72	0.40	0.63
1.18	1.15	1.12	0.86	0.93	1.31	1.14
1.05	1.07	1.09	0.77	0.88	1.13	1.06
1.41	1.33	1.27	1.16	1.08	1.76	1.33
1.42	1.37	1.31	1.24	1.12	1.85	1.36
0.64	0.76	0.88	0.49	0.70	0.59	0.77
0.32	0.49	0.65	0.37	0.61	0.25	0.50
0.26	0.40	0.56	0.34	0.58	0.18	0.42
0.98	1.04	1.08	0.75	0.86	1.06	1.03
0.78	0.87	0.96	0.57	0.75	0.75	0.87
0.82	0.89	0.94	0.56	0.75	0.77	0.88
0.84	0.88	0.93	0.55	0.74	0.77	0.88
0.28	0.47	0.69	0.40	0.63	0.25	0.50
0.47	0.61	0.78	0.42	0.65	0.40	0.63
0.36	0.45	0.57	0.31	0.56	0.22	0.47
0.26	0.35	0.49	0.30	0.55	0.14	0.38
				12.1		12.9

Alternative 2 (Social Norms)

Weight of Matrix			D *		D–	
0.13	0.34	0.60	0.40	0.64	0.16	0.40
0.50	0.65	0.78	0.42	0.65	0.42	0.65
0.41	0.57	0.71	0.39	0.62	0.33	0.57
0.67	0.80	0.91	0.52	0.72	0.63	0.80
0.29	0.52	0.71	0.42	0.65	0.28	0.53
0.96	1.00	1.03	0.68	0.82	0.98	0.99
1.10	1.10	1.09	0.79	0.89	1.19	1.09
1.32	1.26	1.20	1.04	1.02	1.58	1.26
1.05	1.09	1.13	0.82	0.90	1.18	1.09
0.58	0.69	0.80	0.43	0.66	0.48	0.69
1.00	1.03	1.03	0.70	0.83	1.03	1.01
0.75	0.82	0.88	0.50	0.70	0.66	0.81
0.41	0.59	0.78	0.43	0.65	0.37	0.61
0.33	0.49	0.67	0.38	0.61	0.26	0.51
0.60	0.73	0.85	0.47	0.68	0.53	0.73
0.46	0.58	0.71	0.37	0.61	0.35	0.59
				11.7		12.3

Alternative 3 (Moral Support)

Weight of Matrix			D *		D–	
0.24	0.49	0.76	0.45	0.67	0.29	0.53
0.63	0.76	0.88	0.49	0.70	0.58	0.76
0.50	0.66	0.79	0.44	0.66	0.44	0.66
0.92	0.99	1.05	0.69	0.83	0.96	0.98
0.40	0.62	0.80	0.46	0.68	0.39	0.62
0.61	0.74	0.86	0.47	0.69	0.55	0.74
0.66	0.76	0.87	0.47	0.69	0.58	0.76
0.57	0.67	0.79	0.41	0.64	0.46	0.68
1.05	1.09	1.11	0.80	0.89	1.16	1.08
1.20	1.13	1.08	0.82	0.91	1.28	1.13
1.41	1.29	1.17	1.06	1.03	1.66	1.29
1.27	1.18	1.10	0.88	0.94	1.39	1.18
0.90	0.99	1.07	0.70	0.84	0.97	0.98
0.26	0.42	0.61	0.36	0.60	0.20	0.45
1.27	1.21	1.16	0.95	0.97	1.46	1.21
0.66	0.78	0.88	0.49	0.70	0.60	0.77
				12.44		13.83

Alternative 4 (Other reasons effecting the opportunity to grow)

Weight of Matrix			D *		D–	
0.09	0.27	0.51	0.38	0.62	0.11	0.34
0.38	0.55	0.71	0.39	0.63	0.31	0.56
0.26	0.44	0.61	0.37	0.61	0.21	0.46
0.46	0.64	0.78	0.43	0.66	0.41	0.64
0.56	0.75	0.89	0.51	0.71	0.55	0.74
0.42	0.57	0.73	0.39	0.63	0.34	0.58
0.43	0.60	0.75	0.41	0.64	0.36	0.60
0.29	0.44	0.63	0.36	0.60	0.22	0.47
0.46	0.64	0.82	0.45	0.67	0.43	0.65
0.45	0.60	0.75	0.40	0.63	0.37	0.61
0.67	0.76	0.84	0.46	0.68	0.57	0.75
0.52	0.62	0.73	0.38	0.62	0.39	0.63
0.69	0.80	0.94	0.54	0.73	0.66	0.81
0.94	1.02	1.09	0.74	0.86	1.03	1.01
1.58	1.40	1.26	1.28	1.13	1.99	1.41
1.39	1.27	1.20	1.06	1.03	1.64	1.28
				11.44		11.55