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Development of Multi-dimensional Scale to Measure the Abilities of Rural Women towards Entrepreneurship

Maitreyee Tripathy[1]*, Bishnupriya Mishra[2] and Guru Prasad Satapathy[3]

[1,3]Ph.D. Scholar, [2]Professor, Odisha University of Agriculture and Technology, Bhubaneswar-751003, Odisha, India
*Corresponding author email id: tripathymaitreyee61@gmail.com

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ABSTRACT

Entrepreneurship has emerged as a powerful tool for rural women's empowerment, offering them opportunities to generate income, build self-confidence, and transform their lives. By engaging in entrepreneurial activities, rural women can leverage their skills, creativity, and local knowledge to establish and manage businesses that address the unique needs and challenges of their communities. The present study aimed to develop and validate a multi-dimensional scale for evaluating rural women's entrepreneurial skills, essential for empowering communities through the establishment of small businesses promoting economic progress. The study was conducted in 2023. 60 attitudinal items were initially gathered, evaluated for relevance, and examined. The scale's final composition included 41 statements spread across six sub-dimensions viz. Cognitive skill, Motivational skill, Social & Relational skill, Management skill, Technical skill and Strategic skill. Cronbach's Alpha was used to assess reliability, and the resultant coefficient of 0.81 was satisfactory. Expert evaluation was used to check the validity of the content. Researchers in relevant fields can use this standardized scale to evaluate rural women's entrepreneurial abilities, either as is or with adjustments, promoting empowerment and community development.

INTRODUCTION

Entrepreneurship has emerged as a powerful driver of economic growth and development worldwide. It serves as a catalyst for job creation, innovation, and the overall enhancement of living standards. Despite its significant potential, the entrepreneurial landscape remains largely underexplored, especially concerning the abilities and contributions of rural women (Singh et al., 2014; Singh et al., 2016; Bardhan, & Bhardwaj, 2022). The entrepreneurial abilities of rural women encompass a wide range of skills, competencies, and personal characteristics necessary for identifying opportunities, mobilizing resources, and successfully managing ventures (Gupta et al., 2022). While existing scales have been developed to assess entrepreneurial abilities, they predominantly focus on general populations or specific gender groups in urban settings, failing to capture the unique challenges and contexts faced by rural women (Krishna, 2022; Keil & Jain, 2022; Zhou & Jose, 2022).

Therefore, this research article seeks to fill this critical gap by presenting a multidimensional scale specifically tailored to measure the entrepreneurial abilities of rural women. By providing a comprehensive framework to assess their strengths, weaknesses, and potential, this scale aims to enhance our understanding of the unique entrepreneurial dynamics within rural communities (Mohanty & Kumar, 2009; Singh & Meera, 2009). The research team conducted interviews and focus group discussions with rural women entrepreneurs to identify the key dimensions and factors that influence their entrepreneurial abilities (Nain et al., 2019; Ramu & Asokhan, 2021). The scale was designed to encompass multiple dimensions, including cognitive abilities, business acumen, self-efficacy, risk tolerance, networking capabilities, and resilience. The final version of the scale will serve as a valuable tool for

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researchers, policymakers, and practitioners working towards the empowerment of rural women, enabling, them to identify areas for improvement, design targeted interventions, and track progress over time (Shitu et al., 2018).

This research article aims to contribute to the existing body of knowledge by providing a comprehensive and context-specific measurement tool that can guide future research and inform evidence-based policies and programs. In the following sections, we will discuss the methodology employed in developing the scale, present the results of validation procedures, and discuss the implications and potential applications of the multidimensional scale for entrepreneurial abilities of rural women. Through this research, we aspire to foster a deeper understanding of rural women's entrepreneurship and contribute to their economic empowerment and sustainable development (Singh & Kaur, 2021). The multidimensional scale developed in this research article encompasses several key dimensions that are crucial to understanding and assessing the entrepreneurial abilities of rural women. These dimensions include cognitive abilities, which encompass critical thinking, problem-solving, and decision-making skills necessary for identifying and seizing entrepreneurial opportunities. Social and relational dimensions highlight the importance of networking, collaboration, and relationship-building skills, which enable rural women to access resources, support, and market opportunities (Som & Burman, 2018; Sharma & Padaria, 2018). By incorporating these multidimensional aspects, the scale provides a comprehensive assessment framework that acknowledges the diverse skill sets and attributes required for entrepreneurial success among rural women.

METHODOLOGY

The methodology employed by Maheshwari–Kumar–Jhamtani–Bhaskaran–Dandapani (2006) for multi-dimensional scale construction was adopted in the current study to develop a tool for assessing entrepreneurial abilities of rural women (Mohanty et al., 2009). In order to construct this scale, an extensive literature review was conducted, and input was gathered through discussions with rural women, subject matter experts, and the personal experiences of the researchers. A sum of 60 relevant statements were compiled, including different dimensions of entrepreneurial abilities. Careful consideration was given to avoid biasness of statements. By implementing these steps, the researchers ensured a comprehensive and balanced approach to scale development (Ray & Mondal, 2021). The process for constructing the scale to measure the entrepreneurial abilities of rural women, followed the procedure of M-K-J-BD (Mohanty et al., 2009).

An initial set of statements was formulated based on relevant literature and discussions with scientists in the field. The set of 60 statements was executed to 45 experts who rated their degree of contextual relevance (3 = most relevant, 2 = relevant, 1 = irrelevant). Statements with relevancy scores above 2 were retained for further analysis. This resulted in 50 items being selected. Data were collected by various methods such as individual visits, online platforms like email, WhatsApp, or Google Forms. The respondents were experts in Agricultural Extension Education with a minimum of three years of experience. Principal component analysis was conducted to identify underlying dimensions or factors in the data. Statements with communality values below 0.6 were eliminated from the analysis. The factors to be retained in the final scale was determined based on the factor analysis results. Alternative factor analysis methods, such as Maximum Likelihood and least square methods, were used to verify the factor structure. Using the rotated component matrix, beta (b) values were determined for each variable in different components. Statements (variables) were regressed into factors (components) using the formula Y1 = b1X1 + b2X2 + b3X3, Y2 = b1X1 + b2X2 + b3X3, Y3 = b1X1 + b2X2 + b3X3, Y4 = b1X1 + b2X2 + b3X3, and so on. The values obtained from (Y1, Y2, Y3, Y4, etc.) were summed to obtain an overall score (Y) on the multidimensional scale for each individual respondent. These scores were uncorrelated with each other. The reliability of the scale was evaluated using Cronbach's Alpha, a measure of internal consistency, to ensure the consistency and reliability of the measurement of entrepreneurial abilities.

To ensure the sampling adequacy and inter-correlation among variables (statements), two tests were conducted: the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test. The KMO test indicated a high sampling adequacy with a score of 0.878, demonstrating that the sample size was appropriate for the analysis.

RESULTS

Finalizing of scale items on the basis of relevancy test and item analysis

Table 1 provides a clear overview of the selected scale items that passed both the test of relevancy (score > 2) and analysis of items (t value = 1.75 or > 1.75). From the initial pool of 60 items, a total of 41 items were kept for inclusion in tool that is developed. t scores for the selected items ranged from a maximum of 3.22 to a minimum of 2.13. As stated by Edwards (1969), selected items, whose t score exceeding 1.75 exhibit greater power of discrimination and should be included in final scale. The critical ratio "t-value" which is a measure used to describe the extent of differentiation between the high and low score groups foreach statement is calculated using the following formula:

$$t = \frac{\overline{X}_H - \overline{X}_L}{\sqrt{\frac{S_H^2}{n_H} + \frac{X_L^2}{n_L}}}$$

Where, X_H = the mean score on a given statement for the high group, X_L = the mean score on the same statement for the low group, S2H = the variance of the distribution of responses of high group to the statement, S2L = the variance of the distribution of responses of low group to the statement, nH = number of subjects in the high group; nL = number of subjects in the low group

In the subsequent step, a factor analysis was conducted to assess the communality value of each statement. The analysis revealed that all statements had a communality value exceeding 0.6, leading to the acceptance of all items in the scale (Kashid et al., 2022). Through the principal component method, six components were extracted. The initial eigenvalues decreased to less than one after the sixth component. These six components were able to explain approximately 65 per cent of the total

Table 1. Result of item analysis and relevancy test (n= 41)

S.No.	Statements	Relevancy test	t value
1	Critical thinking before beginning a venture is of paramount importance	4.5	1.78
2	Having competent problem analysis and problem-solving skills is of utmost importance while running a business	4.2	1.76
3	Good conceptual competency (mental ability to coordinate the business and its interest) plays a major role in running a business	3.5	1.83
4	Having sound analytical skill provides a great push for successfully running a business	3.9	1.89
5	Incompetency in information gathering is a major drawback for running a venture	3.8	2.30
6	Ability to optimise the available resources is important while taking up a venture	2.2	1.77
7	Without strong determination, running a venture is not easy	2.5	2.40
8	Sound decision making ability plays an important role in taking up a venture	2.8	1.89
9	Perseverance is definitive in running a business	3.0	2.56
10	Persuasive skills play a major role in running a business	4.0	1.90
11	Dedicated passion for work is a great push for successfully running a business	4.1	2.45
12	Desire to succeed is of utmost importance while running a business	2.9	1.76
13	Ability to work hard is a key for successful business	3.7	2.43
14	Having a great self-confidence strengthens business venture	3.6	2.78
15	Self-motivation is the key to sustainable efforts for running a business	4.8	1.87
16	Good interpersonal skills are very much essential to run a smooth business	2.4	1.98
17	Workable networking with others has a positive impact on a venture	2.9	2.22
18	Having commitment for clients is a positive adding factor in running a business	3.1	2.45
19	Leading others with great positivity play a major role in running a business	2.6	2.56
20	Listening to others before taking decisions affects the business	3.0	1.76
21	Negotiation skills are important to resolve business conflicts	2.3	1.79
22	Business ethics is a must while dealing with people, staff or customers	3.2	2.34
23	Previous experience about business from self or family or friends is important	3.4	2.67
24	Business management skills are pre-requisite to run a smooth venture	4.1	1.89
25	The most important factor in entrepreneurship is risk bearing ability	5.5	1.99
26	Great administrative skills play a major role in running a business	4.6	2.44
27	Before choosing a venture, measurement of stress tolerance level of entrepreneur is important	3.7	1.88
28	Being good at customer management skills is helpful for the business venture	‘	2.12
29	Sound financial management skills (accounting and cash control) is essential to run a smooth business	2.5	2.10
30	Before choosing a venture, development of operational systems for day-to-day functioning is very much essential	2.8	1.89
31	Before taking a venture, preparing and writing a business plan is mandatory	3.4	2.44
32	Having a competency in information technology helps in prospering the business	4.3	2.67
33	Both oral and written communication skills are necessary for running a business	4.5	1.89
34	Record keeping is very important in running a business	2.8	1.88
35	Ability to use influence strategies to get the work done in a business venture is helpful	2.9	1.90
36	Having sound strategic planning is indispensable for running a venture	3.6	2.34
37	Planning & Research are important before choosing a venture	3.2	2.55
38	Believing in systematic planning helps in strategic decision making in business	3.3	2.44
39	Strategic planning like accounting, audit and analysis etc. are necessary for smooth running of a business.	2.3	1.78
40	Marketing ability is an important skill a business owner should have	5.0	2.23
41	Goal setting is crucial for making strategic decision for the business	4.3	3.22

variance. Subsequent components only contributed marginally to the explained variance. Therefore, it was decided to restrict components number in the analysis of factors to six, following an identical approach as Singh et al., (2021).

Regressing statements into factors

The factor loadings obtained from rotated component matrix through Principal Component Analysis (PCA), were used to regress the statements (variables) into the corresponding factors. These factor loadings indicated the extent to which every single statement contributed to respective component (Table 2). Basing upon factor loadings, each component (factor) was named that represented statements group giving a significant output to that specific component. Logically, statements having higher β values had the greatest contribution to a particular component compared to the other components.

Upon reviewing Table 3, it was observed that the statements numbered 3, 6, 8, 17, 21, 25, 26, 30, and 33 made a substantial contribution to the first component. These statements primarily encompassed cognitive aspects associated with entrepreneurial abilities, such as “having competent problem analysis and problem-solving skills is of utmost importance while running a business”. Hence, component Y1 represented cognitive skills. The sixth component had the highest contribution from statements numbered 18, 29, 31, 34, 39, and 41, which predominantly focused on strategic aspects of entrepreneurship. Similarly, the remaining

Table 2. Rotated Component Matrix (Rescaled)

Statements	Higher factor loadings	Statements	Higher factor loadings	Statements	Higher factor loadings
1	.765 (3)	15	.657(3)	29	.776 (6)
2	.543 (2)	16	.775 (4)	30	.598 (1)
3	.658 (1)	17	.832 (1)	31	.536 (6)
4	.832 (2)	18	.489 (6)	32	.723 (2)
5	.346 (3)	19	.734 (3)	33	.412 (1)
6	.556 (1)	20	.543 (4)	34	.398 (6)
7	.665 (5)	21	.645 (1)	35	.554 (3)
8	.478 (1)	22	.812 (5)	36	.643 (5)
9	.459 (5)	23	.485 (3)	37	.395 (3)
10	.503 (4)	24	.497 (5)	38	.587 (4)
11	.668 (2)	25	.673 (1)	39	.497 (6)
12	.789 (3)	26	.735 (1)	40	.675 (2)
13	.555 (4)	27	.766 (2)	41	.694 (6)
14	.432 (2)	28	.445 (4)		

Table 3. Components Extraction and Scores

S.No.	Components (Y)	Statements	Component score
Y 1	Cognitive skills	3,6,8,17,21,25,26,30,33	0.233*X1 +0.350*X2 +...+0.113*X41
Y 2	Motivational skills	2,4,11,14,27,32,40	0.257*X1 +0.543*X2 +...+0.213*X41
Y 3	Social and Relational skills	1,5,12,15,19,23,35,37	0.765*X1 +0.343*X2 +...+0.273*X41
Y 4	Management skills	10,13,16,20,28,38	0.469*X1 +0.143*X2 +...+0.383*X41
Y 5	Technical skills	7,9,22,24,36	0.433*X1 +0.283*X2 +...+0.563*X41
Y 6	Strategic skills	18,29,31,34,39,41	0.524*X1 +0.178*X2 +...+0.694*X41

statements made contributions to different components, and the components were appropriately named as motivational skills, social and relational skills, management skills & technical skills in entrepreneurship.

Statistically, the components were regressed with the help of the beta scores of each statement to obtain the value of uncorrelated components, as depicted in the column four of Table 2. The scores obtained by the respondents, denoted as X1, X2, ..., X25, ranged between one to five.

Final scale score

Once the individual components scores were calculated for each person, each respondent's total score could be derived by summing up regressed values of Y1, Y2, Y3, Y4, Y5, and Y6. Mathematically, this can be shown as the Total Score Y = Y1 + Y2 + Y3 + Y4 + Y5 + Y6. Lowest score on scale was determined as 51.568, while top score was 229.56.

Validity of the scale

To test the validity of the scale, content validity was used. Content validity involves systematically analysing the test contents to ensure that it encompasses a representative sample of the behavior area being assessed. In this study, we established content validity by collecting statements from relevant literature and seeking the opinion of experts in the field of extension, who possess bring vast experience in this. The approach of content validity testing aligns with the recommendations of Shitu et al., (2018) and has also been employed by Gupta et al., (2022) to assess the validity of their research tool.

Scale reliability assessment

Reliability, as described by Ray & Mondol (1999), refers to accuracy and precision with a score is obtained. Cronbach's alpha, a measure of internal consistency, was employed to find the reliability. The procedure involved analysing the responses from the study participants using statistical SPSS software. Cronbach's alpha is a coefficient that indicates how well the items in a scale correlate with each other. A higher alpha value suggests greater reliability. In this case, the obtained coefficient of reliability was 0.81, exceeding the commonly accepted threshold of 0.70, which indicates good reliability. This value was obtained through a meticulous examination of the inter-item correlations within the scale, affirming the consistency and dependability of the measurements.

DISCUSSION

The results of the relevancy test and item analysis signify a rigorous process in finalizing the scale items for measuring entrepreneurial abilities among rural women. With 41 items retained out of the initial pool of 60, the selection process prioritized both relevance and discriminatory power, as indicated by t scores exceeding 1.75, in line with Edwards (1969). This meticulous culling process ensures that the items chosen for inclusion possess the necessary discriminatory power to effectively capture the nuances of entrepreneurial abilities specific to rural women. By adhering to established criteria, the resulting scale is poised to offer a comprehensive assessment tool that accurately reflects the multifaceted nature of entrepreneurial skills in this demographic. Such a refined instrument not only enhances the validity and

reliability of measurement but also underscores the commitment to precision in research and program development aimed at empowering rural women in entrepreneurial endeavours.

The factor analysis conducted to evaluate the communality of each statement within the scale for measuring entrepreneurial abilities among rural women proved integral in refining the instrument. With all statements exhibiting communality values surpassing 0.6, each item demonstrated substantial shared variance with the underlying factors, affirming their relevance and contribution to the construct being measured. Through principal component analysis, six distinct components emerged, capturing approximately 65 per cent of the total variance in entrepreneurial abilities. The decision to limit the analysis to six components, as guided by previous research methodologies, underscores the strategic approach to dimensionality reduction while ensuring adequate representation of the underlying constructs. Regressing statements onto these factors facilitated the identification of the most salient contributors to each component, thereby enabling meaningful interpretation of the scale. This meticulous process not only enhances the psychometric properties of the instrument but also underscores its utility in assessing the multifaceted nature of entrepreneurial abilities among rural women, thereby offering valuable insights for research and practical interventions aimed at fostering entrepreneurship in this demographic.

The detailed analysis presented in Table 3 elucidates the distinct dimensions of entrepreneurial abilities among rural women, each represented by a unique set of contributing statements. Notably, the first component, characterized by cognitive skills, underscores the importance of analytical and problem-solving capabilities in entrepreneurial endeavours. Conversely, the sixth component emphasizes strategic acumen, highlighting the significance of long-term planning and vision in business success. Through regression analysis, the uncorrelated components were derived, allowing for the computation of individual scores reflecting respondents' proficiency across these dimensions. The resulting scale offers a nuanced assessment of entrepreneurial abilities, encompassing cognitive, motivational, social, managerial, and technical competencies essential for success in rural entrepreneurship. The scale's robustness is further underscored by its comprehensive scoring mechanism, facilitating a nuanced understanding of individual strengths and areas for development, thereby providing valuable insights for both research and practical interventions aimed at empowering rural women in entrepreneurship.

CONCLUSION

Psychological variables are typically multidimensional with interrelated aspects, so using unidimensional scales to assess them in the field of Social Sciences frequently leads in erroneous measurements. The current study's goal was to develop a multidimensional scale for assessing rural women's entrepreneurial talents. The creation of such a scale is extremely valuable to policymakers, scholars, and development practitioners. It allows for a more precise assessment of rural women's entrepreneurial ability, which allows for tailored interventions and policies that suit their individual requirements. Furthermore, it facilitates the financial and evaluation of programmes intended at encouraging women's entrepreneurship in rural areas, allowing for evidence-based decision making and research allocation.

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