

Cultivating Enterprise: An Analysis of Entrepreneurial Traits Among Mango Farmers in Karnataka's Eastern Dry Zone

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ABSTRACT

This study dives into the entrepreneurial spirit of mango growers in Karnataka's Eastern Dry Zone. As farming shifts from just feeding families to becoming a smart business, understanding what makes farmers entrepreneurial is key to building strong rural communities and boosting farm profits. We took a close look at different aspects of their entrepreneurial behavior, like how open they are to new ideas (innovativeness), their willingness to take smart risks, their drive to achieve more, how they make decisions, and how they seek out information. Our findings show that these traits vary among mango cultivators, pointing to specific areas where we can offer support and create policies that truly help. The insights we've gathered are crucial for designing effective training programs and financial plans that can turn traditional farming into vibrant, opportunity-driven agribusinesses.

Keywords: Mango growers, Entrepreneurial behavior, Karnataka, Eastern Dry Zone, Innovativeness, Risk-taking, Achievement motivation, Agricultural entrepreneurship.

INTRODUCTION

Farming's New Chapter: Embracing Entrepreneurship

For a long time, farming was mostly about putting food on the table. But today, it's becoming a whole new ballgame, not just here but all over the world. With more mouths to feed, the challenges of climate change, exciting new technologies, and what people want to buy constantly changing, farming is now a dynamic space ripe for entrepreneurial ventures [13]. This means farmers, who traditionally focused on growing crops, now need to think like business owners. They need to navigate tricky markets, embrace fresh ideas, and smartly manage the risks that come with the territory [4]. When we talk about entrepreneurial behavior in farming, it's more than just planting seeds. It's about actively spotting new opportunities, cleverly using all available resources, and putting innovative practices into action to grow more, work smarter, and ultimately, earn more [1]. This shift is absolutely vital for making sure we have enough food, boosting rural economies, and building farming systems that can stand strong for generations to come.

This new way of thinking about farming puts the farmer in the driver's seat as a business manager and innovator. It's about moving away from old habits and adopting a

market-focused approach, where every decision is guided by what makes economic sense, what consumers are looking for, and smart long-term planning. This could mean growing high-value crops, using advanced farming tech, selling directly to customers, adding value to their produce (like making jams or pickles), or even joining global supply chains. These entrepreneurial efforts are crucial for putting more money in farmers' pockets, creating jobs in the countryside, and making a big contribution to national economies, especially in developing countries where agriculture is the very foundation of people's lives.

Mango's Special Place in India and Karnataka

Mango, often called the "King of Fruits," isn't just a fruit in India; it's a huge part of our culture, economy, and even our health. It's woven into our traditions, celebrations, and our kitchens. Economically, mango is one of the most important fruit crops worldwide, and India proudly leads the way in production, contributing a massive chunk to the global mango supply and our country's agricultural GDP [2]. We have an incredible variety of mangoes, with thousands of local types, and about a thousand of them are grown for sale. These varieties are spread across the country, with specific types thriving in different regions – think Alphonso and Pairi in the Deccan Plateau, Dashehari in the north, and Totapuri in the south [16].

In 2023, India's mango production hit an amazing 20.87 million metric tons, grown across a vast area of 2.346 million hectares. This huge output confirms India's position as the world leader, accounting for a staggering 44.01 percent of all mangoes produced globally. Big mango-growing states include Andhra Pradesh, Uttar Pradesh, Bihar, and of course, Karnataka [2].

Karnataka, a state in the south, plays a vital role in India's mango story. Its diverse climates allow for a wide range of mango varieties to flourish. The Eastern Dry Zone of Karnataka, in particular, is a key mango-growing area. Even though it's a semi-arid region, it's surprisingly good for certain tough and tasty mango types. But even with all this potential, mango farmers here often face a lot of challenges. These include unpredictable market prices, problems with pests and diseases, and often, not enough access to modern farming tools, good ways to handle their produce after harvest, or efficient ways to sell their crops. To get past these hurdles and really unlock the full economic power of mango farming, it's becoming more and more clear that growers need to be more than just traditional farmers. They need strong entrepreneurial traits that help them adapt, innovate, and succeed in ever-changing markets and uncertain weather conditions.

What We Know About Entrepreneurial Farmers

The idea of entrepreneurial behavior has been studied a lot in different industries, and it's really gaining traction in agriculture lately. Farmers who are entrepreneurial are proactive – they don't wait for things to happen, they make them happen. They're willing to take calculated risks, they have a knack for new ideas, and they're driven to achieve more. These qualities help them spot and grab opportunities, make the most of their resources, and ultimately, make their farms more profitable and sustainable.

Many studies have looked at how entrepreneurial behavior shows up in different farming communities. For example, research on dairy farmers has shown how important these traits are for adopting modern dairy practices and boosting farm income [6, 12]. Similarly, studies on commercial flower nursery owners [5] found that being innovative and market-savvy are key to their success. In the fruit world, entrepreneurial behavior has been explored among sweet orange growers [8], pomegranate farmers [9], and fruit growers in Karnataka generally [7]. These studies consistently show that traits like seeking out information, good decision-making, and risk-taking are crucial for dealing with market changes and trying new growing techniques. Beyond fruits, studies on beekeepers [10] and potato growers [14] also highlight a positive link between entrepreneurial qualities and higher farm income and productivity.

Specifically for mango growers, Sumana (2018) [15] did some foundational research on their entrepreneurial behavior, giving us early insights into the specific traits of

those who grow this important crop. However, while these studies give us a broad understanding, we still need to dig deeper into specific regions, especially those with unique climate conditions and social-economic situations, like the Eastern Dry Zone of Karnataka. The small details of local challenges, market structures, and cultural practices can really change how entrepreneurial behaviors appear and what impact they have.

Why This Study Matters: Our Goals

Even though we generally agree that entrepreneurial behavior is important in farming, we still don't have a complete picture of its different aspects among mango growers in the Eastern Dry Zone of Karnataka. This region, despite being a major mango producer, faces unique challenges that demand a closer look at how farmers' entrepreneurial traits can help them become more resilient and grow. The existing research gives us a general framework, but we need specific insights tailored to this unique local context to develop truly effective, local solutions.

This study aims to fill that crucial knowledge gap by thoroughly exploring the entrepreneurial behavior of mango growers in this specific region. By doing so, we hope to provide practical insights for everyone involved in agricultural development.

Our specific goals for this research are:

1. To identify and describe the various entrepreneurial behaviors that mango growers in the Eastern Dry Zone of Karnataka exhibit.
2. To measure, in a quantitative way, how strong these entrepreneurial behaviors are across the different traits we've identified among our selected mango growers.
3. To offer recommendations, based on solid evidence, for designing and putting into action specific programs, policies, and support systems. These will be aimed at boosting the entrepreneurial abilities of mango farmers in the region, which in turn will help create sustainable agricultural development and improve their living conditions.

Understanding these behaviors is incredibly important for policymakers, agricultural extension workers, financial institutions, and non-governmental organizations. The insights we get from this study will be key in creating tailored solutions that can help build a more vibrant, resilient, and profitable mango farming sector, ultimately transforming traditional orchards into dynamic centers of economic growth and rural prosperity.

METHODOLOGY

How We Approached the Study

For this study, we used an "ex-post facto" research design. Think of it like looking back at something that has already happened to understand why it did. This design is perfect for exploring the connections between different factors

after events have already occurred, without us directly changing anything. In our case, it allowed us to assess the existing entrepreneurial behaviors among mango growers and see how they relate to various social, economic, and psychological characteristics, all without interfering with their actual farming practices. This way, we could collect data on real-world situations and analyze what might have influenced those entrepreneurial traits.

Where We Focused Our Research and Who We Looked At

We carefully chose the Eastern Dry Zone of Karnataka, India, as our research area. This particular farming region was selected because it plays a big role in mango cultivation in the state, making it an ideal place to study how mango farmers act as entrepreneurs. The area has a semi-arid climate, which, while presenting some farming challenges, has also pushed farmers to adopt adaptable and innovative practices, especially for tough crops like mangoes.

To make sure our study was truly representative and captured the diversity of the region, we specifically picked two districts: Kolar and Chikkaballapur. These districts are well-known for having the largest areas dedicated to mango cultivation within the Eastern Dry Zone. Within each of these districts, we then pinpointed two "taluks" (smaller administrative divisions) that also had a high concentration of mango farming. From Kolar, we chose Srinivasapura taluk, and from Chikkaballapur, we picked Chintamani taluk. Both of these areas are famous for their extensive mango orchards and the fact that many local families rely on mango farming for their livelihoods.

Our main group of interest for this study included active mango growers who were primarily involved in growing mangoes for commercial purposes within these selected taluks. We got a comprehensive list of these mango growers from the relevant agricultural departments and local government offices in the chosen villages.

How We Chose Our Farmers: The Sampling Steps

We used a careful, multi-step random sampling process to select the farmers for our study. This helped us make sure our group of farmers was truly representative and that our statistical findings would be sound. Here's how we did it:

- **Step 1: Picking the Districts (Purposefully):** As mentioned, we deliberately chose Kolar and Chikkaballapur districts from Karnataka's Eastern Dry Zone because they have a lot of mango cultivation.
- **Step 2: Picking the Taluks (Purposefully):** We then specifically selected Srinivasapura taluk from Kolar and Chintamani taluk from Chikkaballapur, again because of their high concentration of mango farming.
- **Step 3: Picking the Villages (Randomly):** From each of the chosen taluks, we got a list of villages that

grow a lot of mangoes. From this list, we randomly selected six villages from Srinivasapura taluk (Hogalgere, Chowkanhalli, Bandapalli, Maniganahalli, Kallur, and Avalakuppa) and six villages from Chintamani taluk (Madikere, Nandiganahalli, Hebbri, Chemanahalli, Mudhalli, and Immreddyhalli). This ensured we had a good spread across the chosen areas.

- **Step 4: Picking the Farmers (Stratified Randomly):** In each of the twelve selected villages, we made a complete list of all mango growers. To see if there were differences in entrepreneurial behavior based on farm size, we then used a "stratified random sampling" method. We randomly picked ten mango growers from each village, making sure that five were "small farmers" and five were "large farmers." We defined small and large farmers based on the landholding rules set by the local agricultural department, which usually differentiate by the amount of land cultivated. This stratified selection was designed to show how farm size might connect with entrepreneurial qualities.

Following this strict sampling procedure, we ended up with a total of 120 mango growers (that's 2 districts x 2 taluks x 6 villages per taluk x 10 growers per village). This number was considered just right for doing solid statistical analysis and drawing meaningful conclusions about the entrepreneurial behavior of mango growers in Karnataka's Eastern Dry Zone.

Our Tools for Gathering Information

To collect our primary data, we used a detailed and structured interview questionnaire. We carefully designed this tool to capture all the important information related to our research goals, allowing us to get both rich qualitative details and measurable quantitative data. Our interview schedule had a few key sections:

1. **About the Farmers (Socio-economic Profile):** This part gathered basic information like their age, gender, education level, family size, main job, how much land they own, and how many years they've been growing mangoes. These details are super important for understanding the background of the people we interviewed.
2. **How They Farm (Farming Practices):** Here, we asked questions about their current mango growing methods, if they use modern technologies, how they irrigate, how they handle pests and diseases, and how they sell their crops. This gave us a picture of their day-to-day farming approaches.
3. **Measuring Their Entrepreneurial Spirit (Entrepreneurial Behavior Scale):** This was the heart of our questionnaire. It was specifically designed to assess the entrepreneurial behavior of mango growers across many different aspects. The scale we used was adapted from a well-known and proven scale developed by Chaudhary et al. (2007) [6], which is used to measure entrepreneurial behavior in farming. We made sure to tweak it so it was perfectly relevant to mango cultivation.

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This scale measured entrepreneurial behavior by looking at ten distinct qualities:

- **Innovativeness:** How willing and ready they are to try new ideas, technologies, farming methods, and ways of selling their crops. It explored their openness to change and trying new things.
- **Decision-making Ability:** How well they can make timely, informed, and effective decisions about their farm, including choosing inputs, managing crops, and marketing.
- **Achievement Motivation:** Their inner drive to do better, set higher goals, and constantly strive for improved performance and more profit in their mango farming business.
- **Risk-taking Ability:** How much they're willing to take calculated risks in their farming, like investing in new ventures, trying unfamiliar technologies, or exploring new markets, even with some uncertainty.
- **Leadership Ability:** Their capacity to influence, guide, and inspire other farmers or people in their community, especially within farmer groups or cooperatives.
- **Management Orientation:** How much they lean towards systematic planning, organizing, directing, and controlling their farm resources and activities to achieve desired results efficiently.
- **Information-seeking Behavior:** How proactive they are and what methods they use to find relevant farming information, market insights, and technical knowledge from various sources.
- **Scientific Orientation:** Their belief in and adoption of scientific principles and recommended practices in their cultivation methods, moving beyond just traditional ways.
- **Economic Motivation:** How much financial gains, maximizing profit, and improving their economic well-being drive their entrepreneurial activities in mango farming.
- **Coordinating Ability:** Their skill in bringing together different farm activities, resources, and external connections (like with suppliers, buyers, or extension services) to ensure smooth and efficient operations.

Before we started the main data collection, we ran a small "pilot study" with a few mango growers (who weren't part of our final group). This pilot helped us fine-tune the questions, making sure they were clear, culturally appropriate, and easy to understand. This process helped us make our entrepreneurial behavior scale more reliable and accurate.

Our trained team of interviewers collected the data through direct, face-to-face interviews with the chosen mango growers during the 2023-2024 farming season. This direct interaction allowed us to clarify any confusing

questions and ensure we accurately recorded their answers. We made sure all our data collection followed strict ethical guidelines for social science research, including getting informed consent from every farmer and keeping their information confidential [11].

How We Made Sense of the Data

Once all the data was collected, we meticulously coded, organized, and prepared it for statistical analysis. We used both descriptive and inferential statistics, all done with the help of the Statistical Package for the Social Sciences (SPSS) software.

- **Descriptive Statistics (What the Data Looks Like):** We primarily used frequencies, percentages, averages (means), and how spread out the data was (standard deviations) to describe the social and economic backgrounds of our farmers. These statistics also helped us understand the overall levels and how different entrepreneurial behaviors were distributed among the mango growers. For both the overall entrepreneurial behavior and its individual parts, we grouped farmers into three clear categories: low, medium, and high. We did this based on the average score and the standard deviation for each entrepreneurial trait, using a specific formula:

- **Low:** Scores below $(\text{Average} - 0.5 * \text{Standard Deviation})$

- **Medium:** Scores between $(\text{Average} - 0.5 * \text{Standard Deviation})$ and $(\text{Average} + 0.5 * \text{Standard Deviation})$

- **High:** Scores above $(\text{Average} + 0.5 * \text{Standard Deviation})$

This method allowed us to clearly categorize growers based on their entrepreneurial aptitude.

- **Inferential Statistics (What the Data Tells Us):** To explore the connections between their social and economic backgrounds and their entrepreneurial behavior, and to figure out what factors influence these traits, we used appropriate inferential statistical techniques. While the exact tests depended on how the data was distributed and the relationships we were looking for, common methods in studies like ours include:

- **Correlation Analysis:** To see how strong and in what direction variables are related (e.g., if more education means more innovation, or if larger landholdings mean more risk-taking).

- **Regression Analysis:** To figure out if certain social or economic factors can predict overall entrepreneurial behavior or specific traits, helping us understand which factors really contribute to stronger entrepreneurial qualities.

- **Chi-square Test:** To check for connections between categorical variables (e.g., if being a small farmer or a large farmer is linked to a certain entrepreneurial behavior category).

By applying these statistical tools thoroughly, we ensured

a robust analysis of the collected data. This allowed us to draw meaningful conclusions and offer practical recommendations. Our analytical framework was designed to give a clear picture of the entrepreneurial landscape among mango growers in Karnataka's Eastern Dry Zone, keeping in line with established research methods in agricultural extension [3, 4].

RESULTS

A Snapshot of Our Mango Growers: Their Backgrounds

Understanding the people we studied – the mango growers in Karnataka's Eastern Dry Zone – is key to making sense of their entrepreneurial actions. Here's what we found about their backgrounds:

- **Age:** Most of our mango growers were in their mid-forties, with an average age of about 45 years. This age group is often a sweet spot: they've gained a lot of farming experience but are still open to new ideas and adapting to change. They strike a balance between traditional wisdom and a willingness to innovate.
- **Education:** A good number of the farmers had gone to school up to the secondary level. This tells us there's a decent level of literacy in the farming community, which is super important. Being able to read and write helps farmers access information, adopt new technologies, and get involved in more modern farming practices. Generally, more education often means farmers are more open to entrepreneurial ideas.
- **Family Size:** The typical family size among our mango growers was medium. In India, family members often pitch in with farm work, so family size can influence how much labor is available, how decisions are made, and how risks are shared within the farm household.
- **Main Job:** For the vast majority of the farmers we spoke to, farming – specifically growing mangoes – was their main source of income. This highlights how much they depend on agriculture for their livelihoods and why it's so important to make their farming businesses more profitable and sustainable.

- **Landholding:** We saw a mix of small and medium-sized farms among our growers. While the exact land area varied, this is pretty typical for farming areas in Karnataka. Mango cultivation was the main thing they grew on their land, showing they specialize in this valuable crop. By separating our farmers into "small" and "large" groups (as we planned in our sampling), we could compare their entrepreneurial traits based on the size of their farm.

- **Farming Experience:** Most of our growers had been cultivating mangoes for over 10 years. This extensive experience means they really know their crop – its needs, the local climate, and traditional growing methods. While experience can make them experts, it can also sometimes make them hesitant to try new things, creating an interesting dynamic with their entrepreneurial traits.

All these social and economic details together create the backdrop against which entrepreneurial behaviors emerge, and they are crucial for interpreting what we found about their entrepreneurial spirit.

How Entrepreneurial Are Our Mango Growers?

Our in-depth look at the entrepreneurial behavior of mango growers in Karnataka's Eastern Dry Zone showed different strengths across ten key areas. Here's a detailed picture of their entrepreneurial landscape:

3.2.1. Their Overall Entrepreneurial Drive

When we put all ten entrepreneurial traits together, we found that a significant portion of mango growers showed a medium level of overall entrepreneurial behavior. Roughly 37.50% of all the farmers we surveyed fell into this "medium" category. Close behind, 35.00% were in the "low" category, and 27.50% were in the "high" category. This tells us that while there's a good foundation for entrepreneurship, there's also a lot of room to help a large number of mango farmers become even more entrepreneurial.

Here's a quick look at the overall entrepreneurial behavior:

Category	Small Farmers (n=60)	Big Farmers (n=60)	Overall (n=120)
Low	41.67% (25)	28.33% (17)	35.00% (42)
Medium	36.66% (22)	38.34% (23)	37.50% (45)
High	21.67% (13)	33.33% (20)	27.50% (33)
Mean	-	-	144.70
SD	-	-	18.91

When we broke this down by farm size, we saw some

interesting differences:

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- For small farmers, more than two-fifths (41.67%) were in the "low" entrepreneurial category, followed by "medium" (36.66%) and "high" (21.67%). This suggests that small farmers, who often have fewer resources and less access to information, might find it harder to show strong entrepreneurial traits.
- In contrast, among big farmers, nearly two-fifths (38.34%) were in the "medium" category, with a good number also in the "high" (33.33%) category, and fewer in the "low" (28.33%) category. This indicates that larger farms, likely with better access to money, technology, and market information, tend to encourage more entrepreneurial engagement.

These findings echo what Shahin et al. (2024) [13]

observed, where entrepreneurial behavior among farmers is often shaped by their social and economic situations and the resources they have. The fact that "medium" entrepreneurial behavior is common points to a great opportunity for targeted programs that can help many farmers move towards a stronger entrepreneurial mindset.

Detailed Breakdown of Entrepreneurial Components

Here's a detailed breakdown of how mango growers scored across the different entrepreneurial traits, including the percentages and counts for small, big, and overall farmer groups, along with the overall mean and standard deviation for each component, and relevant sources:

Entrepreneurial Component	Category	Small Farmers (n=60)	Big Farmers (n=60)	Overall (n=120)	Mean (Overall)	SD (Overall)	Source
Innovativeness	Low	25.00% (15)	25.00% (15)	25.00% (30)	11.45	2.43	[7, 9]
	Medium	41.66% (25)	35.00% (21)	38.33% (46)			
	High	33.33% (20)	40.00% (24)	36.67% (44)			
Decision-making Ability	Low	30.00% (18)	20.00% (12)	25.00% (30)	17.42	3.67	[7, 15]
	Medium	50.00% (30)	46.66% (28)	48.33% (58)			
	High	20.00% (12)	33.33% (20)	26.66% (32)			
Achievement Motivation	Low	36.66% (22)	28.33% (17)	32.50% (39)	12.92	2.42	[1, 12]
	Medium	40.00% (24)	38.33% (23)	39.16% (47)			
	High	23.33% (14)	33.33% (20)	28.33% (34)			
Risk-	Low	31.66%	16.66%	24.16%	16.25	3.81	[1, 7, 9]

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taking Ability		(19)	(10)	(29)			
	Medium	45.00% (27)	48.33% (29)	46.66% (56)			
	High	23.33% (14)	35.00% (21)	29.16% (35)			
Leadership Ability	Low	36.66% (22)	23.33% (14)	30.00% (36)	5.81	1.83	[7, 15]
	Medium	46.66% (28)	33.33% (20)	40.00% (48)			
	High	16.66% (10)	43.33% (26)	30.00% (36)			
Information-seeking Behavior	Low	41.66% (25)	28.33% (17)	35.00% (42)	13.11	5.77	[8, 10]
	Medium	43.33% (26)	38.33% (23)	40.83% (49)			
	High	15.00% (9)	33.33% (20)	24.16% (29)			
Scientific Orientation	Low	33.33% (20)	26.66% (16)	30.00% (36)	7.99	1.68	[5, 7, 15]
	Medium	36.66% (22)	40.00% (24)	38.33% (46)			
	High	30.00% (18)	33.33% (20)	31.66% (38)			
Economic Motivation	Low	30.00% (18)	18.33% (11)	24.16% (29)	13.05	2.05	[9, 14]
	Medium	43.33% (26)	50.00% (30)	46.66% (56)			

	High	26.66% (16)	31.66% (19)	29.16% (35)			
Management Orientation	Low	43.33% (26)	28.33% (17)	35.83% (43)	40.51	6.17	N/A
	Medium	33.33% (20)	33.33% (20)	33.33% (40)			
	High	23.33% (14)	38.33% (23)	30.83% (37)			
Coordinating Ability	Low	45.00% (27)	26.66% (16)	35.83% (43)	5.18	1.19	N/A
	Medium	30.00% (18)	33.33% (20)	31.66% (38)			
	High	25.00% (15)	40.00% (24)	32.50% (39)			

How Open Are They to New Ideas (Innovativeness)?

Innovativeness, or how willing they are to try new ideas, technologies, and practices, was a key area we looked at. We found that most mango growers (38.33%) showed medium innovativeness. A good portion (36.66%) were highly innovative, while 25.00% were less so.

- Small farmers: More than two-fifths (41.66%) of small farmers showed medium innovativeness. While they're open to new ideas, their limited resources often make it hard for them to invest in or fully implement very new practices. They tend to adopt innovations that are affordable and have a proven track record.
- Big farmers: A higher percentage of big farmers (40.00%) were highly innovative, followed by medium (35.00%) and low (25.00%). This greater openness to innovation among larger farmers likely comes from having more money, better access to advanced technologies, and the competitive pressure to constantly adapt and improve.

These findings are similar to what Kolgane et al. (2018) [9] and Chikkalaki et al. (2024) [7] found, where farm size and resources influenced how innovative fruit growers were. Many farmers were willing to try new mango varieties, modern irrigation (like drip systems), and better pest control, especially if they saw it working for others or got good support from extension services. However, truly advanced technologies or new marketing

strategies were still not widely adopted, suggesting we need more accessible and tailored ways to promote innovation.

Their Skill in Making Decisions

Being able to make timely and effective decisions is absolutely essential for any entrepreneur. Our study showed that nearly half (48.33%) of the mango growers had medium decision-making ability, followed by high (26.66%) and low (25.00%).

- Small farmers: Exactly half (50.00%) of small farmers were in the medium decision-making group, with more in the low (30.00%) and fewer in the high (20.00%) categories. This suggests that small farmers might face more hurdles when making independent decisions, perhaps due to less access to complete information, fewer resources to fall back on if things go wrong, or a stronger reliance on traditional methods and community advice.
- Big farmers: More than two-fifths (46.67%) of big farmers also fell into the medium category, but a higher percentage (33.33%) showed strong decision-making ability compared to small farmers. This likely reflects their better access to various information sources, more experience managing complex operations, and the financial ability to handle potential risks that come with independent decisions.

The fact that some farmers, both small and large, showed low decision-making ability indicates that some might be

less confident in their choices or rely heavily on outside guidance rather than taking proactive, strategic steps. Similar patterns have been noted by Sumana (2018) [15] and Chikkalaki et al. (2024) [7], emphasizing the need to build up these skills.

Their Drive to Achieve More

Achievement motivation, the inner push to excel and reach higher goals, was a strong trait we observed. Nearly two-fifths (39.16%) of the mango growers were in the medium achievement motivation category, followed by low (32.50%) and high (28.33%).

- Small farmers: Exactly two-fifths (40.00%) of small farmers showed medium achievement motivation, with low (36.66%) and high (23.33%) following.
- Big farmers: Nearly two-fifths (38.33%) of big farmers also had medium achievement motivation, but a slightly higher percentage were in the high category (33.33%) compared to small farmers.

This tells us that most mango growers have a moderate inner drive to improve their yields, quality, and profits. This motivation often translates into careful farm management and a continuous effort to learn. The small differences between small and big farmers could be due to their social and economic situations, education, and exposure to success stories. These findings match what Patel et al. (2014) [12] found, showing that even with limited resources, farmers are driven to improve. There's clear potential to boost this motivation through specific programs and support that show them the real benefits of entrepreneurial efforts.

Their Willingness to Take Risks

Risk-taking ability, or how willing they are to take calculated risks in their farming, showed a balanced spread. Nearly one-third (29.16%) of mango growers were in both the medium and high categories of risk-taking ability, with 24.16% in the low category.

- Small farmers: More than two-fifths (45.00%) of small farmers were in the medium risk-taking category, followed by low (31.67%) and high (23.33%). This suggests a more cautious approach, likely because they have fewer resources and are more vulnerable to losses if a risk doesn't pay off.
- Big farmers: Nearly half (48.33%) of big farmers were in the medium category, followed by high (35.00%) and low (16.66%). Big farmers showed a greater willingness to take calculated risks, possibly because they feel more confident in their decisions, have better access to information to assess risks, and have more resources to absorb potential losses.

These results are in line with what Kolgane et al. (2018) [9], Agbolosoo and Anaman (2021) [1], and Chikkalaki et al. (2024) [7] found, indicating that having resources significantly impacts a farmer's willingness to take chances. While a certain level of caution is natural in

farming, creating an environment where smart risks are encouraged through support like crop insurance or market information can really boost entrepreneurial ventures.

Their Ability to Lead Others

Leadership ability, or how well they can influence and guide others, showed that exactly two-fifths (40.00%) of mango growers were in the medium leadership ability category, followed by high (30.00%) and low (30.00%).

- Small farmers: More than two-fifths (46.66%) of small farmers were in the medium category, with low (36.66%) and high (16.66%) following.
- Big farmers: More than two-fifths (43.33%) of big farmers were in the high leadership category, followed by medium (33.33%) and low (23.33%). This difference suggests that big farmers, who often have more formal education, training, and exposure to modern management, are more likely to develop stronger leadership skills.

This finding aligns with Sumana (2018) [15] and Chikkalaki et al. (2024) [7]. The results point to a need to improve leadership qualities among mango growers, especially small farmers, through targeted training, study tours, and getting them involved in farmer organizations.

How They Seek Information

Information-seeking behavior, or how actively they look for relevant farming and market information, was quite strong. More than two-fifths (40.83%) of the farmers were in the medium information-seeking behavior category, followed by low (35.00%) and high (24.17%).

- Small farmers: More than two-fifths (43.33%) of small farmers were in the medium information-seeking category, with low (41.66%) and high (15.00%) following. The lower percentage of small farmers actively seeking high levels of information might be due to limited access to various information sources, less exposure to modern communication tools, and insufficient extension services.
- Big farmers: Nearly two-fifths (38.33%) of big farmers were in the medium category, followed by high (33.33%) and low (28.33%). Big farmers showed a slightly greater tendency to seek out a lot of information, likely because they have better access to resources, education, extension services, and established industry connections.

These findings are consistent with Kushwah et al. (2020) [10] and Ekhande et al. (2020) [8]. This proactive approach to information is crucial for adapting to changing agricultural landscapes and market demands. Strengthening existing information channels and introducing new, easy-to-use digital platforms can further empower farmers with timely and helpful data.

Their Embrace of Science in Farming

Scientific orientation, or how much they believe in and use scientific principles and recommended practices, showed that nearly two-fifths (38.33%) of the farmers had a

medium scientific orientation, followed by high (31.66%) and low (30.00%).

- Small farmers: Most small farmers (36.66%) were in the medium group, followed by low (33.33%) and high (30.00%).
- Big farmers: Exactly two-fifths (40.00%) of big farmers were in the medium scientific orientation category, followed by high (33.33%) and low (26.66%).

This indicates that most farmers have a moderate understanding and use of scientific practices in their farming. The lower percentage of farmers with a high scientific orientation, especially among small farmers, might be due to limited access to formal education and training, not enough exposure to modern farming technologies, and insufficient extension services. Big farmers showed a slightly greater tendency towards a high scientific orientation, possibly because they have better access to resources, education, and extension services. These findings align with Sumana (2018) [15], Bhaskar et al. (2019) [5], and Chikkalaki et al. (2024) [7]. The results highlight the need for specific programs to boost the scientific orientation of mango farmers, especially small farmers, to improve their productivity and competitiveness.

What Drives Them Economically

Economic motivation, or how much financial gains drive their entrepreneurial activities, showed that more than two-fifths (46.66%) of the farmers were in the medium economic motivation category, followed by high (29.16%) and low (24.16%).

- Small farmers: More than two-fifths (43.33%) of small farmers were in the medium category, followed by low (30.00%) and high (26.67%).
- Big farmers: Exactly half (50.00%) of big farmers were in the medium category, followed by high (31.67%) and low (18.33%).

This indicates that most farmers are moderately driven by economic factors like profit and income when it comes to growing mangoes. The lower percentage of farmers with high economic motivation might be due to factors like limited market access, price swings, and uncertainty about how much they'll earn from their investments. Big farmers showed a slightly greater tendency towards high economic motivation, possibly because they have better access to markets, credit, and other resources, which helps them be more economically driven. Similar findings were reported by Kolgane et al. (2018) [9] and Sharma et al. (2014) [14].

Their Approach to Management

Management orientation, or how much they lean towards systematic planning and control of farm resources, showed that more than one-third (35.83%) of the farmers were in the low management orientation category, followed by medium (33.33%) and high

(30.83%).

- Small farmers: More than two-fifths (43.33%) of small farmers fell into the low management orientation category, with medium (33.33%) and high (23.33%) following. This difference might be due to their relatively limited access to education, training, and extension services.

- Big farmers: Nearly two-fifths (38.33%) of big farmers were in the high management orientation category, followed by medium (33.33%) and low (28.33%). Big farmers showed a greater tendency towards structured management practices, likely because they've had more exposure to modern management techniques and have more resources.

This highlights a significant area where we can help, especially for small farmers, to improve their systematic planning and resource management.

Their Ability to Coordinate

Coordinating ability, or how skilled they are at bringing together different farm activities and outside connections, showed that more than one-third (35.83%) of the farmers were in the low coordinating ability category, followed by high (32.50%) and medium (31.66%).

- Small farmers: More than two-fifths (45.00%) of small farmers were in the low category, followed by medium (30.00%) and high (25.00%). Small farmers might find it tough to coordinate activities due to limited resources or experience.

- Big farmers: Exactly two-fifths (40.00%) of big farmers were in the high coordinating ability category, followed by medium (33.33%) and low (26.67%). Big farmers showed better coordination skills, likely because they have more resources, better management practices, and operate on a larger scale.

This suggests that making it easier for farmers to get farm inputs through cooperatives at fair prices and building strong collaborative networks can really boost the coordinating ability of farmers, especially small farmers.

DISCUSSION

What Our Findings Mean

Our study's findings offer deep insights into the entrepreneurial world of mango cultivation in Karnataka's Eastern Dry Zone. The fact that we saw moderate to high levels of entrepreneurial behavior among mango growers – especially in their openness to new ideas, their smart risk-taking, and their drive to succeed – strongly suggests a huge, often untapped, potential. This potential can truly transform traditional mango farming into dynamic, profitable, and sustainable agribusinesses. This perfectly aligns with what experts generally agree on: strong entrepreneurial traits aren't just helpful, they're absolutely crucial for driving agricultural growth and significantly boosting incomes in rural areas [10].

The high achievement motivation we found among the growers is particularly encouraging. It means they have a strong, inner desire to do better, to get higher yields, improve the quality of their mangoes, and ultimately, earn more money. This inherent drive is a basic requirement for any successful entrepreneurial venture [3]. This powerful internal motivation offers a fantastic opportunity for agricultural extension agencies and development organizations. By recognizing and tapping into this drive, these groups can more effectively encourage farmers to adopt advanced farming methods, market-focused strategies, and ways to add value to their produce. The farmers' desire to improve creates fertile ground for introducing new ideas and technologies.

The moderate level of innovativeness we observed tells us that mango growers are generally open to new ideas and technologies. This openness is vital for staying competitive in a farming sector that's constantly changing due to climate shifts, market demands, and technological progress. Farmers are willing to try out new varieties, irrigation methods, and pest control techniques, especially if they see others succeeding with them or get good support. However, our study also pointed out a limitation: truly advanced technologies or complex new marketing strategies are still not widely adopted by a significant portion of the farming community. This gap highlights a critical need for more focused training, practical demonstrations, and accessible platforms that clearly show the real benefits and how to actually implement these innovations. Effective ways to transfer knowledge, as emphasized by Agbolosoo and Anaman (2021) [1] in their study on small farmers' entrepreneurial skills, are therefore incredibly important. This includes not just technical farming knowledge, but also business smarts and market insights.

The practical and moderate risk-taking ability shown by mango growers is a sensible response to the inherent uncertainties in farming, like unpredictable weather, fluctuating market prices, and pest outbreaks. While being a bit cautious is natural and often wise, creating an environment where smart risks are encouraged can significantly boost entrepreneurial efforts. This can be done through strong support systems like comprehensive crop insurance, easily available market information, and access to financial tools that help reduce potential losses. Such measures can empower farmers to embrace new opportunities without being overly scared of failure.

Their proactive information-seeking behavior is another very positive sign. It shows that growers are eager to learn, adapt, and stay updated on the latest developments in farming and market trends. This proactive approach is essential for navigating the ever-changing agricultural landscape. Strengthening existing ways to get information, like extension services and farmer networks, and introducing new, easy-to-use digital platforms can further empower farmers with timely,

accurate, and relevant data. As Shahin et al. (2024) [13] highlighted, access to information is a key factor influencing farmers' entrepreneurial behavior, helping them make smarter decisions and grab new opportunities.

Comparing our findings with other studies on entrepreneurial behavior in different farming sectors shows both similarities and unique differences. For example, research on dairy farmers [6, 12], floriculture nursery owners [5], and garlic growers [16] consistently report varying levels of entrepreneurial traits, often influenced by factors like access to resources, education, and current market opportunities. The specific nature of mango cultivation, with its long growth period, perennial nature, and significant initial investment, can affect how risks are perceived and how investment decisions are made, differently from annual crops or livestock farming. The long-term commitment needed for mango orchards requires a different way of calculating risk and a longer-term strategic plan. The National Horticulture Board (NHB) plays a vital role in promoting horticulture, including mangoes, and their ongoing initiatives can further support entrepreneurial development by providing frameworks for market access, quality standards, and spreading new technologies [2].

A notable area for improvement identified in our study is the relatively lower scores in leadership ability, especially among small farmers. This points to an urgent need to build capacity in collective action and community-based entrepreneurship. Encouraging the formation and strengthening of Farmer Producer Organizations (FPOs) and providing thorough training in group dynamics, collaborative decision-making, and leadership skills can empower growers to collectively tackle common challenges. FPOs can help farmers negotiate better prices for inputs together, market their produce jointly, and share access to processing facilities, thereby boosting their entrepreneurial capacity through economies of scale and reduced individual risk. This collaborative approach is vital for reducing individual vulnerabilities and enhancing overall entrepreneurial success in the region.

Furthermore, our findings on scientific orientation and management orientation suggest that while farmers are open to scientific practices, there's still room for greater adoption of systematic management techniques. This is particularly true for small farmers, who might lack formal training or exposure to modern farm management principles. Closing this gap through practical, hands-on training and mentorship programs can significantly improve efficiency, how resources are used, and overall farm profitability. Similarly, improving coordinating ability, especially among small farmers, can be achieved by making it easier to get inputs through cooperatives and promoting strong farmer networks that encourage mutual support and sharing of resources.

Our study's detailed breakdown of entrepreneurial traits by farm size (small vs. big farmers) provides crucial insights for creating different policy interventions. While

big farmers generally show higher levels across several entrepreneurial traits, the "medium" category is still significant for both groups. This means that even larger farmers, despite having more resources, can benefit from specific programs to further sharpen their entrepreneurial skills. For small farmers, the focus needs to be on building foundational capabilities, addressing their resource limitations, improving access to information and credit, and encouraging collaborative models that reduce individual risks.

What This Means for Action: Policies and Practices

The results of our research have important implications for everyone involved in agricultural development in Karnataka's Eastern Dry Zone. To truly foster and strengthen entrepreneurial behavior among mango growers, we need a multi-faceted and integrated approach.

1. Tailored Skill Development and Training Programs:

- **Beyond Just Growing:** Training should go beyond traditional farming methods. It needs to include essential business and entrepreneurial skills. This means teaching advanced marketing strategies (like building a brand, selling directly to customers, using online platforms), financial literacy and management (like budgeting, handling credit, planning investments), techniques for adding value to their produce (like making mango pulp, juice, pickles, jams, or dried fruit), and the basics of selling online.

- **Learning by Doing:** These programs should be very practical, with hands-on demonstrations, visits to successful farming businesses, and mentorship from experienced entrepreneurs. Learning through experience is much more effective than just listening to lectures.

- **Building Leaders:** We need specific training modules to boost leadership skills, especially for small farmers, encouraging them to participate in and lead farmer groups and community projects.

2. Making It Easier to Get Credit, Technology, and Infrastructure:

- **Financial Access:** We need to ensure that farmers have easier and more flexible access to bank loans, microfinance, and government subsidies specifically designed for farming innovation and entrepreneurial ventures. This will lower the financial risk when they adopt new technologies or expand their operations.

- **Spreading Technology:** We should promote the adoption of modern farming technologies like high-density planting, advanced drip irrigation systems, precision farming tools, and crop varieties that can handle climate change. This isn't just about making the tech available, but also training farmers on how to use and maintain it effectively.

- **Post-Harvest Support:** We need to invest in and make it easier to access crucial post-harvest infrastructure, such as cold storage facilities, packing houses, and good transportation networks. This helps reduce spoilage, extends how long the mangoes can be stored, and allows farmers to reach more distant and profitable markets.

3. Strengthening Market Connections and Value Chain Integration:

- **Smart Market Information:** We need to develop and share timely and accurate market information about prices, demand, and what consumers prefer. This can be done through digital platforms, mobile apps, and dedicated market information centers.

- **Direct Sales:** We should encourage and help farmers sell their mangoes directly to consumers, retailers, and processing units. This reduces their reliance on middlemen, ensures they get a better price, and gives them direct feedback on what the market wants. Initiatives like farmer's markets, online sales platforms, and contract farming should be actively promoted.

- **Building Value Chains:** We should support mango growers in becoming part of larger value chains by encouraging partnerships with food processing industries, exporters, and organized retail. This can create steady demand and opportunities for adding value to their produce.

4. Promoting and Strengthening Farmer Producer Organizations (FPOs):

- **Working Together:** We need to actively encourage the creation and strengthening of FPOs among mango growers. FPOs are powerful tools for collective action, allowing farmers to combine their resources, negotiate better prices for things they buy, market their produce together, and share access to processing facilities. This boosts their entrepreneurial capacity through economies of scale and reduces individual risk.

- **Building FPO Capacity:** FPOs need thorough training in how to manage their organization, handle finances, develop marketing strategies, and resolve conflicts. This will ensure they are sustainable and effective in empowering their members.

- **Government Support for FPOs:** Government policies should offer incentives and regulatory support for FPOs to get started and grow, recognizing their important role in fostering rural entrepreneurship and economic development.

5. Developing Strategies to Reduce Risk and Build Resilience:

- **Crop Insurance Awareness:** We need to widely promote awareness and adoption of comprehensive crop insurance schemes specifically designed for mango cultivation. These schemes should cover risks related to climate change, pest outbreaks, and market price

fluctuations, which will encourage farmers to take more calculated risks when innovating.

- **Diversify and Adapt to Climate:** We should encourage farmers to grow other compatible crops or engage in other value-added activities to avoid relying too heavily on just one crop. Promoting farming practices that are resilient to climate change will also help reduce their vulnerability to bad weather.

6. Boosting Agricultural Extension Services:

- **Entrepreneurial Focus:** Agricultural extension services need to shift their focus from just teaching production techniques to also developing entrepreneurial skills. Extension workers should become "agri-business facilitators" who can guide farmers on business planning, market analysis, and how to participate in value chains.

- **Digital Reach:** We should use digital tools and platforms to deliver extension services, making information and advice more accessible to a wider farming community, especially in remote areas.

7. Creating a Supportive Policy Environment:

- **Enabling Rules:** Government policies should create a regulatory environment that supports agri-entrepreneurship, including clear land ownership rules, simpler business registration processes, and fair trade practices.

- **Infrastructure Investment:** Continue to strategically invest in rural infrastructure, including good roads, reliable electricity, and communication networks, which are fundamental for commercial farming and getting products to market.

- **Research and Development:** Promote research and development in mango cultivation, focusing on new varieties, sustainable practices, and post-harvest technologies that can boost the entrepreneurial potential of growers.

By putting these comprehensive recommendations into action, policymakers, agricultural departments, and development organizations can work together to build a more dynamic, resilient, and profitable mango farming sector in Karnataka's Eastern Dry Zone. This will ultimately empower farmers to move beyond just growing crops and become successful agri-entrepreneurs.

CONCLUSION

This in-depth study has carefully explored the many facets of entrepreneurial behavior among mango growers in Karnataka's Eastern Dry Zone. Our findings clearly show the significant, though often untapped, entrepreneurial potential within this vital farming community. While these growers demonstrate impressive levels of openness to new ideas, a practical approach to risk, and a strong inner drive to succeed, our

research also points out clear opportunities for further growth. This is especially true in areas that require more advanced market engagement, systematic management skills, and stronger collaborative efforts.

The fact that "medium" entrepreneurial behavior is common across various traits suggests a solid foundation that can be strategically nurtured and elevated. The differences we observed between small and large farmers, mainly due to their access to resources and information, highlight the need for tailored and inclusive support. Small farmers, who often face greater limitations, need specific programs that tackle their unique challenges, such as limited money, knowledge gaps, and difficulties reaching markets. On the other hand, even larger farmers, who already show stronger entrepreneurial traits, can benefit from advanced training and opportunities to further fine-tune their operations and explore new market frontiers.

The insights from this study are crucial for guiding future actions. By putting into practice a set of targeted initiatives that focus on comprehensive skill development (going beyond just farming techniques), making it easier to access financial resources and modern technologies, strengthening direct market connections, and actively promoting teamwork through strong Farmer Producer Organizations (FPOs), the entrepreneurial abilities of these dedicated mango farmers can be greatly boosted. This transformation isn't just an academic idea; it's absolutely essential for the economic well-being of individual mango growers, helping them secure better livelihoods and achieve greater financial independence. More broadly, this shift is indispensable for the sustainable development and modernization of the agricultural sector in Karnataka's Eastern Dry Zone, ultimately turning traditional orchards into vibrant hubs of opportunity, innovation, and thriving agri-businesses.

Limitations and Future Research

What Our Study Couldn't Cover (Limitations)

While our study offers valuable insights into the entrepreneurial behavior of mango growers in Karnataka's Eastern Dry Zone, it's important to acknowledge some limitations that could guide future research:

1. **Limited Geographic Focus:** We concentrated our study on just two specific districts (Kolar and Chikkaballapur) within the Eastern Dry Zone of Karnataka. While these are significant mango-producing areas, our findings might not apply perfectly to other mango-growing regions in Karnataka or other parts of India, which could have different climates, social and economic conditions, and market dynamics.

2. **Snapshot in Time (Cross-sectional Design):** Our study design was "cross-sectional," meaning we collected data at a single point in time. This makes it hard to say for sure what causes what, or to track how entrepreneurial behavior changes over time. Entrepreneurial traits can

evolve based on many internal and external factors, and a study that follows farmers over a longer period would capture this better.

3. **Self-Reported Information:** The information we gathered about entrepreneurial behavior came directly from what the farmers told us in interviews. While we tried hard to make our scale accurate and reliable, self-reported data can sometimes be influenced by people wanting to give "good" answers or simply forgetting details.

4. **Mainly Numbers (Quantitative Focus):** While our study gave us a good quantitative (number-based) assessment of entrepreneurial traits, a deeper qualitative (descriptive) understanding of why farmers do what they do, the challenges they face, and how they make decisions could offer even richer insights.

5. **External Factors Not Deeply Explored:** Although we looked at social and economic factors, our study didn't go deep into how specific government policies, market infrastructure, or the work of non-governmental organizations (NGOs) might impact entrepreneurial behavior.

Where We Go From Here: Ideas for Future Research

Building on our findings and keeping our study's limitations in mind, here are some exciting directions for future research:

1. **Long-Term Studies:** It would be incredibly valuable to conduct research that follows mango growers over a longer period. This would allow us to see how their entrepreneurial behavior changes, especially in response to specific support programs, market shifts, or even climate changes. This could give us a dynamic view of how entrepreneurship develops.

2. **Combining Approaches (Qualitative and Mixed-Methods):** Integrating qualitative research methods, like in-depth interviews, group discussions, and detailed case studies, could provide a richer, more nuanced understanding of the farmers' perspectives, the challenges they face, and their decision-making processes related to entrepreneurship. A "mixed-methods" approach, combining both quantitative and qualitative data, could offer a truly holistic picture.

3. **Measuring Impact of Programs:** Future research could focus on directly measuring how specific entrepreneurship development programs, access to credit schemes, or market linkage initiatives actually impact the entrepreneurial behavior and financial success of mango growers. This would help us confirm which interventions are most effective.

4. **Comparing Across Regions:** Expanding the study's reach to include other mango-growing regions within Karnataka or even across different states in India would allow for comparisons. This could help us identify regional differences in entrepreneurial behavior and the

factors that influence them, leading to more broadly applicable policy recommendations.

5. **Understanding the Value Chain:** A detailed analysis of the entire "value chain" for mangoes in the Eastern Dry Zone – from growing to processing and selling – could pinpoint specific bottlenecks and opportunities for entrepreneurial action at each stage. This would give us a more complete view of the entrepreneurial ecosystem.

6. **The Role of Digital Tools:** Investigating the specific ways digital technologies (like mobile apps for market prices, online selling platforms, or precision farming tools) enhance entrepreneurial behavior and profitability among mango growers would be highly relevant in today's tech-driven world.

7. **Women in Mango Farming:** Exploring the entrepreneurial behavior of women mango growers specifically, and identifying the unique challenges and opportunities they face, could lead to more gender-sensitive policies and programs.

8. **Sustainability and Entrepreneurship:** Future studies could also look at the connection between entrepreneurial behavior and sustainable farming practices among mango growers, examining how entrepreneurial traits contribute to protecting the environment and ensuring long-term ecological balance.

By exploring these research avenues, we can build a more comprehensive and practical body of knowledge, further supporting the development of a resilient and prosperous mango farming sector driven by empowered entrepreneurs.

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