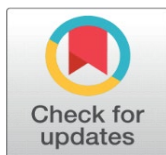


COFFEE VALUE CHAIN ANALYSIS: A STUDY OF ARAKU AND PADERU REGIONS IN ANDHRA PRADESH

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ABSTRACT

This study investigates the factors influencing coffee farmers' decisions regarding their membership in Farmer Producer Organizations (FPOs) and their selling patterns based on landholding size. Using chi-square tests, the researcher analyses the relationship between income groups and FPO membership and the associations between landholding sizes and the selling channels and buyers for coffee produce. The findings reveal no statistically strong correlation between levels of income and FPO membership, implying that farmers' actions may be influenced by other variables to join FPOs. In contrast, a robust correlation was found between landholding size and both the market channels utilized for selling produce and the choice of buyers. Smaller farmers typically favored selling to village aggregators and local traders, while larger landholders tended to engage with FPOs and contract buyers. These insights highlight the importance of considering landholding size in understanding market behavior among coffee farmers and encourage further investigation into the underlying factors influencing selling patterns.

Keywords: Coffee Farmers, Farmer Producer Organizations (FPOs), Landholding size, selling channels, Market Access, and Buyer preferences

1. INTRODUCTION

One of the most popular drinks in the world, coffee has become a major economic commodity that supports millions of people's livelihoods. With origins tracing back to the *Coffea* genus, which includes more than 500 genera and 6,000 species, coffee's commercial production and consumption had mostly been focused on two species—*Coffea Arabica* and *Coffea Canephora* (commonly known as Robusta). From its early cultivation in Ethiopia to its global reach, coffee has shaped not only the economic landscapes of producing countries but also social and cultural identities worldwide.

The coffee value chain is complex and involves numerous stakeholders from production to consumption, including smallholder farmers, processors, traders, exporters, roasters, and consumers. In recent years, The world market for coffee has grown significantly, with consumption reaching an estimated 167.58 million bags by 2022, and production

reaching approximately 174.83 million bags in the 2021-2022 coffee year, according to the International Coffee Organization (ICO). Brazil, Vietnam, Colombia, and Indonesia dominate the production landscape, but countries across Africa, Asia, and Central America also contribute significantly.

While Arabica and Robusta dominate the global coffee market, their distinct characteristics and cultivation requirements have contributed to the diverse nature of the coffee value chain. Arabica coffee, with its delicate flavor profile and aromatic qualities, is preferred by many consumers and commands a premium price. However, its cultivation is labor-intensive and costly, often limited to high-altitude regions with specific climatic conditions. These challenges make Arabica producers, especially smallholder farmers, vulnerable to price volatility, climate change, and diseases such as coffee leaf rust. As a result, many coffee-growing regions face ongoing challenges in maintaining sustainable production levels.

On the other hand, Robusta coffee, known for its robustness, resilience, and higher caffeine content, is primarily used in mass-market products such as instant coffee and blends. Robusta's ability to thrive in lower altitudes and warmer climates, coupled with its resistance to diseases, makes it a more affordable and stable option for coffee producers. As a result, Robusta has gained popularity in emerging coffee markets, and in recent years, its cultivation has expanded significantly, particularly in Vietnam and Brazil. Despite its lower market value compared to Arabica, Robusta is essential to the world's coffee industry, offering producers a viable alternative to more fragile Arabica crops.

With an emphasis on important elements like production, processing, distribution, and marketing, this study attempts to examine the coffee value chain. It also examines the challenges faced by coffee producers, such as fluctuating market prices, environmental impacts, and obstacles to accessing fair markets. The impact of new technology and the growth of specialty coffee, and sustainable production practices are also explored to understand how they impact the overall value chain.

By offering a thorough examination of the coffee value chain, this paper seeks to highlight areas for improvement in terms of economic efficiency, sustainability, and equitable value distribution among stakeholders, particularly smallholder farmers who are critical to global coffee production.

2. LITERATURE REVIEW

The coffee sector in Karnataka has faced increasing labor shortages, impacting production efficiency and profitability, particularly for medium and large plantations. Labor scarcity, compounded by rising agricultural wages, has led to yield reductions and threatens the long-term sustainability of the sector. The dependence on manual labor, especially in Arabica coffee cultivation, exacerbates this issue, with small plantations often relying on family labor to mitigate the effects. Mechanization offers limited potential because of the characteristics of coffee production in the region. Efforts to address labor shortages through incentives and sourcing from surplus areas are essential for sustaining coffee farming. (Akarsha et al., 2009)

Cash crop markets in developing countries often exhibit concentrated buyer power at various points in the supply chain. Small-scale coffee farmers typically sell their produce to middlemen, who then sell it to exporters, often foreign multinationals holding significant monopsony power. Pricing behavior is examined in this research and welfare is under different market power dynamics. The results indicate that a stronger exporter could potentially benefit producers, as it may lead to better prices. Moreover, the presence of stronger exporters might result in higher overall welfare for the producer country, despite the concentrated buyer power. (Bjorvatn et al., 2015)

Despite the increasing domestic consumption of coffee, Indian coffee growers have struggled to expand exports, especially before economic reforms in 1991. The introduction of economic liberalization and India's membership in the WTO significantly boosted the export potential, aligning the industry with global trade norms (Adhikary & Maity, 2011)

The concept of demand chain management (DCM) and its role in maximizing stakeholder value. Through a comprehensive literature review, the study differentiates between supply chain management (SCM) and DCM, emphasizing their integration for optimal value creation. (Anning et al., 2013)

The economic value of high-quality coffee in the global market is significant, but its quality is highly sensitive to natural and operational factors. The coffee supply chain, which involves complex processes like cultivation, harvesting, processing, and roasting, requires stakeholder responsibility at every stage. A lack of knowledge among stakeholders can lead to improper operations that negatively impact coffee quality. This research focuses on identifying critical

knowledge areas within the coffee supply chain. Using expert interviews and knowledge maps, the study highlights that the most crucial knowledge lies in the upstream processes, particularly among farmers and community enterprises, which directly influence coffee quality. (LiangHui & Reeveerakul, 2019)

3. OBJECTIVE

- 1) To examine the factors influencing coffee farmers' membership in Farmer Producer Organizations (FPOs).
- 2) To examine how landholding size affects the sales channels that coffee growers use.
- 3) To assess the relationship between landholding size and the type of buyers selected by coffee farmers.

4. RESEARCH METHODOLOGY

This study employs a quantitative research design to examine the coffee value chain in the Araku and Paderu regions of Andhra Pradesh. The research focuses on understanding the relationships between coffee farmers' income groups, their membership in Farmer Producer Organizations (FPOs), and the factors influencing their selling patterns based on landholding sizes.

4.1. POPULATION AND SAMPLE SELECTION

Coffee growers in Andhra Pradesh's Araku and Paderu regions make up the study's target demographic. Respondents were chosen using a random sample technique, guaranteeing that every coffee farmer had an equal chance to take part. A total of 96 questionnaires were distributed to gather data on various factors affecting their farming practices, market access, and selling strategies.

The dataset provides a demographic overview of coffee farmers surveyed in the Araku and Paderu regions, with 96 responders in all. Regarding the distribution of respondents by gender, 73 men make up 76% of the sample, while 23 women make up 24%. The bulk of respondents (82) have landholdings of less than 6 acres, which makes up 85% of the sample when considering landholding size. Three respondents (3%) had landholdings larger than 12 acres, but only a small percentage (11%) own land between 7 and 12 acres. This suggests that smallholder farmers with scarce land resources make up the majority of farmers polled.

The age distribution is dispersed among various age brackets, with the largest proportion (29%) falling in the 41-50 age range. Other significant groups include farmers aged 31-40 (26 respondents) and 51-60 (19 respondents). A smaller percentage of farmers are either younger (20-30 years, with 14 respondents) or older than 60 (9 respondents). Regarding education levels, over half of the respondents (51 individuals) are uneducated, followed by 25 respondents with primary education. Only 16 respondents have graduated, while 4 have completed secondary education. There are five geographical blocks with a roughly equal distribution of farmers: Ananthagiri, Araku Valley, G. Madugula, Hukumpeta, and Paderu, with each block accounting for 16 to 20 respondents. This gives the study's region a wide geographic scope.

4.2. DATA COLLECTION METHODS

Structured questionnaires intended to gather the following data were used to obtain the data:

- **Demographic Information:** Age, gender, education level, and income group.
- **Landholding Size:** Classification of landholding into categories (less than 6 acres, between 7 to 12 acres, and greater than 12 acres).
- **FPO Membership:** Information regarding membership in FPOs and the perceived benefits or challenges associated with such membership.
- **Selling Patterns:** Information on the markets where farmers sell their produce (e.g., farm gate, weekly market, contract selling) and to whom (e.g., village aggregators, local traders, FPOs).

The questionnaires were administered through face-to-face interviews to ensure a high response rate and to clarify any questions the respondents might have.

Data Analysis

- Statistical techniques were used to analyze the gathered data, Chi-Square Test: This test was employed to examine the associations between different categorical variables: Income Group, and FPO Membership: to ascertain whether farmers' income levels and their FPO membership are statistically significantly correlated. Landholding Size and Selling Patterns: To analyze the relationship between the size of landholding and the selling channels utilized by coffee farmers. Landholding Size and Buyer Preferences: To assess how landholding size influences the choice of buyers among coffee farmers

Chi-Square Test

Income group of respondents And Membership of FPO

Hypothesis Formulation:

- **Null Hypothesis (H_0):** There is no significant association between the income group of coffee farmers and their membership in FPOs.
- **Alternative Hypothesis (H_1):** There is a significant association between the income group of coffee farmers and their membership in FPOs.

5. INTERPRETATION

Table 1 and 1.1 presents the frequently accepted significance level of 0.05 is less than the p-value of 0.337. This indicates that the null hypothesis cannot be ruled out. Therefore, we draw the conclusion that there is no statistically significant correlation between coffee producers' income group and FPO participation. The chi-square test indicates that among the coffee farmers polled, respondents' income group has no discernible impact on their choice to become or remain a member of a Farmer Producer Organization (FPO). This implies that for coffee farmers, variables other than revenue may be more important in determining FPO participation. Other factors like education, farm size, or access to market data should be investigated in more detail.

Where do they sell? And Landholding size

Hypothesis Formulation:

- Null Hypothesis (H_0): There is no significant association between the size of landholding and where coffee farmers sell their produce.
- Alternative Hypothesis (H_1): There is a significant association between the size of landholding and where coffee farmers sell their produce.

Interpretation:

The p-value, 2.206×10^{-5} , is far less than the standard cutoff point of 0.05. Given that there is a statistically significant correlation between the extent of landholding and the location of coffee growers' produce sales, we can reject the null hypothesis. The chi-square test results indicate that where coffee producers sell their produce is significantly influenced by the size of their landholding. Different market channels, such as farm gates, weekly markets, or contract selling, are typically used by farmers with varying landholding sizes (less than 6 acres, 7–12 acres, and more than 12 acres). This implies that the size of a landholding may affect one's ability to access particular markets or sales tactics. Deeper insights may be obtained by looking into the causes of these discrepancies further, such as buyer connections or transportation expenses.

Whom do they sell? And Landholding size

Hypothesis Formulation:

- Null Hypothesis (H_0): There is no significant association between the size of landholding and whom coffee farmers sell their produce.
- Alternative Hypothesis (H_1): There is a significant association between the size of landholding and whom coffee farmers sell their produce.

Interpretation:

Above table 1.3 & 1.3.1 presents the significance level of 0.05 is significantly exceeded by the p-value of 2.281×10^{-7} . This shows that there is a statistically significant correlation between the size of landholding and the customers that coffee growers sell their produce to, allowing us to reject the null hypothesis. The findings imply that a coffee farmer's choice of purchasers is greatly influenced by the amount of their landholding. Farmers with different land sizes (less than 6 acres, between 7 to 12 acres, and greater than 12 acres) exhibit distinct selling patterns. For instance, smaller farmers may prefer selling to village aggregators or local traders, while larger landholders might engage more with FPOs, contract buyers, or a combination of buyers. This finding highlights the need to consider landholding size when analyzing coffee sales channels, as it can shape farmers' access to certain buyers and influence their market strategies. The effects of variables like buyer relationships, transportation, and market accessibility on these selling patterns might be investigated in more detail.

This interpretation emphasizes the significant relationship and opens the door for further exploration of market behavior based on landholding size.

6. CONCLUSION

The chi-square analysis of coffee farmers' income groups and their membership in FPOs indicates no statistically significant correlation, indicating that decisions about FPO participation are influenced by variables other than wealth. This finding implies that elements such as education, farm size, or access to market information may play a more pivotal role in determining a farmer's choice to join an FPO. Conversely, The study discovered important connections between landholding size and both the market channels utilized for selling produce and the choice of buyers. The findings show that farmers with different landholding sizes exhibit distinct selling patterns, with smaller farmers typically selling to village aggregators and local traders, while larger landholders are more likely to engage with FPOs and contract buyers. These results underscore the importance of landholding size in shaping market access and selling strategies for coffee farmers. Future research could further explore how logistical factors, buyer relationships, and market dynamics impact these selling behaviours.

CONFLICT OF INTERESTS

None.

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TABLE

Table 1: Income group

	Income group of respondents			
Membership of FPO	<1 Lakh	1 to 2.5 lakh	4 to 5.5 lakh	5 to 5.5 lakh
No	0.022813448	0.097826087	0.71875	0.110054348
Yes	0.058301034	0.25	1.836805556	0.28125

Chi sq	3.375800472
df	3
P value	0.337231202

Reference: Author calculation

Table 1.2: Size of Land

	Farm Gate	Others	Farm Gate, Others	Weekly Market, Others	Weekly Market	Weekly Market, Farm Gate	Contract Selling
Between 7 to 12 acres	0.00976874	0.114583333	0.34375	0.34375	0.229166667	0.636742424	0.114583333
Greater than 12 acres	0.796052632	0.03125	8.760416667	0.09375	0.0625	0.3125	30.03125
Less than 6 acre	0.018078733	0.024898374	0.12347561	0.074695122	0.049796748	0.034349593	0.854166667
Chi sq	43.05952464						
df	12						
P value	2.20617E-05						

Table 1.3: Coffee farmers to who do they sell

	Whom do they Sell?				
Land Holding Size	Village Aggregators	FPOs, Local Traders, Village Aggregators	FPOs	FPOs, Local Traders	Local Traders
Between 7 to 12 acres	0.174440627	0.572916667	1.000541126	0.114583333	2.59280303
Greater than 12 acres	0.087936047	0.15625	0.875	0.03125	0.0625
Less than 6 acre	0.043970978	0.12449187	0.035133566	0.024898374	0.293699187

Table 1.3.1: Coffee farmers

Land Holding Size	Whom do they Sell?								
	FPOs, Aggregators	Village Others	Village Others	Aggregators, Others	Others	Contract Buyers	FPOs, Buyers	Contract	FPOs, Others
Between 7 to 12 acres	0.018561			0.34375	0.11458 3	0.114583		0.114583	0.114583
Greater than 12 acres		0.3125		0.09375	0.03125	0.03125		30.03125	30.03125
Less than 6 acre		0.024593		0.074695	0.02489 8	0.024898		0.854167	0.854167

Chi sq	69.39972744
df	20
P value	2.28176E-07

Reference: Author calculation