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Psychometric Scale Development for the Measurement of Entrepreneurial Behaviour of Vegetable Growers

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HIGHLIGHTS

- A scientifically validated entrepreneurial behaviour scale was developed- 33, standardised psychometric statements were finalised using Likert summated rating techniques
- Scale demonstrated very high reliability and internal consistency, with Cronbach's alpha values of 0.891 and 0.955.
- The tool offers strong potential for research, extension and policy interventions- provides a framework to assess and enhance entrepreneurial skills.

ARTICLE INFO

Keywords: Entrepreneurial behaviour, Vegetable growers, Psychometric scale development, Likert's summated rating technique, Reliability and Validity, Item analysis.

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ABSTRACT

The study conducted in the year 2025 developed and standardised a valid and dependable psychometric scale to assess vegetable growers' entrepreneurial behaviour. An initial pool of 76 statements was produced using Likert's summated rating approach. Following editing, 86 experts tested the statements for relevancy using mean relevancy score, relevancy weightage, and relevancy percentage. The crucial ratio (t-value) method was used to analyse the replies of 60 vegetable growers who were chosen from non-sample locations. 33 statements were ultimately chosen to be included in the scale based on discrimination power. The split- half approach was used to determine the instrument's reliability, and the results showed excellent internal consistency and elevated levels of Cronbach's alpha value (0.891 and 0.955) and a satisfactory Guttman Split- half Coefficient (0.720). Expert judgement was used to guarantee content reliability and validity. Researchers, extension specialists, and legislators should find the developed scale to be a helpful tool for evaluating entrepreneurial behaviour and creating need-based interventions to improve the entrepreneurial skills of vegetable growers.

INTRODUCTION

The term "entrepreneurship" describes the process of spotting opportunities, gathering resources, and adding value by starting and growing new businesses. In order to produce economic and societal benefits, it entails creativity, taking calculated risks and making proactive decisions (Bhaskar et al., 2020 & Singh et al., 2024). The creation of jobs, competitiveness, economic progress, and technological advancement are all commonly acknowledged to be significantly influenced by entrepreneurship (Gupta et al., 2020). Vegetables are now considered high- value crops in agricultural systems around the world due to rising demand for them brought on by fast urbanization, population growth, and increased knowledge of balanced meals. Particularly in developing nations where

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smallholder farmers control production systems, vegetable gardening has a substantial contribution to food and nutritional security, job creation, and income enhancement (Food & Agriculture Organization, 2021).

In India, most vegetable growers are small-scale, marginal farmers who mostly use intensive cropping systems and family labour. Vegetable crops offer chances for rapid revenue generation and livelihood diversification due to their short duration and high yield potential (Paine et al., 2025). Vegetable farmers in India, however, have a number of difficulties, such as exorbitant input costs, poor infrastructure for selling and storage, unstable prices, and susceptibility to weather- related pressures. Enhancing the resilience and entrepreneurial potential of vegetable growers requires tackling these issues via technological innovation, capacity building, and market integration (Indian Council of Agriculture Research, 2022).

Understanding the entrepreneurial behaviour of vegetable growers is crucial for several reasons. First, vegetable growers' entrepreneurial behaviour is highly influenced by individual, social and experiential factors (Gupta et al., 2014; Gupta et al., 2023; Patel et al., 2023). Second, examining these behavioural patterns can help identify and study successful entrepreneurs, which in turn can aid in formulating government policies along with designing effective training programs (Kobba et al., 2021; Singh et al., 2024; Kademani et al., 2026).

This study aims to analyze the entrepreneurial behaviour of vegetable growers, focusing on key behavioural dimensions that contribute to enterprise success, such as innovation, risk- taking ability, decision-making skills, achievement motivation and leadership. The findings will be valuable for various stakeholders, including financial institutions, agricultural extension services and policymakers in their efforts to promote and support vegetable entrepreneurship development. Additionally, the study will construct and standardise a comprehensive scale to measure entrepreneurial behaviour by identifying the key behavioural attributes, developing relevant indicators, well as ensuring the reliability and validity of the scale. It will also bridge the gap by developing a psychometrically sound scale that captures dimensions like market orientation, financial management and adaptability to new technology.

METHODOLOGY

Likert scale (Likert's Technique,1932) was used in this study to create the intended scale. The summated rating scale consists of several perception statements, each regarded as having approximately equal perception value. Subjects answer to these claims with varying degrees of agreement or disagreement, each of which is assigned a separate score. This approach was chosen for the current study because it avoids using a single statement to describe concepts in favour of using multiple statements as indicators, each of which represents a different aspect of the concept to provide a more comprehensive view. The following is a discussion of the specific procedures used to restrict the (Likerts, 1932) type scale in order to measure the entrepreneurial behaviour of vegetable growers.

In order to create the psychometric scale, a number of statements about the entrepreneurial behaviour of vegetable growers were collected from books, literature, bulletins, articles, and journals. Additionally, a conversation was held with experts from the field and scientists who had expertise in creating and assisting in the entrepreneurial behaviour areas. A preliminary set of questionnaires was created with consideration for their suitability or applicability to the study's field. After these statements were corrected using the 14 criteria set by (Edwards 1957), (Thurstone & Chave, 1929), and (Edward & Kilpatrick, 1948), 40 of the 76 statements were included in the performa.

The performa that was emailed contained these remarks on a three-point scale that went from "highly relevant (HR), relevant (R), and least relevant (LR)". The judges also received the Google Docs form in person. These judges were experts in their fields who held positions at institutes, universities, and extension education centres. They were asked to change or add any final remarks they felt were necessary. The analysis only considered 86 of the 180 judges who, after properly documenting their findings, supplied the same set of notes. After the study, the statements were changed based on the remarks and criticism from professionals. A total of 40 statements were eventually retained. The "Relevancy percentage," "Relevancy weighted," and "Mean relevancy score" for each statement were calculated by tabulating and analyzing the judges' responses.

RESULTS

The "Very relevant" and "relevant" category ratings were added up and converted to a percentage. Relevancy Percentage computed value was discovered within the range of 10.46 (lowest) to 98.83 (highest). The range between each respondent's actual score and the highest possible score. The computed value of relevancy weightage was assessed to be between 0.37 (lowest) and 0.94 (highest). The range of the computed MRS value was 1.13 (lowest) to 2.83 (highest), and the value of the overall mean relevancy score (OMRS) is 2.06. These three standards were used to evaluate the statements' applicability. Therefore, for the final selection of statements, statements with an overall mean relevancy score > 2.29, a relevancy percentage > 70, and a relevancy weightage > 0.70 were taken into consideration (Thakur and Sharma 2017). As a result, 40 statements were chosen, appropriately altered, and revised in accordance with the experts' feedback.

Sixty farmers from non-sample areas were given a questionnaire with forty items. These farmers were chosen on the basis of their status as farmers or members of the farming community. Five-point Likert scale- strongly agree, agree, undecided, disagree and strongly disagree was used to gauge farmers' level of agreement. A score of 5,4,3,2, and 1, was assigned to each positive statement, whereas the score of each negative statement was 1, 2,3 4, and 5. Each respondent's total entrepreneurial conduct was calculated by summing the scores for each category. The respondents were ordered in descending order. As suggested by Edwards (1957), criterion groups were created for evaluating the individual statements by using the 25% of respondents with the highest total score group as the low group and the remaining 25% as the high group for item analysis. Therefore, out of 60 farmers to whom the items were administered for the item analysis, 15 farmers with the lowest scores and 15 with the highest scores were used as

criterion groups to evaluate various things. The critical ratio, often known as the "t" value, was calculated using the formula put out by Edward (1957). This number shows how well a certain statement distinguishes between the high and low response groups for each statement.

It was determined that the computed t-value was distributed between 0.37 and 9.62. Later, the 33 statements that were quantified in the scale that was finalised were evaluated; their t-values, which are included in the finalised scale, were 2.05 or higher. By demonstrating its validity and reliability, the developed scale was further standardised.

The proposed scale's internal consistency was evaluated using the split- half approach. The sets of statements were given to 60 chosen respondents after the scales were divided in half based on random numbers. As a result, two sets of scores were acquired. Cronbach's Alpha was used in SPSS 24 to obtain the split-half test reliability coefficient. Sets 1 and 2 had alpha values of 0.891 and 0.955, respectively, while the correlation between them was 0. 574. The coefficient of reliability acquired demonstrated the entrepreneurial scale developed for the study's strong internal consistency. The Guttman Split-Half Coefficient, which was similarly determined to be 0.720 (Table 1), was used to further validate the outcome. It may be said that, the scale the is reliable for measuring the entrepreneurial behaviour of the vegetable growers.

The content substance, matter, and themes of a measurement device's representativeness or sampling adequacy are known as

Table 1. Reliability test (Split-half)

Reliability Statistics			
Cronbach's Alpha	Set 1	Value	.891
		N of items	17[a]
	Set 2	Value	.955
		N of items	16[b]
	Total N of items		33
Correlation Between Forms			.574
Spearman-Brown	Equal Length		.729
Coefficient	Unequal Length		.730
Guttman Split- Half Coefficient			.720

The items are: S1, S3, S5, S7, S9, S11, S13, S15, S17, S19, S21, S23, S25, S27, S29, S31, and S33

The items are: S2, S4, S6, S8, S10, S12, S14, S16, S18, S20, S22, S24, S26, S28, S30, and S32

Where: S= Statements

Table 2. Statements Chosen to be part of the final scale

S.No.	Statements	RP	RW	MRS	t
1	Challenging attitude to overcome the loss	89.53	0.84	2.52	3.05
2	Searching successful technologies	89.53	0.84	2.54	2.98
3	Best management to the vocation	90.69	0.84	2.52	3.85
4	Close contact with subject matter experts	89.53	0.82	2.47	5.40
5	Competitive attitude	97.67	0.92	2.77	3.44
6	Optimum utilisation of resources	98.93	0.91	2.74	2.51
7	Close supervision and monitoring of each activity	94.18	0.87	2.63	2.08
8	Close contact with experts	96.51	0.91	2.73	2.46
9	Close relationship with expert for guidance	93.02	0.86	2.59	4.71
10	Timely application of inputs and materials	95.34	0.86	2.6	4.33
11	Collecting information on recent technological developments	96.51	0.88	2.65	3.55
12	Following recommends all cultural practices	98.83	0.89	2.67	2.57
13	Priority to engage skilled personnel	93.02	0.86	2.58	2.77
14	Close contact with traders and business personnel	91.86	0.86	2.60	4.36
15	Production on consumer demand	94.18	0.87	2.62	5.71
16	Regular feedback from the consumers on quality	94.18	0.88	2.65	5.71
17	Aspiration for exporting produce	93.02	0.87	2.62	6.17
18	Rapport establishment with credit organisations	95.34	0.88	2.65	5.87
19	Timely developing required infrastructure	95.34	0.78	2.36	7.73
20	Common decision repayment	96.51	0.91	2.74	7.10
21	Timely repayment of instalment	93.02	0.89	2.68	7.41
22	Approach for fixing instalments as per paying capability	91.86	0.88	2.66	8.26
23	Compulsory insurance coverage	90.69	0.89	2.67	7.73
24	Adopting the advice of the experts	94.18	0.89	2.68	8.28
25	Draw the faith and confidence of the traders and consumers	91.86	0.88	2.66	8.88
26	Motto for quality production	91.86	0.89	2.68	9.62
27	Supplying produce to traders/businessmen at prefixed date and time	94.18	0.91	2.75	7.56
28	Close relation with local people	96.51	0.92	2.77	6.43
29	Financial help for village development	94.18	0.91	2.75	5.87
30	Organising socio-cultural activities in the locality	95.34	0.93	2.79	5.40
31	Regularly look for new ideas to improve the quality of the vegetables	96.51	0.93	2.8	5.40
32	Modify traditional practices to increase productivity or profit	97.67	0.94	2.83	5.14
33	Ready to take financial risks if there is a chance of higher profit	96.51	0.93	2.81	5.14

content validity. 86 judges received all of the revised statements for their professional advice in creating the scale. The scale took into account the experts' recommendations. As a result, the current scale met content validity requirements. In order to prevent biased replies, 33 items were chosen to assess the entrepreneurial behaviour of vegetable producers.

The 33 statements chosen for the final layout of the entrepreneurial scales are placed at random to stay clear of biased responses that can result in the scale's poor validity and reliability. In accordance with Likert (1932), a five-point agreement or disagreement scale was represented by five columns: strongly agree, agree, undecided, disagree, and strongly disagree. The points on the continuum had weights of 5,4,3,2, and 1 for statements. An accurate evaluation of vegetable growers' entrepreneurial behaviour is made possible by this organized scoring procedure, which guarantees that the response is methodically quantified. The five categories of entrepreneurial behaviour used in the study are: Strongly agree (SA), Agree (A), Undecided (UN), Disagree (D), and strongly disagree (SD). The lowest possible score was 33 (scoring 1 on each of the 33 items), and the highest score was 165 (ranking 5 on each of the 33 items), as shown in Table 2.

DISCUSSION

The scale, which is developed comprising 33 statements, was examined using the split-half reliability technique in order to assess the internal consistency and stability of the instrument. The statements were separated into two groups according to odd and even numbering, with Set 1 consisting of 17 statements (S1, S3, S5, …, S33) and Set 2 consisting of 16 statements (S2, S4, S6, …, S32).

The results revealed that Cronbach's Alpha for Set 1 was 0.891, indicating a high degree of internal consistency among the statements included in this set. Similarly, set 2 exhibited a very high Cronbach's Alpha value of 0.955, suggesting excellent homogeneity among its statements. The items in each half are consistently measuring the same underlying construct, as shown by these high alpha coefficients (Shirur et al., 2015; Gupta et al., 2022). The slightly higher reliability coefficient for set 2 indicates comparatively stronger inter- item consistency, although both sets exceed the acceptable reliability threshold.

A moderate but acceptable correlation between the two forms is indicated by the correlation of 0.574 between the two parts of the developed scale. This suggests that even though the products in each half are not identical, they are sufficiently related and contribute meaningfully to the measurement of the same construct. Such a correlation is desirable in split- half reliability analysis, as it reflects balance between item diversity and construct consistency.

To account for the unequal number of items in the sets, the Spearman- Brown reliability coefficient was applied. The resulting reliability coefficients were 0.729 for equal length and 0.730 for unequal length, both of which are above the minimum recommended value of 0.70. Additionally, the coefficient of Guttman split-half was calculated as 0.720, further reinforcing the reliability and stability of the scale. The instrument would continue to have sufficient reliability even if it were given as a full- length test, according to these revised coefficients.

The results show that the scale has satisfactory to exceptional dependability. The instrument is reliable for measuring the desired construct, as evidenced by the robust split-half coefficients, adequate inter-form correlation, and strong internal consistency within each set. As a result, the scale that was established can be regarded as psychometrically sound and is appropriate for use in further statistical analyses, result interpretation, and the drawing of legitimate conclusions in the current study (Deepika et al., 2024)

CONCLUSION

The study was effective in creating and standardising a valid and trustworthy scale to measure vegetable growers' entrepreneurial behaviour. It provides a structured approach for assessing entrepreneurship in vegetable farming by incorporating key behavioural dimensions. A final collection of 33 assertions was kept after methodical item production, expert validation, and item analysis, guaranteeing sufficient content coverage and discrimination ability. The instrument's stability and dependability were confirmed by the split- half reliability results, which showed great internal consistency. Overall, the scale is psychometrically sound and suitable for use in research, extension, and policy-oriented studies aimed at assessing and enhancing entrepreneurial behaviour among vegetable growers.

DECLARATION

Ethical approval and consent to participate: Informed consent was sought from the respondents.

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The authors declare that during the preparation of this work, thoroughly reviewed, revised, and edited the content as needed. The authors take full responsibility for the final content of this publication.

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