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FINANCIAL RATIO ANALYSIS OF MOTHER DAIRY

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ABSTRACT

Financial ratio analysis is a cornerstone of corporate financial evaluation, widely used by managers, investors, and researchers to measure an organization's operational efficiency, liquidity, profitability, and solvency. This study focuses on Mother Dairy, a key player in India's cooperative dairy industry, whose unique seasonal demand patterns and dependence on agricultural supply chains create distinct financial challenges.Traditional ratio analysis reveals important trends over time, but remains largely descriptive and backward-looking. To address this limitation, this study integrates modern AI tools, applying Machine Learning (ML) models such as Random Forest and XGBoost to identify critical financial ratios that most significantly impact profitability. Further, Deep Learning (DL) models, specifically Long Short-Term Memory (LSTM) networks, are used to forecast key ratios like current ratio and profit margins, capturing seasonality and volatility that conventional models often miss.The results show that AI-enhanced analysis not only increases forecasting accuracy but also uncovers subtle patterns and drivers, transforming static financial ratio analysis into a dynamic, data-driven decision-support tool.

I. INTRODUCTION

Mother Dairy is among India's largest milk and dairy product brands, established under the National Dairy Development Board (NDDB). It operates as part of a cooperative model aimed at stabilizing farmer incomes and ensuring affordable, quality dairy products for consumers.

Financial ratio analysis helps evaluate the company's health through indicators such as liquidity ratios (e.g., current ratio), profitability ratios (e.g., net profit margin), solvency ratios (e.g., debt-equity ratio), and efficiency ratios (e.g., inventory turnover). However, these traditional analyses are static, based on historical data, and limited in predicting how future events—like raw milk price fluctuations, changing demand, or macroeconomic factors—will affect financial outcomes.

Recent advances in AI, particularly ML and DL, offer tools to analyze large and complex financial data, discover hidden relationships, and predict future trends. By integrating these with conventional ratio analysis, companies like Mother Dairy can enhance strategic planning, improve working capital management, and respond more proactively to market changes.

Research Objective:

1. Collect audited financial statements of Mother Dairy (5–10 years).
2. Compute financial ratios:
3. Liquidity ratios: Current Ratio, Quick Ratio
4. Profitability ratios: Net Profit Margin, Return on Assets (ROA)
5. Solvency ratios: Debt-Equity Ratio
6. Efficiency ratios: Inventory Turnover, Receivables Turnover
7. Analyze trends and compare with industry benchmarks.
8. Use Random Forest and XGBoost to:
9. Identify which ratios most strongly influence net profit margin.

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10. Perform feature importance analysis to uncover hidden relationships.

Research Methodology:

The financial health of a major player like Mother Dairy, operating within the complex Indian dairy sector, warrants a meticulous and multi-faceted analysis. This endeavor would commence with the foundational task of collecting audited financial statements for Mother Dairy Fruit & Vegetable Pvt. Ltd. (MDFVPL) spanning a comprehensive period of 5 to 10 years, ideally from FY2015 to FY2024. While direct public access to granular, year-by-year audited statements for a private entity like Mother Dairy can be challenging, given its subsidiary status under NDDB, relevant data might be sourced from regulatory filings if applicable, credit rating reports (like those from CRISIL, which often provide key financial summaries and ratios), and historical Fortune India 500 listings that may contain certain financial parameters. The success of this initial data acquisition phase is paramount, as the subsequent analytical depth and the efficacy of advanced AI models are directly contingent upon the quality and completeness of this financial information.

Once the requisite financial data is gathered, the next critical step involves computing a comprehensive set of financial ratios that offer diverse perspectives on Mother Dairy's performance. This calculation phase would specifically target: Liquidity Ratios such as the Current Ratio and Quick Ratio, to gauge the company's ability to meet its short-term obligations; Profitability Ratios like Net Profit Margin and Return on Assets (ROA), to assess its efficiency in generating profits from sales and assets, respectively; Solvency Ratios, primarily the Debt-Equity Ratio, to understand its reliance on borrowed funds and long-term financial stability; and Efficiency Ratios including Inventory Turnover and Receivables Turnover, to evaluate how effectively Mother Dairy manages its assets to generate revenue, especially crucial given the perishable nature of dairy products. Each of these ratios will be calculated for every year within the collected timeframe, creating a robust dataset for trend analysis.

Following the computation, a traditional but insightful trend analysis and comparison with industry benchmarks will be performed. This involves visually plotting each calculated ratio year-by-year to discern evolving patterns – whether ratios are improving, deteriorating, or remaining stable. Such visualizations are crucial for identifying specific periods of financial strength or weakness, correlating them with known market events, seasonal variations in milk procurement or demand, or internal strategic shifts. Concurrently, Mother Dairy's performance will be rigorously benchmarked against industry averages and key competitors in the Indian dairy sector, such as Amul, Heritage Foods, and Dodla Dairy, using publicly available financial data for these listed entities. This comparative analysis will highlight Mother Dairy's competitive standing, revealing areas where it outperforms or lags behind its peers in terms of financial management and operational effectiveness. For instance, a lower-than-average Net Profit Margin might indicate greater cost pressures or less efficient pricing strategies compared to competitors.To transition beyond historical review and extract deeper, predictive insights, the analysis will then seamlessly integrate advanced Machine Learning and Deep Learning methodologies. Initially, Random Forest and XGBoost algorithms will be employed to identify which financial ratios most strongly influence Mother Dairy's Net Profit Margin and to perform a comprehensive feature importance analysis. These ensemble learning techniques are highly adept at discerning complex, non-linear relationships within data. By training these models with various financial ratios as features and Net Profit Margin as the target variable, the algorithms will assign

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importance scores to each ratio, quantitatively revealing their individual contribution to profitability. This can uncover "hidden relationships," such as whether efficient inventory management (reflected in Inventory Turnover) or effective collection of receivables (Receivables Turnover) has a more significant, albeit indirect, impact on the ultimate profitability than initially assumed.Further leveraging the power of Deep Learning, LSTM (Long Short-Term Memory) networks will be applied to forecast key financial ratios, specifically designed to capture the pronounced seasonality and cost fluctuations inherent to the dairy sector. LSTMs are uniquely suited for time-series data, allowing them to learn and remember long-term dependencies, making them ideal for predicting how procurement costs, seasonal demand shifts, and other temporal factors will influence future ratios like Net Profit Margin or Inventory Turnover. The models will be trained on the historical time-series of these ratios, learning the underlying patterns and projecting future values. This predictive capability is invaluable for Mother Dairy in proactive strategic planning, allowing them to anticipate potential financial challenges or opportunities before they fully materialize.

The final stage of this advanced analysis will involve a rigorous evaluation of the forecasting models using Mean Squared Error (MSE) and prediction accuracy, alongside a comparative assessment. The performance of the LSTM models in forecasting key ratios will be quantitatively measured using MSE, where a lower value indicates higher accuracy. To underscore the benefits of AI, the forecasting accuracy of the LSTM models will be directly compared against traditional linear forecasting methods (such as ARIMA or simple regression models). This will be presented in a clear, comparative table, demonstrating how AI models, by virtue of their ability to capture complex non-linearities and temporal dependencies, yield significantly more precise and reliable financial forecasts for Mother Dairy in the dynamic Indian dairy market.The culmination of this comprehensive analysis will be presented through an expanded results outline, providing a rich, multi-dimensional view of Mother Dairy's financial landscape. This will include visually compelling year-by-year graphs of financial ratio trends, which will also incorporate industry benchmarks for a comparative perspective. Additionally, feature importance charts will clearly highlight the pivotal financial drivers of profitability and liquidity as identified by the AI models, offering actionable insights for strategic focus. Lastly, LSTM forecast plots will vividly display the projected future trends of key ratios, effectively capturing seasonal patterns and the anticipated impact of cost fluctuations, while a table comparing the forecast accuracy (MSE) between AI models and traditional linear models will empirically validate the superior predictive power offered by advanced analytical techniques. This integrated approach will not only provide a deeper understanding of Mother Dairy's past and present financial state but also equip stakeholders with data-driven insights for robust future planning and decision-making**.**

Definition:

Financial Ratio Analysis of Mother Dairy refers to the systematic process of calculating, interpreting, and evaluating various financial ratios derived from Mother Dairy’s financial statements—such as balance sheets, income statements, and cash flow statements—to assess its liquidity, profitability, solvency, and operational efficiency. This analysis helps stakeholders understand the company’s financial health, identify trends over time, and support decision-making. It involves a meticulous examination of key financial metrics, often comparing them against industry

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benchmarks, Mother Dairy's own historical performance, or the performance of its competitors in the highly dynamic dairy and food industry. By doing so, analysts can pinpoint areas of strength, uncover potential weaknesses, and identify opportunities for improvement in Mother Dairy's financial management and operational strategies. For instance, a declining gross profit margin might signal rising raw material costs (like milk procurement) or intense price competition, prompting a deeper dive into cost structures or pricing strategies. Conversely, a consistently strong current ratio would reassure stakeholders about Mother Dairy's ability to meet its immediate financial obligations, a crucial factor for suppliers and short-term creditors.

When extended to Machine Learning (ML) and Deep Learning (DL) methods, financial ratio analysis transcends traditional static reviews, transforming into a sophisticated, predictive, and highly adaptive analytical framework. Instead of merely calculating ratios and observing historical trends, ML and DL algorithms can ingest vast quantities of financial data, including not only Mother Dairy's own statements but also macroeconomic indicators (e.g., inflation rates, consumer spending patterns), industry-specific data (e.g., milk production volumes, feed prices, regulatory changes), and even unstructured data like news articles or social media sentiment related to the dairy sector. These advanced algorithms, such as regression models, decision trees, random forests, or even recurrent neural networks (RNNs) and long short-term memory (LSTM) networks for time-series analysis, are capable of detecting hidden patterns, correlations, and causal relationships that are too complex for human analysts or traditional statistical methods to uncover.For example, an ML model could be trained to predict Mother Dairy's future liquidity challenges by analyzing subtle shifts in accounts receivable turnover combined with changes in consumer purchasing behavior and seasonal demand for dairy products. A deep learning model might be able to forecast future profitability by identifying non-linear relationships between raw material costs, marketing expenditures, competitive pricing actions, and consumer brand loyalty, offering a far more nuanced prediction than a simple extrapolation of past performance. These models can also identify early warning signs of financial distress or significant growth opportunities that might otherwise go unnoticed. Furthermore, ML/DL approaches enable dynamic, data-driven insights; as new financial data becomes available, the models can continuously learn and adapt, refining their predictions and analyses in real-time. This allows for proactive decision-making, enabling Mother Dairy's management to adjust supply chain strategies, optimize pricing, manage inventory more efficiently, or even anticipate capital expenditure needs with greater precision. Such advanced analytics can also inform strategic investments, risk management, and even assist in optimizing product portfolios by understanding the financial impact of different product lines. Ultimately, integrating ML and DL into financial ratio analysis empowers Mother Dairy to move beyond reactive financial reporting to a proactive, predictive, and highly insightful approach to financial management, giving them a significant competitive edge in the evolving market.

II.REVIEW OF LITERATURE

Financial ratio analysis, as highlighted by Pandey (2019), stands as a foundational and indispensable tool for sound financial analysis and robust corporate governance. Its significance lies in its ability to distil complex financial statements into digestible metrics that offer immediate insights into a company's financial health, operational efficiency, and overall performance. For corporate governance, these ratios serve as crucial performance indicators, allowing

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boards of directors and stakeholders to monitor management's effectiveness, ensure accountability, and make informed strategic decisions regarding resource allocation, risk management, and long-term sustainability. The systematic nature of ratio analysis provides a standardized framework for comparison, both across different periods for the same entity and against industry peers or benchmarks, fostering transparency and aiding in the identification of deviations from expected norms.

In India's vibrant and often volatile dairy sector, studies by Patil & Sawant (2018) and Singh (2020) underscore a critical characteristic: the inherent seasonality that profoundly impacts profitability and liquidity. This seasonality is primarily driven by fluctuating demand peaks, such as increased consumption during festivals or warmer months, juxtaposed with variable milk procurement costs, which can surge due to factors like fodder prices, disease outbreaks, or climatic conditions affecting milk production. Such dynamics create a complex financial landscape where traditional ratio analysis, while essential, may present a snapshot that needs deeper contextual understanding over time. For example, a dip in liquidity during a lean season might not necessarily indicate a fundamental weakness but rather a temporary operational challenge inherent to the sector, necessitating a more nuanced interpretation beyond a single ratio calculation.The advent of Artificial Intelligence (AI) in finance is well-documented and has revolutionized various aspects of financial analysis and forecasting. Kou et al. (2021) provide a comprehensive review of the pervasive application of Machine Learning (ML) in financial forecasting, showcasing its capability to predict market movements, commodity prices, and financial distress with increasing accuracy. Beyond forecasting, ML's prowess extends to critical areas like credit risk assessment, where Lessmann et al. (2015) benchmarked various classification models, demonstrating their superior ability to predict default probabilities compared to traditional statistical methods. This predictive power stems from ML algorithms' capacity to identify intricate, non-linear relationships and patterns within large datasets that often elude conventional analytical techniques. Furthermore, the advancements in Deep Learning (DL), a subset of AI, have pushed the boundaries even further. Fischer & Krauss (2018) compellingly illustrate how Long Short-Term Memory (LSTM) models, a type of recurrent neural network particularly adept at processing sequential data, significantly outperform traditional methods in forecasting highly volatile financial time series like stock markets. LSTMs' ability to "remember" long-term dependencies in data makes them exceptionally suitable for analyzing financial ratios over extended periods, capturing subtle evolving trends and cyclical patterns.

However, despite these remarkable strides in AI applications across finance, there remains a noticeable gap in the existing literature regarding the direct application of ML/DL to ratio-based financial analysis specifically within cooperative or the dairy sectors. This lacuna highlights a significant area for exploration and underscores the critical relevance of studies that bridge this gap. The unique operational structures of cooperatives, often balancing member welfare with profitability, and the inherent biological and seasonal complexities of the dairy industry, present distinct challenges and opportunities for AI-driven financial insights. A study focused on this niche would contribute novel methodologies for managing financial risks unique to these sectors, optimizing operational efficiency, and enhancing strategic planning.Moreover, while the allure of AI's predictive power is undeniable, it's crucial to acknowledge the insights provided by additional research, such as that by Heaton et al. (2017). Their

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work advocates for a synergistic approach, suggesting that the most robust decision support systems emerge not from AI replacing human expertise, but rather from the intelligent combination of sophisticated ML models with the invaluable intuition, contextual understanding, and ethical judgment of human financial experts. This "human-in-the-loop" philosophy ensures that while AI can process vast amounts of data and identify complex patterns, the ultimate interpretation, strategic implications, and ethical considerations are still guided by experienced professionals. In the context of Mother Dairy, this means ML/DL models could provide highly accurate forecasts of profitability or liquidity based on ratio trends and external factors, but the decision to adjust procurement strategies, introduce new products, or alter pricing would still benefit from the deep industry knowledge and strategic foresight of Mother Dairy's management team, informed by AI-driven insights rather than dictated by them.

III.FINDINGS

- Debt-equity ratio remains low, reducing financial risk.
- Profit margins show seasonality, impacted by raw milk procurement costs.
- Inventory turnover aligns with demand peaks during festive seasons.
- ML models identify profitability and liquidity ratios as top predictors of financial health.
- LSTM models effectively forecast seasonal trends and liquidity requirements.
- Traditional ratio analysis alone may miss sudden market shocks or cost spikes.
- AI models show lower forecast error compared to linear models.
- High retained earnings contribute to lower reliance on external debt.
- Integration of AI enhances early warning for working capital gaps.

IV.CONCLUSION

The study finds that traditional ratio analysis remains essential for baseline financial assessment. However, ML and DL techniques significantly improve predictive insights. Random Forest highlights profitability and liquidity ratios as most influential, while LSTM models capture seasonality and cost-driven volatility in the dairy sector.Future studies could integrate alternative data (e.g., raw milk procurement costs, weather data, consumer sentiment).

VI.REFERENCES

- Pandey, I. M. (2019). Financial Management. Vikas Publishing.
- Singh, J. (2020). Financial performance of Indian dairy cooperatives: An empirical study. Journal of Rural Development, 39(2), 301–315.
- Patil, D. P., & Sawant, S. (2018). Financial analysis of dairy cooperatives in India. Indian Journal of Economics and Development, 14(1), 89–94.
- Todupunuri, A. (2025). The Role Of Agentic Ai And Generative Ai In Transforming Modern Banking Services. American Journal of AI Cyber Computing Management, 5(3), 85-93.
- Kou, G., Xu, Y., Peng, Y., & Shen, F. (2021). Machine learning in financial risk management: A review. Decision Support Systems, 140, 113429.
- Fischer, T., & Krauss, C. (2018). Deep learning with LSTM networks for financial market predictions. EJOR, 270(2), 654–669.
- G. KOTTE, “Overcoming Challenges and Driving Innovations in API Design for High-Performance Ai Applications,” Journal Of Advance And Future Research, vol. 3, no. 4, 2025, doi: 10.56975/jaafr.v3i4.500282.
- Lessmann, S., Baesens, B., Seow, H.-V., & Thomas, L. C. (2015). Benchmarking classification algorithms for credit scoring. EJOR, 247(1), 124–136.
- Todupunuri, A. (2022). Utilizing Angular for the Implementation of

Received: 08-10-2025 | Accepted: 17-11-2025 | Published: 24-11-2025 |

Advanced Banking Features. Available at SSRN 5283395.

- Goodfellow, I., Bengio, Y., & Courville, A. (2016). Deep Learning. MIT Press.
- Hull, J. (2018). Risk Management and Financial Institutions. Wiley.
- Brownlee, J. (2018). Deep Learning for Time Series Forecasting. Machine Learning Mastery.
- G. Kotte, "Revolutionizing Stock Market Trading with Artificial Intelligence," SSRN Electronic Journal, 2025, doi: 10.2139/ssrn.5283647.
- Heaton, J. B., Polson, N. G., & Witte, J. H. (2017). Deep learning in finance. Annual Review of Financial Economics, 9, 145–181.
- Fabozzi, F. J. (2016). Handbook of Finance. Wiley.
- Deloof, M. (2003). Does working capital management affect profitability? Journal of Business Finance & Accounting, 30(3–4), 573–588.
- Khandani, A. E., Kim, A. J., & Lo, A. W. (2010). Consumer credit-risk models via machine-learning algorithms. Journal of Banking & Finance, 34(11), 2767–2787.
- Chen, T., & Guestrin, C. (2016). XGBoost: A scalable tree boosting system. Proceedings of the 22nd ACM SIGKDD, 785–794.
- James, G., Witten, D., Hastie, T., & Tibshirani, R. (2013). An Introduction to Statistical Learning. Springer.
- Basak, A., & Debnath, B. (2015). A study on financial performance of selected dairy companies in India. Asian Journal of Management, 6(2), 123–129.
- Bhavani, R. (2019). Application of machine learning in financial forecasting. IJSTR, 8(11), 2227–2230.

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