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Financial Performance Overview of the Indian Sugar Industry

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Abstract-

The Indian sugar industry is pivotal in the country's agricultural economy, contributing significantly to rural livelihoods, export earnings, and bioethanol production. This review aims to synthesise existing research on the financial performance of Indian sugar companies, focusing on studies employing the DuPont analysis framework and related financial indicators. This study uses a narrative review methodology to analyse over 25 papers published between 2012 and 2025. Key performance areas explored include profitability, liquidity, solvency, efficiency, capital structure, intellectual capital and maintenance practices. The findings reveal significant variation in financial performance across private and cooperative sugar mills, with private firms typically exhibiting superior profitability and solvency. The DuPont model is widely used to evaluate the components of Return on Equity, highlighting net profit margin and asset turnover as critical drivers. Furthermore, intellectual capital efficiency and maintenance strategies emerge as important but underexplored factors influencing firm performance. This review identifies several research gaps, including the limited use of longitudinal data, the underrepresentation of cooperative mills in financial modelling and the need for integrated frameworks combining financial and non-financial metrics. The study concludes by offering recommendations for future research and policy, emphasising the need for targeted investment, better financial oversight and modernization to enhance the sustainability of India's sugar sector.

Keywords: Financial Performance, Capital Structure, Indian Sugar Industry, DuPont model

1. INTRODUCTION

Sugar has been cultivated in India since approximately 1200 BC, signifying the early development of one of the world's most important agricultural commodities. Originating in the tropical regions of the Indian and Pakistani subcontinent, sugarcane has significantly contributed to the area's agricultural landscape and economy. Over the centuries, the cultivation and processing of sugar spread beyond India to various parts of Southeast Asia, fostering regional trade and the exchange of agricultural practices and technologies. This long history highlights sugar's cultural and economic significance in shaping societies and trade routes across Asia. Understanding the development of sugar production in India is crucial for grasping its impact on global trade and culinary practices, paving the way for further research into its historical, economic and cultural implications.

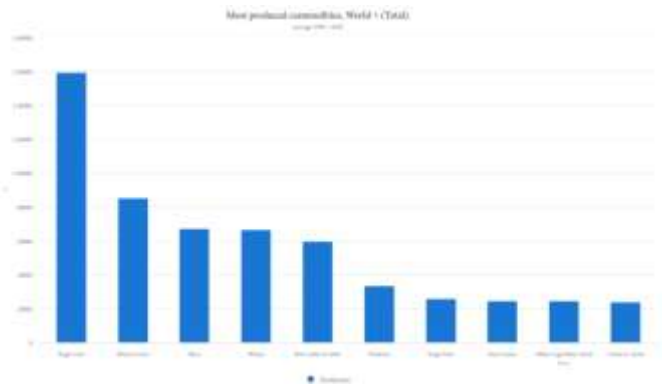

Fig- 1. Source: FAOSTAT (April 30, 2024)

Sugar cane is a significant input for producing sugar. When the production of sugar cane increases, sugar production also increases. Sugar (primarily in sugar cane) is the world's most-produced single commodity, averaging roughly 1.6 billion tonnes annually between 1994 and 2023, as shown in Figure 1 (Food and Agriculture Organization of the United Nations, 2024).

Dominance: At about twice the volume of the next-ranked crop (maize), sugar cane alone accounts for more agricultural output than most entire commodity categories.

Uses: Beyond sweeteners, a growing share is diverted to bioethanol and other industrial applications, reinforcing its leading role in food and energy sectors.

Economic and Regional Importance: Vast plantations in Brazil, India, Thailand and other countries underpin rural livelihoods, trade flows, and national biofuel strategies.

In short, no other crop or product comes close—sugar cane reigns as the globe's top-produced agricultural commodity.

The Indian sugar industry stands out as a cornerstone of the nation's economy, revered as the second-largest agro-based industry in India. It holds a remarkable position on the global stage, proudly ranking as the world's second-largest sugar producer. This vibrant sector is not just an economic powerhouse but also a vital source of livelihood for millions, weaving together the threads of agriculture, rural development and community well-being across the vast landscapes of India (Ray, 2012). Historical records vividly illustrate the rich tapestry of its origins in India, dating back to ancient times. They recount the establishment of early factories during the 17th century, a period marked by innovation and craftsmanship, laying the groundwork for a dynamic industrial landscape. (Shrivastava et al., 2011). Research has delved deeply into assessing the economic performance of the industry, particularly by analysing capacity utilization. This investigation has uncovered striking disparities and a noticeable decline in growth rates during the post-reform era. The wave of liberalization, intended to invigorate the market, has instead cast a shadow, resulting in a significant negative impact that has reshaped the landscape of industrial performance (Ray, 2012). Studies also investigate technical change and productivity growth, with findings indicating a negative Total Factor Productivity (TFP) growth rate primarily due to technological regress, despite moderate positive growth in technical efficiency (Singh, 2016). A recurring theme is the industry's cyclical nature, often attributed to factors like the lack of alignment between sugarcane prices (regulated by the government) and market sugar prices, as well as fluctuations in sugarcane availability. Challenges identified include low sugarcane yield and sugar recovery rates compared to international levels, high production costs, old technology, fragmentation, government controls (price regulation, licensing, and supply), and external threats like political vulnerability and environmental issues (Ray, 2012).

The industry is a cornerstone of socio-economic life in rural India, serving as a lifeline for millions of farmers struggling to sustain their livelihoods. It empowers these hardworking individuals, enabling them to cultivate not just crops, but hope for a brighter future. Through its vibrant tapestry of opportunities, countless jobs are woven into the fabric of these communities, creating a dynamic culture of employment that fuels growth and resilience in every corner of rural life (Prasad, 2007). The potential for sustainability and economic growth is vividly explored through innovative diversification strategies. This includes harnessing valuable by-products, such as transforming molasses into renewable ethanol and utilising bagasse for generating bioelectricity and producing eco-friendly paper. Additionally, there is a promising opportunity to boost productivity and enhance sugar recovery through cutting-edge research, advanced technology adoption, and improved management practices. This multifaceted approach elevates efficiency and fosters a more sustainable future for the industry. (Ray, 2012). Recent studies delve into the profound effects of external shocks, particularly highlighting the seismic impact of the COVID-19 pandemic, on the intricate web of the industry's value chain. These disruptions have reshaped operations, challenged traditional practices, and forced a re-evaluation of resilience strategies throughout the sector (Solomon et al., 2020). The call for a thoughtful overhaul of the sugarcane pricing policy resonates louder than ever, emphasising the necessity for strategic investments in research and development. Such initiatives are crucial for elevating the industry's performance and bolstering its competitiveness on the global stage. By embracing innovation and rational strategies, we can pave the way for a thriving future in sugarcane production (Singh, 2016).

This comprehensive review delves into the intricacies of the financial performance of Indian sugar firms from 2012 to 2025. It meticulously synthesises a diverse array of analytical methods, including insightful ratio analyses, the robust DuPont model, DEA efficiency scores, and Altman's Z-Score, to create a rich tapestry of findings. The study provides an in-depth exploration of key financial metrics such as profitability, liquidity, and solvency, while also uncovering the underlying drivers that influence return on equity.

2. RESEARCH OBJECTIVES

•To analyse and synthesise existing literature on the financial performance of Indian sugar companies

3. METHODOLOGY

This is a narrative literature review using secondary data from existing empirical studies. The methodology section in this paper implies the following structure:

3.1 Type of Review:

- Narrative/Descriptive Review, focusing on comparative synthesis of empirical findings from previous studies.

3.2 Data Sources:

- 25+ research papers, journal articles, and case studies focused on Indian sugar companies, published between 2012 and 2025.

3.3 Selection Criteria:

- Included studies that examined financial performance using DuPont components, profitability, liquidity, solvency, efficiency, or capital structure.
- Focused on Indian sugar companies (private, cooperative, regional variations).

4. REVIEW OF LITERATURE

The existing body of research on the financial performance of Indian sugar companies is extensive and diverse, spanning over a decade of empirical studies (2012–2025) and employing a variety of analytical methodologies. Most researchers have utilised ratio analysis and the DuPont model to examine the components of return on equity, while others have employed panel regressions, Data Envelopment Analysis (DEA), Altman's Z-Score, and metrics related to intellectual capital to investigate factors such as profitability, liquidity, solvency, efficiency, capital structure, and maintenance practices.

These studies reveal persistent disparities between private and cooperative mills, indicating that private firms generally exhibit higher profitability and financial stability. However, variations in research methodologies, sample selections, and geographical focuses are also evident. Below is a table summarising the primary objectives, key variables, methods, and significant findings from over twenty notable studies in this field.

Title of Study (Author(s) & Year)	Objective / Focus Area	Variables Studied	Methodology	Key Findings
Determinants of capital structure in the Indian sugar sector (Bhattacharjee & Dash, 2021)	To identify key determinants of capital structure in the Indian sugar sector and examine the applicability of Static Trade-Off, Pecking Order, and Agency Cost theories	Financial Leverage (dependent variable), Profitability (independent variable)	Pooled regression (OLS) and panel regression (GLS fixed-effects and random-effects) using data from 25 Indian sugar companies (2003-11)	Financial leverage is signific positively related collateralisable value of asset significantly negatively relat profitability. Companies prio internal funds, then debt, equity. Financial leverag significantly positively relat collateralisable value of asset significantly negatively relat profitability. Companies prio internal funds, then debt, equity.
Financial Performance of Sugar Mills in Punjab: A Comparative Study (Gupta & Randhawa, 2018)	To examine and compare the financial performance (profitability, liquidity, solvency, activity) of operative co-operative and private sugar mills in the Doaba region of Punjab, and explore factors affecting profitability	Profitability (ROCE, Gross profit, Operating profit, Net profit ratios), Liquidity (Current, Quick ratios), Solvency (Debt equity, Fixed asset net worth, Proprietary ratios), Activity (Total asset turnover, Working capital turnover, Fixed asset turnover, Inventory turnover ratios)	Ratio analysis, ANOVA, and Panel Data Analysis (Fixed and Random Effect Models) using data for six mills (three co-operative, three private) for 11 years (2003-04 to 2013-14)	Private mills have profitability and solvency tha operative mills. Liquidity activity of both types are Panel data showed fa affecting profitability differ for each sector, with no showing a significant effec private mills.
A Study on Growth and Productivity of Indian Sugar Companies (P.Chellaswamy, 2013)	To access mainly the growth and productivity of select sugar companies in India	Working Capital, Operating Profit, Raw Materials consumption, Net Sales, and Net Profit are mentioned in the context of trend analysis findings.	Trend analysis (method of least squares), productivity ratios, production function (Solow model), Multiple Regression analysis using secondary data from 34 sugar companies (2001-02 to 2010-11) from the Capitaline database	Trend analysis forecasts for 2 2021 indicate variations Working Capital, Operating P Raw Materials consumption Sales, and Net Profit a selected companies.
Financial Health of Selected Sugar Companies in India Altman Z Score (Mohanasundara M, 2015)	To analyse the financial health of selected sugar companies in India using the Altman Z-Score Model	Profitability Ratios and financial ratios used as components of the Altman Z-Score model	Application of the Revised Altman's Z-Score model and ratio analysis using secondary data from 5 sugar companies (2008-09 to 2012-13) selected from NSE listings based on total assets	Mean Z-scores for the sel companies over the study p varied, indicating different l of financial soundness proximity to bankruptcy base Altman's cutoff scores.

Maintenance Performance Measurement - A Case of Sugar Industry (Balasaheb Shahaji Gandhare, Milind M Akarte, 2016)	To investigate maintenance performance management practices in the Indi-an sugar industry and their impact on performance. Explore differences based on ownership and capacity.	Financial Aspects (FA) criterion, including cost of maintenance, measure cost of loss production, average cost. Maintenance Performance (MP) is related to Financial Aspects.	Empirical study using field visits, interviews, statistical methods (correlation, multiple regression, cluster analysis, ANOVA) with data from 63 respondents (54 usable) across 16 sugar industries (2012-2014).	Maintenance performance significantly positively relat maintenance approach, contin improvement, financial appr and spare part manage Industries focusing on maintenance approach, contin improvement, and p development/organisation higher maintenance perform There is a significant differen maintenance performance bet private and cooperative industries.
Drivers Of Financial Performance of Sugar Industry in India (C R & N, 2015)	To find reasons for the sustainability of sugar mills despite poor economics and identify drivers of financial performance, emphasising monitoring volume, productivity, margin, and payables	Financial ratios (Working Capital, Quick, Cash Reserve, Debt-to-assets, Debt-to-capital, Debt/Equity, Interest Coverage, Debt-Service Coverage, Gross Profit Margin, Operating Profit Margin, Net Margin, ROA, ROE), Efficiency ratios. Change in quantity of cane crushed, change in margin. Volume, productivity, margin, payables	Analysis of secondary financial data and qualitative data from interviews with industry professionals, analysts, and policymakers. Examined five sugar industryes over 5 years. Compared production levels with various financial ratios.	Volume increase does drastically reduce margin. arrears can be an issue, accounts payable are less s millers. The relationship bet the change in cane crushed an change in margin is corre Cyclicality affects profitabilit
Assessing Efficiency Trends in the Indian Sugar Industry (Singh, 2016)	To measure technical and scale efficiencies of Indian sugar companies and identify sources of inefficiency. Compare integrated and non-integrated companies.	Efficiency measures (Overall Technical Efficiency - TE, Pure Technical Efficiency - PTE, Scale Efficiency - SE). Input variables (Capital cost, Employee cost, Raw material, Energy & fuel, other manufacturing expenses) and Output variable (Value of output).	Data Envelopment Analysis (DEA), an input-oriented nonparametric approach, was applied to data from 40 private sugar companies (2004-05 to 2013-14) from the Capitaline database. TE decomposed into PTE and SE.	Average TE is 0.94, suggestin input reduction potential efficiency. Technical ineffic is driven more by manag inefficiency (PTE) than inefficiency (SE). Integ companies show higher TE d higher SE. Efficiency can improved by better utilisation. TE fluctuates du cyclical production.
Reviewing Performance of Indian Sugar Industry: An Economic Analysis.	To evaluate the economic performance of the Indian sugar industry in terms of capacity utilisation (CU) measured	Capacity Utilisation (CU), Output (Y), Capital (K), Labour (L), Energy (E), and their prices. Production and consumption data used.	Econometric approach using a short-run variable-cost function to estimate CU. Applied to time series data (1979-80 to 2008-09) divided into pre-	The mean and standard devi of variables significantly enha during the post-reform pe Environmental factors (eth and legal factors (regulations) a role.

(Ray, 2012)	econometrically, and conduct SWOT and PESTEL analysis.		and post-reform periods. Also conducted SWOT and PESTEL analysis.	
Profitability Analysis of Select Sugar Manufacturing Companies in India -A Multidimential Approach. (Sathishkumar et al., 2022)	To analyse the profitability of select sugar manufacturing companies in India	Profitability indicators/ratios, Operational indicator, Non-operational indicator. Specific ratios include Cost of Goods Sold Ratio, Finance Cost Ratio, Return on Shareholders' Fund Ratio (Return on Net Worth), Fixed Interest Cover Ratio (Interest Coverage Ratio)	Analysis using CAGR, Ratios, and Profitability multiplier scoring model based on secondary data from 3 sugar companies (EID Parry, Bajaj Hindustan Sugar, Shree Renuka Sugar) for 10 years (2010-2011 to 2020-2021)	The performance of sel companies was satisfactory, fluctuations. All three sa companies showed an incre trend in cost of goods expenses. Highlights the nee modernisation, produc enhancement, and qu management for competitiver
A Study on Financial Ratio Analysis of Vellore Cooperative Sugar Mills at Ammundi, Vellore (Srinivasan, 2018)	To evaluate and analyse the financial performance and position of Vellore Cooperative Sugar Mills Ltd (VCSM) using ratio analysis.	Financial ratios including Total assets turnover, Inventory turnover, Receivables turnover, Current ratio, Quick ratio, and Net sales. Operational efficiency, liquidity, and solvency are also evaluated.	Financial statement analysis tools and techniques, including Comparative study of Balance sheet/Profit and loss account and Ratio Analysis, using secondary data from VCSM from 2013 to 2017.	Study defines the financial s and structure of VCSM. Pro specific findings on turnover r for different years. Noted s stock held due to l production.
Evaluating the Efficiency of Selected Sugar Enterprises in Tamil Nadu: An Empirical Study. (Sripriya & Renuga Devi, 2024)	To evaluate the financial efficiency of selected private sugar mills in the Tamil Nadu Sugar Industry using ratio analysis.	Financial efficiency/performance (evaluated by ROE, ROA). Turnover ratios (DTR, CTR, STR, WCTR, TATR) are used to evaluate financial performance.	Empirical study applying ratio analysis and PLS SEM Model to data from private sugar mills in Tamil Nadu over 12 years (2011 to 2022). Descriptive statistics are also used.	DTR has no significant link ROE. STR has no significant with both ROE and ROA. WCTR, and TATR demonstr significant correlation financial performance. analysis is essential for gau financial health.
A Study on Financial Performance of Top Five Sugar Companies in India (Maru, 2023)	To analyse the financial performance of sugar companies in India, specifically focusing on profitability, liquidity, activity, and solvency	Profitability (Gross Profit Ratio, Operating profit ratio, Net profit ratio, EPS, Return on capital employed), Liquidity (Current ratio, Quick ratio), Activity (Stock Turnover Ratio, Asset Turnover Ratio), and Solvency (Debt Equity Ratio, Interest Coverage Ratio) ratios	Secondary data from annual reports and websites. Selected top five sugar companies based on net profit. Used ANOVA test	There is significant differen selected sugar comp regarding profitability, liqu activity, and solvency ratios significant difference in Retu Capital Employed and In Coverage Ratio

Analysis of Financial Asset Performance and Production Quantity of Sugar Industry in India (Bagawan, 2019)	To analyse the financial performance of sugar companies in India, specifically focusing on profitability and factors impacting Return on Equity (ROE)	Financial performance variables used: Profitability ratios, Return on Equity (ROE), DuPont Variables, Earnings per Share (EPS)	Selected forty companies based on sales volume and market capitalization. Used DuPont analysis and Path analysis	There was a significant diffe between return on equity an DuPont variables. Du variables (asset turnover an profit margin) were importar EPS. Sugar sector companie profit margin was nega indicating inefficient manage
Performance of Select Co-Op Sugar Mills in Maharashtra: Dupont Analysis (Karanjkar & Vagrecha, 2018)	To ascertain the operational performance of select Cooperative Sugar Mills, specifically using DuPont Analysis	Return on Assets (RoA), Return on Inventory (RoInv), Return on Expenditure (RoExp). DuPont Analysis components (Net Profit Margin, Asset Turnover, Inventory Turnover, Expenditure Turnover, Equity Multiplier)	Selected 11 Cooperative Sugar Mills from western Maharashtra. Secondary data from Annual Reports for 2004-2015. Discusses modified DuPont formulae for cooperatives.	Sales performance is satisfactory, Inventory Turno very minimal. Majority of are performing inefficiently are financially weak. Improve needed in Net Profit Ratio Asset Turnover Ratio.
A Comparative Financial Analysis of Leading Sugar Companies in India (Patel, 2025)	To analyse and compare the financial performance of three major sugar companies	Asset turnover ratio, Current ratio, and Net profit margin ratio	Selected three sugar companies (Bajaj Hindusthan Sugar Ltd, Dalmia Bharat Sugar and Industries Ltd, and EID Parry (India) Ltd). Data analysis using ANOVA. Data period covers 2019-20 to 2023-24 for Net Profit Margin	There is no significant diffe in the asset turnover ratio an profit margin. There i significant difference in current ratios. Bajaj Hindu Sugar Ltd had the we liquidity (lowest current ratio
Performance analysis of sugar industry – DuPont analysis (Praveena & Mahendran, 2014)	To analyse the performance of sugar sector companies by using DuPont analysis. Identify factors impacting EPS	DuPont analysis measures (Net profit margin, Asset turnover, ROA, EM, ROE), Earnings per Share (EPS)	Selected forty companies listed in Bombay stock exchange. Six-year period from 2007 to 2012. Secondary data from CMIE PROWESS database. Used DuPont analysis and Path analysis.	Level of performance was fa should be improved by incre total asset turnover ratio. Net margin was negative, indic inefficient management.
Relationship between intellectual capital and firm performance: evidence from the Indian sugar mill industry (Sharma et al., 2024)	To examine the influence of Intellectual Capital (IC) and its components on the financial performance of Indian sugar mill companies	Financial performance proxied by Return on Equity (RoE) and Return on Asset (RoA). Independent variables: Intellectual Capital and its components (HCE, SCE, RCE, CEE, MVAIC). Control variables: Leverage, Size, Age.	Quantitative research. Sample of 19 sugar mill companies over 10 years (2012–13 to 2021–22). Used Modified Value-Added Intellectual Capital (MVAIC) method and panel regression models.	MVAIC has a positive relatio with firm perform (profitability). Capital Empl Efficiency (CEE) and Relat Capital Efficiency (positively affect RoA. Hu Capital Efficiency (HCE) and positively impact RoE. CEE highly significant compo explaining financial performa

A Study on Financial Performance of Selected Co-Operative Sugar Companies of Gujarat. (Purani, 2023)	To study and compare the financial performance of selected co-operative sugar companies of Gujarat	Financial Ratio: Current Ratio, Net Profit Margin (%), Debt-Equity Ratio	Selected three cooperative businesses in Gujarat. Financial data for 2016-17 through 2020-21. Used Ratio analysis and ANOVA testing.	Significant difference in cu ratio and debt-equity ratio significant difference in net margin ratio.
Assessing Profitability Trends: A Comparative Analysis of Leading Sugar Firms in India (Valajibhai & Desai, 2024)	To assess and compare the profitability indicators of three major sugar companies in India.	Profitability metrics: PBDIT (Profit Before Depreciation, Interest, and Taxes) margin, Net Profit Margin (%), and Return on Assets (%).	Examined a sample of three leading firms (EID Parry (India) Ltd, Shree Renuka Sugars Ltd, and Balrampur Chini Mills Ltd). Study period 2018-19 to 2022-23. Data analysis using ANOVA.	There is a significant differen PBDIT margin, Net Profit M (%), and Return on Assets among the selected compa Analysis reveals signif variations in fina performance.
A case-based analysis of the competitiveness of the North Indian sugar industry (Sheetal et al., 2020)	To understand the factors that influence the competitiveness of the North Indian sugar industry using Porter's theories.	Competitiveness (Gi, GDk). Five determinants ("factor conditions," "demand conditions," "related and supporting industries," "firm strategy, structure, and rivalry," "government") and variables/scores within them.	Case-based analysis using data gathered through interviews with top/middle executives from the North Indian sugar industry. The survey involved personnel from 36 companies, who assessed variables using specific equations based on Shafaei (2009). The sample included profiles of 5 companies.	The study aimed to under competitiveness factors gathered data on the importan the five determinants thr interviews. (Specific finding the levels of competitiveness impact of determinants are detailed in the provided excer

5. RESEARCH GAPS

The existing literature on the Indian sugar industry reveals several research gaps and limitations, indicating areas that warrant further investigation. Among the commonly cited limitations are the reliance on small sample sizes and the use of restricted timeframes in certain studies (Bhattacharjee & Dash, 2021)., There are challenges associated with data availability, particularly regarding market data such as cost of capital and enterprise value. Additionally, there may be difficulties in generalising findings from specific regions or mills to the broader industry context (Gupta & Randhawa, 2018). Numerous studies recognise that the determinants examined possess limited explanatory power. More specifically, there is a notable scarcity of literature about measuring maintenance performance in process industries, particularly within the sugar industry. (Balasaheb Shahaji Gandhare, Milind M Akarte, 2016), There is a notable deficiency in studies examining maintenance practices and their subsequent impacts, particularly regarding performance variations based on ownership type, private or cooperative, and installed capacity. Furthermore, in the context of financial analysis, it has been observed that while numerous studies have assessed sugar mills across various states, none have specifically focused on the financial status of mills located in different states of India. (Gupta & Randhawa, 2018), The study "Financial Performance of Sugar Mills in Punjab" aimed to address a significant gap in the existing literature. Future research on financial performance may consider an analysis of capital structure ratios and identify specific factors, including categorical variables, that influence financial positions. Additionally, one source recommends that future inquiries examine profitability across various industries more specifically (Sathishkumar et al., 2022). In terms of competitiveness, a notable shortcoming is the absence of case-based studies examining the competitive landscape of the Indian sugar industry (Sheetal et al., 2020). Considering the evolving market structures and policies, there is an urgent need for more in-depth examinations at the firm level. Furthermore, fostering additional policy-oriented discussions with industry stakeholders and boosting investment in agricultural research are essential. These measures are designed to improve productivity within the sector (Sheetal et al., 2020). Additional areas identified for further investigation include the determinants of capital structure within the Indian sugar sector and other industries. Future research may incorporate a broader range of determinants, differentiate between various types of debt, utilise market values, model managerial objectives, or apply the free cash flow theory (Bhattacharjee & Dash, 2021). The ongoing financial crisis and multiple stakeholders' persistent issues indicate a need to rethink the industry's growth mechanism (Sheetal & Kumar, 2019). Methodologically, comparing pooled and panel regressions for panel data was highlighted as a contribution to overcoming previous limitations. Additionally, there is a notable research gap in exploring the impact of Intellectual Capital (IC) and its components on the financial performance of Indian sugar mill companies (Sharma et al., 2024). Although intellectual capital (IC) research has been conducted in various sectors in India, the sugar mill sector remains largely unexplored in this context. One study aims to be the first analytical research to address this gap by evaluating the impact of IC on the performance of sugar mills in India using the Modified Value-Added Intellectual Capital (MVAIC) method. The study highlights a gap in applying standard financial analysis techniques, such as DuPont analysis, to cooperative sugar mills. Previous research has typically focused on private sugar companies or those listed on the Bombay Stock Exchange, which points to limitations in using standard DuPont analysis. This is primarily due to structural differences, including very low investor funds and share capital in cooperatives (Karanjkar & Vagrecha, 2018). Despite existing research, significant areas of the Indian sugar industry warrant further empirical investigation, particularly in financial health, operational efficiency (like maintenance), competitiveness, capital structure, and growth mechanisms.

6. SUMMARY

Based on the studies in this research, several significant findings emerge regarding the financial performance of sugar companies in India. Studies consistently indicate significant differences in the financial performance of selected sugar companies across various metrics such as profitability, liquidity, solvency, and activity ratios. For example, one study comparing Bajaj Hindusthan, Dalmia Bharat Sugar, and EID Parry found a significant difference in their current ratios, indicating variations in liquidity management. However, no significant difference was found in the asset turnover ratio or net profit margin among these specific companies (Patel, 2025). Focusing on Punjab, research highlights that private sugar mills exhibit better profitability and solvency than co-operative sugar mills, which often suffer significant losses (Gupta & Randhawa, 2018). However, liquidity and activity levels were generally satisfactory for both types of mills in that region. Factors

influencing financial performance include financial leverage, which was found to be negatively related to profitability (Bhattacharjee & Dash, 2021), and Intellectual Capital (IC), with studies showing a positive association between IC (measured by MVAIC) and profitability (ROA, ROE), particularly highlighting Capital Employed Efficiency (CEE) as a prominent contributor (Sharma et al., 2024). Effective maintenance practices, encompassing approaches, continuous improvement, financial aspects, and spare part management, are also significantly related to maintenance performance and by extension, profitability (Balasaheb Shahaji Gandhare, Milind M Akarte, 2016). The industry faces chronic financial challenges and cyclicality, and while governmental support exists, it may not ensure long-term viability (Sheetal & Kumar, 2019). Despite these challenges, India was the second-largest producer of sugar globally (Gupta & Randhawa, 2018). Furthermore, became the world's largest sugar exporter in 2022 (Maru, 2023).

7. CONCLUSIONS

Based on the studies reviewed, the primary finding is significant differences in the financial performance of sugar companies in India across various measures, including profitability, liquidity, solvency, and activity ratios. Analysis shows variations in specific metrics like net profit and Return on Equity among companies. However, other ratios, such as asset turnover or net profit margin, may not differ significantly in all comparisons. Ownership structure is a notable differentiator, with private sugar mills generally demonstrating superior profitability and solvency compared to co-operative mills, which often struggle with losses. Key factors influencing performance include internal aspects such as Intellectual Capital, particularly Capital Employed Efficiency, which shows a positive association with profitability, and effective maintenance practices, which are positively related to maintenance performance. The industry operates within a challenging external environment marked by inherent cyclicality and the significant influence of government policies, though potentially insufficient for long-term viability.

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