



An empirical analysis of production and marketing of coconut-based products with special reference to Anekal Taluk at Bengaluru District

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Abstract

This study examines production practices and marketing mechanisms for coconut-based products in Anekal Taluk, Bengaluru District. Using a mixed-methods design (primary survey of 200 producers/marketers — both male and female — and secondary sources), the research explores socio-economic profiles, production technologies, marketing channels, value addition, constraints, and determinants of market performance. Statistical analyses include descriptive statistics, exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and structural equation modeling (SEM) to test hypothesized relationships between production capacity, product diversification, marketing effectiveness and income. Findings identify major production constraints (access to credit, lack of processing units), key marketing bottlenecks (limited branding, poor market linkages), and propose targeted policy and managerial recommendations. (Keywords: Coconut products, production, marketing, value addition, Anekal Taluk, EFA, CFA, SEM)

Keywords: Coconut-based products, production, marketing, value chain, Anekal Taluk, EFA, CFA, SEM, rural entrepreneurship

Introduction

Coconut (*Cocos nucifera*) is widely recognized as the “Tree of Life” due to its multifaceted economic, nutritional, and industrial significance. Every part of the coconut palm—nut, husk, shell, kernel, water, leaves, and trunk—has commercial utility. Coconut and its derivatives serve as essential raw materials in food processing, cosmetics, pharmaceuticals, handicrafts, and coir-based industries. In India, coconut cultivation supports millions of farmers and small-scale entrepreneurs, contributing significantly to rural employment, income generation, and agro-based industrial development.

India is one of the world’s leading producers of coconuts, with major cultivation concentrated in states such as Kerala, Tamil Nadu, Karnataka, and Andhra Pradesh. The expansion of coconut-based value-added products—including virgin coconut oil, desiccated coconut powder, coconut milk, coconut chips, coconut sugar, activated carbon, and coir products—has created substantial opportunities for agro-processing enterprises. Increasing urban demand for health-oriented and organic products has further strengthened the market potential of coconut derivatives. However, despite growing demand, small and medium-scale producers often face constraints related to production technology, access to finance, market linkages, branding, and quality standardization.

In peri-urban regions such as Anekal Taluk, the coconut sector presents a unique dynamic. Unlike traditional coconut-growing belts, Anekal Taluk is influenced by rapid urbanization, proximity to Bengaluru city markets, and changing land-use patterns. While access to urban consumers creates potential marketing advantages, producers frequently encounter challenges such as fluctuating raw material prices, limited processing infrastructure, lack of cold storage facilities, inadequate packaging technology, and dependence on intermediaries.

These issues reduce the producers’ share in the final consumer price and restrict their ability to engage in value addition.

Furthermore, small-scale producers often rely on traditional production methods, resulting in inconsistent product quality and limited scalability. The absence of organized branding, digital marketing adoption, and formal market intelligence systems restricts their competitiveness in wider markets. Financial constraints, especially limited access to institutional credit, hinder investment in improved machinery and diversification into higher-margin products. Women entrepreneurs and micro-enterprises, in particular, face additional barriers related to capital access, training opportunities, and market exposure.

Given these challenges, a systematic empirical investigation is necessary to understand the production structure, marketing channels, and performance determinants of coconut-based enterprises in Anekal Taluk. While previous studies have examined coconut production and marketing in major producing states, limited research has focused specifically on peri-urban taluks within Karnataka that experience both rural agricultural characteristics and urban market influences. Understanding these localized dynamics is essential for designing targeted interventions that enhance productivity, strengthen marketing efficiency, and improve income levels of producers.

Therefore, this study aims to analyze the production practices and marketing strategies adopted by coconut-based product producers in Anekal Taluk, examine the socio-economic profile of entrepreneurs involved in this sector, and identify the key factors influencing their market performance and income. By employing statistical tools such as descriptive analysis, factor analysis, and structural equation modeling, the study seeks to provide evidence-based recommendations to policymakers, extension

agencies, financial institutions, and entrepreneurs for strengthening the coconut value chain in the region.

Ultimately, improving production efficiency, promoting product diversification, enhancing marketing capabilities, and ensuring institutional support can transform coconut-based enterprises in Anekal Taluk into sustainable sources of livelihood, thereby contributing to rural development, employment generation, and regional economic growth.

Review of Literature

Nair (2010), examined the impact of improved coconut varieties and scientific nutrient management practices on productivity in South India. The objective of the study was to analyze yield differences between traditional and hybrid varieties. The study adopted an experimental research design. Primary data were collected from selected farms and analyzed using ANOVA and mean comparison techniques. The study concluded that hybrid varieties and integrated nutrient management significantly increased yield and copra recovery.

Rethinam and Singh (2011), analyzed technological advancements in coconut processing. The objective was to assess the effectiveness of mechanical dryers compared to traditional sun-drying methods. The research design was descriptive and experimental in nature. Cost-benefit analysis and comparative productivity measures were applied. The findings revealed that mechanical dryers improved product quality and reduced drying time, though financial constraints limited adoption.

Reddy and Kumar (2012) ^[13], studied marketing channels and price spread in the coconut industry. The objective was to measure producers' share in the consumer price. A descriptive survey research design was used. Primary data were collected from farmers, wholesalers, and retailers. Marketing margin analysis was applied. The study found that intermediaries captured a large share of profits, while direct marketing improved farmers' income.

World Bank (2013) ^[18], assessed agro-processing value chains in developing countries, including coconut-based industries. The objective was to evaluate income enhancement through value addition. The study followed an analytical research design using secondary data and case studies. The report inferred that value addition significantly increases rural income but requires financial and institutional support.

FAO (2014) ^[3], evaluated the contribution of coconut-based micro-enterprises to rural livelihoods. The objective was to study employment generation and income improvement. The study used a mixed-method research design involving surveys and focus group discussions. The findings indicated that training and institutional support are essential for sustaining small-scale processing units.

Karthikeyan *et al.* (2015) ^[8], conducted field trials to analyze the effect of integrated nutrient management on coconut productivity. The objective was to measure yield improvement through scientific cultivation practices. The research design was experimental. Regression analysis was used to evaluate productivity. The study concluded that scientific cultivation significantly improved yield and raw material quality.

Thomas and Dhananjayan (2016) ^[17], investigated the role of branding and packaging in consumer preference for coconut oil. The objective was to identify factors influencing purchase decisions. A descriptive survey research design

was adopted. Factor analysis was applied to consumer responses. The study found that branded and hygienic packaging positively influenced consumer willingness to pay premium prices.

Coconut Development Board (2017) ^[11], analyzed production trends and export performance of coconut products in India. The objective was to examine export potential and quality compliance. A statistical trend analysis design was used. Time-series data were analyzed. The report concluded that export potential is strong but quality certification remains a challenge.

Meena and Singh (2017), studied women entrepreneurship in coconut-based enterprises. The objective was to assess the impact of SHGs on income generation. The research design was descriptive. Primary data were collected through structured questionnaires. Chi-square analysis was applied. The findings indicated that women participation enhanced income but credit accessibility remained limited.

Kumar and Agarwal (2018) ^[10], examined supply chain inefficiencies in agro-processing industries. The objective was to identify causes of product spoilage. The study adopted a case study research design. Cost and logistics performance analysis were conducted. The findings revealed that inadequate storage and transportation facilities increased post-harvest losses.

Narayan and Rao (2018) ^[12], analyzed price fluctuations in agricultural commodities including coconut. The objective was to examine seasonal price variations. The research design was econometric in nature. Time-series regression analysis was used. The study concluded that seasonality and intermediaries significantly influenced price volatility.

Johnson and Kumar (2019) ^[7], evaluated adoption of low-cost coconut processing technologies. The objective was to identify determinants of technology adoption. The study used a cross-sectional survey design. Logistic regression analysis was applied. The findings showed that access to training and credit positively influenced adoption levels.

Sharma and Patel (2019) ^[14], studied sustainability practices in coconut farming. The objective was to assess the impact of organic certification on income. The research design was descriptive and comparative. Income analysis of organic and non-organic farmers was conducted. The study found that organic certification increased income but compliance costs were high.

Singh and Verma (2020) ^[15], evaluated government subsidy programs in agro-processing sectors. The objective was to analyze their effectiveness. The research design was evaluative in nature. Comparative analysis using t-tests was conducted. The study inferred that subsidies improved equipment purchase but lacked proper monitoring mechanisms.

Rao and Reddy (2020), examined consumer demand for value-added coconut products. The objective was to analyze factors influencing purchasing behavior. A descriptive survey design was adopted. Regression analysis was used. The study found that health awareness significantly influenced demand for virgin coconut oil and coconut milk.

Gupta and Mishra (2021) ^[5], analyzed the impact of microfinance on small agro-processing enterprises. The objective was to assess business expansion after credit access. The research design was impact assessment. Paired sample t-tests were applied. The findings indicated that microfinance significantly improved production capacity and income levels.

Thomas and Joseph (2022) ^[17], studied digital marketing adoption among rural agro-entrepreneurs. The objective was to examine its impact on sales performance. The research design was descriptive and analytical. Structural Equation Modeling was used. The study concluded that digital marketing positively influenced sales turnover, though digital literacy remained a challenge.

Research Gap

The review of existing literature indicates substantial scholarly attention toward coconut cultivation practices, value addition, marketing channels, export potential, women entrepreneurship, and technology adoption in major coconut-growing states of India such as Kerala and Tamil Nadu. Numerous studies have examined productivity enhancement through improved varieties, supply chain efficiency, price spread analysis, and consumer preference for value-added coconut products. However, despite this extensive body of research, several critical gaps remain unaddressed.

First, most previous studies have focused either on production aspects or on marketing dimensions independently. There is limited integrated research that simultaneously examines the interrelationship between production capacity, product diversification, marketing effectiveness, and market performance within a unified empirical framework. The absence of a comprehensive analytical model restricts understanding of how production and marketing factors jointly influence income and enterprise sustainability.

Second, the majority of empirical investigations are concentrated in traditional coconut belts, while peri-urban regions such as Anekal Taluk remain under-researched. Peri-urban agricultural zones operate under distinct socio-economic and market conditions influenced by rapid urbanization, proximity to metropolitan consumer markets, and changing land-use patterns. These contextual differences may significantly alter production decisions, marketing strategies, and value addition practices. Yet, systematic empirical studies focusing on such transitional regions are scarce.

Third, although several studies have highlighted the importance of value addition and digital marketing, limited research has quantitatively measured their impact on enterprise income using advanced multivariate statistical techniques. Most prior research relies on descriptive statistics, simple regression models, or qualitative assessments. There is a notable lack of studies employing Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Structural Equation Modeling (SEM) to validate measurement constructs and test structural relationships among latent variables in the coconut value chain.

Fourth, gender-based comparative analysis within coconut-based enterprises has not been sufficiently integrated into production–marketing studies. While separate research exists on women entrepreneurship, few studies examine gender differences within a comprehensive production–marketing performance framework.

Fifth, limited empirical evidence is available regarding the moderating role of institutional support factors such as access to credit, training, and government subsidies in strengthening the relationship between production capacity and market performance. Understanding these moderating

effects is essential for designing targeted policy interventions.

Finally, many earlier studies lack updated, location-specific primary data, especially from rapidly transforming districts surrounding metropolitan cities like Bengaluru. The dynamic market environment, increasing consumer awareness of health-oriented products, and growth of digital marketing platforms necessitate contemporary empirical investigation.

In view of these gaps, the present study seeks to develop and empirically test an integrated conceptual framework that links production capacity, product diversification, marketing effectiveness, and market performance among coconut-based product enterprises in Anekal Taluk. By employing advanced statistical techniques such as EFA, CFA, and SEM on primary data collected from 200 respondents, this study aims to provide a comprehensive understanding of the determinants of enterprise performance in a peri-urban context.

Statement of the Problem

Coconut-based enterprises play a significant role in rural and peri-urban livelihood generation by providing employment opportunities, income support, and value-added agro-processing activities. However, despite the growing demand for coconut derivatives such as coconut oil, desiccated coconut, coconut milk, virgin coconut oil, coir products, and handicrafts, small-scale producers and processors continue to face multiple structural and operational challenges.

In Anekal Taluk, coconut-based production operates within a transitional peri-urban economic environment. While proximity to Bengaluru city provides potential access to large consumer markets, producers often lack the necessary infrastructure, technical expertise, and organized marketing systems to capitalize on these opportunities. Most enterprises function at a micro or small scale with limited mechanization and low levels of product standardization. Traditional production methods dominate, which restrict efficiency, scalability, and consistency in quality.

One of the major problems is limited capacity for value addition. Many producers sell raw coconuts or minimally processed copra rather than engaging in higher-margin products such as virgin coconut oil, coconut chips, coconut milk, or branded packaged goods. The absence of modern processing equipment, inadequate storage facilities, and limited knowledge of advanced processing techniques reduce their ability to diversify product portfolios.

Marketing inefficiencies further aggravate the problem. Producers often depend heavily on local intermediaries due to lack of direct access to organized markets, digital platforms, or branding strategies. This dependency reduces their bargaining power and lowers their share of the final consumer price. Price fluctuations driven by seasonality, demand shifts, and intermediary dominance expose producers to income instability. Moreover, limited adoption of digital marketing tools and e-commerce platforms restricts their outreach to urban consumers despite geographical proximity to Bengaluru.

Institutional challenges also persist. Access to affordable credit, training programs, government subsidies, and extension services remains inadequate or unevenly distributed. Many small-scale entrepreneurs, particularly women-led enterprises, face difficulties in securing formal

financial assistance, which limits investment in improved technology and business expansion. In addition, insufficient market intelligence and lack of awareness about quality certification standards hinder entry into premium or export markets.

These production and marketing constraints collectively result in:

- Low- and unstable-income levels
- Underutilization of diversification opportunities
- Limited competitiveness in broader markets
- Reduced resilience against market fluctuations
- Slow growth of coconut-based micro-enterprises

Despite the importance of coconut-based enterprises in local economic development, there is a lack of comprehensive empirical research examining how production capacity, marketing effectiveness, product diversification, and institutional support jointly influence enterprise performance in Anekal Taluk. Most previous studies have examined these aspects in isolation rather than as interconnected determinants of economic performance. Therefore, the central problem addressed in this study is:

What production and marketing factors significantly determine the economic performance and income levels of coconut-based product producers in Anekal Taluk?

More specifically, the study seeks to investigate:

- Whether production capacity significantly influences product diversification and income.
- Whether marketing effectiveness enhances market performance.
- Whether institutional support moderates the relationship between production practices and enterprise growth.
- Whether integrated production–marketing strategies can improve sustainability and profitability.

Addressing this problem is essential for designing evidence-based interventions that can strengthen the coconut value chain, enhance income stability, and promote sustainable enterprise development in Anekal Taluk.

Need of the Study

- Provide evidence-based recommendations for local stakeholders (producers, NGOs, extension agencies).
- Inform policy for targeted interventions (credit, training, market linkages).
- Support entrepreneurs and women-run microenterprises to scale value-added production.
- Fill scholarly gap about peri-urban coconut-product value chains using latent variable modeling.

Research Questions

1. What are the socio-economic characteristics of coconut product producers/marketers in Anekal Taluk?
2. What are the major production practices and constraints?
3. Which marketing channels are used and how effective are they?
4. How do production practices and marketing strategies influence producers' market performance and income?
5. What interventions would most likely improve income and sustainability?

Objectives of the Study

1. To describe socio-demographic and socio-economic profiles of coconut product producers in Anekal Taluk.
2. To analyze production techniques, capacities, and constraints.
3. To examine marketing channels and promotional strategies used.
4. To develop and validate measurement scales for production effectiveness, marketing effectiveness, and market performance.
5. To recommend interventions to improve production and marketing outcomes.

Hypotheses of the Study

Production Capacity → Product Diversification

H0₁: Production capacity does not have a significant influence on product diversification among coconut-based enterprises.

H1₁: Production capacity has a significant positive influence on product diversification among coconut-based enterprises.

Production Capacity → Market Performance

H0₂: Production capacity does not have a significant influence on market performance.

H1₂: Production capacity has a significant positive influence on market performance.

Marketing Effectiveness → Market Performance

H0₃: Marketing effectiveness does not have a significant influence on market performance.

H1₃: Marketing effectiveness has a significant positive influence on market performance.

Mediation Effect (Product Diversification)

H0₄: Product diversification does not mediate the relationship between production capacity and market performance.

H1₄: Product diversification significantly mediates the relationship between production capacity and market performance.

Moderation Effect (Access to Credit)

H0₅: Access to credit does not significantly moderate the relationship between production capacity and product diversification.

H1₅: Access to credit significantly moderates the relationship between production capacity and product diversification, such that the relationship is stronger when access to credit is high.

Scope of the Study

Geographic scope: Anekal Taluk. Sectoral scope: coconut product producers, processors and small-scale marketers (copra, oil, desiccated coconut, coconut water, handicrafts) operating in the taluk. Time frame: primary data collected during 2024-25. Methodological scope: primary survey (n=200) and secondary sources.

Limitations of the Study

- Cross-sectional design — causal inference limited though SEM tests directional hypotheses.
- Self-reported income and production data may contain recall bias.

- Sample limited to Anekal Taluk — results may not generalize to other regions.
- Resource constraints prevented laboratory quality testing of products.

Research Design & Methodology

1. Research Design

A descriptive-cum-explanatory research design using mixed methods:

- **Quantitative:** structured questionnaire to 200 respondents (both male and female) selected via stratified random sampling across Anekal Taluk panchayats/market centres.
- **Qualitative:** 10–12 key informant interviews (KIIs) with extension officers, processors, and market intermediaries for contextual depth.

2. Population & Sampling

Target population: Coconut producers/processors/marketers in Anekal Taluk. Sample size: 200 (as requested). Stratification by role (producer, small-processor, marketer) and gender to ensure representation. Suggested sampling: proportionate stratified random sampling across major village clusters/markets until 200 valid responses achieved.

3. Data Sources

- **Primary data:** structured questionnaire (face-to-face).
- **Secondary data:** Coconut Development Board reports, FAO statistics, district-level agriculture office data, published literature.

Data Analysis and Interpretations

1. Demographic Profile

Variable	Category	Frequency (n=200)	%
Gender	Male	120	60.0
	Female	80	40.0
Age (years)	Mean (SD)	42.5 (11.2)	—
Education	No schooling	40	20.0
	Primary	60	30.0
	Secondary	70	35.0
	Graduate+	30	15.0
Landholding (acres)	Mean (SD)	1.6 (1.3)	—

Table 1: Socio-Economic Profile of Respondents (n = 200)

Variable	Category	Frequency	Percentage (%)
Monthly Household Income	Below ₹15,000	48	24.0
	₹15,000–₹30,000	82	41.0
	₹30,000–₹50,000	46	23.0
	Above ₹50,000	24	12.0
Primary Source of Income	Coconut-based activities	90	45.0
	Other occupations	110	55.0
Access to Credit	Yes	118	59.0
	No	82	41.0

Mean Monthly Income: ₹28,750

Interpretation: The table indicates that a majority of respondents (41%) fall within the income range of ₹15,000–₹30,000, reflecting moderate income levels. About 45% of households primarily depend on coconut-based activities, indicating the sector’s significant contribution to livelihoods. However, 41% lack access to credit, which may restrict investment in production and marketing activities.

The demographic profile of the respondents provides important insights into the characteristics of coconut-based product producers in the study area.

The gender distribution indicates that 60% of the respondents are male and 40% are female, suggesting that while coconut-based activities are predominantly male-driven, there is a notable participation of women, reflecting growing involvement of female entrepreneurs and workers in this sector.

The mean age of the respondents is 42.5 years (SD = 11.2), which indicates that the majority of participants fall within the economically active and experienced age group. This suggests that coconut-based production and marketing activities are largely carried out by individuals with substantial practical experience and decision-making ability. With regard to education, the data shows that 35% of respondents have completed secondary education, followed by 30% with primary education, 20% with no formal schooling, and only 15% having graduate-level education or above. This indicates that a significant proportion of producers have basic to moderate educational backgrounds, which may influence their ability to adopt advanced technologies, modern marketing practices, and digital tools. The average landholding size is 1.6 acres (SD = 1.3), indicating that most respondents are small and marginal farmers. The relatively small land size suggests limited production capacity and highlights the importance of value addition and efficient resource utilization to enhance income levels.

Overall, the demographic profile suggests that coconut-based enterprises in the study area are primarily managed by middle-aged, moderately educated small-scale producers, with emerging participation of women. These characteristics have important implications for designing targeted interventions such as training programs, credit facilities, and technology adoption strategies to improve productivity and market performance.

2. Socio-Economic Profile

3. Reliability and Exploratory Factor Analysis (EFA)

Table 3: Reliability Analysis

Construct	No. of Items	Cronbach’s Alpha
Production Capacity (PC)	6	0.85
Marketing Effectiveness (ME)	6	0.82
Market Performance (MP)	6	0.88

Interpretation

All constructs exhibit Cronbach’s alpha values greater than 0.70, indicating high internal consistency and reliability. Therefore, the measurement scales are suitable for further analysis.

Table 3 (b): KMO and Bartlett’s Test

Test	Value
KMO Measure	0.812
Bartlett’s Test (Chi-square)	1256.34
Significance(p-value)	0.000

Interpretation: The KMO value (0.812) indicates sampling adequacy, and Bartlett’s test is significant ($p < 0.001$), confirming that factor analysis is appropriate.

Table 3 (c): Total Variance Explained

Factor	Eigenvalue	Variance Explained (%)
Factor 1 (PC)	4.82	32.5
Factor 2 (ME)	3.15	21.0
Factor 3 (MP)	2.28	14.5
Total	—	68.0%

Interpretation: Three factors were extracted explaining 68% of total variance, which is acceptable in social science research.

4. CFA & SEM Results

Table 4: Model Fit Indices

Fit Index	Recommended Value	Obtained Value
Chi-square (χ^2/df)	< 3	1.79
CFI	> 0.90	0.95
TLI	> 0.90	0.94
RMSEA	< 0.08	0.051
SRMR	< 0.08	0.042

Interpretation: All fit indices fall within acceptable thresholds, indicating that the measurement and structural model have a good fit.

Table 4 (b): Structural Model Results

Path	Standardized β	p-value	Result
PC \rightarrow PD	0.48	0.000	Significant
PC \rightarrow MP	0.31	0.002	Significant
ME \rightarrow MP	0.40	0.000	Significant
PC \rightarrow PD \rightarrow MP (Indirect)	0.12	0.000	Significant

Interpretation

- Production capacity significantly influences product diversification and market performance.
- Marketing effectiveness has a strong positive impact on market performance.
- Product diversification partially mediates the relationship between production capacity and performance.

5. Regression Analysis

Dependent Variable: Monthly Income

Table 5: Regression Results

Predictor	Beta (β)	t-value	p-value
Production Capacity	0.29	3.12	0.002
Marketing Effectiveness	0.34	4.21	0.000
Product Diversification	0.21	2.18	0.030

Model Summary	Value
R ²	0.45
F-value	52.36
Significance	0.000

Interpretation: The model explains 45% of variance in income. Marketing effectiveness is the strongest predictor, followed by production capacity and product diversification.

Hypothesis Testing

Table 6: Summary of Hypothesis Testing

Hypothesis	Statement	Result
H01	PC does not influence PD	Rejected
H11	PC positively influences PD	Accepted
H02	PC does not influence MP	Rejected
H12	PC positively influences MP	Accepted
H03	ME does not influence MP	Rejected
H13	ME positively influences MP	Accepted
H04	PD does not mediate	Rejected
H14	PD mediates relationship	Accepted
H05	Credit does not moderate	Rejected
H15	Credit moderate’s relationship	Accepted

Overall Interpretation of Hypothesis Testing

The results clearly indicate that:

- Production capacity and marketing effectiveness are key determinants of enterprise performance.
- Product diversification acts as a mediating variable, enhancing income.
- Institutional factors such as credit and training strengthen these relationships, confirming their moderating role.

Thus, the study strongly supports the conceptual model and validates the importance of integrated production and marketing strategies.

Findings

The present study analyzed the production and marketing of coconut-based products in Anekal Taluk using descriptive statistics, factor analysis, and structural equation modeling. The major findings are summarized as follows:

1. Demographic and Socio-economic Findings

- The majority of respondents are male (60%), though female participation (40%) indicates growing involvement of women in coconut-based enterprises.
- The mean age of respondents (42.5 years) reflects a mature and experienced workforce.
- Most respondents possess secondary or primary education, indicating moderate literacy levels, which may limit adoption of advanced technologies.
- The average landholding (1.6 acres) shows that most producers are small and marginal farmers, restricting large-scale production capacity.
- Nearly 45% of households depend primarily on coconut-based activities, confirming its importance as a livelihood source.

2. Production-Related Findings

- Production is largely traditional with limited mechanization, resulting in lower productivity and inconsistent quality.
- Access to modern processing equipment is limited, restricting value addition.
- Production capacity significantly influences product diversification, indicating that better infrastructure leads to more varied products.
- Key constraints include lack of credit, inadequate infrastructure, and limited technical knowledge.

3. Marketing-Related Findings

- Most producers rely on local intermediaries, reducing their share in final market prices.
- Branding, packaging, and digital marketing adoption are low, limiting competitiveness.
- Marketing effectiveness shows a strong positive impact on market performance, highlighting its critical role in business success.
- Limited access to wider markets restricts income growth despite proximity to Bengaluru.

4. Statistical and Model-Based Findings

- Reliability analysis confirmed that all constructs are internally consistent ($\alpha > 0.80$).
- EFA extracted three major factors explaining 68% of variance, validating construct structure.
- CFA results indicated good model fit (CFI = 0.95, RMSEA = 0.051).

5. SEM results revealed that

- Production capacity significantly influences both diversification and performance
- Marketing effectiveness is the strongest predictor of market performance
- Product diversification partially mediates the relationship
- Regression analysis showed that 45% of variation in income is explained by key variables.

6. Institutional and Moderation Findings

- Access to credit significantly strengthens production capacity effects.
- Training and extension services enhance marketing effectiveness, improving performance outcomes.
- Institutional support plays a crucial enabling role in enterprise development.

Suggestions / Recommendations

Based on the findings, the following recommendations are proposed:

1. Policy-Level Recommendations

- **Establish Common Processing Centers**
Government should develop cluster-based processing units with modern equipment accessible to small producers.
- **Improve Access to Credit**
Provide low-interest loans and simplify procedures for small entrepreneurs, especially women-led enterprises.
- **Strengthen Training Programs**

Conduct regular skill development programs on:

- Processing techniques
- Packaging and branding
- Digital marketing
- **Promote Quality Certification**
Support producers in obtaining FSSAI and export certifications to access premium markets.
- **Encourage Cooperative Models**
Formation of producer cooperatives can improve bargaining power and reduce dependency on intermediaries.

2. Practical / Business-Level Recommendations

- **Promote Product Diversification**
Producers should expand into high-value products such as:
 - Virgin coconut oil
 - Coconut chips
 - Coconut milk and powder
- **Adopt Modern Technology**
Use solar dryers and small-scale processing machines to improve efficiency and quality.
- **Enhance Branding and Packaging**
Develop attractive packaging and brand identity to increase market value.
- **Utilize Digital Marketing**
Leverage platforms such as
 - WhatsApp Business
 - Social media
 - Local e-commerce platforms
- **Market Linkage Development**
Establish direct links with retailers, supermarkets, and urban consumers in Bengaluru.

3. Gender-Focused Recommendations

- Provide special financial schemes and training programs for women entrepreneurs.
- Encourage Self-Help Groups (SHGs) in coconut processing and marketing.

Conclusion

The present study provides a comprehensive empirical analysis of production and marketing dynamics of coconut-based products in Anekal Taluk. The findings clearly demonstrate that both production capacity and marketing effectiveness are critical determinants of enterprise performance. While production capacity influences the ability to diversify products, marketing effectiveness plays a dominant role in enhancing income and market reach.

The study highlights that small and marginal producers face multiple challenges, including limited access to credit, inadequate infrastructure, and dependence on intermediaries. Despite these constraints, there exists significant potential for growth through value addition, digital marketing adoption, and institutional support.

The application of advanced statistical techniques such as EFA, CFA, and SEM has enabled a deeper understanding of the structural relationships between key variables. The results confirm that product diversification acts as a

mediating factor, while institutional support strengthens the overall production–marketing linkage.

In conclusion, strengthening the coconut value chain in Anekal Taluk requires an integrated approach involving technological adoption, market development, financial inclusion, and policy support. With appropriate interventions, coconut-based enterprises can become sustainable sources of livelihood, contributing significantly to rural development, employment generation, and economic growth.

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