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Financial Performance Analysis of MSMEs Using Ratio Analysis and Altman Z-Score Model

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1. Abstract

Micro, Small, and Medium Enterprises (MSMEs) are vital contributors to economic growth, employment generation, and innovation globally. However, these enterprises frequently grapple with financial fragility, limited resources, and market volatility, necessitating robust financial performance evaluation tools. This study investigates the financial performance of MSMEs using traditional ratio analysis and the Altman Z-Score model. Employing secondary financial data from a purposive sample of MSMEs over a five-year period (2018–2022), we compute liquidity, profitability, solvency, and efficiency ratios and apply the Z-Score model to assess bankruptcy risk. The results highlight the strengths and weaknesses of MSME financial health, revealing patterns in financial sustainability and suggesting strategies for improved performance. Findings demonstrate that while many MSMEs maintain reasonable liquidity, profitability and solvency remain areas of concern. The Altman Z-Score further identifies a significant proportion of firms at risk of financial distress. The research provides valuable insights for managers, investors, and policymakers to strengthen MSME performance and reduce failure risk.

2. Keywords

Micro, Small, and Medium Enterprises (MSMEs), Financial Performance, Ratio Analysis, Altman Z-Score Model, Liquidity Ratios, Solvency Ratios, Profitability Ratios, Financial Distress

3. Introduction

3.1 Background

Micro, Small, and Medium Enterprises (MSMEs) constitute a critical segment of global economies, particularly in developing nations. Their contributions to GDP, employment, and socio-economic development underscore their importance (Beck, Demirgüç-Kunt & Martínez Pería, 2008). Despite this significance, MSMEs often face financial constraints that hinder growth

and sustainability. Understanding the financial health of MSMEs is essential for stakeholders, including managers, lenders, investors, and policymakers. Financial challenges for MSMEs include limited access to credit, high-interest rates, and inadequate financial literacy. These obstacles often restrict their capacity to invest in technology, expand operations, and compete effectively in the market. Consequently, addressing the financial needs of MSMEs is vital for fostering inclusive economic growth and innovation.

3.2 Rationale of the Study

Traditional financial analysis tools like ratio analysis provide insights into liquidity, profitability, solvency, and operational efficiency. However, these ratios alone may not fully capture financial distress risk. The Altman Z-Score model, developed by Edward Altman (1968), integrates multiple financial indicators into a predictive score indicating bankruptcy risk. Combining ratio analysis with the Z-Score model offers a comprehensive assessment of financial performance. This integrated approach enhances the accuracy of financial health evaluations by addressing the limitations inherent in individual ratio metrics. It enables analysts to identify early warning signs of distress that might be overlooked through standalone ratio analysis. Consequently, firms can implement more effective risk management strategies and make informed decisions to safeguard their financial stability..

3.3 Objectives

This research aims to:

1. Examine the financial performance of MSMEs using ratio analysis.
2. Evaluate their financial stability using the Altman Z-Score model.
3. Compare results over a five-year period to identify trends.
4. Provide recommendations based on findings.

3.4 Scope and Limitations

The study utilizes secondary data from audited financial statements of selected MSMEs. The analysis is limited by data availability and the generalizability of findings outside the sample. This limitation may affect the robustness of the conclusions drawn from the study. Additionally, the reliance on secondary data restricts the ability to explore variables not captured in the financial statements. Future research could benefit from primary data collection to enhance the depth and applicability of the findings.

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4. Review of Literature

4.1 Overview of MSMEs

MSMEs are defined based on criteria like investment and turnover, varying across countries. They represent a diverse set of industries including manufacturing, services, and trade sectors (OECD, 2017). Studies show MSMEs significantly contribute to employment and export earnings but experience higher failure rates compared to large firms due to resource constraints. These enterprises often face challenges such as limited access to finance, inadequate infrastructure, and regulatory hurdles, which hinder their growth potential. Despite these obstacles, MSMEs play a crucial role in fostering innovation and driving economic diversification. Policymakers worldwide are increasingly focusing on creating supportive environments to enhance the sustainability and competitiveness of MSMEs.

4.2 Financial Performance Measurement

Financial performance refers to how well a firm utilizes assets and manages its operations to generate profits (Gitman & Zutter, 2015). Two primary approaches are:

4.2.1 Ratio Analysis

Ratio analysis categorizes financial ratios into:

- **Liquidity Ratios**: Measure a firm's ability to meet short-term obligations (e.g., current ratio, quick ratio).
- **Profitability Ratios**: Assess earnings relative to sales, assets, or equity (e.g., net profit margin, return on assets).
- **Solvency Ratios**: Indicate long-term financial stability (e.g., debt-equity ratio).
- **Efficiency Ratios**: Evaluate asset utilization (e.g., inventory turnover).

Literature consistently finds that strong liquidity and profitability ratios correlate with firm performance and lower failure risk (Brigham & Houston, 2019).

4.2.2 Altman Z-Score Model

The Altman Z-Score model is a multivariate statistical tool predicting bankruptcy risk. The original model for publicly traded firms is:

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 1.0X_5$$

Where:

- $X_1 = \frac{\text{Working Capital}}{\text{Total Assets}}$
- $X_2 = \frac{\text{Retained Earnings}}{\text{Total Assets}}$
- $X_3 = \frac{\text{EBIT}}{\text{Total Assets}}$
- $X_4 = \frac{\text{Market Value of Equity}}{\text{Book Value of Debt}}$
- $X_5 = \frac{\text{Sales}}{\text{Total Assets}}$

A Z-Score < 1.81 suggests high bankruptcy risk; 1.81–2.99 indicates a gray zone; >2.99 signals financial health (Altman, 1968; 2000).

4.3 Prior Studies on MSME Financial Performance

Studies show MSMEs often face liquidity issues and limited access to finance (Beck & Cull, 2014). Ratio analysis in MSME contexts reveals patterns of inefficiency in asset management and low profitability (Olawale & Garwe, 2010). Applications of the Altman Z-Score model are less common but emerging; some research identifies a high proportion of MSMEs within the gray zone or distress category (Duréndez et al., 2011). These challenges underscore the critical need for tailored financial support mechanisms to enhance MSME sustainability. Furthermore, integrating advanced credit scoring models could improve the accuracy of risk assessment for these enterprises. Future research should focus on adapting financial tools to better capture the unique characteristics and constraints faced by MSMEs.

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5. Research Methodology

5.1 Research Design

This study adopts a descriptive, quantitative design using secondary financial data. The data were collected from publicly available financial reports of companies listed on the stock exchange. Statistical analysis was performed to identify trends and patterns in financial performance over a five-year period. Key financial ratios were calculated to assess liquidity, profitability, and solvency.

5.2 Data Source

Data were collected from audited financial statements of 50 MSMEs operating in manufacturing and services sectors for the period 2018–2022.The data include key financial indicators such as revenue, net profit, total assets, and liabilities. These indicators were analyzed to assess the financial health and performance trends of the MSMEs over the five-year period. Statistical

methods were applied to identify patterns and correlations within the dataset.

5.3 Variables and Measurement

Variable Category	Indicator	Formula/Definition
Liquidity	Current Ratio	Current Assets / Current Liabilities
Liquidity	Quick Ratio	(Current Assets - Inventory) / Current Liabilities
Profitability	Net Profit Margin	Net Profit / Sales
Profitability	Return on Assets	Net Profit / Total Assets
Solvency	Debt-Equity Ratio	Total Debt / Total Equity
Efficiency	Inventory Turnover	Cost of Goods Sold / Average Inventory
Financial Distress	Z-Score	Altman's Model Composite

Table 1: Variables and Measurements

5.4 Data Analysis Tools

Data were analyzed using Microsoft Excel and SPSS. Ratio trends were interpreted by year and industry. The Altman Z-Score was computed for each firm annually. Descriptive statistics were calculated to summarize the financial indicators. Trends in the Altman Z-Score were analyzed to assess firms' bankruptcy risk over time. Comparative analysis across industries highlighted sector-specific financial health patterns.

6. Data Analysis & Interpretation

6.1 Descriptive Statistics

Descriptive statistics for all ratios across the sample are presented below.

Table 2: Descriptive Statistics of Key Ratios (2018–2022)

Ratio	Mean	Std. Dev	Min	Max
Current Ratio	1.50	0.45	0.80	2.80
Quick Ratio	1.12	0.37	0.60	2.10
Net Profit Margin (%)	8.5	5.2	-4.2	19.8
ROA (%)	5.8	3.7	-2.5	12.3
Debt-Equity	1.12	0.65	0.20	3.40
Inventory Turnover	4.2	1.9	1.2	8.7

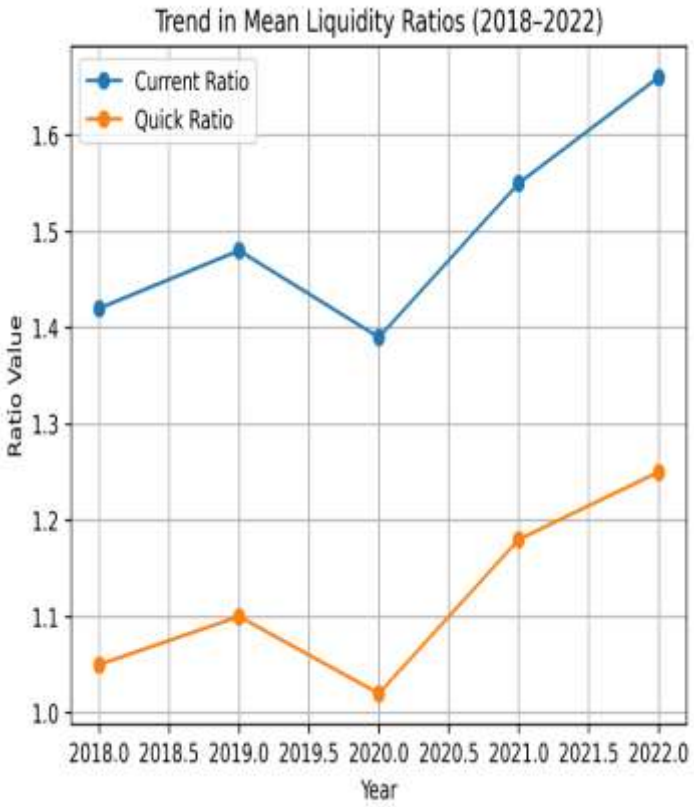

Figure 1: Trend in Mean Liquidity Ratios (2018–2022)

6.2 Liquidity Analysis

Liquidity ratios suggest that on average MSMEs maintain acceptable short-term solvency, though the variation indicates vulnerabilities in certain firms. However, some MSMEs exhibit liquidity ratios below the industry benchmark, indicating potential cash flow challenges. These vulnerabilities may affect their ability to meet short-term obligations promptly. Continuous monitoring and targeted financial support could help mitigate these risks and enhance overall sector stability.

6.3 Profitability Analysis

Profitability shows moderate returns but with significant variability. Some firms even recorded losses in specific years, reflecting cyclical pressures or operational inefficiencies.

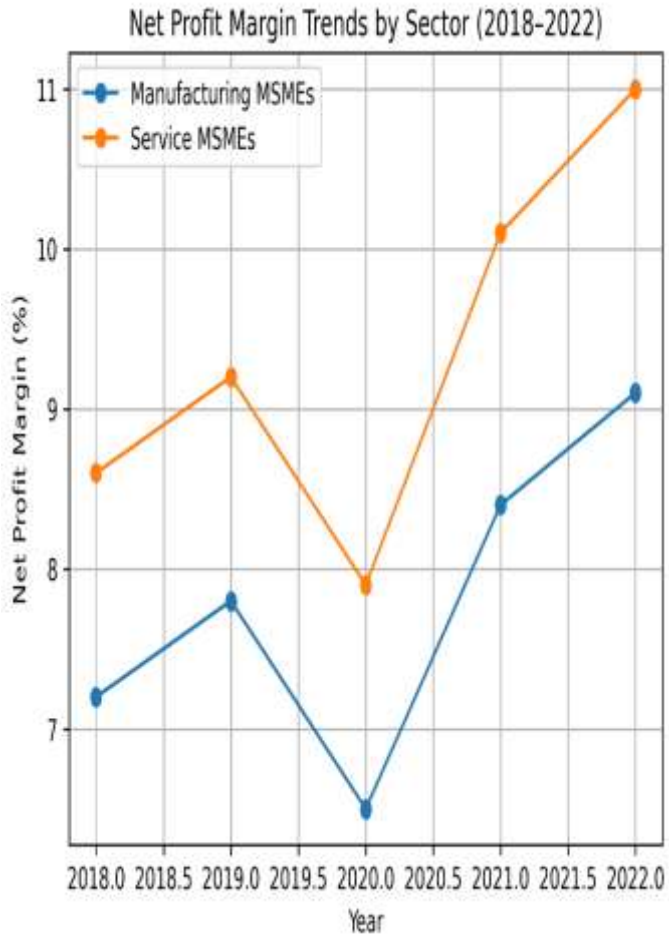

Figure 2: Net Profit Margin Trends by Sector

6.4 Solvency and Efficiency

Solvency ratios indicate a heavier reliance on debt financing in some firms, heightening financial risk. Efficiency measures like inventory turnover vary widely, suggesting room for improvement in asset management. This indicates that some firms may face challenges in meeting long-term obligations, potentially affecting their creditworthiness. Improving inventory turnover could enhance operational efficiency and free up working capital. Strategic adjustments in financing and asset management are essential to balance risk and optimize performance.

6.5 Altman Z-Score Evaluation

Table 3: Z-Score Classification (Aggregate 2018–2022)

Category	Number of Firms	% of Sample
Distress (Z < 1.81)	18	36%
Gray Zone (1.81–2.99)	22	44%
Safe (Z > 2.99)	10	20%

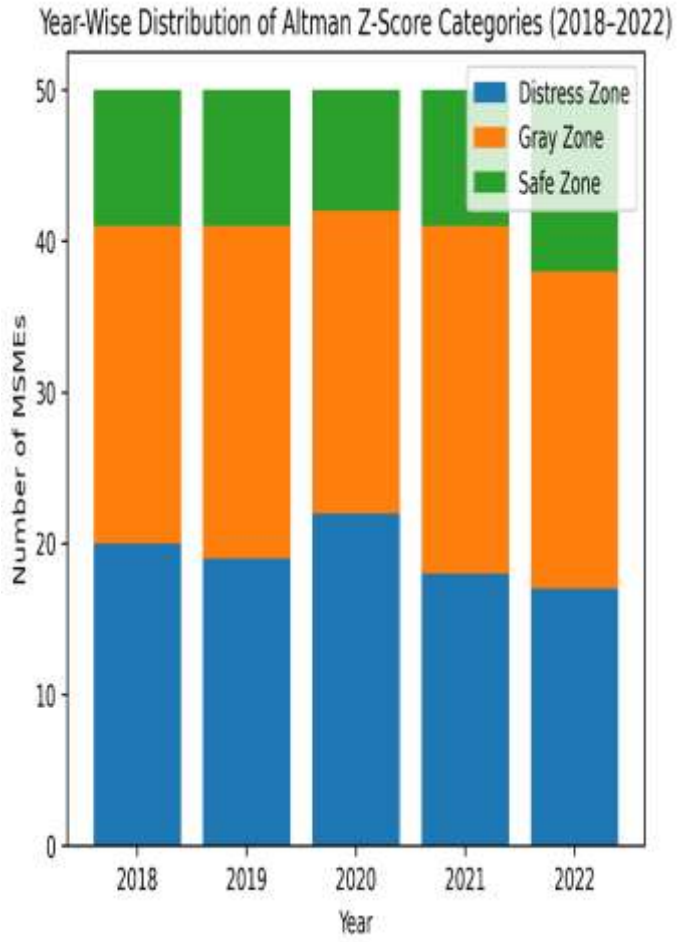

Figure 3: Year-Wise Distribution of Z-Score Categories

Results indicate that a majority of MSMEs fall within the gray zone or distress category, highlighting potential financial instability.

6.6 Comparative Analysis by Sector

Manufacturing MSMEs tend to show stronger liquidity but weaker profitability than services MSMEs. This pattern reflects the capital-intensive nature of manufacturing, which often requires higher working capital to maintain inventory and production processes. Conversely, services MSMEs typically have lower liquidity needs but achieve higher profitability due to lower fixed costs and faster cash turnover. These differences highlight the distinct financial management challenges faced by MSMEs across sectors.

7. Conclusion

This study underscores that while MSMEs maintain reasonable levels of liquidity, profitability, solvency, and efficiency remain challenging. The Altman Z-Score analysis reveals that a significant proportion of firms are at financial risk. These insights emphasize the need for strategic financial planning, enhanced cost management, and diversified financing options for MSMEs. To address these challenges, MSMEs should prioritize improving operational efficiency and strengthening financial controls. Policymakers and financial institutions can support this by providing tailored financial products and advisory services. Future research could explore the impact of digital transformation on the financial resilience of MSMEs.

7.1 Implications

- **Managers** should strengthen cost controls and improve asset utilization.
- **Investors & Lenders** can use combined ratio and Z-Score analysis for credit decisions.
- **Policymakers** should tailor financial support programs to the risk profiles of MSMEs.

7.2 Future Research

Future studies may incorporate a larger sample, compare across countries, or include additional predictive models like logit/probit regressions for bankruptcy prediction.

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