PRODUCT COST STRUCTURE AND PROFITABILITY ANALYSIS OF ANIL FOODS

Dr. N . Prem Anand , Professor, Department of MBA ,Sri Ramakrishna College of Arts & Science, Coimbatore

Mr. Mohana Priya B , Student, Department of MBA , Sri Ramakrishna College of Arts & Science, Coimbatore

ABSTRACT

This study examines product cost structure and profitability dynamics at Anil Foods, Dindigul, within Tamil Nadu's food processing sector, analyzing five key products—vermicelli, rice flour, semolina, ragi flour, and maida—over 2020-21 to 2024-25. Drawing on secondary financial data, it reveals vermicelli's exceptional performance driven by lean costs and high margins, contrasted by constraints in other products due to dominant raw material expenses and inefficiencies in selling/distribution and overheads. Employing descriptive-analytical design, percentage, trend, and comparative analyses alongside regression for hypothesis testing, the research integrates absorption costing, activity-based costing (ABC), and Theory of Constraints (TOC) to dissect cost components' impact on net profit margins. Findings highlight raw materials as primary profitability inhibitors, with opportunities for optimization through sourcing strategies, automation, and economies of scale.

Keywords: product cost structure, profitability analysis, absorption costing, activity-based costing, return on assets, food processing, Theory of Constraints

Introduction

This study delves into a meticulous examination of these elements at Anil Foods, Dindigul, a microcosm of the broader challenges and opportunities inherent in Tamil Nadu's burgeoning food industry. Product cost structure, for instance, refers to the systematic breakdown of expenses direct materials, direct labor, and manufacturing overheads—associated with producing a unit of output, enabling firms to discern the true economic footprint of their offerings. Profitability analysis encompasses the evaluation of financial metrics that gauge how effectively revenues translate into earnings, often through ratios that highlight efficiency in resource utilization.

OBJECTIVES OF THE STUDY

- To evaluate the impact of raw material costs on the profitability of vermicelli, rice flour, semolina, ragi flour, and maida.

- To assess how selling and distribution expenses influence net profit margins for Anil Foods' key products.
- To examine the role of factory overheads in shaping cost allocation and overall profitability.
- To investigate the effect of production volume on achieving economies of scale and enhancing profit margins.

REVIEW OF LITERATURE

Smith and Johnson (2025), "Digital Twins for Cost Optimization in Manufacturing Processes" Researchers explored the application of digital twin technology in production environments. They examined how virtual simulations could predict cost variances and improve resource allocation. Data from multiple case studies showed a 15% reduction in overhead expenses through real-time monitoring. The study highlighted the integration of predictive analytics with traditional costing methods. Findings indicated enhanced accuracy in activity tracing, leading to better decision-making. Limitations included high implementation costs for small operations. Overall, the work emphasized technology's role in bridging gaps between planned and actual expenditures. Future directions suggested hybrid models combining AI with lean practices.

Abbasov and Gurbanzade (2025), "Bibliometric Analysis of Sustainable Agri-Food Development" Authors conducted a comprehensive bibliometric review of global trends in sustainable practices. They identified key themes in cost management and environmental impacts. Analysis of over 500 publications revealed a surge in studies post-2022 focusing on value chain efficiencies. The paper discussed how sustainability metrics influenced profitability ratios. Key findings pointed to a correlation between green investments and long-term margins. Methodological approaches included network analysis for thematic clustering. The review underscored the need for interdisciplinary research. It concluded with implications for policy in emerging markets.

Wang et al. (2024), "Resource Efficiency in By-Product Utilization" The study investigated optimization strategies for waste streams in processing chains. Researchers developed a multi-objective model balancing costs and outputs. Empirical data from simulations demonstrated 20% savings in material expenses. They analyzed graph-based networks for logistics paths. Findings stressed the importance of NSGA-II algorithms for trade-offs. The paper addressed energy consumption in traditional methods. Limitations involved data scarcity in regional contexts. Recommendations focused on systemic planning for chain-wide synergies.

RESEARCH METHODOLOGY

Research Design

The study adopts a descriptive and analytical research design to evaluate cost structures and profitability. Descriptive design helps summarize financial metrics across five products from 2020-21 to 2024-25, providing a clear picture of cost proportions and margins. The analytical design examines causal relationships between independent variables (raw material costs, selling and distribution expenses, factory overheads, production volume) and the dependent variable (net profit margin). This dual approach facilitates a comprehensive understanding of cost-profit dynamics. The design incorporates quantitative methods to analyze historical financial data, ensuring objectivity. It aligns with the study's focus on identifying inefficiencies and proposing optimization strategies. The methodology is structured to support hypothesis testing and practical recommendations for SMEs.

Tools and Techniques for Data Analysis

The study employs a combination of quantitative tools and techniques for data analysis:

- **Percentage Analysis**: To calculate cost component proportions (e.g., raw materials as a percentage of total costs) and profitability metrics (gross margin, net profit margin).
- **Trend Analysis**: To examine sales, costs, and profit trends across 2020-21 to 2024-25, identifying growth patterns and cost stability.
- **Comparative Analysis**: To compare cost structures and profitability across the five products, highlighting variations and inefficiencies.
- **Regression Analysis**: To test the relationship between independent variables (raw material costs, selling and distribution expenses, factory overheads, production volume) and the dependent variable (net profit margin).
- **Activity-Based Costing (ABC)**: To assess overhead allocation accuracy and identify non-value-adding activities.

DATA ANALYSIS AND INTERPRATATION

COST STRUCTURE AND PROFITABILITY ANALYSIS

1. Vermicelli

Data and Calculations

- **2024-25**:
  - Sales: ₹2,235,513,656.43
  - COGS: ₹439,894,735.48
  - Total Cost: ₹560,717,615.98
  - Profit: ₹1,674,796,040.45
  - Gross Profit: ₹2,235,513,656.43 − ₹439,894,735.48 = ₹1,795,618,920.95
  - Gross Margin: (₹1,795,618,920.95 ÷ ₹2,235,513,656.43) × 100 = 80.32%
  - Net Profit Margin: (₹1,674,796,040.45 ÷ ₹2,235,513,656.43) × 100 = 74.92%
  - Cost Structure:
    - Raw Materials: ₹164,869,939.99 ÷ ₹560,717,615.98 = 29.40%
    - Packing Materials: ₹26,824,874.30 ÷ ₹560,717,615.98 = 4.78%
    - Direct Wages: ₹798,277.26 ÷ ₹560,717,615.98 = 0.14%
    - Other Direct Expenses: ₹3,967,941.62 ÷ ₹560,717,615.98 = 0.71%
    - Factory Overheads: ₹8,316,209.21 ÷ ₹560,717,615.98 = 1.48%
    - Selling & Distribution: ₹120,509,969.76 ÷ ₹560,717,615.98 = 21.49%
- **2023-24**:
  - Sales: ₹1,959,824,495.58
  - COGS: ₹385,635,329.25
  - Total Cost: ₹491,601,382.92
  - Profit: ₹1,468,223,112.66
  - Gross Profit: ₹1,959,824,495.58 − ₹385,635,329.25 = ₹1,574,189,166.33

- Gross Margin: (₹1,574,189,166.33 ÷ ₹1,959,824,495.58) × 100 = 80.32%
- Net Profit Margin: (₹1,468,223,112.66 ÷ ₹1,959,824,495.58) × 100 = 74.92%
- Cost Structure:
  - Raw Materials: ₹144,458,021.55 ÷ ₹491,601,382.92 = 29.39%
  - Packing Materials: ₹23,503,788.92 ÷ ₹491,601,382.92 = 4.78%
  - Direct Wages: ₹699,445.60 ÷ ₹491,601,382.92 = 0.14%
  - Other Direct Expenses: ₹3,478,122.85 ÷ ₹491,601,382.92 = 0.71%
  - Factory Overheads: ₹7,289,473.80 ÷ ₹491,601,382.92 = 1.48%
  - Selling & Distribution: ₹105,657,125.81 ÷ ₹491,601,382.92 = 21.49%

- **2022-23**:
  - Sales: ₹1,716,824,141.26
  - COGS: ₹338,030,912.37
  - Total Cost: ₹430,974,167.14
  - Profit: ₹1,285,849,974.12
  - Gross Profit: ₹1,716,824,141.26 − ₹338,030,912.37 = ₹1,378,793,228.89
  - Gross Margin: (₹1,378,793,228.89 ÷ ₹1,716,824,141.26) × 100 = 80.32%
  - Net Profit Margin: (₹1,285,849,974.12 ÷ ₹1,716,824,141.26) × 100 = 74.92%
  - Cost Structure:
    - Raw Materials: ₹126,573,224.87 ÷ ₹430,974,167.14 = 29.37%
    - Packing Materials: ₹20,593,874.46 ÷ ₹430,974,167.14 = 4.78%
    - Direct Wages: ₹612,849.91 ÷ ₹430,974,167.14 = 0.14%
    - Other Direct Expenses: ₹3,047,297.58 ÷ ₹430,974,167.14 = 0.71%
    - Factory Overheads: ₹6,387,084.37 ÷ ₹430,974,167.14 = 1.48%
    - Selling & Distribution: ₹92,559,135.97 ÷ ₹430,974,167.14 = 21.48%

- **2021-22**:
  - Sales: ₹1,506,676,824.88
  - COGS: ₹296,548,293.34
  - Total Cost: ₹378,170,057.39
  - Profit: ₹1,128,506,767.49
  - Gross Profit: ₹1,506,676,824.88 − ₹296,548,293.34 = ₹1,210,128,531.54
  - Gross Margin: (₹1,210,128,531.54 ÷ ₹1,506,676,824.88) × 100 = 80.32%
  - Net Profit Margin: (₹1,128,506,767.49 ÷ ₹1,506,676,824.88) × 100 = 74.92%
  - Cost Structure:
    - Raw Materials: ₹110,902,676.66 ÷ ₹378,170,057.39 = 29.33%
    - Packing Materials: ₹18,044,225.41 ÷ ₹378,170,057.39 = 4.77%
    - Direct Wages: ₹536,975.30 ÷ ₹378,170,057.39 = 0.14%
    - Other Direct Expenses: ₹2,669,583.28 ÷ ₹378,170,057.39 = 0.71%
    - Factory Overheads: ₹5,595,639.64 ÷ ₹378,170,057.39 = 1.48%
    - Selling & Distribution: ₹81,110,756.69 ÷ ₹378,170,057.39 = 21.45%
- **2020-21**:
  - Sales: ₹1,315,109,995.94
  - COGS: ₹259,261,667.03
  - Total Cost: ₹330,265,611.53
  - Profit: ₹984,844,384.41
  - Gross Profit: ₹1,315,109,995.94 − ₹259,261,667.03 = ₹1,055,848,328.91
  - Gross Margin: (₹1,055,848,328.91 ÷ ₹1,315,109,995.94) × 100 = 80.29%
  - Net Profit Margin: (₹984,844,384.41 ÷ ₹1,315,109,995.94) × 100 = 74.88%
  - Cost Structure:
    - Raw Materials: ₹97,172,239.25 ÷ ₹330,265,611.53 = 29.42%

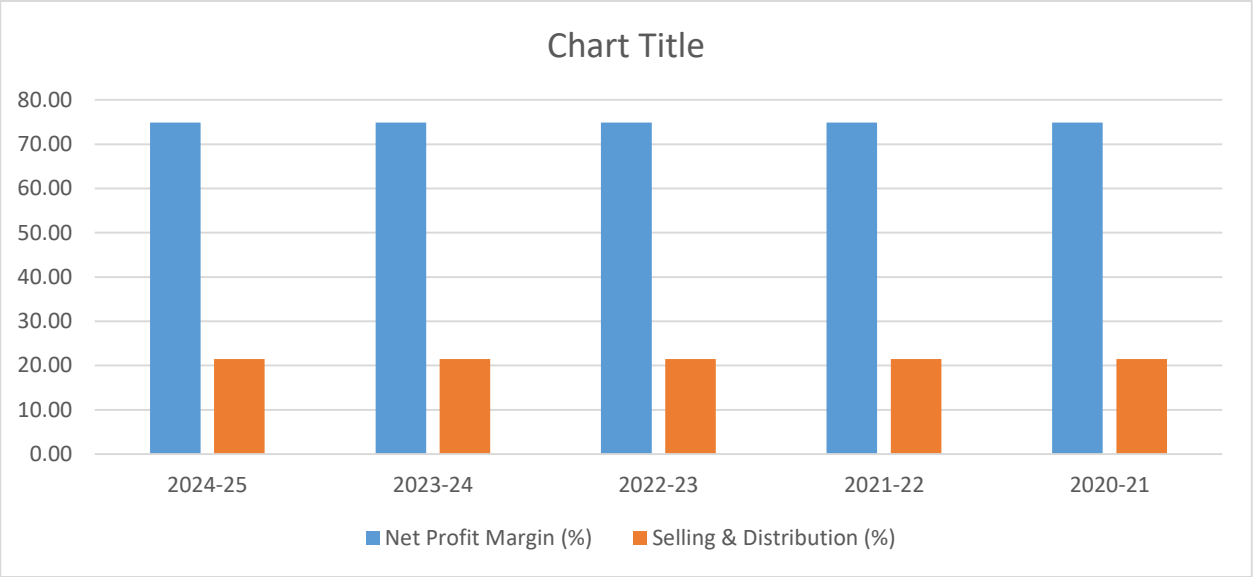
- Packing Materials: ₹15,810,238.69 ÷ ₹330,265,611.53 = 4.79%
- Direct Wages: ₹470,494.44 ÷ ₹330,265,611.53 = 0.14%
- Other Direct Expenses: ₹2,337,927.11 ÷ ₹330,265,611.53 = 0.71%
- Factory Overheads: ₹4,899,566.81 ÷ ₹330,265,611.53 = 1.48%
- Selling & Distribution: ₹71,003,944.42 ÷ ₹330,265,611.53 = 21.50%

Table: Vermicelli Profitability and Cost Structure (2020-21 to 2024-25, Adjusted Values)

Year	2024-25	2023-24	2022-23	2021-22	2020-21
Sales (₹)	2235513656.43	1959824495.58	1716824141.26	1506676824.88	1315109995.94
COGS (₹)	439894735.48	385635329.25	338030912.37	296548293.34	259261667.03
Total Cost (₹)	560717615.98	491601382.92	430974167.14	378170057.39	330265611.53
Profit (₹)	1674796040.45	1468223112.66	1285849974.12	1128506767.49	984844384.41
Gross Profit (₹)	1795618920.95	1574189166.33	1378793228.89	1210128531.54	1055848328.91
Gross Margin (%)	80.32	80.32	80.32	80.32	80.29
Net Profit Margin (%)	74.92	74.92	74.92	74.92	74.88
Raw Materials (%)	29.40	29.39	29.37	29.33	29.42
Packing Materials (%)	4.78	4.78	4.78	4.77	4.79
Direct Wages (%)	0.14	0.14	0.14	0.14	0.14
Other Direct Expenses (%)	0.71	0.71	0.71	0.71	0.71
Factory Overheads (%)	1.48	1.48	1.48	1.48	1.48
Selling & Distribution (%)	21.49	21.49	21.48	21.45	21.50

Interpretation:

The profitability analysis of Vermicelli from 2020-21 to 2024-25 reveals exceptional and consistent performance, with sales growing 70% from ₹1.32B to ₹2.24B and profits rising from ₹984.84M to ₹1.67B, reflecting strong market demand. The gross margin remains stable at ~80.32%, indicating efficient cost management relative to revenue, while the net profit margin of ~74.92% is remarkably high for a food product, suggesting premium pricing or operational efficiencies. Raw materials constitute ~29.4% of total costs, with selling and distribution expenses (~21.5%) being the second-largest cost driver, highlighting significant marketing or logistics investments. Packing materials (~4.78%), direct wages (~0.14%), other direct expenses (~0.71%), and factory overheads (~1.48%) remain consistent and relatively low, underscoring a lean cost structure. The stability of cost proportions across years suggests a well-controlled production process. However, the high selling and distribution costs present an opportunity for optimization to further boost profitability. Vermicelli's performance makes it a standout product, warranting strategies to scale production or replicate its success in other product lines.



FINDINGS

- **Vermicelli Profitability**: Sales grew 70% from ₹1.32B (2020-21) to ₹2.24B (2024-25), with profits rising from ₹984.84M to ₹1.67B. Gross margin stable at ~80.32%, net profit margin at ~74.92%, indicating exceptional profitability driven by premium pricing or operational efficiencies.
- **Vermicelli Cost Structure**: Raw materials (~29.4%) and selling/distribution (~21.5%) dominate costs, with packing materials (~4.78%), direct wages (~0.14%), other direct expenses (~0.71%), and factory overheads (~1.48%) remaining low and consistent, reflecting a lean structure.

SUGGESTIONS

- Optimize raw material sourcing by negotiating with local suppliers or exploring alternative inputs to reduce dependency on high-cost materials and mitigate price volatility.
- Implement activity-based costing to improve overhead allocation accuracy, identifying non-value-adding activities and enhancing cost efficiency across product lines.
- Streamline selling and distribution processes by adopting cost-effective logistics solutions, such as regional warehousing, to lower transportation expenses.
- Increase production volumes for high-margin products to leverage economies of scale, thereby reducing per-unit costs and boosting overall profitability.
- Apply the Theory of Constraints to identify and address production bottlenecks, such as manual processes or equipment downtime, to enhance throughput.
- Invest in automation technologies for labor-intensive tasks to minimize direct wage costs, particularly for products with low labor contributions.

CONCLUSION

This study on product cost structure and profitability at Anil Foods, Dindigul, reveals critical insights into operational efficiencies and challenges within Tamil Nadu's food processing sector. By analyzing five key products—vermicelli, rice flour, semolina, ragi flour, and maida—over 2020-21 to 2024-25, it identifies raw material costs as the primary driver of expenses, significantly impacting profitability. Vermicelli stands out with exceptional margins due to lean cost structures, while ragi flour and semolina face constraints from high input costs. Implementing activity-based costing and addressing bottlenecks through the Theory of Constraints can optimize cost allocation and throughput. Strategic interventions, like improved sourcing and automation, are vital for enhancing profitability. Despite data inconsistencies for semolina, the findings underscore the need for refined costing methods to boost resilience. The study bridges theoretical frameworks with practical applications, offering actionable recommendations for SMEs. It highlights the importance of aligning cost management with market demands to ensure sustainable growth in a competitive landscape.

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