Modeling the critical success factors of women entrepreneurship using Fuzzy AHP Framework

1. Introduction

A silent revolution is now taking shape among women. Since the turn of the century, growing industrialization, globalization, and social legislation have contributed towards a change in status of women worldwide (Jayachitra and Vijayakumar 2013). With an increase in education and awareness, women have come out of their kitchens and reached out to a higher level of professional activity (Jayachitra and Vijayakumar2013). In almost all developed countries, women have successfully equaled men in the corporate field (Nandy and Kumar 2014). Women-controlled and women -owned enterprises are now seen as vital functional elements of the society and the economy, representing approximately 25.8 to 28.1 percent of the total entrepreneurship in the world. According to a report by Women's Business Research (2009), growth rate of women entrepreneurship was twice as fast as compared to other enterprises from 1997 to 2002. It was also identified in the Women's Business Research (2008) report that 10.1 million firms are now supervised and run by women (40 percentage of privately owned enterprises), generating employment for more than 13 million and around $1.9 trillion in turnover in the United States. Women owned businesses can today be found in every sector of the economy and in every region of the US (WBR 2009 Report). Similarly, women-owned businesses in Canada account for nearly one third of all businesses in Canada and provide nearly one million jobs for Canadians. In Ireland, women's entrepreneurial activity has increased from 4.2 percent in 2006 to 5.9 percent in 2007; this represents over 1,000 women (on an average) starting new businesses in Ireland each month. With more than a million self-employed women, women-run enterprises are now increasing even in the United Kingdom. In Sweden, more than 30 percent of new entrepreneurs are women. In 2007, nearly 32.4 per cent of all Austrian enterprises were supervised and controlled by women. In Denmark, around 25 per cent of all entrepreneurs are women. There were 74, 000 women entrepreneurs in Finland in the year 2007. In 2006, women made up 30.6 per cent of self-employed workers and entrepreneurs in Germany (GEM, 2013Report). According to Observatory on Women Entrepreneurs (2007), there are over 1.3 million women-owned firms in Italy, accounting for 24.02 percent of all startups and firms in the country. The Labor Force Survey suggests that for the last quarter of the year 2007, women accounted for about 30.9 percent of all entrepreneurs. As per AMEX OPEN State of Women-Owned Business Report, the highest ranked countries on grounds of revenue generation by women-owned and women-led firms are - United States (1), Australia (2), Germany (3), France (4) and Mexico (5). India ranked 16th despite the country's latest economic and commercial surge.

India is the fastest growing economy in the world and provides significant opportunity to entrepreneurs. However, the environment for women entrepreneurs in the country is not very encouraging because of the prevalence of patriarchy in business. Though the percentage of women entrepreneurs has constantly increased from 14% in 1970 to 31% in 2010, motivated women who could really make a difference are still very less. After India introduced a new law in 2013 and made it mandatory for every company to have at least one woman on the board of directors, the number of successful women entrepreneurs has increased, but not significantly. Participation of women in work and business is relatively low in India in comparison to developed countries. Women participation in work in India is

31.6 % whereas in USA it is 45 %, UK 43 %, Canada 42 %, France 32 %, Indonesia 40 %, Sri Lanka and Brazil (both) 35 % (Nandy and kumar, 2014).

Traditionally in India, the role of women has been to look after domestic affairs as housewives. The greatest barriers faced by Indian women to succeeding in their enterprise are expectations from the family and personal commitments and responsibilities. In such circumstances, it becomes difficult to set priorities and execute business activities efficiently and effectively. Indian women are very careful and concerned about their obligations and duties towards their families and place them above business responsibilities (Agrawal & Lenka, 2015). In Hindu culture, a woman is beheld as the epitome of Shakti or power. Using the Shakti, a woman can do all achievable tasks; come what may (Vijayakumar and Jayachitra, 2013). In older times, there existed 3 Ks for the Indian woman in an Indian household – Kids, Kitchen & Knitting. The stepping up of women into the corporate realm is considered an extension to their household chores and kitchen activity, mainly the 3Ps- Pickle, Powder and Pappad. However, with passage of time and more education, women started shifting from the 3Ps to the new age 4Es - Electricity, Electronics, Energy and Engineering (Vijayakumar and Jayachitra, 2013). Women entrepreneurs are now assuming roles other than the conventional ones mentioned above. While traditionally they were involved in micro and small businesses like beauty products, beauty salons, restaurants or boutiques, women are now engaging in businesses which are technical and software oriented. In the state of Kerala, 30% of the factories are registered in the name of women entrepreneurs. In Maharashtra, about 33% of all industries registered are run by women (MSMEs report, 2013-14).

1.1 ***Categories of women entrepreneurs in India***

1.1.1 First Category

Dwell in cities, posses higher educational qualifications and are well off.

1.1.2 Second Category

Come from cities and towns and possess adequate education and skills. Women undertaking services such as kindergarten, crèches, beauty parlors, health clinics etc. are also included.

1.1.3 Third Category

Uneducated, financially vulnerable and involved in family businesses like dairy, farming, handlooms, power looms, horticulture, etc.

The role of the woman entrepreneur in economic as well as social development is very crucial. A next generation of women across the world have undone all negative notions and limitations, and have proved their mettle beyond doubt in every walk of life, even the most complicated and ever - demanding world of corporate. Our country too has its own pool of smart and confident women who have distinguished themselves within the country as well as on the global platform (Radha 2014).

Since the middle of 1991, a dramatic change has occurred in the Indian economy. The capacity and caliber for entrepreneurship in India. In India, low work participation limits the contribution of women in commercial activities. In recent years, in developed countries like USA and Canada, women's role in terms of their share in small

businesses has been increasing. Six out of every ten women in India are uneducated. They are far behind men in education. Rapidly growing technology, new methods of production, marketing techniques and government policies (Radha, 2014) are areas about which women entrepreneurs lack information. On the other hand, there is continuous pressure from the government, regulatory bodies and planning commission to focus on empowering women, especially at the grass root level, and to encourage women to set up their own micro, small and medium size ventures. This inspired us to analyze the critical success factor of women entrepreneurship in Indian MSMEs.

1.2 Research motives

This exploration has a few targets, as hereunder:

- To identify critical success factors of women entrepreneurship specific to Indian MSMEs.
- To prioritise and analyse the identified critical success factors.
- To propose a hierarchy model of critical success factors of women entrepreneurship.
- To verify the robustness of the model.

To support the above, we propose to identify and investigate the CSFs of WE. The analysis of CSFs is being done by prioritizing them to enhance clarity in decision making and effective deployment. The first objective is to identify and sort out major CSFs of WE related to MSMEs. To identify most prominent CSFs of WE, a North Indian cluster of MSMEs has been chosen. Secondly, we propose a modeling and prioritization of identifying CSFs of WE. Data analysis may be difficult under vagueness so we propose fuzzy set theory with analytical hierarchal process (AHP) method. AHP is a commonly used method under multi criteria decision making (MCDM) but is unable to provide a better understanding of a linguistic variable (pertaining to confusion in opinion under exploratory studies) rated through Likert scale. Therefore, it is recommended to use the integrated fuzzy AHP concept to meet desired objectives. Managerial insights would help Indian MSMEs and world-wide companies in adoption of successful WE.

The rest of the paper is structured as follows: Part 2 concisely reviews the literature on the identification, classification and finalization of CSFs of WE in Indian MSMEs. Problem definition is given in part 3. The research methodology with respect to Fuzzy AHP approach is discussed in Part 4. Parts 5 and 6 lay down results and discussion with sensitivity analysis. Managerial insights are given in part 7. Part 8 provides the conclusion and underlines the unique contribution of the study.

2. Literature Review

The commitment made by women entrepreneurs to monetary advancement incorporates work creation and financial development originating from the expansion in their dynamic association in corporate life (Huarng, Tur and Yu, 2012). Business execution is influenced by the basic achievement elements of ladies possessed business (Lee et.al. 2009). Critical Success Factors (CSFs) are vital integral components/empowering influences/exercises required for the achievement of any business objective, and important for an association to realize its objectives. Thus, these

CSFs must be recognized, assessed and centered. Moreover, a key range of factors for which women entrepreneurs are getting consideration is the accomplishment of their business (Lee et.al. 2009). To nurture a business, the proprietors require an expansive arrangement of capacities, abilities and aptitudes which are vital to the enterprise's success (Walker and Webster, 2006). Accurate analyses of these factors are required for a financial improvement to the business enterprise. From an industrial perspective, a more strategic focus on these CSFs can create substantial value for all stakeholders and ensure profitability in business activities. Many authors have suggested various factors for the successful implementation of WE. A better understanding of the factors for successful adoption of WE may be helpful in WE implementation and providing opportunities to new women entrepreneurs entering into business.

2.1 Identification of critical success factors of women entrepreneurship in Indian MSMEs

Identification of factors for successful implementation of reverse logistics (RL) practices in Indian MSMEs has been done through in-depth literature analysis followed by discussions with industrial experts. Further, these identified and finalized factors are not entirely focused on studies in India but a similar situation has been assumed for identifying these factors outside the Indian context.

Seven CSFs (main criteria) and forty-one CSFs (sub-criteria) of WE have been identified in Indian MSMEs as expressed in the writing have been clarified as follows. The identified CSFs and Sub- CSFs criteria are given in Table 1.

2.1.1 Government factors

Many authors have identified that government policies and schemes directly affect the conditions of women entrepreneurs (Solesviket.al, 2013). The Government of India has initiated different programs for ladies to begin their endeavors in micro and small level businesses (Farr-Wharton et. al, (2007). Apart from this, different NGOs have supported women entrepreneurship activities. The Government of India has organized many training programs for women entrepreneurship. Further, the government has exercised various policies such as limitations on imports and fares, provisions of insolvency law's passage hindrances, procedural prerequisite for enrollment and authorizing rules and directions representing entrepreneurial maneuvers, and laws to ensure respectability rights (Michael et al., 2009). Moreover, access to entrepreneurial subsidizing, proficient preparing, conferences on business, computer aptitudes and preparing, and networking with other entrepreneurs also affects WE (Solesviket.al, 2013). Government associations have influenced social elements required for organized entrepreneurial women. To support more prominent entrepreneurial action, various organizations for Economic Co-operation and Development (OECD) have embraced new arrangements in order to synergize community exercises through the development of industry groups or business systems (Solesviket.al, 2013). Government contribution on account of these bunch/systems were viewed as essential for inventive action due to the potential event connected with quickened dissemination of innovation and expertise (OECD, 1997); which is advantageous for organizations themselves, as well as can improve the monetary advancement of an area. In any case, government support for women business visionaries is not as clear. If governments were truly keen on quickening monetary development by advancing financial movement, then they should concentrate on empowering "a greater amount of its ladies to take an interest". There have been some late

endeavors to grow new strategies to better bolster women entrepreneurship (Farr-Wharton et.al. 2007). The identified government factors that influence WE have been given in table 1

2.1.2 Individual factors

Personal skills, competencies and capabilities are critical factors for entrepreneurial activities. A combination of knowledge and skills is practiced by business visionaries to bolster the advancement of competencies (Walker and Webster, 2006), and in turn, develop businesses. These comprehensive skills enable women-entrepreneurs to manage organizations effectively (Mitchelmore et al., 2013). Willingness to tune in, individual style and self-advancement, capacity to withstand weight, tender loving care and concentration on consistent change, uplifting the state of mind, individual duty and obligations have been mentioned as inherent attributes required to be a successful entrepreneur. Further, personal capacity to make new thoughts, creative ideas and innovations in products and process are also influential factors in the making of successful entrepreneurs (Yadav and Goyal, 2015). The working style of business people, leadership ability and skill development in the team directly contributes towards the development of successful entrepreneurs. Work-life parity implies maintaining harmony between work and personal life. By acquiring cash for the advancement of the family, ladies are now assuming the role of the provider, as a consequence of which, the parity of their families is getting disturbed. The association of women in entrepreneurial exercises has kept up harmony between work and family (Agarwal and Lenka, 2015). Successful entrepreneurs are proactive; they prefer to present new items or administrations in the face of opposition and act towards future interests of the organization (Prabhu et al., 2015). They are also able to tolerate disappointment, examine and tackle issues, diligent soul of advancement, and strong will to go out on a limb (Sebora and Theerapatvong, 2010). The essential motivational components for progressing productive women representatives could be a result of the support of relatives. Other factors are - duty to enhance family unit economy, ability to adapt to family related possibilities, ability to adjust family and work, relationship with life partner, relationship with kids, homemaker part, early adolescence experience and personal flexibility (Dyer and Handler, 1994). Successful business people believe that learning's from good and bad experiences might be communicated among employees through information sharing. This information might be connected to tackle the functional issues of work, and the state of mind that encourage conduct in accordance with the qualities and society of the association (Yew, 2005). Aptitudes are of multidimensional forms; they incorporate the subjective – data, moreover, what is learnt and the loaded with feeling– motional expression and what is experienced; the behavior – action at essential, vital and singular levels; and the setting sectoral, word related, occupation and task levels (Madsen et al., 2003).The identified individual factors that influence WE have been given in table 1.

2.1.3 Social Factors

In India, social issues are very critical for women entrepreneurs. It is difficult for women to use entrepreneurial models, to deal with them, and manage the challenge of social dogma. A business visionary try to change and address the societal concerns through the production of reasonable financial structures, relations, foundations, associations, and practices that yield and support social advantages (Hasan, 2005). This requires societal support and

inspiration especially to women who endeavor to do business. Women entrepreneurship adoption is also influenced by nearness of experienced maori business people, presence of good example inside maori society, existence with maori entrepreneurial qualities, recognition of maori entrepreneurial execution (Clydesdale, 2007). Success of women entrepreneur depends on the acceptance and perception of the society (Welsh, 2012). Conducive growth of the business requires effective network management (Noguera et al., 2013). The capacity to take advantage of new markets requires aptitude, learning and contacts. Organizing prompts the connectedness of individuals in a general public and mirrors their capacity to take up with each other. Systems administration is seen as a crucial component for empowering helpful conduct, enhancing the proficiency of society by creating composed activities, and meeting regular objectives. (Hoang et al., 2003). The identified social factors which influence WE have been given in table 1.

2.1.4 Economic and Financial factors

The financial performance of an organization is measured in terms of monetary strength and how well the firm manages the economic viability of the business process. Generation of sufficient profit is a prerequisite to running the organization. Hence, an entrepreneur is able to generate financial surplus for organization (Kantor et al., 2005) Entrepreneurs should be able to control cost and achieve economy of scale (Amatucci et al. 2011). A successful business requires allocating sufficient resources wherever required and utilizing them effectively and efficiently (Garg, 2016). Business women should be capable of arranging sufficient funds for business operations. An entrepreneur must be able to finance business through various financial sources and manage capital budgeting decisions effectively (Kumar et al., 2013). Specific capital budgeting decisions such as investment in R&D activities and innovations for product (existing and new) and process improvements help the organization deal with future risk and uncertainty (Ebersbergeret.al. 2013). The identified economic and financial factors that influence WE have been given in table 1.

2.1.5 Market related factors

The success of a business firm depends on the market demands of organizational products and services. Business entrepreneurs are able to address gaps and generate sufficient demand for their products and services (Prakash & Barua; 2016). Firms must be able to forge good customer relationships throughout the supply chain of products and services and among all partners (Prakash & Barua; 2016a). Effective marketing efforts are required for MSME products and services in order to increase their reach to customers. From time to time, entrepreneurs should also be able to introduce new and innovative products and services in order to meet current and future needs of customers (Garg et al., 2017). Products and services would become order winners if they are able to be different from existing products and services. Therefore, successful women entrepreneurs should be capable enough to differentiate their products and services from those of competitors (Prasad et al., 2013). The acceptance and performance of the products and services would be evaluated by customers. Hence, entrepreneurs should provide necessary competitive dimensions and priorities in their products and services to increase market acceptance (Coley et al., 2010). Competition among firms has shifted firm focus towards better supply chains and how an organization may provide fast, efficient and cost effective products and services as compared to competitors (Prakash & Barua; 2016b). To

successfully achieve this objective, proper coordination and smooth collaboration among suppliers, partners and other service providers is necessary (Jayaram, 2011).The identified market related factors that influence WE have been given in table 1.

2.1.6 Technological & Infrastructural factors

Technology and infrastructure have significantly contributed towards the enhancement of global economy and cleaner and safer technology adoption is being done to counter environmental issues. Individuals may accomplish cost-effective and environmentally friendly ways to do away with problems related to production and green innovation by innovating and updating their technical know-how (Spillan and Ziemnowics, 2002). Up gradation and advancement of technology involved in production reduces pollution (Orsat et al., 2008). Adequate infrastructure may serve as a provision for a cost-cutting advantage to organizations and readily complies with pre-existing optimization goals. Clean and green technology sharing among suppliers would enhance environmental performance. Moreover, transfer of technology to vendors/suppliers will help firms in achieving efficient energy solutions to accomplish their aims (Lawson et al., 2003). ICTs can play a vital role in developing MSMEs through efficient usage and good inclusion of ICTs in entrepreneurial tasks while providing assistance in zeroing down to efficient decisionsthat are contextually relevant and precise. ICTs can generate the step change among MSMEs and make them competitive, innovative and generate growth (Sánchez et al**.**, 2007). The identified technological &infrastructural factors that influence WE have been given in table 1.

2.1.6 Management factors

The success and performance of the firm directly depend on management and strategic decision making. Successful business people can see what other people cannot. They believe in good relationships with their colleagues and subordinates. Their decision making style, skills and competency make them different from others. Managerial ability and administrative skills provide human asset to the firms such as procedures that comprise the orderly legible proof of key standings which add to the organization's economical bounds, gender equality, the improvement of an ability pool of potent and efficient occupants to complete these parts, talent management and the advancement of a separated human asset engineering to encourage filling these positions with skilled officeholders and to guarantee their proceeding with responsibility to the organization (Collings et al.,2009). Other management factors such as multitasking capacity, ability to oversee faculty, production adaptability, adequacy of creation procedure, standardization of administration and processes, proper treatment of crude material, attention to cleanliness of workplace and flexibility aid in organizational success (Ramírezet.al. 2010). Current research stresses that business people are driven by a few inspirations, including financial increase and non-monetary thought processes, for example, want for accomplishment and freedom, self-improvement, enhanced economic wellbeing and commitment to group welfare (Shane et al., 2003). Good organizational policies and shared understanding of best practices are required for optimal output and synergy among the workforce (Luthra et al., 2016). The identified management/managerial factors that influence WE have been given in table 1.

Table 1 IdentifiedCritical Success Factors and their evaluation criteria along with their sub-criteria are listed

Criteria	Criteria code	Sub criteria	Description	Supporting relevant literature
Government factor	GF 1	Government assistance	Encourages women to start their own venture through Government schemes like "trade related entrepreneurship assistance and development" in non - agricultural activities.	Iakovleva et al.(2013)
	GF 2	Government Policies and programs	Government programs related to job improvement and training programs with support of NGOs for women entrepreneurship.	Prakash et al.(2015a)
	GF 3	Government Subsidiaries	Entrepreneurship Development Programs (EDPs) in India are conducted by Micro, Small & Medium Enterprises development organizations, various State Small Industries Development Corporations, nationalized banks and even NGOs.	Farr-Wharton et al.(2007), Michael et al.(2009)
	GF4	Financial support by Government	Financial support of government for women entrepreneurs in India, e.g. BharatiyaMahila Bank. Credit Guarantee Fund Trust for MEMs. .	Iakovleva et al.(2013)
Individual factor	IF 1	Family commitment and conflict handling	Support by relatives is vital to the work performance of women and determines to a large extent their success rate.	Dyer et al.(1994), Lee et al.(2001)
	IF 2	Knowledge, Skills and Competence	Knowledge is a set of structured information, skills, values, experiences and information that is context - related to change the modus operandi of the listener. Knowledge is used to do away with practical problems of attitudes and labor.	Lee et al.(2015), Walker et al.(2006), Mitchelmore et al. (2013)
	IF 3	Problem solving aptitude and Independence	Entrepreneurial and serious personal style and optimistic attitude should be adopted to do away with difficulties.	Wong et al.(2005), Petridou et al.(2013)
	IF 4	Leadership, Working Style and Work Life Balance	Initiative is a pragmatic experience relativeto the capacity of a person or organization to "lead" or "guide" different individuals, groups of individuals, or whole associations.	Agarwal et al.(2015)
	IF 5	Innovation and creativity	Creativity is a potentiality of a human being. It is the ability to produce and be useful. It is the capability to imagine and create. The ability to create fresh ideas, be inventive, and of innovative originality.	Prabhu et al.(2015), Khandwalla (2014), Yadav et al.(2015), Hemmen et al. (2015)

	IF 6	Risk Taking ability and Responsibility	Ability to take risks and assume responsibilities when undertaking entrepreneurial ventures, adventurous spirit, problem solving ability, and indomitable character are a must.	Lee et al.(2015), Sebora et al.(2010), Hormiga et al.(2014)
	IF 7	Ethics and Efficient	Ethical principles that govern the behavior of a person or an organized activity.	Peris-Ortiz et al.(2011)
Social Factor	SF 1	Societal support and inspiration	Somebody who sees a social issue and uses entrepreneurial standards and skills to sort it out, and dares to bring about social improvement can be said to be a social business person.	Hasan et al. (2005)
	SF 2	Public attitude to Maori entrepreneurship	Entrepreneurial activity is powered by the motivation and the energy of the person or people who are making it come alive. They drive it and sustain it.	Clydesdale et al. (2007)
	SF 3	Societal perception about women entrepreneurs	A social business person is the one who is involved in social business enterprise. He or she is somebody who perceives a social issue.	Noguera et al.(2013), Welsh et al.(2013)
	SF 4	Entrepreneurship network management	Organizing prompts the connectedness of individuals and mirrors their capacity to take up with one another.	Brett et al.(2012), Hoang et al.(2003)
Economic and Financial Factor	EFF 1	Ability to generate profit	Entrepreneurial capacity is measured by how well the business person joins assets, settles on strategy choices, and develops.	Kantor et al. (2005)
	EFF 2	Ability to control cost and achieve economy of scale	It deals with women's access to economic empowerment, resources and employment opportunities, financial services, property and other productive opportunities.	Amatucci et al.(2011)
	EFF3	Capabilities to project resources	To achieve a project resource is the efficient and effective development of an organization's resources when they are needed.	Narayana et al.(2007)

	EFF 4	Ability to finance business	Main financing options available to women owned ventures. The investors demand improbable and preposterous securities.	Kumar et al. (2013), Morris et al.(2015), Williams et al. (2012)
	EFF 5	Spending on R&D and innovations business	Decisions relating to R&D capability help manufacturers of high-risk R & D activities to address their concerns is increased, their confidence, and promotes their firms' R & D spending.	Ebersberger et al.(2013),Gao et al.(2015)
Market related Factor	MRF 1	Demand for the Product and Services	Demand is a purchaser's eagerness and capacity to pay a cost for a particular amount of goods or administration.	Pitta et al (2012), Alom et al. (2016)
	MRF 2	Customer assistance and Relationship Management	It is a system to expand client maintenance and assemble client value.	Wang et al.(2008), Chaudhry (2007)
	MRF 3	Marketing of products & services and ability to introduce new product,	It comprises of pin-pointing groups of customers, their needs, groups of customers one prefers to serve, products or services one might introduce to meet their needs and knowing how the customers prefer to use the products and services.	Uslay et al. (2014)
	MRF 4	Product and services differentiation ability	By offering a valued variation of the physical product, product differentiation can be realized.	Prasad et al.(2013)
	MRF5	Customer perception about products and services	Consumer evaluation of productscan occur along several stages.	Mosey et al. (2005), Reijonen et al. (2010)
	MRF 6	Degree of market acceptance and Consumer purchasing power	Consumer purchasing power measures the value in money for which consumers may purchase goods or services	Coley et al.(2010)
	MRF 7	Competition and business environment	It is the study and interpretation of political, social, monetary and mechanical interactions and patterns that impact an industry, a business or even an aggregate business sector.	Smith et al.(2009), Cuervo et al. (2005), Alvarez et al(2011) Straub et al.(2010),

	MRF 8	Proper coordination and collaboration among suppliers, partners and other service providers	SMEs are a system of organizations, activities, people, resources, and information involved in ensuring product transfer between supplier and consumer.	Jayaram(2011)
Technological & Infrastructural factors	TIF 1	Access to new and state-of art technology	Capability to access new and current technology for in-house production and supporting suppliers in adopting that.	Spillan et al.(2002),Gupta et al.(2015)
	TIF 2	Clean technologies adaption	Capability to apply cleaner technologies to enhance environmental performances. It can assist firms in accomplishing energy efficient solutions to realize their environmentally friendly aims.	Orsat et al.(2008), Lawson et al.(2003),
	TIF 3	Employ technology and R&D centers related to new product development	Research and development is a vital component of innovation and is situated at the front gate of the innovation life cycle. Firms are capable enough to focus on technological innovations and provide R&D facilities for new products.	Wamuyuet. al. (2015)
	TIF 4	Adequate communication & IT infrastructure and facilities for operations	Capability of the firms to employ information and communication technologies (ICTs) for resources allocations, communication and create sufficient technological infrastructure for operations.	Mcquaid et al. (2002)
	TIF 5	Integrated information and technology systems (MSMEs network)	Using each other's websites, communication material, workshops, seminars and promotional activities, enhanced networking activities will involve the exchange and sharing of information among all supply chain partners.	Anderson et al.(2015), barba-sanchez et al.(2007),
Management factors	MF 1	Management Decision Making skills	Important strategic and action at the individual level; And setting regional, related to the word, the level of employment and work.	Charlesetal (2015), Ndemo et al. (2007)
	MF 2	Motivation, Training, Mentoring and Advising	Current research proposes that business people are driven by a few inspirations, mentoring, business advising and training including financial increase and non-monetary thought processes.	Shane et al.(2003), Jayawarna et al. (2011), Bhardwaj et al. (2014),

	MF 3	Inter-Relationship with colleagues and subordinates	Inter-relationships between colleagues and subordinates and established business linkages between multinational companies and small scale endeavors can give clear common advantages.	Farashah Ali (2013) Sangar et al.(2014)
	MF 4	Talent management & Quality recruitment	Talent management is nothing but the science of applying strategy-specific human resource planning to highlight and enhance business value and to make it possible for firms and organizations to accomplish their objectives.	Collings et al.(2009)
	MF 5	Managerial process and competency	One of the key building blocks of success of a company are managerial competencies as they help to achieve both mission and vision, realize added value and enhance business performance and efficiency.	Ramírez et al.(2010)
	MF 6	Gender empowerment & Security	Gender empowerment is conceived as a process by which many of the women can overcome hurdles and make decisions based.	Paramanandam et al. (2015)
	MF7	Favorable organizational policies and shared understanding of best Practices	A best practice is a method or technique that is generally accepted as better because it is a standard way of doing things.	Ramstad et al. (2009)
	MF 8	Standard performance measurement System	A fundamental challenge in the design of performance measurement and incentive system. It is also known as performance standards.	Courty et al.(2007) Vishwakarma et al.(2016)

2.2 Fuzzy AHP in the diverse area

In this study, Fuzzy AHP approach has been used to analyse the critical factors of women entrepreneurship. This fuzzy based integrated AHP method would enable us to deal with the problems of vagueness and biasness associated with human judgment in analyzing indicators of WE, which is difficult in classical AHP (Garg, 2016; Prakash & Barua, 2016b). Moreover, modeling real life situations precisely using crisp data is critical. Hence, fuzzy assessment and inputs of multiple experts have been employed to deal with uncertain information and impreciseness in evaluation of critical factors of WEs. There is enough evidence available in literature to show that many authors and researchers have used fuzzy AHP methodology in diverse areas (for example, the studies of Prakash & Barua, 2016a; Vishwakarma et al., 2015; Prakash et al., 2014, 2015b).

The AHP approach is based on three basic principles: firstly, building a hierarchical structure; secondly, judging comparatively activities or variables; and thirdly, synthesizing the priorities (Prakash & Barua, 2016a). AHP is a linear assessment MCDM technique which provides better results as compared to other MCDMs such as ANP, ISM, VIKOR, DEMATEL, PROMETHEE etc. (Prakash & Barua, 2016b). AHP is an efficient approach which involves decision makers into analysis and guide to take decision more effectively. It has been used in many studies for prioritizing the alternatives with respective criteria. AHP has been used in many management decision making areas (Luthra et al., 2017) which can be seen in Table 2. Further, there are a number of the studies available which justify the integration of Fuzzy theory with AHP in order to improve decision framework and research outcomes. Hence, this study uses fuzzy AHP methodology for evaluating WE factors.

Table 2 Recent studies that have used Fuzzy AHP approach in supply chain area

S.N.	Author (Year)	Use of Fuzzy AHP	Application area
1.	Wang et al. (2012)	Fuzzy AHP	Risk analysis for adoption of green practices in the fashion supply chain.
2.	Shaverdi et al. (2013)	Fuzzy AHP	Evaluation and development of a sustainable supply chain model.
4.	Rezaei et al. (2014)	Fuzzy AHP	Supplier selection for the airline industry.
5.	Gold &Awasthi (2015)	Fuzzy AHP	Sustainable supplier selection considering risk.
6.	Mangla et al. (2015)	Fuzzy AHP	Risk analysis of green supply chain for plastic industry, India.
8.	Vishwakarma et al. (2015)	Fuzzy AHP	Prioritized quality dimensions under technological integration of pharmaceutical supply chain, India.
9.	Prakash et al. (2015b)	Fuzzy AHP	Prioritized TQM enablers to improve the performance of Indian airlines.
10.	Vishwakarma et al. (2016)	Fuzzy AHP	Risk analysis of pharmaceutical supply chain, India.

11.	Prakash & Barua. (2016a)	Fuzzy AHP	Barrier analysis of reverse supply chain, electronics industry, India.
12.	Gorav et al. (2015)	Fuzzy AHP	Evaluation of critical success factors for implementing green practices in supply chain.
13.	Kumar & Garg (2016)	Fuzzy AHP	Evaluation of critical success factors for implementing sustainable supply chain.
14.	Vishwakarma et al. (2017)	Fuzzy AHP	Barrier analysis of pharmaceutical supply chain, India.

2.3 Research gaps

There are numerous studies available on WE in developed countries. Many studies have tried to identify and suggest critical dimensions for successful WE in different areas. But these dimensions may vary from country to country and industry to industry. Even the same dimension requires different handling in the same type of organizations due to the varied nature of resources, capabilities and strategies. Review of literature reveals that many authors and researchers have shown interest in analyzing the drivers, factors and indicators of WE in different fields. Based on a review of previous studies, this paper finds the following research gaps:

- ✓ There is a lack of qualitative studies/articles from developing countries, especially India. Women are establishing business enterprises in this country to create independent identities, increase awareness, have a strategic focus on women empowerment, make economic and financial impacts, and contribute towards society and supportive Govt. policies.
- ✓ Indian MSMEs have emerged as a fast growing sector in terms of production, internal consumption and export. This sector contributes highly to the overall manufacturing industry. Moreover, government initiatives such as MAKE IN INDIA, new promotional starts ups through MUDRA and other women-entrepreneurs oriented initiatives in MSMEs have been very helpful. Hence, the MSME sector wants to increase its contribution to the industry and provide more opportunities to new entrepreneurs, especially women. Further, previous work has diversified into the sub categorization of the issue laying partly in considerations of its factors, losing the essence of the holistic concept of the WE in MSMEs of India.
- ✓ It is confirmed that fuzzy AHP has extensive application in diverse areas. There are various applications of fuzzy AHP as highlighted in table 4 but there is no such study found till date which has evaluated WE factors and presented sensitivity analysis in an Indian context as well as in other countries.

3. Problem definition

The contribution of women is increasing such as participation of ladies in popular government (political strengthening); education of young ladies (social empowerment) destruction of sex boundaries in occupation (financial strengthening) and land rights and legitimate apparatus (lawful strengthening) etc. There is enough evidence from developed countries that women's role in business enterprises has been increasing. MSMEs businesses require inventive entrepreneurial skills, innovations and high level of promotion and development schemes to make an impact in the current business environment (Munoz et al., 2015). Hence, the identification of critical success factors of WE in MSMEs is a must to enhance control over expected hazards and improve performance. Such studies are necessary to support both academia and MSMEs, especially in the context of developing countries like India. However, very few such studies are available in literature in the Indian context (Kamath et al., 2012). Existing research is still in the nascent stage and studies have not yet specified contemporary issues of WE in Indian MSMEs. This study could help in giving a clear picture of the factors that need to be given more consideration over others and framing an informed course of action.

Identification of critical factors of WE has been done by a decision group through a literature review and expert's knowledgeable about MSMEs. The expert team comprised of ten members having more than 12 years of experience including women entrepreneurs, consultants, ministry head and industry & academic associates. This paper proposes a fuzzy based hybrid model for prioritizing critical factors of WE in Indian MSMEs.

In order to get responses from the team of experts, a series of brain storming sessions was organized. The objectives of the study are as follows:

1. To get the consent of all the experts on the critical factors of women entrepreneurship.
2. To get the consent of all the factors of Women Entrepreneurship on the relationship between the various factors and their categories.

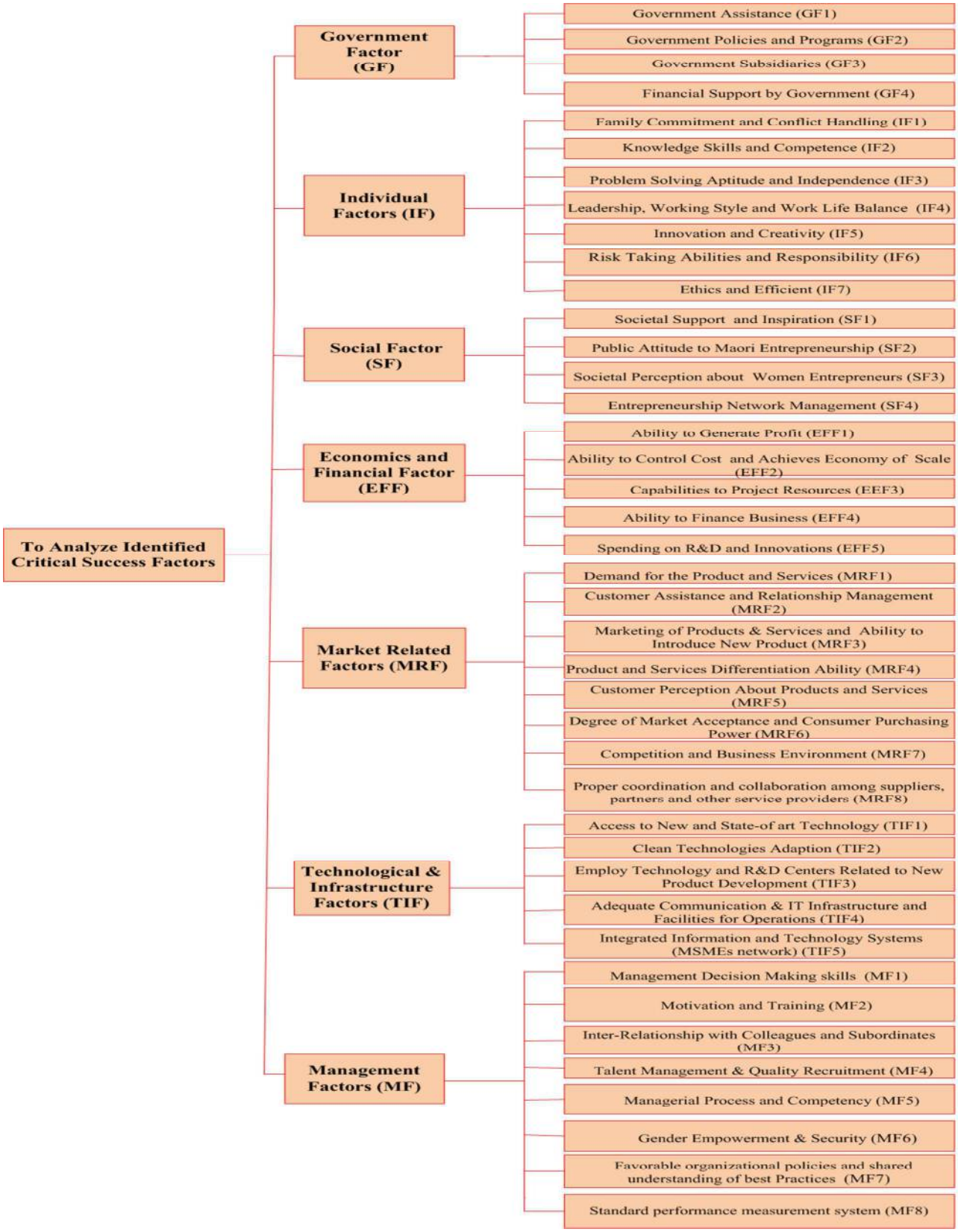

Figure 3 Fuzzy AHP-based hierarchical structures

4. Research Methodology

The motive behind the selection of this methodology is the identification, evaluation and prioritization of identified factors for successful WE in Indian MSMES. The decision makers include experts (domain specialist, consultants, ministry head, and senior executive) from the country. In this research, 41 factors (qualitative and quantitative) were recognized through literature and expert discussions (See Table1). This study utilizes Fuzzy Analytical Hierarchical Process to rank and evaluate the identified specific critical factors of WE in Indian MSMEs as shown in figure 1.

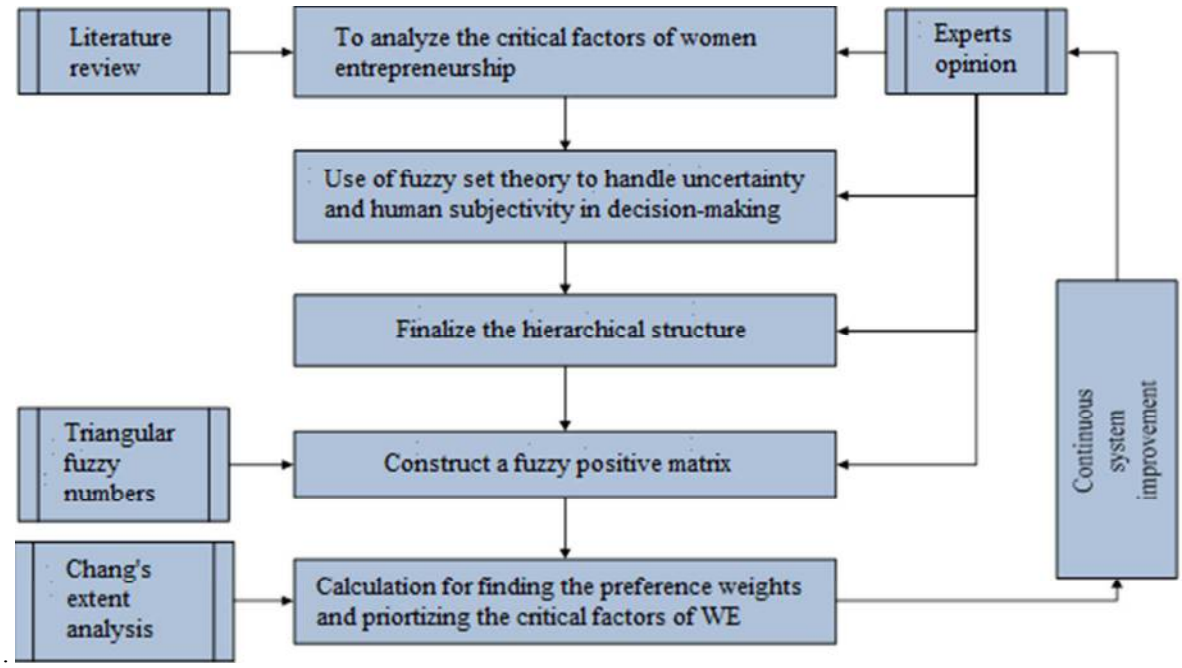

Figure 1. Flow chart for Fuzzy AHP analysis

4.1 Fuzzy AHP

Analytic Hierarchy Process (AHP) approach, given by Satty (1980), is a numerical approach of multi criteria decision making. The use of AHP has a few drawbacks due to its inapplicability to certain situations, instability of measurement scale, and impreciseness with its subjective nature. This necessitates a fuzzy environment to answer such problems. In the fuzzy AHP approach, there is always an error and lack of clarity in judging linguistic variables. By the application of fuzzy approach, this uncertainty can be reduced (1965). In particular, linguistic terms are converted into fuzzy numbers to resolve the uncertainties that arise from linguistic assessment. In a practical situation, the triangular fuzzy numbers (TFN) are commonly used as given in table 3.

Table 3 TFN matrix

Linguistic variables	Allotted TFN
Equally	(1, 1, 1)
Very Lower	(1, 2, 3)

Lower	(2, 3, 4)
Medium	(3, 4, 5)
Higher	(4, 5, 6)
Very Higher	(5, 6, 7)
Excellent	(7, 8, 9)

Definition 1.If $\check{A}_1 = (l_1, l_2, l_3)$ and $\check{A}_2 = (m_1, m_2, m_3)$ are representing two triangular fuzzy numbers then algebraic operations can be expressed as follows:

$\check{A}_1 \oplus \check{A}_2 = (l_1, l_2, l_3) \oplus (m_1, m_2, m_3) = (l_1 + m_1, l_2 + m_2, l_3 + m_3)$ …….. (4.1)

$\check{A}_1 \ominus \check{A}_2 = (l_1, l_2, l_3) \ominus (m_1, m_2, m_3) = (l_1 - m_1, l_2 - m_2, l_3 - m_3)$ ……... (4.2)

$\check{A}_1 \otimes \check{A}_2 = (l_1, l_2, l_3) \otimes (m_1, m_2, m_3) = (l_1 m_1, l_2 m_2, l_3 m_3)$ …….. (4.3)

$\check{A}_1 \oslash \check{A}_2 = (l_1, l_2, l_3) \oslash (m_1, m_2, m_3) = (l_1/m_3, l_2/m_2, l_3/m_1)$ …….. (4.4)

$\alpha \otimes \check{A}_1 = (\alpha l_1, \alpha l_2, \alpha l_3)$where α >0 …….. (4.5)

$\check{A}_1^{-1} = (l_1, l_2, l_3)^{-1} = \left(\frac{1}{l_3}, \frac{1}{l_2}, \frac{1}{l_1}\right)$ …….. (4.6)

Chang's extent analysis (1992) is the FAHP process, according to this approach, each criterion is considered and extent analysis for each criterion g_i,is done. The values of extent method for each criterion are obtained by using following notation.

$M_{g_i}^1, M_{g_i}^2, M_{g_i}^3 \ldots\ldots, M_{g_i}^m$(i = 1, 2, 3, 4, 5 …....n and j = 1, 2, 3, 4, 5 ....., m) are Triangular Fuzzy Numbers. The steps of Chang's analysis can be given as in the following:

Step 1: The fuzzy synthetic extent value (S_i) with respect to the i^{th} criterion is defined as,

$$S_i = \sum_{j=1}^{m} M_{g_i}^j \times \left[\sum_{i=1}^{n}\sum_{j=1}^{m} M_{g_i}^j\right]^{-1} \quad \text{.....……..(4.7)}$$

$$\sum_{j=1}^{m} M_{g_i}^j = \left(\sum_{j=1}^{m} l_{ij}, \sum_{j=1}^{m} m_{ij}, \sum_{j=1}^{m} u_{ij}\right)$$

$$\left[\sum_{i=1}^{n}\sum_{j=1}^{m} M_{g_i}^j\right]^{-1} = \left(\frac{1}{\sum_{i=1}^{n}\sum_{j=1}^{m} u_{ij}}, \frac{1}{\sum_{i=1}^{n}\sum_{j=1}^{m} m_{ij}}, \frac{1}{\sum_{i=1}^{n}\sum_{j=1}^{m} l_{ij}}\right)$$

Where l is the lower limit value, m is the most promising value and u is the upper limit value.

Step 2: The degree of possibility of

$S_2 = (l_2, m_2, u_2) \geq S_1 = (l_1, m_1, u_1)$ is defined as below

$V(S_2 \geq S_1) = \sup_{y \geq x}[\min(\mu_{S_1}(x), \mu_{S_2}(y)]$

and x and y are the values on the axis of membership function of each criterion. This expression can be equivalently written as given in equation 4.8 below:

$$V(S_2 \geq S_1) = \begin{cases} 1 & \text{if } m_2 \geq m_1 \\ 0 & \text{if } l_1 \geq u_2 \end{cases}$$

$$\frac{l_1-u_2}{(m_2-u_2)-(m_1-l_1)}=\mu d, \quad \text{otherwise} \quad \ldots\ldots\ldots (4.8)$$

Where μd is the highest intersection point μ_{S_1} and μ_{S_2} (see figure 2)

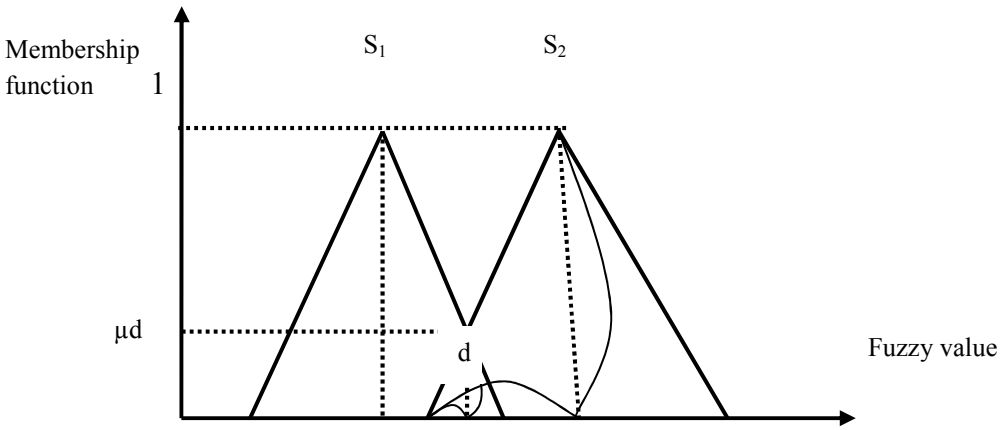

Figure 2. The intersection of fuzzy numbers

To compare S_1 and S_2 we need both $V(S_1 \geq S_2)$ and $V(S_2 \geq S_1)$.

Step 3: The degree of possibility for a convex fuzzy number S to be greater than *k* convex fuzzy numbers S_i (*i*= 1,2,.....,*k*) can be defined by

$V(S \geq S_1, S_2, \ldots\ldots, S_k)$

$= V[(S \geq S_1) \text{ and } (S \geq S_2) \text{ and } \ldots\ldots \text{and } (S \geq S_k)]$

$= \min V(S \geq S_i), \quad i = 1,2,\ldots\ldots,k$

Assume that $d'(A_i) = \min V(S_i \geq S_k)$ ……...(4.9)

For $k = 1, 2, \ldots, n, k \neq i$, Than the weight vectors are given in equation 4.10 as,

$W' = (d'(A_1), d'(A_2), \ldots\ldots, d'(A_m))^T$ ……..(4.10)

Step 4: Via normalization, the normalized weight vectors are given in equation 4.11 as,

$W = (d(A_1), d(A_2), \ldots\ldots, d(A_m))^T$ ……(4.11)

4.2 Calculation of the Value of Fuzzy Synthetic Extent

Decision group has to make pair-wise comparison of 7 factors and 41 sub-factors, defined by TFN as given in table 3. The TFN comparison matrices of the criteria are given in Table 4. The fuzzy comparison matrices by computing arithmetic mean of these values of criteria and final weights of the criteria (please see Table 5)

Table 4 Triangular fuzzy number based pair-wise judgment matrix for specific factors category

	GF	IF	SF	EFF	MRF	TF	MF
GF	(1, 1, 1)	(0.2, 0.25,0.33)	(3, 4, 5)	(0.33, 0.5, 1)	(3, 4, 5)	(0.25, 0.33, 05)	(1, 2, 3)
IF	(3, 4, 5)	(1, 1, 1)	(0.33, 0.5, 1)	(0.2, 0.25,0.33)	(0.33, 0.5, 1)	(3, 4, 5)	(2, 3, 4)
SF	(0.2, 0.25,0.33)	(1, 2, 3)	(1, 1, 1)	(3, 4, 5)	(0.33, 0.5, 1)	(0.25, 0.33, 05)	(0.2, 0.25,0.33)
EFF	(1, 2, 3)	(3, 4, 5)	(0.2, 0.25,0.33)	(1, 1, 1)	(1, 2, 3)	(0.2, 0.25,0.33)	(0.33, 0.5, 1)
MRF	(0.2, 0.25,0.33)	(1, 2, 3)	(1, 2, 3)	(0.33, 0.5, 1)	(1, 1, 1)	(2, 3, 4)	(0.25, 0.33, 05)
TIF	(2, 3, 4)	(0.2, 0.25,0.33)	(2, 3, 4)	(3, 4, 5)	(0.25, 0.33, 05)	(1, 1, 1)	(0.33, 0.5, 1)
MF	(0.33, 0.5, 1)	(0.25, 0.33, 05)	(3, 4, 5)	(1, 2, 3)	(2, 3, 4)	(1, 2, 3)	(1, 1, 1)

Source: Fuzzy AHP Analysis

Calculation of the fuzzy synthetic extent of 7 factors is given below by using eq. (4.7).

S (GF) = $(8.78, 12.08, 15.833) \otimes [54.52, 77.67, 104.166]^{-1}$

$= (0.084, 0.155, 0.29)$

S (IF) = $(9.87, 13.25, 17.33) \otimes [54.52, 77.67, 104.166]^{-1}$

$= (0.094, 0.17, 0.32)$

S (SF) = $(5.98, 8.33, 11.167) \otimes [54.52, 77.67, 104.166]^{-1}$

$= (0.057, 0.11, 0.204)$

S (EFF) = $(6.73, 10, 13.67) \otimes [54.52, 77.67, 104.166]^{-1}$

$= (0.064, 0.13, 0.25)$

S (MRF) = $(5.78, 9.08, 12.83) \otimes [54.52, 77.67, 104.166]^{-1}$

$= (0.055, 0.116, 0.235)$

S (TIF) = $(8.78, 12.08, 15.83) \otimes [54.52, 77.67, 104.166]^{-1}$

$= (0.084, 0.155, 0.29)$

S (MF) = $(8.58, 12.83, 17.5) \otimes [54.52, 77.67, 104.166]^{-1}$

$= (0.082, 0.165, 0.321)$

V values and minimum degree of possibility are calculated by using the equations 4.8, 4.9 respectively.

m(GF) = $\min V(S_1 \geq S_k) = 0.9287$

and other values are m(IF) = 1, m(SF) = 0.6349, m(EFF) = 0.7884,m(MRF) = 0.7239,m(TIF) = 0.9287,m(MF) = 0.9768

Weight vector is given by:

$W_v = (0.9287, 1, 0.6349, 0.7884, 0.7239, 0.9287, 0.9768)^T$

Final weights determined after normalization process-

W = (0.15562, 0.16718, 0.10615, 0.13181, 0.12103, 0.15526, 0.16331)

Table 5 Ranking of categories of Indicators

Specific factors	Preference weights	Ranking
GF	0.15562	3
IF	0.16718	1
SF	0.10615	7
EFF	0.13181	5
MRF	0.12103	6
TIF	0.15526	4
MF	0.16331	2

Same process was applied to determine the weights of the sub-factors which are given in Table 6, 7, 8, 9, 10, 11 and 12. These calculations have been done using MS-Excel.

Table 6 Ranking of categories of Government factors

Factors	Preference weights	Ranking
GF1	0.15010	4
GF2	0.32833	1
GF3	0.27795	2
GF4	0.24362	3

Table 7 Ranking of categories of Individual factors

Factors	Preference weights	Ranking
IF1	0.12897	6
IF2	0.17703	1
IF3	0.16692	2
IF4	0.14957	3
IF5	0.14846	4
IF6	0.14732	5
IF7	0.08173	7

Table 8 Ranking of categories of Social factors

Factors	Preference weights	Ranking
SF1	0.25954	3
SF2	0.26661	2
SF3	0.18763	4
SF4	0.28622	1

Table 9 Ranking of categories of Economic and financial factors

Factors	Preference weights	Ranking

EFF1	0.25098	2
EFF2	0.12414	4
EFF3	0.22216	3
EFF4	0.31368	1
EFF5	0.08904	5

Table 10 Ranking of categories of Market related factors

Factors	Preference weights	Ranking
MRF1	0.16966	1
MRF2	0.10329	7
MRF3	0.15787	2
MRF4	0.08955	8
MRF5	0.11121	6
MRF6	0.12874	3
MRF7	0.12131	4
MRF8	0.11837	5

Table 11 Ranking of categories of Technological and infrastructural factors

Factors	Preference weights	Ranking
TIF1	0.22171	3
TIF2	0.24842	1
TIF3	0.22659	2
TIF4	0.21124	4
TIF5	0.09205	5

Table 12 Ranking of categories of Management factors

Factors	Preference weights	Ranking
MF1	0.15843	2

F2	0.12025	4
MF3	0.16400	1
MF4	0.08839	8
MF5	0.10765	7
MF6	0.12896	3
MF7	0.11914	5
MF8	0.11318	6

In order to get the overall priorities of the factors, the global weights of sub-factors and the final ranking are presented in Table 13. These rankings are calculated by multiplying the indicators weight with the weight of its category. For example, for the government factor GF1:

The weight of GF1 in its category is 0.15010 (Table 6) and the weight of government category is 0.15562 (Table 5). By multiplying these two weights with each other the final global weight is 0.02331(Table 13). Similarly, weights and rankings of all other factors of WE can be calculated (Table 13).

Table 13 Final ranking for specific factors

Factors category	Relative preference weights	Relative Rank	Specific factors	Relative preference weights	Relative ranking	Global preference weights	Global ranking
GF	0.15562	3	GF1	0.15010	4	0.02331	21
			GF2	0.32833	1	0.05098	1
			GF3	0.27795	2	0.04315	2
			GF4	0.24362	3	0.03782	5
IF	0.16718	1	IF1	0.12897	6	0.02156	22
			IF2	0.17703	1	0.02960	11
			IF3	0.16692	2	0.02791	14
			IF4	0.14957	3	0.02501	18
			IF5	0.14846	4	0.02482	19
			IF6	0.14732	5	0.02463	20
			IF7	0.08173	7	0.01366	37
SF	0.10615	7	SF1	0.25954	3	0.02755	15

			SF2	0.26661	2	0.02830	13
			SF3	0.18763	4	0.01992	25
			SF4	0.28622	1	0.03038	10
EFF	0.13181	5	EFF1	0.25098	2	0.03308	8
			EFF2	0.12414	4	0.01636	31
			EFF3	0.22216	3	0.02928	12
			EFF4	0.31368	1	0.04135	3
			EFF5	0.08904	5	0.01174	40
MRF	0.12103	6	MRF1	0.16966	1	0.02053	24
			MRF2	0.10329	7	0.01250	39
			MRF3	0.15787	2	0.01911	28
			MRF4	0.08955	8	0.01084	41
			MRF5	0.11121	6	0.01346	38
			MRF6	0.12874	3	0.01558	32
			MRF7	0.12131	4	0.01468	33
			MRF8	0.11837	5	0.01433	35
TIF	0.15526	4	TIF1	0.22171	3	0.03442	7
			TIF2	0.24842	1	0.03857	4
			TIF3	0.22659	2	0.03518	6
			TIF4	0.21124	4	0.03280	9
			TIF5	0.09205	5	0.01429	36
MF	0.16331	2	MF1	0.15843	2	0.02587	17
			MF2	0.12025	4	0.01964	26
			MF3	0.16400	1	0.02678	16
			MF4	0.08839	8	0.01443	34
			MF5	0.10765	7	0.01758	30
			MF6	0.12896	3	0.02106	23

			MF7	0.11914	5	0.01946	27
			MF8	0.11318	6	0.01848	29

5. Analysis of results and practical implications

A rigorous effort has been made to identify and evaluate the CSFs using AHP technique under fuzzy conditions as shown by the results (see Table 5). The ranks of identifying factors quite stand on realistic grounds, as portrayed throughout the studies and supported by the literature. The priority order came out to be IF < MF<GF <TIF< EFF< MRF< SF. The result of FAHP analysis shows that Individual factor occupied the first rank; Management factor received the second rank and Technological & infrastructure factor got the third rank. The priority rating of other factors can be seen in table 5. This indicates that individual factor assumes the paramount importance for women aiming to become entrepreneurs. The person who is self-motivated, fully committed and has sterling faith can become a successful entrepreneur. The women who have taken risk, managed their work, life and worked with uncompromising purity have achieved high positions in top management team. Management style, managerial skills and competency directly affect the entrepreneurial ability of a person. These skills help in allocating resources efficiently where ever they are needed in to optimize the output. Such management factors help women in gaining effective positions in business areas. Technology and infrastructural support are a prerequisite to run and operate a business successfully. These factors also enable the entrepreneur to remain competitive in the market. A successful entrepreneur can easily understand the importance of this factor. This may help managers/practitioners, Government, MSMEs Industry, manufacturing sector, policymakers and potential women entrepreneurs to critically understand and analyze the factors of WE in India and take decision accordingly.

In the global rankings of specific CSFs are furthermore calculated and ranked on their respective global weights (see Table 13). Global ranking was determined by the multiplication of preference weights of specific CSFs and respective category. Later, the research finding was analyzed again by our team of experts aiming to interpret and furthermore develop some insights to analyse the CSFs in MSMEs which could develop robustness of micro, small and medium industry which indeed enhances overall performance. If we analyse global rankings, we can see that rankings of the CSFs are GF2 > GF3 > EFF4 > TIF2 > GF4. These are the top five globally weighted specific CSFs. This shows that government policies and programs, government subsidiaries, ability to finance business, technology adaption, and financial support by government have more impact as compared to others. MRF4 occupies the last position which can be interpreted as the least impacting CSFs. We can understand the importance of other factors as per ranking obtained in table 13.

Individual factor has the most impact as shown by expert response; it occupies the highest rank in both criteria ranking as well as global ranking. In this category, rankings of individual factors are IF2>IF3>IF4>IF5>IF6>IF1>IF7 (see table 7). This shows that knowledge, skills and competence (IF2) factors are critical for women entrepreneurs. For MSMEs these comprehensive skills with regards to female-drove organizations are much needed to get success in business process (Wong et al., 2005; Mitchelmore et. al., 2013).

Problem solving aptitude and independence (IF3) factor received second rank in this category. This indicates that successful women entrepreneurs utilize their positive attitude and skills to manage problems diligently whether they are personal, family or enterprise related (Lee et al., 2015). Leadership, working style and work life balance (IF4) factor was ranked third in the individual factor rating category. Balance between work and life is a concept that includes proper prioritization of work, career, ambition and working "lifestyle" (Agrawal et. al., 2015). Leadership skills help to unite and synergize organizational work environment. Women with leadership skills and work-life balance tend to be good entrepreneurs. Innovation and creativity (IF5) factor came at fourth position under this category. Innovation is creative thinking regarding something that already exists and creativity is the capability to think and carve our actions out of thoughts in ways that are new and novel (Khandwalla et al., 2014, Prabhu et al., 2014). Professionals feel that in Indian MSMEs, women who are innovative and creative in their work prove to be more successful entrepreneurs (Yadav et al., 2015). Risk taking abilities and responsibility (IF6) factor acquired fifth rank. It means that the entrepreneur has to make quick decisions to accept the risk or cost effective to control or reduce the risk to decrease the potential risks (Lee et. al., 2015). Family commitment and conflict handling (IF1) factor was the second last factor under the individual factor category. This suggests that the primary motivational elements for advancing fruitful ladies business person could be because of the backing of relatives commitment and handling of the family with sustain in business with purely focusing on her business (Dyer et.al. 1994 and Lee et.al. 2001).Ethics and Efficient (IF7) factor ranked last. This signifies that individuals should be ethical while pursuing the aim of running the business. Ethical business practices make persons successful and efficient entrepreneurs in India where the market is highly dependent on moral values (Peris-Ortiz et.al. 2012). The management factor (MF) was profound in literature and especially focusing on overall business perspectives therefore it occupies second rank among the other factor criteria. Within the criteria listed, the ranks are as follows: MF3 > MF1 > MF6 > MF2 > MF7 > MF8 > MF5>MF4 (See table 12). Relationship with colleagues and subordinates (MF3) factor is placed on the top most position. This suggests that interpersonal relationships of employees working in the same organization are very important. Healthy relationships among individuals provide a good working environment in the organization. The entrepreneur has to provide and develop a harmonious environment for forging good interpersonal relationships among working individuals (Sangar et al., 2014).Strategic/management decision making skills (MF1) factor acquired second rank which shows the decision-making processes of entrepreneurs and managers in organizations. Those entrepreneurs who are quick, transparent, analytical and effective in decision-making are more successful (Ndemo et al. 2007andCharles et al., 2015).Gender empowerment & security (MF6) factor was placed at the third position. This indicates that gender empowerment is conceived as a process of empowering deserving women irrespective of traditional Indian ethos, further, it provides security of job and equal opportunities for growth (Paramanandam et.al. 2015). Motivation and training (MF2) factor was given fourth rank. This is indicative of the fact that employee motivation and training is extremely important for better performance and productivity, especially in Indian MSMEs (Shane et al., 2003andBhardwaj et al., 2014).Favorable organizational policies and shared understanding of best practices (MF7) got fifth rank. This suggests that an organization should learn from best practices of other industries and use such practices as a benchmark. Standard performance measurement system (MF8) factor got sixth rank which means that a well-defined, quantitative and qualitative performance measurement

system evaluating key performance indicators of an organization is required in to make current practices more efficient, and determine how well the organization is managed and the value it delivers to customers and other stakeholders (Courty et al., 2007).Managerial process and competency (MF5) was positioned seventh. This signifies that management attributes, plans and actions contribute to enhanced performance and ultimately result in organizational success (Ramírez et al., 2010). Talent management & quality recruitment (MF4) factor was placed at eighth position. This indicates that quality personnel should be recruited strategically and the talent retained to improve business value and make achievement of organizational goals possible(Collings et al., 2009).Government factors (GF) also emerged to have an influential role in the development of women entrepreneurs. The ranking of government factors is GF2>GF3>GF4>GF1 (Please see table 6). Among GF, government policies and programs (GF2) factor appeared as very important to becoming a successful woman entrepreneur in Indian MSMEs (Huarng et al., 2012; Yusof et al., 2000; Watson et al., 1998). The Government of India is promoting women working in MSMEs through various schemes. Government subsidiaries (GF3) factor occupies second rank in the priority list of GF category. The Indian government has shown greater focused through MAKE IN INDIA programs to support small ventures and subsidiaries in which women are working (Gagoitseope et al., 2012; Munoz et al., 2015). Financial support by government (GF4) factor received third rank in this category. This suggests that the government is providing monetary support to women entrepreneurs through financing their business ventures. Government assistance (GF1) obtained fourth rank. This indicates that the government is assisting women in starting their business by providing easy and assessable working environment.

The technological and infrastructural factor (TF) has a very important role in the transfer of best information and communications technology (ICT) and provides necessary infrastructural support for developing and maintaining efficient and effective business operations. The ranking of the factors under this category isTIF2>TIF3>TIF1>TIF4>TIF5 (Please see table 11). Technologies adaption (TIF2) factor is placed at the first position. This suggests that an organization should be able to adopt existing technologies in order to maximize outputs (Lawson et al. 2003).Fast implementation of technology adoption would provide a competitive advantage to the firm. Employ technology and R&D centers related to new product development (TIF3) factor gained second rank in this list. This indicates that an organization should invest in technology and R&D centers for new product development to meet current and future needs of the market (Wamuyu et al., 2015).Access to new and state-of art technology (TIF1)factor came at third place. This signifies that technological innovations can help firms to remain sustainable and competitive in today's era (Gupta et al., 2015).Adequate communication & IT infrastructure and facilities for operations (TIF4) factor received fourth rank in the priority list. This indicates that sufficient ICTs have the potential to achieve optimum operational efficiency. A well-organized IT infrastructure support and system makes a firm competitive and innovative, and generates growth (McQuaid et al., 2002).Integrated information and technology systems (MSMEs network), i.e. TIF5 factor occupied the last position. All the members of the MSME network must share a common IT system in order to serve customers efficiently and reduce uncertainty. Such an integrated information system would support all the partners of the supply chain (Prakash and Barua; 2016c).

The economic and financial factor (EFF) is also impacting one for survival of firm. The ranking of sub-factors under this factor is EFF4>EFF1>EFF3>EFF2>EFF5 (Please see table 9). This means, these sub-factors are very important

for MSMEs due to their tangible output is regularly assessed as far as financial results, for example, salary, income, esteem included, turnover, and business levels are concerned (Kantor et al., 2005).

Ability to finance business (EFF4) factor appeared as the most important factor under the EFF category. This factor implies how well one can finance business and is able to employ staff, purchase goods, acquire licenses, and expand and develop (Kumar, 2013). The financial ability of a business is crucial to making the good stuff happen (Williams et al., 2012). Ability to generate profit (EFF1) factor came at second position. This suggests that an entrepreneur must be able meet all operational cost - from raw material acquisition to distributing the goods to customers - and make sufficient profit for stakeholders. In financial terms, it is the metrics that the business expenses and other relevant costs incurred during a specific period of time than the ability to generate earnings that are used to assess (Kantor, 2005). Capabilities to project resources (EFF3) factor received third rank in this category. This indicates that available limited resources must be projected to maximize their utilization and extract optimum output from them. A successful entrepreneur has the capability to project resources at the right time, right place and in the right amount (Narayana, 2007).Ability to control cost and achieve economy of scale (EFF2) factor stood fourth in this category. This signifies that an entrepreneur is able to achieve economies of scale and cost benefits irrespective of enterprise size, production, or scale of operation and output (Amatucci et. al.2011). Spending on R&D and innovations (EFF5) factor gained fifth rank. This suggests that successful entrepreneurs are able to monitor continuously the changing business environment. They have futuristic vision through environmental scanning and spend on R&D activities and innovations to improve the features of existing products or generate new or creative products (Gao et al., 2015).

Market related factors moderately impact MSMEs as they occupy fifth rank among criteria within these factors, they are ranked as follows: MRF1>MRF3>MRF6>MRF7>MRF8>MRF5>MRF2>MRF4 (Please see table 10).

Demand for products and services (MRF1) factor gained first rank. This implies that an entrepreneur must target segments where significant demand for products and services may be created. Marketing of products & services and the ability to introduce new product (MRF3) factor obtained second rank in this category. This signifies that the firm must market and distribute the products and services to the target segment. Firms must able to introduce and realize new products. A new product can be a continuous innovation and products not previously marketed by the firm, but by others (Sangar et al., 2014).

Degree of market acceptance and consumer purchasing power (MRF6) factor placed at third position. This indicates that products and services must have such desirable features that the market accepts them. The products must also fall within the budget or paying power of customers. Entrepreneurs must scan the socio-economic condition of the target market. Competition and business environment (MRF7) factor came at fourth position. This implies that an entrepreneur must be able to understand the competitive business environment and assume a position so as to beat the competition by successfully scanning and monitoring competing businesses and the business environment. Proper coordination and collaboration among suppliers, partners and other service providers (MRF8) factor received fifth rank under the MRF category. This suggests that an entrepreneur must maintain smooth and healthy relationships with supply chain partners. Proper collaboration with supply chain partners would increase flexibility

and reduce uncertainty (Garg, 2016). Similarly, importance of other factors under MRF category may be understood from the ranking as given in table 10.

Social factors (SF) include lifestyle, family, wealth and religion. It is crucial for enterprises to be aware of these factors as they influence marketing of products. The social factor (SF) occupies last rank as these factors are moreover related social business enterprise and social business persons. The ranking of sub-factors is SF4 > SF2 > SF3>SF1 (Please see table 8). Entrepreneurs' network (SF4) factor came at first position. This implies that an entrepreneur's social connectivity and network must be strong to gain business success. Public attitude to Maori entrepreneurship (SF2) factor gained second rank. It indicates that public attitude towards social and Maori entrepreneurs (Clydesdale et al., 2007).Societal perception about women entrepreneurs (SF3) factor occupied third place under SF category. With the changing structure of society and rising expenses of living, the perception of the Indian society towards working women has transformed, both in urban and rural areas (Hasan et al., 2005,Noguera et al., 2013).This changing social perception has created a favorable situation for women entrepreneurs working in MSMEs. Societal support and inspiration (SF1) factor obtained fourth rank. This suggests that personal trust and care, love, respect, social support and inspiration are vital to women entrepreneurs for business success and working freely without social inhibitions.

With due understanding of current scenario of MSMEs industry, the CSFs of women entrepreneurship have been analysis in Indian context.

6. Sensitivity Analysis

Sensitivity analysis was carried out to assess the ranks of specific factors by changing their weights. This was done so that amongst all factors, an individual factor received the first rank with high priority weights (please see table 5). Thus, this factor would have the potential to influence other factors. It is hence advised to examine the final ranking by altering the weights of all factors (Prakash & Barua, 2016d; Prakash & Barua, 2016e; Luthra et al., 2017). To demonstrate the sensitivity analysis of influence of an increment in the value from 0.1 to 0.9, to the individual factor (IF), was determined as given in Table 14. The sensitivity analysis conclusions indicate that the highest relative change showed up in the commercial and financial factors (for details please see Table 14). Further, as individual factor weights varied, specific factor weights and their final ranking were also affected. In sensitivity analysis, when the value of individual factor is 0.1, GF2 acquires the first rank, while, the final rank is held by GF7. At normalized level when individual factor value is 0.16718, GF2 occupies the first rank, while, MRF4 acquired the last rank. Again the factor GF2 holds the first rank when individual factor value is 0.2, while MRF4 holds the last rank. Now onwards individual factor value varies from 0.3 to 0.9, IF2acquires first rank and last rank is held by MRF4. The placing of other factors in the ranking also varies (for details please see Table 15 and figure 4). At this circumstance, it may be conclusive to say that individual factor is most crucial in WE development in the case of India, and so, greater concentration is needed. If the woman is motivated enough and can deal with personal concerns in an efficient manner, she will be a successful leader as well as entrepreneur.

Table 14 Factors category values when increasing individual factor.

Listed factors category	Values of preference weights for listed factors category									
GF	0.15562	0.16646	0.14979	0.13313	0.11646	0.09979	0.08313	0.06646	0.04979	0.02247
IF	0.16718	0.10000	0.20000	0.30000	0.40000	0.50000	0.60000	0.70000	0.80000	0.90000
SF	0.10615	0.11735	0.10068	0.08401	0.06735	0.05068	0.03401	0.01735	0.00068	0.00004
EFF	0.13181	0.14301	0.12634	0.10968	0.09301	0.07634	0.05968	0.04301	0.02634	0.00466
MRF	0.12103	0.13222	0.11556	0.09889	0.08222	0.06556	0.04889	0.03222	0.01556	0.00056
TIF	0.15526	0.16646	0.14979	0.13313	0.11646	0.09979	0.08313	0.06646	0.04979	0.03213
MF	0.16331	0.17450	0.15784	0.14117	0.12450	0.10784	0.09117	0.07450	0.05784	0.04017
Total	1	1	1	1	1	1	1	1	1	1

Table 15 Ranking for specific factors by sensitivity analysis when individual factor varies

Identified Factors	Individual factor category values in performing the sensitivity analysis test									
	0.1	Normalized (0.16717)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
GF1	16	21	22	23	22	20	20	19	18	23
GF2	1	1	1	6	7	8	8	8	8	9
GF3	2	2	2	8	9	9	9	9	9	15
GF4	5	5	5	11	12	11	11	11	11	16
IF1	38	22	20	7	6	6	6	6	6	6
IF2	26	11	6	1	1	1	1	1	1	1
IF3	28	14	8	2	2	2	2	2	2	2
IF4	33	18	12	3	3	3	3	3	3	3
IF5	34	19	13	4	4	4	4	4	4	4
IF6	35	20	14	5	5	5	5	5	5	5
IF7	41	37	31	16	8	7	7	7	7	7
SF1	13	15	18	22	23	24	28	33	40	40
SF2	12	13	17	20	21	23	27	32	39	39
SF3	19	25	26	29	31	32	34	40	41	41
SF4	10	10	15	18	20	21	26	31	38	38
EFF1	8	8	10	15	16	16	16	18	22	26
EFF2	25	31	32	32	32	33	33	29	28	28
EFF3	11	12	16	17	17	19	19	21	25	27
EFF4	3	3	3	9	10	12	13	15	17	25
EFF5	39	40	40	40	40	39	39	36	31	29
MRF1	18	24	24	27	28	29	29	28	29	30
MRF2	37	39	39	39	39	40	40	39	36	36
MRF3	21	28	28	30	30	30	31	30	30	31
MRF4	40	41	41	41	41	41	41	41	37	37
MRF5	36	38	38	38	38	38	38	38	35	35
MRF6	27	32	33	33	35	35	35	34	32	32
MRF7	29	33	34	36	36	36	36	35	33	33
MRF8	30	35	37	37	37	37	37	37	34	34
TIF1	7	7	9	13	14	14	14	13	13	11
TIF2	4	4	4	10	11	10	10	10	10	8
TIF3	6	6	7	12	13	13	12	12	12	10
TIF4	9	9	11	14	15	15	15	14	14	12
TIF5	32	36	36	35	34	34	32	27	27	24
MF1	15	17	21	21	19	18	18	17	16	14
MF2	20	26	25	25	25	25	22	22	20	18

MF3	14	16	19	19	18	17	17	16	15	13
MF4	31	34	35	34	33	31	30	26	26	22
MF5	24	30	30	31	29	28	25	25	24	21
MF6	17	23	23	24	24	22	21	20	19	17
MF7	22	27	27	26	26	26	23	23	21	19
MF8	23	29	29	28	27	27	24	24	23	20

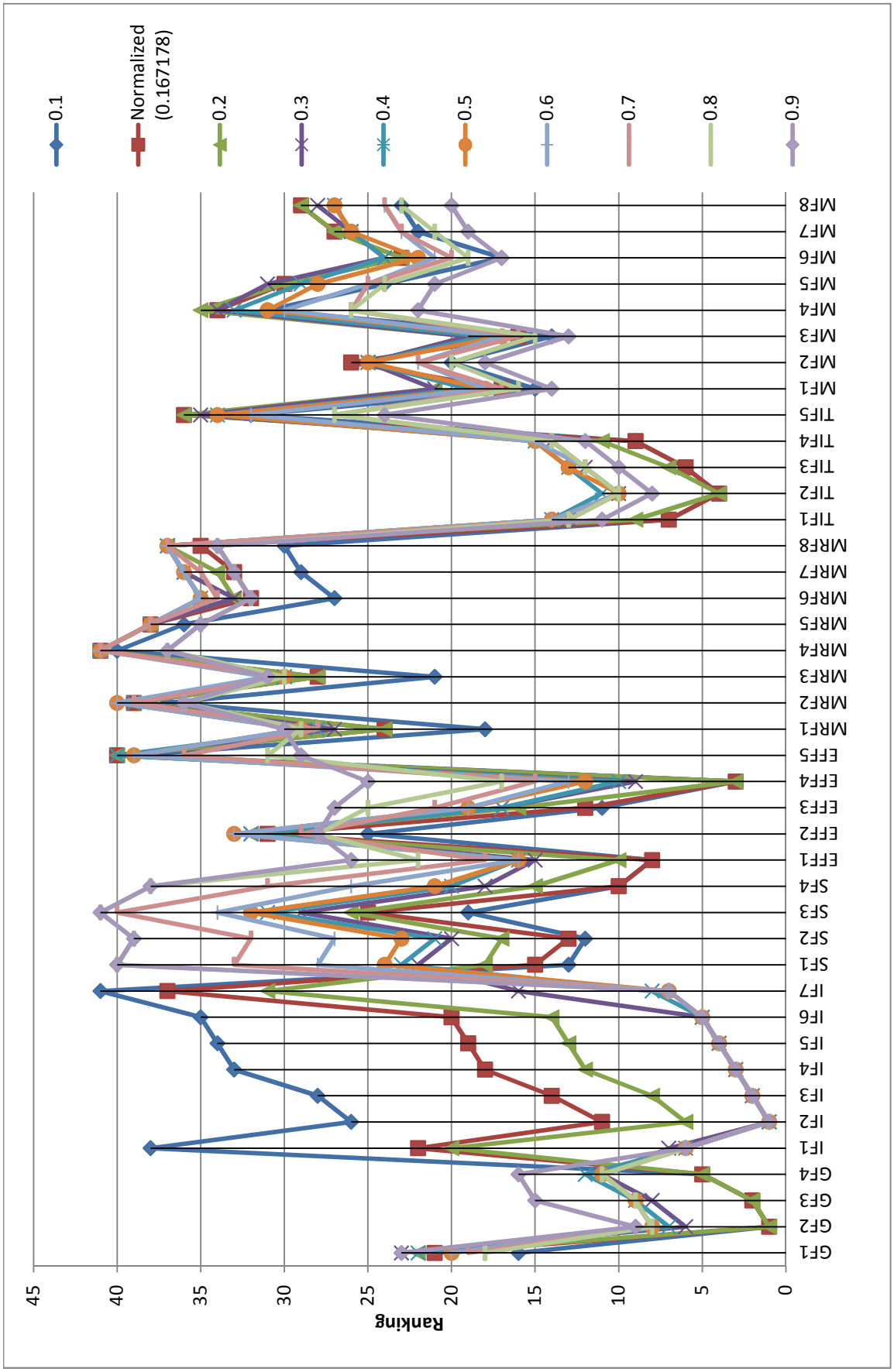

Figure 4 Results of the sensitivity analysis

7. Conclusions, limitations and scope of future work

In this era of globalization, the role of Indian women as entrepreneurs is a major active element in the society and the economy. Women entrepreneurs face societal pressures and amid such pressures, strive hard to get success, and manage and improve the business environment, especially in Indian MSMEs. The revelations of this research broaden and deepen our knowledge of how the critical success factors for women-run enterprises affect business performance. A good understanding of these factors enables managers to direct their efforts towards improving overall business performance. In this paper, it has been demonstrated that Fuzzy AHP approach can be used to rank and classify the CSFs of WE adoption in Indian MSMEs. Data analysis using fuzzy AHP may help managers to do away with the issue of human subjectivity in evaluating and studying the CSFs. In analyzing and determining the relative concerns of recognized categories of factors and specific factors of WE, this can be a great helping hand. The concern for the identified seven categories of factors can be prioritized as IF < MF < GF <TIF< EFF < MRF < SF. This implies that IF are factors of vitality and need a larger concern as compared to the other categories and subcategories of factors for improving WE adoption in Indian MSMEs. The global rankings of specific CSFs are furthermore calculated and ranked on the basis of respective global weights (see Table 13). Global ranking was determined by multiplication of preference weights of specific CSFs and respective categories. Later, the research finding was analyzed again by a team of experts aiming to interpret and develop some insights to analyse the CSFs in MSMEs which could develop robustness of micro, small and medium industry. This indeed enhances the overall performance. To test the credibility of priority ranking for the finalized list of categorized and situation specific factors, sensitivity analysis was performed. In this outlook, the present study tries to add in the literature of MSMEs; through identifying, finalizing, and prioritizing the CSFs related to MSMEs, so they can manage on strategically important levels in an organization. The findings of this study would be useful for micro small medium enterprises and management to become more capable in analyzing the CSFs of WE in Indian MSMEs.

We have used fuzzy AHP approach for prioritizing CSFs of WE adoption in Indian MSMEs. All pair evaluations in fuzzy AHP have been suggested and standardized by experts. From the knowledge sources and experts viewpoints in detail, various factors have been pin-pointed and ranked accordingly. Naturally views of critics and decision makers may be subjective and may vary from that of ours.

Future research should focus on survey based quantitative research for the selection and classification of factors using factor analysis. Future studies could also consider the opinion of other stakeholders to identify more holistic factors. After the identification of CSFs of WE, focus should be on finding ways in which these factors may be implemented.

References

1. Agarwal, S., & Lenka, U. (2015). Study on work-life balance of women entrepreneurs–review and research agenda. *Industrial and Commercial Training*, *47*(7), 356-362.

2. Alom, F., Abdullah, M. A., Moten, A. R., &Azam, S. F. (2016). Success factors of overall improvement of microenterprises in Malaysia: an empirical study. *Journal of Global Entrepreneurship Research*, *6*(1), 1.
3. Amatucci, F. M., & Crawley, D. C. (2011). Financial self-efficacy among women entrepreneurs. *International Journal of Gender and Entrepreneurship*, *3*(1), 23-37.
4. AMEX OPEN State of Women-Owned Business Report 2013
5. ArulParamanandam, D., &Packirisamy, P. (2015). An empirical study on the impact of micro enterprises on women empowerment. *Journal of Enterprising Communities: People and Places in the Global Economy*, *9*(4), 298-314.
6. Barba-Sánchez, V., delPilarMartínez-Ruiz, M., & Jiménez-Zarco, A. I. (2007). Drivers, benefits and challenges of ICT adoption by small and medium sized enterprises (SMEs): a literature review. *Problems and Perspectives in Management*, *5*(1), 103.
7. Brett, V., Mullally, M., O'Gorman, B., & Fuller-Love, N. (2012). The role of action research in the development of learning networks for entrepreneurs. *Action Learning: Research and Practice*, *9*(2), 125-143.
8. Charles, N. A., Ojera, P. B., & David, O. (2015). Factors influencing choice of strategic management modes of small enterprises. *Journal of Innovation and Entrepreneurship*, *4*(1), 1-22.
9. Chaudhry, P. E. (2007). Developing a process to enhance customer relationship management for small entrepreneurial businesses in the service sector. *Journal of Research in Marketing and Entrepreneurship*, *9*(1), 4-23.
10. Clydesdale, G. (2007). Cultural evolution and economic growth: New Zealand Maori. *Entrepreneurship and Regional Development*, *19*(1), 49-68.
11. Coley, Linda Silver, John T. Mentzer, and Martha C. Cooper. "Is" Consumer Orientation" A Dimension of Market Orientation in Consumer Markets?." *Journal of marketing theory and practice* 18, no. 2 (2010): 141-154.
12. Collings, D. G., &Mellahi, K. (2009). Strategic talent management: A review and research agenda. *Human Resource Management Review*, *19*(4), 304-313.
13. Courty, Pascal, Carolyn Heinrich, and Gerald Marschke. "Setting the standard in performance measurement systems." *International Public Management Journal* 8, no. 3 (2005): 321-347.
14. Cuervo, A. (2005). Individual and environmental determinants of entrepreneurship. *The International Entrepreneurship and Management Journal*, *1*(3), 293-311.
15. DehghanpourFarashah, A. (2013). The process of impact of entrepreneurship education and training on entrepreneurship perception and intention: Study of educational system of Iran. *Education Training*, *55*(8/9), 868-885.
16. Dyer, W. G., & Handler, W. (1994). Entrepreneurship and family business: Exploring the connections. *Entrepreneurship Theory and Practice*, *19*, 71-71.
17. Ebersberger, Bernd, and Sverre J. Herstad. "The relationship between international innovation collaboration, intramural R&D and SMEs' innovation performance: a quantile regression approach." *Applied Economics Letters* 20, no. 7 (2013): 626-630.

18. Farr-Wharton, R., &Brunetto, Y. (2007). Women entrepreneurs, opportunity recognition and government-sponsored business networks: A social capital perspective. *Women in Management Review*, *22*(3), 187-207.
19. Gagoitseope, P. K., &Pansiri, J. (2012). Evaluation of critical success factors for developing small and medium-sized enterprises in Botswana. *Journal of African Business*, *13*(1), 51-61.
20. Gao, Yongqiang, and TaïebHafsi. "R & D spending among Chinese SMEs: the role of business owners' characteristics." *Management Decision* 53, no. 8 (2015): 1714-1735.
21. Garg C.P., (2016). A robust hybrid decision model for evaluation and selection of the strategic alliance partner in the airline industry. *Journal of Air Transport Management,* 52(2016), 55-66.
22. Garg, C., Sharma, A., & Goyal, G. (2017). A hybrid decision model to evaluate critical factors for successful adoption of GSCM practices under fuzzy environment. *Uncertain Supply Chain Management*, *5*(1), 59-70.
23. Global Entrepreneurship Monitor 2006 Global Report
24. Global Entrepreneurship Monitor 2013 Global Report
25. Global Women Entrepreneur Leaders Scorecard 2015
26. Gupta H., Prakash C, Vishwakarma V., Barua M.K. (2015).Evaluating TQM adoption success factors to improve Indian MSMEs performance using fuzzy DEMATEL approach. *International Journal of Productivity and Quality Management* [in press].
27. Gupta, Himanshu, and Mukesh Kumar Barua. "Identifying enablers of technological innovation for Indian MSMEs using best–worst multi criteria decision making method." *Technological Forecasting and Social Change* 107 (2016): 69-79.
28. Gupta, V. K., Niranjan, S., Goktan, B. A., &Eriskon, J. (2015). Individual entrepreneurial orientation role in shaping reactions to new technologies. *International Entrepreneurship and Management Journal*, 1-27.
29. Harper-Anderson, E. L., & Gooden, S. T. (2015). Integrating Entrepreneurship Services into Local Workforce Development Systems: Who is Doing It and How. *Journal of Poverty*, 1-24.
30. Hasan, S. (2005). Social capital and social entrepreneurship in Asia: Analysing the links. *Asia Pacific Journal of Public Administration*, *27*(1), 1-17.
31. Hoang, H., &Antoncic, B. (2003). Network-based research in entrepreneurship: A critical review. *Journal of business venturing*, *18*(2), 165-187.
32. Hormiga, E.,& Bolívar-Cruz, A. (2014). The relationship between the migration experience and risk perception: A factor in the decision to become an entrepreneur. *International Entrepreneurship and Management Journal*, *10*(2), 297-317.
33. Huarng, K. H., Mas-Tur, A., & Yu, T. H. K. (2012). Factors affecting the success of women entrepreneurs. *International Entrepreneurship and Management Journal*, *8*(4), 487-497.
34. Jayaram, Jayanth, KefengXu, and Mariana Nicolae. "The direct and contingency effects of supplier coordination and customer coordination on quality and flexibility performance." *International Journal of Production Research* 49, no. 1 (2011): 59-85.
35. Jayawarna, D., Rouse, J., &sKitching, J. (2013). Entrepreneur motivations and life course. *International Small Business Journal*, *31*(1), 34-56.

36. Kantor, P. (2005). Determinants of women's microenterprise success in Ahmedabad, India: Empowerment and economics. *Feminist Economics*, *11*(3), 63-83.
37. Khandwalla, P. (2014). Designing a creative and innovative India. *The International Journal of Human Resource Management*, *25*(10), 1417-1433.
38. Kumar, D. & Garg C.P., (2016). Evaluating sustainable supply chain indicators using Fuzzy AHP: Case of Indian automotive industry. *Benchmarking: An International Journal* [in press].
39. Kumar, N. (2013). Financial inclusion and its determinants: evidence from India. *Journal of Financial Economic Policy*, *5*(1), 4-19.
40. Kyrgidou, Lida P., and Eugenia Petridou. "Developing women entrepreneurs' knowledge, skills and attitudes through e-mentoring support." *Journal of Small Business and Enterprise Development* 20, no. 3 (2013): 548-566.
41. Lawson, R., Alcock, C., Cooper, J., & Burgess, L. (2003). Factors affecting adoption of electronic commerce technologies by SMEs: an Australian study. *Journal of small business and enterprise development*, *10*(3), 265-276.
42. Lee Siew Kim, J., &Seow Ling, C. (2001). Work-family conflict of women entrepreneurs in Singapore. *Women in Management review*, *16*(5), 204-221.
43. Lee, L., & Yang, C. L. (2013). Key Success Factors in Female Micro Entrepreneurship-A Study of the Catering Business. *Service Science and Management Research*, *2*(3), 39-47.
44. Lee, S. S., Stearns, T. M., Osteryoung, J. S., & Stephenson, H. B. (2009). A comparison of the critical success factors in women-owned business between the United States and Korea. *International Entrepreneurship and Management Journal*, *5*(3), 259-270.
45. Luthra, S., Garg, D., &Haleem, A. (2016). An analysis of interactions among critical success factors to implement green supply chain management towards sustainability: An Indian perspective. *Resources Policy*, *46*, 37-50.
46. Luthra, S., Govindan, K., Kannan, D., Mangla, S. K., & Garg, C. P. (2017). An integrated framework for sustainable supplier selection and evaluation in supply chains. *Journal of Cleaner Production*, *140*, 1686-1698.
47. Madsen, H., Neergaard, H., &Ulhøi, J. P. (2003). Knowledge-intensive entrepreneurship and human capital. *Journal of Small Business and Enterprise Development*, *10*(4), 426-434.
48. McGowan, P., Redeker, C. L., Cooper, S. Y., &Greenan, K. (2012). Female entrepreneurship and the management of business and domestic roles: Motivations, expectations and realities. *Entrepreneurship & Regional Development*, *24*(1-2), 53-72.
49. McQuaid, R. W. (2002). Entrepreneurship and ICT industries: support from regional and local policies. *Regional Studies*, *36*(8), 909-919.
50. Michael, S. C., & Pearce, J. A. (2009). The need for innovation as a rationale for government involvement in entrepreneurship. *Entrepreneurship and Regional Development*, *21*(3), 285-302.
51. Mitchelmore, S., & Rowley, J. (2013). Entrepreneurial competencies of women entrepreneurs pursuing business growth. *Journal of Small Business and Enterprise Development*, *20*(1), 125-142.

52. Morris, M. H., Neumeyer, X., &Kuratko, D. F. (2015). A portfolio perspective on entrepreneurship and economic development. *Small Business Economics*, *45*(4), 713-728.
53. Mosey, Simon. "Understanding new-to-market product development in SMEs." *International Journal of Operations & Production Management* 25, no. 2 (2005): 114-130.
54. Munoz, J. M., Welsh, D. H., Chan, S. H., & Raven, P. V. (2015). Microenterprises in Malaysia: a preliminary study of the factors for management success. *International Entrepreneurship and Management Journal*, *11*(3), 673-694.
55. Nandy, Sarmistha, and Shalini Kumar. "Women entrepreneurship in 21st century India." *Global Journal of Finance and Management* 6, no. 9 (2014): 967-976.
56. Narayana, M. R. (2007). Economic size and performance of dispersed and clustered small scale enterprises in India: Recent evidence and implications. *International Journal of Social Economics*, *34*(9), 599-611.
57. Ndemo, B., &WanjikuMaina, F. (2007). Women entrepreneurs and strategic decision making. *Management Decision*, *45*(1), 118-130.
58. Noguera, M., Alvarez, C., &Urbano, D. (2013). Socio-cultural factors and female entrepreneurship. *International Entrepreneurship and Management Journal*, *9*(2), 183-197.
59. OECD (1997), theorganization for economic co-operation and developmentOECD Report on Regulatory Reform.
60. Orsat, V., VijayaRaghavan, G. S., &Sosle, V. (2008). Adapting drying technologies for agri-food market development in India. *Drying Technology*, *26*(11), 1355-1361.
61. Peris-Ortiz, M., Rueda-Armengot, C., & Osorio, D. B. (2012). Women in business: entrepreneurship, ethics and efficiency. *International Entrepreneurship and Management Journal*, *8*(3), 343-354.
62. Pitta, D., & Pitta, E. (2012). Transforming the nature and scope of new product development. *Journal of Product & Brand Management*, *21*(1), 35-46.
63. Prabhu, J., & Jain, S. (2015). Innovation and entrepreneurship in India: Understanding jugaad. *Asia Pacific Journal of Management*, *32*(4), 843-868.
64. Prakash C, Barua M.K. (2015). Integration of AHP-TOPSIS method for prioritizing the solutions of reverse logistics adoption to overcome its barriers under fuzzy environment. *Journal of Manufacturing System,* 37(2015), 599-615.
65. Prakash C, Barua M.K. (2016a). An analysis of integrated robust hybrid model for third-party reverse logistics partner selection under fuzzy environment. *Resources, Conservation & Recycling,* 108(2016), 65-81.
66. Prakash C., Barua M.K. (2016b). Flexible Modelling Approach for Evaluating Reverse Logistics Adoption Barriers using Fuzzy AHP and IRP Framework. *International Journal of Operational Research* [in press].
67. Prakash C., Barua M.K. (2016c). A multi criteria decision making approach for prioritizing reverse logistics adoption barriers under fuzzy environment: Case of Indian electronics industry. *Global Business Review, 17(5),* 1-18.
68. Prakash C., Barua M.K., Balon V. (2015a). Prioritizing TQM enablers to improve Indian airlines performance under fuzzy environment. *Industrial Engineering Journal,* 8(8), 28-34.

69. Prakash, C., &Barua, M. K. (2016d). A combined MCDM approach for evaluation and selection of third-party reverse logistics partner for Indian electronics industry. *Sustainable Production and Consumption*, *7*, 66-78.
70. Prakash, C., &Barua, M. K. (2016e). A Robust Multi-Criteria Decision-Making Framework for Evaluation of the Airport Service Quality Enablers for Ranking the Airports. *Journal of Quality Assurance in Hospitality & Tourism*, *17(3),* 351-370.
71. Prakash, C., Barua, M. K., Vishwakarma, V., & Balon, V. (2014, March). A multi criteria decision making approach to overcome its barriers in green supply chain management under fuzzy environment. In *proceeding of the International Conference on Research & Sustainable Business on March, 08-09 2014 in DoMS, IIT Roorkee* (pp. 965-976).
72. Prakash, C., Barua, M. K.,& Pandya, K. V. (2015b). Barriers analysis for reverse logistics implementation in Indian electronics industry using fuzzy analytic hierarchy process. *Procedia-Social and Behavioral Sciences*, *189*, 91-102.
73. Prakash, D., Jain, S., &C hauhan, K. (2015). Supportive government policies, locus of control and student's entrepreneurial intensity: a study of India. *Journal of Global Entrepreneurship Research*, *5*(1), 1-15.
74. Prasad, V. K., Naidu, G. M., Kinnera Murthy, B., Winkel, D. E., &Ehrhardt, K. (2013). Women entrepreneurs and business venture growth: an examination of the influence of human and social capital resources in an Indian context. *Journal of Small Business & Entrepreneurship*, *26*(4), 341-364.
75. Radha, J. L. "Trends in Women Entrepreneurship in India."
76. Ramírez, A. R., Orejuela, A. R., & Vargas, G. M. (2010). New perspectives for the managerial entrepreneurship. *International entrepreneurship and management journal*, *6*(2), 203-219.
77. RauthBhardwaj, B. (2014). Impact of education and training on performance of women entrepreneurs: A study in emerging market context. *Journal of Entrepreneurship in Emerging Economies*, *6*(1), 38-52.
78. Reeg, Caroline. "Micro, small and medium enterprise upgrading in India: learning from success cases." (2013).
79. Reijonen, Helen, and TommiLaukkanen. "Customer relationship oriented marketing practices in SMEs." *Marketing Intelligence & Planning* 28, no. 2 (2010): 115-136.
80. Report of the steering committee on empowerment of women and development of children for the tenth five year plan (2002-07) Government of India planning commission October - 2001
81. Sangar, R., &Rangnekar, S. (2014). Role satisfaction and entrepreneurship: An approach to analyze the dynamics of relationships. *Journal of Entrepreneurship in Emerging Economies*, *6*(2), 122-139.
82. Sebora, T. C., &Theerapatvong, T. (2010). Corporate entrepreneurship: A test of external and internal influences on managers' idea generation, risk taking, and proactiveness. *International Entrepreneurship and Management Journal*, *6*(3), 331-350.
83. Shane, S., Locke, E. A., & Collins, C. J. (2003). Entrepreneurial motivation. *Human resource management review*, *13*(2), 257-279.
84. Smith, R., &Christou, M. L. (2009). Extracting value from their environment: some observations on pimping and prostitution as entrepreneurship. *Journal of Small Business & Entrepreneurship*, *22*(1), 69-84.

85. Solesvik, M. Z.,Iakovleva, T., &Trifilova, A. (2013). Financial availability and government support for women entrepreneurs in transitional economies: cases of Russia and Ukraine.
86. Spillan, J. E., &Ziemnowics, C. (2002). Advanced technology and entrepreneurship opportunities: Examples in Poland. *Journal of East-West Business*, *7*(2), 63-83.
87. Uslay, C., &Erdogan, E. (2014). The mediating role of mindful entrepreneurial marketing (MEM) between production and consumption. *Journal of Research in Marketing and Entrepreneurship*, *16*(1), 47-62.
88. vanHemmen, S., Alvarez, C., Peris-Ortiz, M., &Urbano, D. (2015). Leadership Styles and Innovative Entrepreneurship: An International Study. *Cybernetics and Systems*, *46*(3-4), 271-286.
89. Vijayakumar, A., and S. Jayachitra. "Women entrepreneurs in India-Emergingissues and challenges." *International Journal of Development Research* 3, no. 04 (2013): 12-17.
90. Vishwakarma V., Prakash C, Barua M.K. (2015). Evaluating quality dimensions under technological integration in pharmaceutical supply chain: A fuzzy MCDM approach. *Shodh Ganga Management Journal, 5(1),* 1-4.
91. Vishwakarma V., Prakash C, Barua M.K. (2016). A fuzzy-based multi criteria decision making approach for supply chain risk assessment in Indian pharmaceutical industry. *International Journal of Logistics Systems and Management, 25(2),* 245-265.
92. Vishwakarma V., Prakash C, Barua M.K. (2017). Modeling the barriers of Indian Pharmaceutical Supply Chain using fuzzy AHP. *International Journal of Operational Research* [in press].
93. Walker, E., & Webster, B. (2006). Management competencies of women business owners. *The International Entrepreneurship and Management Journal*, *2*(4), 495-508.
94. Wamuyu, P. K. (2015). The impact of information and communication technology adoption and diffusion on technology entrepreneurship in developing countries: The case of Kenya. *Information Technology for Development*, *21*(2), 253-280.
95. Wang, P., & Burton Swanson, E. (2008). Customer relationship management as advertised: Exploiting and sustaining technological momentum. *Information Technology & People*, *21*(4), 323-349.
96. Wang, X., Jessup, L. M., & Clay, P. F. (2015). Measurement model in entrepreneurship and small business research: a ten year review. *International Entrepreneurship and Management Journal*, *11*(1), 183-212.
97. Welsh, D. H., & Krueger, N. (2012). The evolution of social entrepreneurship: what have we learned?. *Journal of Technology Management in China*, *7*(3), 270-290.
98. Williams, C. C., &Nadin, S. (2012). Entrepreneurship in the informal economy: commercial or social entrepreneurs? *International Entrepreneurship and Management Journal*, *8*(3), 309-324.
99. Women's Business Research, 2009
100. Yadav, V., &Goyal, P. (2015). User innovation and entrepreneurship: case studies from rural India. *Journal of Innovation and Entrepreneurship*, *4*(1), 1-20.
101. Yew Wong, K. (2005). Critical success factors for implementing knowledge management in small and medium enterprises. *Industrial Management & Data Systems*, *105*(3), 261-279.

Author bios

Kumari Amrita, doctoral student in Department of Management Studies, IIT (ISM) Dhanbad, India. Her current areas of research are Human Resource Management, Women Entrepreneurship, and Entrepreneurship in the MSMEs sector and Innovation & Entrepreneurship. She has completed Master in Zoology and MBA with Human Resource and Marketing Management.

Chandra Prakash Garg, Assistant Professor in Department of Transportation, UPES, Dehardun, India. His current areas of research are Sustainability, e-waste Management, Reverse Logistics, Green Supply Chain Management Inventory Control and Aviation Management. He has completed Master in Math and MBA. He obtained Doctor of Philosophy from IIT Roorkee. He has published more than 25 research papers in reputed journals and conferences.

Dr. Saumya Singh, Associate Professor in the Department of Management Studies, IIT (ISM) Dhanbad, India. She holds MBA in Marketing and PhD degree in entrepreneurship. Her research area includes advertising and Promotion Management, Retail Management, Rural Marketing, Innovation & Entrepreneurship, Entrepreneurship in the MSMEs Sector and Women Entrepreneurship Management. She has published more than 50 research papers in reputed journal and conferences.