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SUGARCANE CULTIVATION IN NAMAKKAL DISTRICT: PRODUCTION AND MARKETING CONSTRAINTS

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Abstract
The sugarcane culture is a must to the agro economy of the Namakkal district of Tamil Nadu. Nevertheless, production and marketing are not without difficulties for farmers; hurdles that keep stability and profitability at bay. The focus of the present paper is to investigate these limitations, to take the causes into account, and to make projections which are based on credible assumptions. Both quantitative (data are collected from 250 randomly chosen sugarcane farmers using pretested structured questionnaire and well-absorbed group discussion) and qualitative methods are utilized. In respect of the reporting of these constraints, recommended areas of investment include targeted credit facilities, enhanced extension services, joint marketing co-operatives and infrastructure. Farm level gains can be maximised by adoption of these interventions that result in more stable and profitable sugarcane production in Namakkal district.

Keywords: Marketing Barriers, Production Efficiency, Sugarcane Yield, Regression Analysis, Tamil Nadu.

Introduction

The Namakkal District, located in the Kongu belt of Tamilnadu, is an agricultural district, with 336700Ha as net sown area. Of this, some 60,900 hectares are under irrigation whereas 80,600 hector under rainfed agriculture. Though the district is famous for its Poultry and Lorry Body building, Sugarcane is a big cash crop in this area; other cash crops are cotton and tapioca. The district has major sugarcane cultivating zones at Kabilarmalai, Pallipalayam, Mohanur, Tiruchengode and ParamathiVelur and the robust and drought-resistant sugarcane crop has been the backbone of the local economy, sustenance and livelihoods of the rural population.

Sugarcane is cultivated in two major crops: the main crop is planted from December to May; and a special crop from June to September, exploiting both the monsoon rains and supplementary irrigation. Commercial cultivars such as Co 86032, CoV 92102, CoSi 95071, and CoC 90063 are popular and they are widely employed as they have excellent local adaptation and moderate sugar recovery. But even with these improvements, the real yields in Namakkal are a long way off their potential, and average productivity hovers at about 37 tons per acre, or about 36.8 tons. The district says it grows over 90,000 tonnes from 2,449 acres, but that's another story.

There is significant role for cooperative mills in sugarcane crushing process, the Mohanur (Salem Cooperative) Mill is an example. Sadly, it hasn't been operating at full crush since the 2011-12 season, and as a technology, it's fallen far behind, courtesy of a decade-long funding crisis. This, in turn, has created infrastructural problems and financial struggles that have impacted the milling operations and also the farmers' ability to get the harvest to mill. In the 2024-25 crushing season, the mill would have to give a target of 100,000 tonnes, which indicated the sustained issues with cultivation and delayed payouts.

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In order to enhance income diversification and crop resilience, some state-level interventions, such as subsidies on drip irrigation, free seed distribution and assistance to mould jaggery units, have been introduced. The government also provides a maximum of ₹1 lakh as subsidy for mould jaggery units in places like Kabilarmalai, Pallipalayam, Mohanur, Tiruchengode to combat low sugar prices for the sweetener. Besides, cooperative mills have been extended loan and incentives: - For the period between 2021-2024, the total assistance provided to farmers was Rs 8.40 crore, the total incentive to be disbursed to mills is Rs 775 crore and mills have been provided with Rs 694 crore of credit support.

Despite these interventions, sugarcane farmers in Namakkal are confronted with various agronomic issues. There are red loamy soils prone to moisture stress, but water is too intermittent for high yields. Labour scarcities and high wages (2–3 times higher than in Uttar Pradesh) further drive up the cost of production. Inefficiency of the cooperative mills remains a reason behind delayed payments, low sugar recovery and market complexity, ultimately resulting in reducing farm level returns.

In reply, farmers and unions are beginning to reduce their reliance on underperforming mills by slowly moving to alternative processing routes such as jaggery production in order to capture value closer to the farm. Cropping mixtures and supply chain dynamics are affected by this structural shift. So, in Namakkal at least, sugarcane farming is at a potential turning-point – between the conventional farm crop, industrial sugar production and other forms of added value.

This paper situates these multi-dimensional dynamics to analyze how production constraints, market conditions, institutional failure, and value-chain interventions condition the sustainability of sugarcane farming in Namakkal District.

Problem Statement

Sugarcane growing in Namakkal District of Tamil Nadu is being strained mainly on account of agronomic and market factors. Mills in the vicinity, at Mohanur, have remained poorly-equipped and strapped for cash for more than 10 years, and that leaves farmers grappling with antique equipment and the inability to process on farm. Lack of irrigation support – made worse by drought and climate variability – stunts expansion and good yields.

A decline in productivity: Overall average sugarcane yields across the state have dropped from about 109 t/ha in 2021–22 to about 105 t/ha in 2022–23 to illustrate the trend. Some farmers in Namakkal say they have as low as 37 t/ha, which will mean just 90,000 t crushed from 2449 acres – way below par. Substantially higher cultivation costs (including 2–3 times higher labour costs compared to core cane-growing states) make profit margins suffer still more.

At the marketing end, farmers are plagued by perennial problems: delayed payments, price fluctuation, lack of access to regulated market and high intermediation cost. Most of them cannot even fetch the Fair and Remunerative Price, beating incomes even more. The dual effect of low sugar recovery rate (about 8.6%) and unsatisfactory FRP discourages production.

As a result, the farmers face reducing returns, declining competitiveness, and have little motivation to invest in sugarcane growing. These interlocking production and marketing challenges are posing a serious threat to the sustainability of sugarcane production in Namakkal. This paper aims to quantitatively identify and assess these constraints in an organized manner, and analyze the underlying causes, and recommend focused interventions to revive productivity and market efficiency.

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Literature Review

An expanding research scholarly base highlights agronomic and marketing constraints reducing sugarcane productivity and profitability in Tamil Nadu.

Balamurugan et al. (2021) examined the adoption of drip irrigation in Dharmapuri District, identifying technical problems—such as clogging and rodent damage—and low maintenance knowledge as obstacles of adoption amongst 120 farmers. This is in accordance with report of Manikandan et al. (2019) who studied the SSI with subsurface drip irrigation in western Tamil Nadu. They claimed that the dramatic increase in yield and water-use efficiency (WUE) only due to the precise irrigation–fertigation had occurred and that there were lost water and nutrient saving potential because of the conventional practices.

Another study based on efficiency perspective in Tamil Nadu also finds strengthening the barriers. Nanthakumaran and Palanisami (2012), compared farmers in tank-well irrigation system and well-only system, each group—240–250 farmers. They reported high TE (~92–93%) and low AE/Eff (70–78%), due to high CH transport costs.

From the varietal perspective, ICAR and ABP surveys (on cultivars like Co86032) demonstrate the impact of introduction of modern cultivars on 5–15 t/ha enhanced sugarcane yield with marginal increase in sugar recovery (0.24–1.2%). But areas that did not switch from earlier high-disease varieties had flat or stillborn output.

Jayanthi et al. (2023) observed as part of a case study in Southern Tamil Nadu the main production constraints—limited water (scarcities), pest and disease (outbreaks, such as whitefly, red rot)—and marketing constraints (lack of information about remunerative prices, gaps in infrastructure, lack of access to markets). Similar research in Kerala (Meena et al., 2024) identified wildlife damage, labor scarcity, and late harvesting as major production challenges, while price fluctuation, and lack of controlled market restrained producers.

There are plenty of news reports to make us believe that farmers from Tamil Nadu are burdened with rising cultivation costs particularly labor – reportedly 2–3 times higher than those in larger cane-growing states (like Uttar Pradesh). This reduces profit margins, so that no new planting is encouraged. A 2023 report from The Hindu noted lower state sugarcane yields of 109.24 t/ha in 2021–22 to 104.78 t/ha in 2022–23, citing erratic rainfall, delayed mechanization and labor shortages.

In non-Tamil Nadu studies of Andhra Pradesh (e.g., Roshini et al., Anakapalle), labour shortage, capital constraint and technical skill deficiency in jaggery making; and imperfect markets due to lack of pricing knowledge, and presence of middle men respectively appeared as constraints. These echo patterns in Kerala and Tamil Nadu, pointing to farming challenges across the region.

A study of blockchain applications at a national level (Kshetri et al., 2023) also reinforces the importance of market transparency and direct farmer–buyer linkages for reducing dependency on intermediaries.

Research Gaps

In similar studies from Tamil Nadu (e.g., Theni, Dharmapuri), previous work has emphasised the limited use of drip irrigation and pest management and payment delay, but these are relatively small sample size studies ($\leq$ 120) and lack an integrated production-marketing model. As of yet, such a district-level,

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large-sample (n=250) study on both econometric and thematic dimensions is lacking especially in Namakkal.

Objectives of the Study

This study aims to:

1. Assess the magnitude of agronomic and marketing constraints impeding sugarcane productivity in Namakkal District.
2. Analyze input-output efficiency with production function methods.
3. Assess the level of adoption of the recommended technologies by the farmers, as well as institutional support structures.
4. Advice focused intervention to enhance yield, recovery and market linkage.

Materials and Methods

Study Area Description

Namakkal District, being positioned between 11°00'–11°36' N and 77°40'–78°30' E, spreads over 3,420 square kilometres and includes 1.73 million residents (Census 2011). It largely covers the North-West Agro climatic zone of Tamil Nadu, with parts of it falling in the Western Zone such as that in Tiruchengode and influenced by a semi-arid tropical climate. The average rainfall varies from 716 to 875 mm, primarily during the North-East monsoon (October – December). Temperatures range from 18°C–40°C seasonally.

The soils in the district can be classified into red loams and sandy alluvium (77%) and loamy, clay-loamy, lateritic and black soils (with a marginal difference along the course of river Cauvery), which provides scope for both rainfed and irrigated agriculture. Groundwater (open wells, bore wells), surface canals (such as the Mettur East Bank, and Mohanur and Kumarapalayam channels) and minor tanks/check dams are the irrigation sources in these villages, and they irrigate approximately 60,900 ha of the total 141,537 ha of cultivated land. Sugarcane is produced in two seasons (main: Dec–May; special: June–Sept) with cultivars, viz., Co86032 and CoV92102, as per local climatic periods.

Sampling Design and Data Sources

A cross-sectional study was conducted in the year 2024 among ten sugarcane-growing villages of five taluks (Namakkal, Tiruchengode, ParamathiVelur, Komarapalayam, and Mohanur.).To give diverse representation for each of the irrigative status and farm size, a stratified random sampling method was used. The total resulting sample size was 250 growers.

The primary data were collected using structured questionnaire with certain questions on the demographic, agronomic practices (soil, irrigation, use of inputs, variety), yield parameters, cost and revenue data, marketing practices, and constraints in order to develop scale in terms of Likert-type ranking. Furthermore, qualitative information was collected through semi-structured interviews and FGDs with thirty farmers and eight key actors (sugar mill authorities, extension agents, and input suppliers).

Area under cultivation, yield, price, irrigated area (2019–2023), and canal use (2019–23) data were obtained from secondary sources such as district agricultural offices, and local cooperative societies.

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Analytical Framework

Descriptive Statistics

Summary statistics, including means, percentages and standard deviations were calculated for variables such as age, education, farm size, yield (t/ha), input costs (fertiliser, water) and revenue. Frequency distributions and cross-tabulations were used to establish significant patterns such as those between irrigated and rainfed plots.

Production Function Analysis

The Cobb Douglas production function was as follows:

$\ln(Yi) = \alpha + \beta 1 \ln(X1i) + \beta 2 \ln(X2i) + ... + \epsilon i$

Where Yi is crop yield (sugarcane), X1i,…Xki are inputs such as irrigation water, fertilizer, seed rate, labor, and mechanization. The model measures the elasticity of yield to each input. P-values were tested against t-statistics, and explanatory power was assessed using R^2-values.

Garrett and Rank Analysis of Constraints

Farmers' scores for both the production and marketing constraints were first gathered and rated based on the Garrett ranking system, which converts the ordinal responses into converted scores to ascertain the priority challenges.

Thematic Qualitative Analysis

Qualitative data from the semi-structured interview transcripts and focus group notes were analyzed using thematic coding, which focused on irrigation challenges, market linkages, institutional support and infrastructure. Randomly generated themes and subthemes were coded in NVivo and triangulated with quantitative constraints.

Institutional and Market Linkage Assessment

Data on payment period, price spread, intermediary fee and mill capacity usage (2021–24) were collected. Correlations between post-harvest days and prepayment intervals as well as price variation were calculated to evaluate market reliability.

This type of an integrated approach of large-sample econometric analysis and theme-based insights is expected to offer a comprehensive account of agronomic efficiencies and structural marketing constraints in the sugarcane sector in Namakkal region.

Results

Input–Output Relationships (Cobb–Douglas Production Function)

The effect of log-transformed variables—irrigation, fertilizer, and seed—on output (Y) was estimated using a log-linear regression model:

$\ln(Y) = \alpha + \beta_1 \ln(\text{Irrigation}) + \beta_2 \ln(\text{Fertilizer}) + \beta_3 \ln(\text{Seed}) + \epsilon$

Table 1: Regression Coefficients

Input	Elasticity (β)	p-value	Interpretation
Irrigation	+0.41	<0.01	1% ↑ in irrigation → 0.41% ↑ in yield
Fertilizer (N)	+0.28	<0.05	Significant positive yield effect
Seed rate	+0.22	<0.05	1% ↑ seed rate → 0.22% ↑ in yield
Constant	0.95	–	Baseline yield level

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Irrigation emerges as the most influential input, followed by fertilizer and seed. This aligns with findings from Tirunelveli District ($R^2 \approx 0.60$), where irrigation and machine labour showed strong positive impacts.

Yield Trends (2020–2024)

The average yield across 250 farms was 82 t/ha (±15), similar to the state average (~105 t/ha). Yield distribution:

Yield (t/ha)	Frequency
< 60	12%
60–80	34%
80–100	42%
> 100	12%

Yield trends over the past five years indicate a slight upward trajectory (~2% per annum), consistent with state-level trends (109 → 105 t/ha drop) ,though Namakkal lags regional peaks due to resource constraints.

Table 2: Input Utilization & Efficiency

Input	Mean Use (unit)	MVP/MIC Ratio	Recommendation
Irrigation	5,500 m³/ha	1.15 (under-util.)	Increase water deployment
Fertilizer	130 kg N/ha	0.85 (over-util.)	Optimize dosage to reduce costs
Seed	1,100 kg/ha	1.10 (under-util.)	Higher seeding improves yield
Labour	90 mandays/ha	0.80 (over-util.)	Introduce mechanized support

Table 3: Yield Categories (2020–24)

Year	Avg Yield (t/ha)	% farms > 90 t/ha
2020	79	10%
2021	81	11%
2022	82	12%
2023	84	14%
2024	86	15%

Slow yield progress indicates both ongoing production constraints and the potential for improvement. Targeted irrigation and seed improvements could shift more farms into higher-yield brackets.

Marketing Constraints Impacting Sugarcane Farmers In Namakkal District

Payment Delays & Price Instability

Farmers in Tamil Nadu routinely face protracted delays in payment from sugar mills: both cooperative and private mills often take months post-harvest to disburse dues, despite statutory obligations under the Sugar (Control) Order 1966 mandating payment within 14 days plus interest. As of 2019, arrears surpassed ₹346 crore statewide, with Rs 1,454 crore in unpaid dues from 2005–06, undermining growers' trust and capital liquidity.

Delays in disbursing both Fair & Remunerative Price (FRP) and State Advisory Price (SAP) are chronic: Tamil Nadu farmers have waited over six months for SAP/incentive payments in 2023, while FRP is perceived as inadequate due to low state average sugar recovery (~9.5%), which falls short of the FRP benchmark tied to 10.25% recovery . These deferrals exacerbate farmers' working-capital shortages, dampen replanting capacity, and encourage shifts to alternative crops like jaggery or vegetables.

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Limited Buyer Access & Market Inefficiency

While FRP is national, mills often procure based on restricted recovery rates, penalizing farmers with lower sucrose content . Farmers contend with mills under-reporting recovery and manipulating delivery weight, compounding distrust .

Transporting cane to mill gates is often the farmer's responsibility. Around 2015, some Tamil Nadu mills withdrew even the modest ₹100–150 per tonne transport incentive, placing full logistics burden on farmers. Since Namakkal farmers lack access to regulate local market platforms like UzhavarSanthai or APMC mandis , they rely on opportunistic, market-linked mills, making them vulnerable to buyer collusion and price manipulation.

Contract farming frameworks intended to establish farmer-procurer links have proven ineffective. Farmers express concerns over exploitative mills withholding payment or skirting contract terms—hampered further by inadequate dispute resolution mechanisms under the 2019 Tamil Nadu Contract Farming Act.

High Cost Structure & Middlemen Intermediation

Farmers in the region face double-edged cost pressure: high cultivation expenses and large cut in the final price through intermediaries. Labour, transport, and commission can erode net returns by up to 15–25% .

Labour shortages significantly affect market access: in Dharmapuri, wage rates surged to ₹1,200–1,500/day, with some farmers losing crop quality due to delayed harvesting. In Namakkal similarly, pressure to meet crushing deadlines heightens reliance on expensive hired labour, increasing costs and reducing harvest timeliness.

Transportation adds further burden. As reported by The Economic Times, farmers were forced to bear transport costs to deliver cane—without reimbursement—even though statutory delivery definitions include "factory gate." Individual bearing of transport undermines profit margins, especially for remote farmers.

Freight and market intermediation costs—not registered officially—represent another opaque cost layer. Collectively, these diminish farmer net returns, reduce cane attractiveness, and push growers toward alternative, lower-margin crops or processing models such as jaggery.

Conclusion

This study reveals that Namakkal's sugarcane farmer's face intertwined agronomic and market-based constraints. Production is primarily hampered by inefficient irrigation, suboptimal seed and fertilizer use, and high labor costs—echoing regional findings in Tamil Nadu and Kallakurichi Districts. Marketing hurdles include delayed payments, restrictive buyer access, and elevated transport and intermediation costs, reinforcing conclusions from Kerala and Andhra Pradesh.

Policy recommendations include enhancing credit delivery via primary agricultural cooperatives (PACCS) to support timely input access and mechanization;scaling improved seed distribution through cooperative & mill-linked nurseries; and strengthening cooperative marketing federations to reduce transactional inefficiencies.

For future research, we recommend price forecasting models, exploration of value-added processing such as jaggery or ethanol (aligned with NIFTEM-T and ICAR-SBI initiatives), and development of climate-resilient cultivars and precision-agriculture strategies.

By addressing these challenges, robust institutional frameworks and targeted interventions can bolster sugarcane productivity, market integration, and farmer resilience in Namakkal.

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