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Development and standardization of a Guava Farmer Entrepreneurial Index (GFEI): A tool for measuring entrepreneurial behaviour

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Abstract

Entrepreneurial behaviour plays a crucial role in enhancing the productivity, profitability, and sustainability of agricultural enterprises. In the context of guava cultivation, entrepreneurial competencies enable farmers to effectively adopt innovations, manage risks, access markets, and respond to emerging business opportunities. The present study was undertaken to develop and standardize a Guava Farmer Entrepreneurial Index (GFEI) for measuring entrepreneurial behaviour among guava farmers. The index was developed through a systematic procedure involving identification of dimensions, item generation, relevancy analysis, content validation, reliability testing and standardization. Based on an extensive review of literature and expert consultation, ten dimensions of entrepreneurial behaviour were identified. A pool of 100 statements was initially developed and edited according to the criteria suggested by Edwards (1957). The statements were subjected to relevancy analysis by a panel of experts, and statements with a relevancy weightage score greater than 0.75 were retained. Consequently, 59 statements were selected for inclusion in the final index. Content validity was established through expert judgment and relevancy assessment. The reliability of the instrument was tested using the test-retest method with a sample of 30 guava farmers, yielding a reliability coefficient (r) of 0.79, which was significant at the one per cent level. The finalized GFEI was administered to 60 guava farmers in Dindigul district to assess its applicability under field conditions. The results revealed that 48.33 per cent of the respondents exhibited medium entrepreneurial behaviour, followed by 30.00 per cent with high entrepreneurial behaviour and 21.67 per cent with low entrepreneurial behaviour. The findings confirmed that the developed index is a reliable and valid tool for assessing entrepreneurial behaviour among guava farmers and can be effectively utilized for research, extension, and policy interventions aimed at promoting agripreneurship.

Keywords: Entrepreneurial behaviour, guava farmers, index development, standardization, reliability, validity and agripreneurship

1. Introduction

Agriculture is increasingly being recognized not merely as a means of subsistence but as a dynamic enterprise requiring innovation, strategic decision-making and market-oriented approaches (Timmer, 1988) ^[1]. In the rapidly changing agricultural environment, farmers are expected to respond effectively to technological advancements, market fluctuations, climate uncertainties, and evolving consumer preferences (Galanakis, 2024) ^[5]. Consequently, entrepreneurial behaviour has emerged as a critical determinant of agricultural success, enabling farmers to identify opportunities, mobilize resources efficiently, manage risks, and enhance farm profitability (Gadanakis, 2024) ^[4]. Entrepreneurship has emerged as a key factor in enhancing agricultural productivity, profitability, and sustainability in modern farming systems (Mansingh *et al.*, 2025) ^[8]. Entrepreneurial farmers are more likely to adopt innovations, diversify their enterprises, access new markets and contribute to the overall development of the agricultural sector (Choudhury and Easwaran, 2019; Kobba *et al.*, 2021)

[2, 6].

Among fruit crops, guava (*Psidium guajava* L.) occupies a prominent position due to its high nutritional value, adaptability to diverse agro-climatic conditions and substantial economic potential (Santhi *et al.*, 2020) ^[9]. Guava cultivation offers substantial opportunities for income generation, value addition, processing, and market expansion, thereby necessitating entrepreneurial competencies among farmers (Times of India, 2026) ^[10]. Guava cultivation has gained considerable importance in India owing to its increasing demand for fresh consumption as well as processing into value-added products such as juices, jams, jellies, and beverages (Kumar *et al.*, 2022) ^[7]. The crop offers significant opportunities for income generation, employment creation and rural livelihood enhancement. However, the profitability and sustainability of guava cultivation depend not only on production practices but also on the entrepreneurial capabilities of farmers in managing resources, adopting technologies, accessing markets and responding to emerging business

opportunities (Vangapandu *et al.*, 2021; Chandre Gowda *et al.*, 2024) ^[12, 1].

Entrepreneurial behaviour in agriculture encompasses a range of dimensions including innovativeness, achievement motivation, risk-taking ability, decision-making ability, information-seeking behaviour, leadership ability, market orientation, economic motivation, scientific orientation and digital orientation. These behavioural characteristics influence farmers' capacity to transform traditional farming into a commercially viable and competitive enterprise. In the context of guava cultivation, entrepreneurial behaviour plays a crucial role in promoting technology adoption, improving market linkages, enhancing value addition, and increasing farm income. Therefore, understanding and assessing entrepreneurial behaviour among guava farmers is essential for designing effective extension interventions, entrepreneurship development programmes and policy initiatives.

Despite the growing recognition of agricultural entrepreneurship, the measurement of entrepreneurial behaviour remains a complex task due to its multidimensional nature. Several researchers have developed scales and indices to assess entrepreneurial behaviour among farmers; however, most existing instruments are either generic in nature or developed for specific farming communities and contexts. Such tools may not adequately capture the unique entrepreneurial characteristics, opportunities, and challenges associated with guava cultivation.

The development of a reliable and valid measurement tool is therefore necessary to quantify entrepreneurial behaviour and facilitate evidence-based decision-making. The present study was undertaken to design and standardize a Guava Farmer Entrepreneurial Index (GFEI) for measuring entrepreneurial behaviour among guava farmers. The index was developed using a systematic and scientific procedure involving item generation, expert validation, reliability testing, and standardization. The resulting instrument is expected to provide a comprehensive, reliable, and valid measure of entrepreneurial behaviour, thereby contributing to research and extension efforts focused on strengthening entrepreneurship in guava cultivation.

2. Research Methodology

The study was undertaken to develop and standardize a Guava Farmer Entrepreneurial Index (GFEI) for measuring entrepreneurial behaviour among guava farmers. The index was developed through a systematic procedure involving identification of dimensions, item generation, relevancy analysis, content validation, reliability testing and standardization.

Based on an extensive review of literature and expert consultation, ten dimensions of entrepreneurial behaviour were identified. An initial pool of statements was generated from previous studies, existing scales and discussions with subject matter specialists. The statements were subjected to

relevancy analysis by a panel of experts from Agricultural Extension, Horticulture, Agricultural Economics and Agribusiness Management. Relevancy Percentage (RP), Relevancy Weightage (RW) and Mean Relevancy Score (MRS) were computed and statements meeting the prescribed criteria were retained.

The content validity of the selected items was established through expert judgment to ensure adequate representation of the construct. The reliability of the index was tested using the split-half method and the reliability coefficient was estimated. The finalized statements were arranged on a five-point Likert-type continuum. Entrepreneurial behaviour scores were obtained by summing the responses of individual farmers. The Guava Farmer Entrepreneurial Index (GFEI) score was calculated by converting the obtained score into an index value, which was subsequently used to classify respondents into different levels of entrepreneurial behaviour. Thus, the developed index was standardized and established as a valid and reliable tool for measuring entrepreneurial behaviour among guava farmers.

3. Results and Discussion

3.1. Identification of Dimensions of Entrepreneurial Behaviour

An extensive review of literature and consultation with experts in Agricultural Extension, Horticulture, Agricultural Economics and Agribusiness Management resulted in the identification of ten dimensions representing entrepreneurial behaviour among guava farmers. These dimensions included innovativeness, risk orientation, decision-making ability, achievement motivation, management orientation, market orientation, production orientation, competition orientation, value addition orientation and digital orientation. The identified dimensions were considered comprehensive in capturing the entrepreneurial competencies required for successful guava cultivation and agribusiness management.

3.2. Generation of Items

Based on the identified dimensions of entrepreneurial behaviour, an initial pool of statements was generated through an extensive review of literature, consultation with experts and examination of existing entrepreneurial behaviour scales. The statements developed under each identified dimension were carefully reviewed and refined to suit the objectives and context of the study. The editing of statements was carried out in accordance with the informal criteria suggested by Edwards (1957) ^[3], which emphasize clarity, simplicity, specificity and avoidance of ambiguity. Necessary modifications were made to ensure that the statements were easily understandable and capable of eliciting reliable responses from guava farmers.

After thorough scrutiny, editing and refinement, a total of 100 statements representing the ten dimensions of entrepreneurial behaviour were finalized for further evaluation through relevancy analysis. The distribution of statements under each dimension is presented in Table 1.

Table 1: Dimension-wise Distribution of Statements Developed for the Guava Farmer Entrepreneurial Index (GFEI)

S. No.	Statements
I.	Innovativeness
1.	I adopt improved guava varieties such as high-yielding or disease-resistant types.
2.	I use integrated pest management (IPM) practices in my orchard.
3.	I implement scientific pruning and training techniques.
4.	I experiment with organic and inorganic nutrient management practices.
5.	I utilize modern irrigation techniques to optimize water use.
6.	I actively seek information on new guava cultivation practices.
7.	I modify recommended practices to suit my local conditions.
8*.	I rely only on traditional methods of guava cultivation.
9*.	I am reluctant to adopt new farming technologies.
10*.	I do not update my knowledge about improved practices.
II.	Risk Orientation
1.	I am willing to invest in high-density planting systems in guava cultivation despite initial uncertainty.
2.	I adopt new pest and disease management practices even when outcomes are not guaranteed.
3.	I invest in drip irrigation or fertigation systems to enhance productivity.
4.	I allocate resources to new guava varieties with potential market demand.
5.	I experiment with off-season flowering techniques to increase income.
6.	I take financial risks to improve orchard productivity.
7.	I adopt recommended technologies after assessing potential benefits and risks.
8*.	I avoid investing in improved practices due to fear of financial loss.
9*.	I prefer to continue existing practices even if they are less profitable.
10*.	I hesitate to adopt new technologies due to uncertainty of results.
III.	Decision Making Ability
1.	I make timely decisions regarding pruning, irrigation, and harvesting operations.
2.	I select inputs based on soil condition and crop requirements.
3.	I analyse cost-benefit aspects before adopting new practices.
4.	I decide the appropriate time for marketing based on price trends.
5.	I prioritize farm operations based on urgency and importance.
6.	I evaluate multiple alternatives before selecting a farming practice.
7.	I make independent decisions regarding orchard management.
8*.	I depend on other farmers or middlemen for major farm decisions.
9*.	I delay important farm decisions affecting crop performance.
10*.	I face difficulty in selecting appropriate farming practices.
IV.	Achievement Motivation
1.	I strive to achieve higher yield per hectare in guava cultivation.
2.	I aim to improve the quality of fruits to meet market standards.
3.	I set production and income targets for each season.
4.	I continuously work to enhance orchard productivity.
5.	I feel motivated when my farm performance improves over time.
6.	I compare my performance with progressive farmers.
7.	I take pride in achieving better results in guava cultivation.
8*.	I am satisfied with average production levels.
9*.	I do not set specific goals for my farm.
10*.	I lack motivation to improve farm performance.
V.	Management Orientation
1.	I prepare a seasonal calendar for guava orchard operations.
2.	I efficiently allocate labour during peak operations like harvesting and pruning.
3.	I maintain records of input use, yield, and income.
4.	I monitor orchard performance regularly.
5.	I manage financial resources effectively for farm activities.
6.	I coordinate different farm operations systematically.
7.	I ensure timely execution of all cultivation practices.
8*.	I find it difficult to organize farm operations efficiently.
9*.	I do not maintain records of farm activities.
10*.	I fail to monitor and evaluate farm performance.
VI.	Market Orientation
1.	I track price fluctuations in guava markets before selling produce.
2.	I select marketing channels based on profitability.
3.	I understand consumer preferences for fruit size, colour, and quality.
4.	I plan harvesting according to market demand.
5.	I explore distant or alternative markets for better prices.
6.	I gather information on market trends from various sources.
7.	I adjust production practices based on market requirements.

8*	I sell produce without considering prevailing market prices.
9*	I do not consider consumer preferences while producing guava.
10*	I ignore market trends while making selling decisions.
VII.	Production Orientation
1.	I focus on maximizing yield through scientific management practices.
2.	I ensure uniform fruit quality across the orchard.
3.	I adopt recommended spacing and planting techniques.
4.	I monitor pest and disease incidence regularly.
5.	I apply fertilizers based on crop requirements.
6.	I aim to reduce post-harvest losses.
7.	I follow timely cultural practices for better productivity.
8*	I do not prioritize improving yield levels.
9*	I neglect quality aspects of guava production.
10*	I rarely monitor crop condition and growth.
VIII.	Competition Orientation
1.	I observe cultivation practices of progressive guava farmers.
2.	I strive to achieve better yield and quality than neighbouring farmers.
3.	I adopt successful practices observed in other orchards.
4.	I update my practices to remain competitive in the market.
5.	I respond to market competition by improving product quality.
6.	I analyse strengths of other farmers to improve my performance.
7.	I continuously upgrade my skills to stay competitive.
8*	I do not pay attention to practices of other farmers.
9*	I am not concerned about competition in guava farming.
10*	I do not change my practices despite increasing competition.
IX.	Value Addition Orientation
1.	I grade guava fruits according to size and quality before marketing.
2.	I use proper packaging materials to improve the attractiveness and market value of my guava produce.
3.	I believe that value addition increases the profitability of guava farming.
4.	I am willing to invest in value-addition activities such as grading, packaging and processing.
5.	I explore opportunities to produce value-added guava products such as juice, jam, jelly, pulp, or candy.
6.	I seek information and training related to value-addition techniques in guava.
7.	I am interested in branding and labeling my guava products to create a distinct market identity.
8*	I do not consider grading and packaging of guava fruits necessary for obtaining better market prices.
9*	I am not interested in processing guava into value-added products.
10*	I believe that value-addition activities involve unnecessary costs and do not significantly increase farm income.
X.	Digital Orientation
1.	I use a smartphone regularly to obtain information related to guava cultivation and management.
2.	I use mobile applications or online platforms to access market prices of guava.
3.	I utilize social media platforms to learn about new technologies and market opportunities in guava farming.
4.	I prefer digital payment methods for agricultural transactions whenever possible.
5.	I use weather forecast applications or digital advisories to plan farm operations.
6.	I actively seek agricultural information through digital sources such as websites, YouTube videos, and mobile apps.
7.	I am willing to adopt new digital tools that can improve the productivity and profitability of my guava enterprise.
8*	I find digital technologies too complicated to be useful in guava farming.
9*	I do not trust information obtained through mobile applications or online platforms for farm-related decisions.
10*	I believe that traditional methods of communication are sufficient and there is no need to use digital tools in guava farming.

3.3. Relevancy Analysis of Statements

The edited statements were grouped under the ten identified dimensions of entrepreneurial behaviour and submitted to a panel of 30 experts for evaluation. The judges were requested to assess the relevance of each statement on a three-point continuum, namely Most Relevant, Relevant, and Not Relevant, with scores of 3, 2, and 1, respectively. For negatively worded statements, the scoring pattern was reversed.

Out of the 30 experts contacted, responses were received from 15 judges. The ratings provided by these judges were used for further analysis and selection of statements for the development of the Guava Farmer Entrepreneurial Index (GFEI).

The relevancy weightage (RW) of each statement was calculated using the following formula:

$$\text{Relevancy Weightage} = \frac{(n_3 \times 3) + (n_2 \times 2) + (n_1 \times 1)}{N \times 3}$$

Where,

n_3 = Number of judges who marked the statement as “Most Relevant”

n_2 = Number of judges who marked it as “Relevant”

n_1 = Number of judges who marked it as “Not Relevant”

N = Total number of judges

Based on the ratings received from the judges, the relevancy weightage scores of all statements were computed. The calculated relevancy weightage values served as the basis for selecting the most relevant statements for inclusion in the final Guava Farmer Entrepreneurial Index (GFEI). The details of the relevancy weightage scores are presented in Table 2.

Table 2: Relevancy Weightage Scores of Statements Developed for the Guava Farmer Entrepreneurial Index (GFEI)

S. No.	Statements	Relevancy Weightage
I.	Innovativeness	
1.	I adopt improved guava varieties such as high-yielding or disease-resistant types.	0.89
2.	I use integrated pest management (IPM) practices in my orchard.	0.72
3.	I implement scientific pruning and training techniques.	0.84
4.	I experiment with organic and inorganic nutrient management practices.	0.74
5.	I utilize modern irrigation techniques to optimize water use.	0.73
6.	I actively seek information on new guava cultivation practices.	0.91
7.	I modify recommended practices to suit my local conditions.	0.70
8*.	I rely only on traditional methods of guava cultivation.	0.81
9*.	I am reluctant to adopt new farming technologies.	0.78
10*.	I do not update my knowledge about improved practices.	0.69
II.	Risk Orientation	
1.	I am willing to invest in high-density planting systems in guava cultivation despite initial uncertainty.	0.88
2.	I adopt new pest and disease management practices even when outcomes are not guaranteed.	0.72
3.	I invest in drip irrigation or fertigation systems to enhance productivity.	0.74
4.	I allocate resources to new guava varieties with potential market demand.	0.85
5.	I experiment with off-season flowering techniques to increase income.	0.72
6.	I take financial risks to improve orchard productivity.	0.90
7.	I adopt recommended technologies after assessing potential benefits and risks.	0.87
8*.	I avoid investing in improved practices due to fear of financial loss.	0.73
9*.	I prefer to continue existing practices even if they are less profitable.	0.79
10*.	I hesitate to adopt new technologies due to uncertainty of results.	0.71
III.	Decision Making Ability	
1.	I make timely decisions regarding pruning, irrigation, and harvesting operations.	0.91
2.	I select inputs based on soil condition and crop requirements.	0.74
3.	I analyse cost-benefit aspects before adopting new practices.	0.88
4.	I decide the appropriate time for marketing based on price trends.	0.84
5.	I prioritize farm operations based on urgency and importance.	0.73
6.	I evaluate multiple alternatives before selecting a farming practice.	0.86
7.	I make independent decisions regarding orchard management.	0.89
8*.	I depend on other farmers or middlemen for major farm decisions.	0.72
9*.	I delay important farm decisions affecting crop performance.	0.80
10*.	I face difficulty in selecting appropriate farming practices.	0.69
IV.	Achievement Motivation	
1.	I strive to achieve higher yield per hectare in guava cultivation.	0.92
2.	I aim to improve the quality of fruits to meet market standards.	0.89
3.	I set production and income targets for each season.	0.68
4.	I continuously work to enhance orchard productivity.	0.90
5.	I feel motivated when my farm performance improves over time.	0.85
6.	I compare my performance with progressive farmers.	0.72
7.	I take pride in achieving better results in guava cultivation.	0.84
8*.	I am satisfied with average production levels.	0.78
9*.	I do not set specific goals for my farm.	0.69
10*.	I lack motivation to improve farm performance.	0.71
V.	Management Orientation	
1.	I prepare a seasonal calendar for guava orchard operations.	0.87
2.	I efficiently allocate labour during peak operations like harvesting and pruning.	0.84
3.	I maintain records of input use, yield, and income.	0.91
4.	I monitor orchard performance regularly.	0.71
5.	I manage financial resources effectively for farm activities.	0.74
6.	I coordinate different farm operations systematically.	0.82
7.	I ensure timely execution of all cultivation practices.	0.73
8*.	I find it difficult to organize farm operations efficiently.	0.71
9*.	I do not maintain records of farm activities.	0.86
10*.	I fail to monitor and evaluate farm performance.	0.72
VI.	Market Orientation	
1.	I track price fluctuations in guava markets before selling produce.	0.92
2.	I select marketing channels based on profitability.	0.88
3.	I understand consumer preferences for fruit size, colour, and quality.	0.86
4.	I plan harvesting according to market demand.	0.76
5.	I explore distant or alternative markets for better prices.	0.74
6.	I gather information on market trends from various sources.	0.87

7.	I adjust production practices based on market requirements.	0.73
8*.	I sell produce without considering prevailing market prices.	0.76
9*.	I do not consider consumer preferences while producing guava.	0.65
10*.	I ignore market trends while making selling decisions.	0.72
VII.	Production Orientation	
1.	I focus on maximizing yield through scientific management practices.	0.93
2.	I ensure uniform fruit quality across the orchard.	0.89
3.	I adopt recommended spacing and planting techniques.	0.82
4.	I monitor pest and disease incidence regularly.	0.91
5.	I apply fertilizers based on crop requirements.	0.86
6.	I aim to reduce post-harvest losses.	0.69
7.	I follow timely cultural practices for better productivity.	0.74
8*.	I do not prioritize improving yield levels.	0.79
9*.	I neglect quality aspects of guava production.	0.73
10*.	I rarely monitor crop condition and growth.	0.71
VIII.	Competition Orientation	
1.	I observe cultivation practices of progressive guava farmers.	0.88
2.	I strive to achieve better yield and quality than neighbouring farmers.	0.79
3.	I adopt successful practices observed in other orchards.	0.87
4.	I update my practices to remain competitive in the market.	0.72
5.	I respond to market competition by improving product quality.	0.70
6.	I analyse strengths of other farmers to improve my performance.	0.82
7.	I continuously upgrade my skills to stay competitive.	0.79
8*.	I do not pay attention to practices of other farmers.	0.82
9*.	I am not concerned about competition in guava farming.	0.65
10*.	I do not change my practices despite increasing competition.	0.60
IX.	Value Addition Orientation	
1.	I grade guava fruits according to size and quality before marketing.	0.81
2.	I use proper packaging materials to improve the attractiveness and market value of my guava produce.	0.73
3.	I believe that value addition increases the profitability of guava farming.	0.93
4.	I am willing to invest in value-addition activities such as grading, packaging and processing.	0.89
5.	I explore opportunities to produce value-added guava products such as juice, jam, jelly, pulp, or candy.	0.86
6.	I seek information and training related to value-addition techniques in guava.	0.84
7.	I am interested in branding and labeling my guava products to create a distinct market identity.	0.79
8*.	I do not consider grading and packaging of guava fruits necessary for obtaining better market prices.	0.69
9*.	I am not interested in processing guava into value-added products.	0.74
10*.	I believe that value-addition activities involve unnecessary costs and do not significantly increase farm income.	0.78
X.	Digital Orientation	
1.	I use a smartphone regularly to obtain information related to guava cultivation and management.	0.92
2.	I use mobile applications or online platforms to access market prices of guava.	0.89
3.	I utilize social media platforms to learn about new technologies and market opportunities in guava farming.	0.84
4.	I prefer digital payment methods for agricultural transactions whenever possible.	0.74
5.	I use weather forecast applications or digital advisories to plan farm operations.	0.87
6.	I actively seek agricultural information through digital sources such as websites, YouTube videos, and mobile apps.	0.79
7.	I am willing to adopt new digital tools that can improve the productivity and profitability of my guava enterprise.	0.88
8*.	I find digital technologies too complicated to be useful in guava farming.	0.80
9*.	I do not trust information obtained through mobile applications or online platforms for farm-related decisions.	0.73
10*.	I believe that traditional methods of communication are sufficient and there is no need to use digital tools in guava farming.	0.71

3.4. Reliability and Validity

3.4.1. Reliability

The reliability of the Guava Farmer Entrepreneurial Index (GFEI) was assessed using the test-retest method. The finalized statements were administered to a sample of 30 guava farmers using a five-point continuum scale. After an interval of 15 days, the same instrument was re-administered to the same respondents, yielding two sets of scores. The reliability coefficient was estimated by computing the correlation between the two sets of scores. The obtained correlation coefficient (r) was 0.79, which was significant at the one per cent level. The high and significant correlation indicates a satisfactory degree of stability and consistency of the instrument over time. Hence, the Guava Farmer Entrepreneurial Index (GFEI) was considered

reliable for measuring the entrepreneurial behaviour of guava farmers.

3.4.2. Content Validity

The content validity of the Guava Farmer Entrepreneurial Index (GFEI) was established through an extensive review of relevant literature and consultation with experts in Agricultural Extension, Entrepreneurship and related disciplines. The statements included in the index were designed to adequately represent the identified dimensions of entrepreneurial behaviour among guava farmers. Further, the relevancy analysis conducted by a panel of experts ensured that only the most relevant and appropriate statements were retained in the final instrument. Thus, the developed index was found to possess satisfactory content

validity and was considered suitable for assessing the entrepreneurial behaviour of guava farmers.

3.5. Finalization of Statements

Based on the results of relevancy analysis, content validity assessment, and reliability testing, the final Guava Farmer Entrepreneurial Index (GFEI) was developed. The index consisted of 59 statements representing the ten identified dimensions of entrepreneurial behaviour. The selected

statements were found to be relevant, valid, and reliable for measuring entrepreneurial behaviour among guava farmers. The finalized index provides a comprehensive tool for assessing the entrepreneurial competencies of guava farmers and can be effectively utilized by researchers, extension professionals, and policymakers for entrepreneurship assessment, programme planning and impact evaluation. The dimension-wise list of selected statements is presented in Table 3.

Table 3: Dimension-wise Distribution of Selected Statements for GFEI

S. No.	Statements
I.	Innovativeness
1.	I adopt improved guava varieties such as high-yielding or disease-resistant types.
2.	I implement scientific pruning and training techniques.
3.	I actively seek information on new guava cultivation practices.
4.	I rely only on traditional methods of guava cultivation.
5*.	I am reluctant to adopt new farming technologies.
II.	Risk Orientation
1.	I am willing to invest in high-density planting systems in guava cultivation despite initial uncertainty.
2.	I allocate resources to new guava varieties with potential market demand.
3.	I take financial risks to improve orchard productivity.
4.	I adopt recommended technologies after assessing potential benefits and risks.
5*.	I prefer to continue existing practices even if they are less profitable.
III.	Decision Making Ability
1.	I make timely decisions regarding pruning, irrigation, and harvesting operations.
2.	I analyse cost-benefit aspects before adopting new practices.
3.	I decide the appropriate time for marketing based on price trends.
4.	I evaluate multiple alternatives before selecting a farming practice.
5.	I make independent decisions regarding orchard management.
6*.	I delay important farm decisions affecting crop performance.
IV.	Achievement Motivation
1.	I strive to achieve higher yield per hectare in guava cultivation.
2.	I aim to improve the quality of fruits to meet market standards.
3.	I continuously work to enhance orchard productivity.
4.	I feel motivated when my farm performance improves over time.
5.	I take pride in achieving better results in guava cultivation.
6*.	I am satisfied with average production levels.
V.	Management Orientation
1.	I prepare a seasonal calendar for guava orchard operations.
2.	I efficiently allocate labour during peak operations like harvesting and pruning.
3.	I maintain records of input use, yield and income.
4.	I coordinate different farm operations systematically.
5*.	I do not maintain records of farm activities.
VI.	Market Orientation
1.	I track price fluctuations in guava markets before selling produce.
2.	I select marketing channels based on profitability.
3.	I understand consumer preferences for fruit size, colour and quality.
4.	I plan harvesting according to market demand.
5.	I gather information on market trends from various sources.
6*.	I sell produce without considering prevailing market prices.
VII.	Production Orientation
1.	I adopt recommended spacing and planting techniques.
2.	I ensure uniform fruit quality across the orchard.
3.	I monitor pest and disease incidence regularly.
4.	I apply fertilizers based on crop requirements.
5.	I focus on maximizing yield through scientific management practices.
6*.	I do not prioritize improving yield levels.
VIII.	Competition Orientation
1.	I observe cultivation practices of progressive guava farmers.
2.	I strive to achieve better yield and quality than neighbouring farmers.
3.	I adopt successful practices observed in other orchards.
4.	I analyse strengths of other farmers to improve my performance.
5.	I continuously upgrade my skills to stay competitive.
6*.	I do not pay attention to practices of other farmers.

IX.	Value Addition Orientation
1.	I grade guava fruits according to size and quality before marketing.
2.	I believe that value addition increases the profitability of guava farming.
3.	I am willing to invest in value-addition activities such as grading, packaging and processing.
4.	I explore opportunities to produce value-added guava products such as juice, jam, jelly, pulp, or candy.
5.	I am interested in branding and labeling my guava products to create a distinct market identity.
6.	I seek information and training related to value-addition techniques in guava.
7*.	I believe that value-addition activities involve unnecessary costs and do not significantly increase farm income
X.	Digital Orientation
1.	I use a smartphone regularly to obtain information related to guava cultivation and management.
2.	I use mobile applications or online platforms to access market prices of guava.
3.	I utilize social media platforms to learn about new technologies and market opportunities in guava farming.
4.	I use weather forecast applications or digital advisories to plan farm operations.
5.	I actively seek agricultural information through digital sources such as websites, YouTube videos and mobile apps.
6.	I am willing to adopt new digital tools that can improve the productivity and profitability of my guava enterprise.
7*.	I find digital technologies too complicated to be useful in guava farming.

3.6. Scoring Procedure and Standardization

The finalized Guava Farmer Entrepreneurial Index (GFEI) consisted of 59 statements representing ten dimensions of entrepreneurial behaviour. The responses to each statement were obtained on a five-point continuum, namely Strongly Agree, Agree, Undecided, Disagree, and Strongly Disagree. For positive statements, scores of 5, 4, 3, 2, and 1 were assigned, respectively. For negative statements, the scoring pattern was reversed. The entrepreneurial behaviour score of an individual respondent was obtained by summing the scores of all the statements included in the index.

The maximum possible score and minimum possible score of the index were determined based on the number of statements retained in the final instrument. To facilitate comparison and interpretation, the entrepreneurial behaviour score was converted into an index value using the following formula:

$$\text{GFEI Score} = \frac{\text{Obtained Score}}{\text{Maximum Possible Score}} \times 100$$

The resulting index score represented the level of entrepreneurial behaviour of the respondent. Higher index scores indicated a higher level of entrepreneurial behaviour, whereas lower scores indicated a lower level of entrepreneurial behaviour.

3.7. Application of the Developed Index

The finalized Guava Farmer Entrepreneurial Index (GFEI) was administered to a sample of 60 guava farmers in Ayakudi village of Dindigul district to assess their entrepreneurial behaviour. The responses obtained from the respondents were scored according to the prescribed scoring procedure. The entrepreneurial behaviour scores were computed for each respondent by summing the scores obtained across all the statements included in the index.

The obtained scores were converted into index values and the respondents were classified into low, medium and high entrepreneurial behaviour categories using the mean and standard deviation method. The application of the index under field conditions facilitated the assessment of entrepreneurial behaviour among guava farmers and demonstrated its practical utility in measuring entrepreneurial competencies related to guava cultivation and enterprise management. The distribution of guava farmers according to their entrepreneurial behaviour is presented in Table 4.

Table 4: Distribution of Guava Farmers According to Their Entrepreneurial Behaviour (n = 60)

Category	Frequency	Percentage
Low	13	21.67
Medium	29	48.33
High	18	30.00
Total	60	100.00

The results from the Table 4. and Fig 1. revealed that nearly half of the guava farmers (48.33 per cent) belonged to the medium entrepreneurial behaviour category, followed by 30.00 per cent in the high entrepreneurial behaviour category and 21.67 per cent in the low entrepreneurial behaviour category. The predominance of farmers in the medium category indicates that most respondents possessed a moderate level of entrepreneurial characteristics such as innovativeness, achievement motivation, risk-taking ability, decision-making ability, market orientation, information-seeking behaviour, leadership ability, scientific orientation, economic motivation and digital orientation. This may be attributed to their farming experience, exposure to extension services, access to information sources, and gradual adoption of improved cultivation and marketing practices.

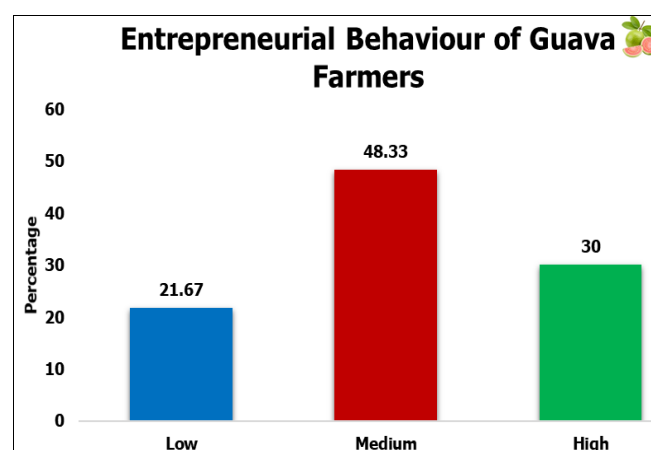


Fig 1: Entrepreneurial Behaviour of Guava Farmers

The presence of 30.00 per cent of respondents in the high entrepreneurial behaviour category suggests that a considerable proportion of guava farmers actively seek new opportunities, adopt innovative technologies, make informed decisions and effectively respond to market

demands. Such farmers can serve as role models and change agents in promoting entrepreneurship among other growers. The respondents with 21.67 per cent were categorized under low entrepreneurial behaviour, indicating the need for targeted interventions to strengthen their entrepreneurial competencies.

Capacity-building programmes, entrepreneurship development training, market intelligence services, digital literacy initiatives, and extension support may help enhance their entrepreneurial behaviour and improve the profitability and sustainability of guava cultivation.

The successful application of the Guava Farmer Entrepreneurial Index (GFEI) among guava farmers in Dindigul district demonstrates its usefulness as a reliable and valid tool for assessing entrepreneurial behaviour under field conditions. The index can be effectively utilized by researchers, extension personnel and policymakers for entrepreneurship assessment, programme planning and impact evaluation.

4. Conclusion

The present study developed and standardized a Guava Farmer Entrepreneurial Index (GFEI) for measuring entrepreneurial behaviour among guava farmers. Through a systematic process involving identification of dimensions, item generation, relevancy analysis, content validation, and reliability testing, a final index comprising 59 statements representing ten dimensions of entrepreneurial behaviour was developed. The reliability coefficient obtained through the test-retest method ($r = 0.79$) indicated satisfactory reliability of the instrument, while expert evaluation established its content validity. The application of the index among 60 guava farmers in Dindigul district demonstrated its practicality and effectiveness in assessing entrepreneurial behaviour. The developed GFEI can therefore be used as a reliable and valid tool for research, extension and policy interventions aimed at promoting entrepreneurship among guava farmers.

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