

A Study on Cost Optimization and Financial Performance of Maharashtra State Road Transport Corporation (MSRTC)

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Abstract—This study examines the relationship between cost optimization practices and financial performance in a large public sector road transport undertaking in India, with specific reference to a state-operated bus corporation. The purpose is to evaluate how operational cost controls influence revenue efficiency and financial sustainability. The research adopts a quantitative, explanatory design using secondary financial data and operational indicators over multiple years, supported by ratio analysis and regression modelling. Key variables include fuel cost efficiency, maintenance expenditure, employee cost ratio, and revenue per kilometer. The empirical results indicate that fuel efficiency and fleet utilization have a significant positive effect on financial performance ($\beta = 0.41$, $p < 0.01$), while uncontrolled maintenance cost shows a negative association ($\beta = -0.29$, $p < 0.05$). The findings contribute to cost management theory in public utilities and offer managerial guidance for transport administrators to strengthen financial discipline through data-driven cost optimization strategies.

Index Terms—Cost optimization, financial performance, public transport, operating efficiency, cost control, transport finance.

I. INTRODUCTION

Cost optimisation and financial performance have become central themes in organisational research, particularly in infrastructure-intensive public service sectors. Transport organisations operate under continuous pressure to balance service obligations with financial sustainability. Rising input costs, fluctuating fuel prices, labour-intensive operations, and asset maintenance burdens directly influence their operating outcomes. In developing economies such as

India, public transport institutions are not only commercial entities but also social service providers, which makes financial evaluation more complex. Unlike private firms that focus primarily on profitability, public transport bodies must ensure affordability, accessibility, and regional connectivity while managing constrained budgets. Hence, systematic study of cost structures and efficiency drivers becomes essential for long-term viability and policy planning.

Public road transport plays a crucial role in supporting economic activity, labour mobility, rural access, and inclusive growth. However, the sector faces structural challenges such as high fixed costs, uneven passenger demand, regulatory fare controls, and ageing fleets. Cost efficiency in this context does not merely mean reducing expenses, but optimising resource utilisation without reducing service quality. Key cost heads typically include fuel consumption, employee expenses, fleet maintenance, administrative overheads, and route operations. Inefficiencies in any of these areas can lead to persistent financial deficits. Modern management approaches emphasise data-based route planning, preventive maintenance systems, fuel monitoring, and performance-linked controls as tools for cost optimisation. Studying these dimensions in a structured manner helps in understanding how operational discipline influences financial outcomes.

Maharashtra State Road Transport Corporation is one of the largest state-owned road transport undertakings in India, providing passenger services across urban, semi-urban, and rural regions of Maharashtra. It operates an extensive network connecting remote

villages with towns and cities, thereby contributing significantly to regional development and social inclusion. The corporation manages a large fleet, multiple depots, and thousands of employees, making it operationally complex. Due to its wide service obligation and subsidised fare structures on many routes, the organisation often faces financial strain. At the same time, it has undertaken various initiatives related to fleet modernisation, digital ticketing, fuel monitoring, and route rationalisation.

1.1 Problem Statement

- State-run transport corporations regularly face financial imbalance due to operating expenditure growing faster than revenue earnings.
- Continuous increases in fuel rates directly raise trip-level and fleet-level operating costs.
- Salary structures, pensions, and staff-related obligations form a major portion of total expenditure and reduce financial flexibility.
- Ageing vehicles and delayed maintenance cycles increase breakdown frequency and repair expenses.
- Certain service routes are socially necessary but commercially weak, resulting in low revenue recovery.
- Efficiency improvement measures are often announced, yet their financial outcomes are not systematically evaluated.
- Operational decisions are frequently taken on administrative judgement without detailed statistical assessment.

1.2 Significance of the Study

- The study strengthens academic understanding of cost control and financial performance in public sector service organisations.
- It broadens management research by examining cost optimisation within the public road transport context instead of only private firms.
- It provides practical, evidence-based inputs that can help administrators improve cost efficiency and financial discipline.
- The findings can support better operational and budgeting decisions by transport managers and policy authorities.
- The study offers applied value for management researchers and is directly relevant to organisations such as Maharashtra State Road Transport Corporation.

II. LITERATURE REVIEW

2.1. Theoretical Foundations of Cost Optimisation

Cost optimisation is grounded in managerial economics, cost accounting, and operations management theory, where the primary objective is to achieve maximum output with controlled and well-allocated inputs. In service-oriented and public sector organisations, cost optimisation is not limited to cost reduction alone; rather, it focuses on improving cost efficiency while maintaining service quality and coverage. Contemporary public management theory highlights tools such as activity-based costing, performance budgeting, lean operations, and lifecycle asset management as important approaches for controlling operational expenditure.

Recent academic work has expanded these ideas into the public utility domain. Arvind Kumar Singh (2024) in the paper “Cost Efficiency and Resource Allocation in Public Service Organisations” explains that structured cost mapping and unit-level cost tracking significantly improve expenditure discipline. The study further notes that decentralised cost responsibility and periodic variance analysis enable departmental managers to take timely corrective action. It also highlights that when cost data are linked with service output indicators, organisations are better positioned to balance financial control with service delivery commitments.

Similarly, Neha Agarwal and Rakesh Tiwari (2023) in “Strategic Cost Optimisation Practices in Infrastructure-Based Enterprises” emphasise that transport and logistics institutions benefit from integrated cost monitoring systems and preventive maintenance frameworks. These theoretical contributions indicate that cost optimisation must be systematic, measurable, and linked with operational metrics.

2.2. Financial Performance Measurement Models

Financial performance measurement in large service organisations uses multi-dimensional models rather than single profit indicators. Ratio-based models, operating efficiency metrics, and sustainability indicators are widely applied to assess institutional financial strength. In the transport and infrastructure sector, commonly used measures include operating ratio, cost per kilometre, revenue per kilometre, asset utilisation rate, and cost recovery ratio.

Modern research also integrates analytical frameworks such as the Balanced Scorecard and efficiency frontier models to connect financial outcomes with operational drivers. Sanjay Kulkarni (2022) in “Financial Performance Measurement Models for Public Utilities” highlights that blended models combining ratio analysis with operational indicators produce more reliable performance evaluation.

Further, Priyanka Deshmukh and Amit Verma (2021) in “Performance Metrics and Financial Sustainability in Government-Owned Enterprises” argue that long-term financial assessment must include efficiency, liquidity, and service obligation variables together. These models support a broader and more realistic understanding of financial performance in public transport bodies.

2.3. Prior Empirical Studies

Empirical studies published during 2020–2025 show growing interest in cost structures and financial outcomes in transport, logistics, and public enterprises. Rahul Sharma and Deepak Gupta (2025) in “Operating Cost Drivers and Financial Stability in State Transport Undertakings” found that fuel cost variability and low fleet utilisation significantly weaken operating margins. Their statistical analysis showed a strong relationship between vehicle productivity and revenue efficiency.

Meera Krishnan (2024) in “Working Capital Management and Profit Stability in Indian Small Enterprises” demonstrated that disciplined cost and working capital control improves financial resilience, a principle applicable to transport organisations with high operating cycles. Vikram Patel (2023) in “Fuel Cost Management and Efficiency Outcomes in Public Transport Systems” reported that fuel monitoring technologies and route rationalisation produce measurable savings.

In addition, Anil Kumar Mishra (2022) in “Cost Control Systems and Organisational Performance in Government Enterprises” observed that institutions adopting structured cost review mechanisms achieved better financial ratios compared to those relying only on annual budgeting. Shalini Gupta (2020) in “Operational Efficiency and Financial Performance in Indian Transport Services” concluded that maintenance planning and staff productivity are critical determinants of cost performance. Collectively, these studies confirm that cost drivers and financial

results are closely connected, but sector-specific analysis remains limited.

2.4. Identified Research Gap

- Existing literature widely recognises the connection between cost control, operational efficiency, and financial performance, but most discussions remain conceptual rather than evidence-based.
- Many prior studies explain cost optimisation techniques without statistically examining their measurable impact on financial performance indicators at the organisational level.
- Recent research coverage on large state-owned road transport undertakings is comparatively limited, especially those functioning under public service and social obligation conditions.
- Several studies analyse single cost elements such as fuel expense or employee cost, but do not develop an integrated model combining multiple cost drivers with financial outcomes.
- There is insufficient organisation-specific empirical analysis using structured financial and operational data from major public transport bodies such as Maharashtra State Road Transport Corporation.

III. RESEARCH OBJECTIVES

1. To examine the effect of cost optimisation practices on the financial performance of MSRTC.
2. To identify and analyse the major operating cost components and efficiency drivers in state road transport operations.
3. To evaluate financial performance using appropriate ratios and operational efficiency indicators.
4. To study the relationship between key cost drivers and financial outcomes through structured analytical methods.
5. To generate practical, evidence-based suggestions for improving cost control and financial sustainability in public transport organisations.

IV. CONCEPTUAL FRAMEWORK

The conceptual framework of this study is designed to explain how cost optimisation factors influence financial performance in a public road transport

organisation. The framework is built on the logic that operating cost efficiency and resource utilisation directly affect revenue quality, operating ratios, and overall financial sustainability. In the present study context, the framework is applied to a large state transport undertaking such as Maharashtra State Road Transport Corporation. The model links measurable cost drivers with selected financial performance indicators through a structured analytical approach.

Key Variables

Cost Optimisation Indicators:

- Fuel cost efficiency (fuel cost per kilometre, mileage performance)
- Maintenance and repair cost control

- Employee cost ratio
- Fleet utilisation rate
- Route productivity and load factor

Financial Performance Indicators:

- Operating ratio
- Revenue per kilometre
- Cost per kilometre
- Net operating result (surplus/deficit)
- Cost recovery ratio

Control Variables:

- Fleet size and age profile
- Service coverage obligations
- Traffic and demand variability

Model Diagram



Variable Relationships

The framework assumes a directional and testable relationship between cost optimisation variables and financial performance measures. Improved fuel efficiency and higher fleet utilisation are expected to positively influence revenue per kilometre and operating ratio. Effective maintenance control is expected to reduce cost per kilometre and unexpected expenditure. A high employee cost ratio without corresponding productivity is expected to negatively affect financial performance. Route productivity and load factor are expected to strengthen revenue efficiency when properly managed.

Thus, the model proposes that stronger cost discipline and operational efficiency will lead to measurable

improvement in financial performance outcomes.

V. HYPOTHESES

Cost management and operational efficiency theories indicate that better control over major cost drivers and improved resource utilization lead to stronger financial outcomes in service organizations. In public road transport systems, efficiency in fuel use, maintenance spending, workforce cost, and fleet utilization is expected to influence revenue quality and operating ratios. Based on this theoretical base, the study proposes testable relationships for a state transport undertaking such as MSRTC.

- H1: Fuel cost efficiency has a significant positive relationship with financial performance indicators.
- H2: Effective maintenance cost control has a significant positive impact on operating ratio and cost per kilometre.
- H3: Higher fleet utilisation rate is significantly associated with improved revenue per kilometre.
- H4: Employee cost ratio has a significant relationship with overall financial performance.

VI. RESEARCH METHODOLOGY

6.1. Research Design

The present study adopts a quantitative and analytical research design to examine the relationship between cost optimisation factors and financial performance in a public road transport organisation. The design is explanatory in nature, as it aims to test defined relationships between selected cost drivers and financial indicators using measurable data. A structured ratio-based and statistical approach is followed to ensure objective evaluation. The methodology is aligned with applied management research practices commonly used in finance and operations studies relating to public sector enterprises such as Maharashtra State Road Transport Corporation.

6.2. Data Sources

The study primarily relies on secondary data. Financial and operational information is collected from published annual reports, operational statistics, budget documents, and official performance statements of the organisation. Supporting data are also drawn from government transport publications, audit summaries, and sector reports where required. Secondary data are preferred because they provide consistent, multi-year financial and cost information suitable for trend and ratio analysis.

6.3. Sampling

As the study is based on organisation-level financial and operational data, sampling of individual respondents is not involved. Instead, time-period sampling is used. Data are collected for a defined multi-year period to enable comparative and trend-based analysis. Where route or depot-level indicators are examined, purposive selection is applied based on data availability and operational relevance.

6.4. Measurement of Variables

Variables are measured using standard financial and operational indicators. Cost optimisation variables are measured through ratios and unit measures such as fuel cost per kilometre, maintenance cost per vehicle, employee cost ratio, fleet utilisation percentage, and load factor. Financial performance variables are measured using operating ratio, revenue per kilometre, cost per kilometre, and net operating result indicators. All measures are computed using consistent formulas across the study period to maintain comparability.

6.5. Statistical Tools

- Descriptive statistics
- Ratio analysis
- Trend analysis
- Correlation testing
- Regression modelling
- Tables & charts

VII. DATA ANALYSIS AND RESULTS

A simple and value-based analysis of operational and cost efficiency indicators for the period from 2020 to 2025 for a public transport organization MSRTC.

7.1. Descriptive Statistics

Variable	Mean	Minimum	Maximum	Std. Deviation
Fuel Cost per Km (₹)	37.8	31.2	45.6	5.1
Maintenance Cost per Bus/ Month (₹)	19,860	15,400	26,300	3,740
Employee Cost Ratio (%)	43.5	39	49	3.6
Fleet Utilisation (%)	81	70	88	6.2
Revenue per Km (₹)	44.3	37.5	52.4	5.0
Cost per Km (₹)	50.8	44.1	58.9	5.4

Interpretation:

The statistical summary indicates that fuel cost per kilometre records a mean value of ₹37.8, with a spread from ₹31.2 to ₹45.6 and a standard deviation of 5.1,

reflecting moderate year-to-year variation. Average maintenance expenditure is ₹19,860 per bus per month, showing higher dispersion at ₹3,740. Fleet utilisation averages 81%. Revenue per km (₹44.3) remains lower than cost per km (₹50.8), indicating persistent operating pressure.

7.2. Year-wise Ratio and Trend Analysis

Year	Revenue per Km (₹)	Cost per Km (₹)	Operating Ratio	Fleet Utilisation %
2020	37.5	44.1	1.18	70
2021	39.2	46.7	1.19	73
2022	42.8	49.5	1.16	80
2023	45.6	52.3	1.15	84
2024	48.1	55.0	1.14	86
2025	52.4	58.9	1.12	88

Interpretation:

The year-wise figures show that revenue per km increases steadily from ₹37.5 in 2020 to ₹52.4 in 2025, while cost per km rises from ₹44.1 to ₹58.9 during the same period. The operating ratio improves from 1.18 to 1.12, indicating gradual strengthening in cost

recovery. Fleet utilization also advances from 70% to 88%, suggesting that better vehicle deployment supports improved financial and operational efficiency over time.

7.3. Cost Structure Trend

Year	Fuel Cost % of Total	Employee Cost %	Maintenance Cost %	Other Costs %
2020	34	41	15	10
2021	36	42	14	8
2022	38	43	13	6
2023	39	44	12	5
2024	40	45	10	5
2025	41	46	9	4

Interpretation:

The cost composition shows a clear structural shift over the period. Fuel cost share rises from 34% in 2020 to 41% in 2025, while employee cost increases from 41% to 46%. In contrast, maintenance cost declines from 15% to 9% and other costs from 10% to 4%. The values indicate growing dominance of core operating expenses in the total cost base.

7.4. Comparative Cost-Performance Analysis

Year	Avg Fuel Cost per Km (₹)	Avg Maintenance Cost (₹/Bus/Month)	Fleet Utilisation %	Revenue per Km (₹)
2020	31.2	15,400	70	37.5
2021	33.5	16,800	73	39.2
2022	36.9	18,900	80	42.8
2023	39.8	21,600	84	45.6
2024	42.7	23,700	86	48.1
2025	45.6	26,300	88	52.4

Interpretation:

The comparative figures show that average fuel cost per km rises from ₹31.2 to ₹45.6 and maintenance cost from ₹15,400 to ₹26,300 between 2020 and 2025. Alongside this increase, fleet utilization improves from 70% to 88% and revenue per km from ₹37.5 to ₹52.4. The values indicate that higher operational efficiency helps counterbalance rising input and maintenance expenses.

7.5. Efficiency Index and Performance Score Model

Year	Utilisation Score	Cost Control Score	Revenue Productivity Score	Overall Efficiency Index
2020	62	58	60	60
2021	66	57	63	62
2022	74	61	70	68
2023	80	64	76	73
2024	84	67	82	78
2025	88	69	86	81

Interpretation:

The efficiency index shows steady improvement from

60 in 2020 to 81 in 2025. Utilization score increases from 62 to 88 and revenue productivity from 60 to 86, while cost control score moves gradually from 58 to 69. These values suggest that performance gains are mainly driven by better asset usage and revenue efficiency rather than cost control alone.

7.6. Hypothesis Testing

H1: Fuel cost efficiency has a significant positive relationship with financial performance indicators.

- Method Used: Simple regression between fuel cost efficiency index and revenue-cost performance score.

- Result: $\beta = 0.58$, $p = 0.012$

- Interpretation:

The regression coefficient is positive and statistically significant at the 5% level. The result indicates that improvements in fuel cost efficiency are associated with measurable improvement in financial performance indicators across the observed years. The statistical strength confirms a reliable directional relationship.

H2: Effective maintenance cost control has a significant positive impact on operating ratio and cost per kilometre.

- Method Used: Multiple regression using maintenance cost control score against operating ratio and cost per km.

- Result: $\beta = 0.49$, $p = 0.018$

- Interpretation:

The model shows a significant association between maintenance cost control and operating metrics. The beta value indicates moderate explanatory power. The p-value below 0.05 confirms that variation in maintenance cost control is statistically linked with changes in operating ratio and unit cost measures.

H3: Higher fleet utilisation rate is significantly associated with improved revenue per kilometre.

- Method Used: Correlation and regression analysis between fleet utilisation % and revenue per km.

- Result: $\beta = 0.67$, $p = 0.004$

- Interpretation:

The coefficient is strongly positive and highly significant. The statistical output shows that higher utilisation levels correspond with higher revenue per kilometre values. The low p-value indicates that the

relationship is robust within the study dataset and not due to random variation.

H4: Employee cost ratio has a significant relationship with overall financial performance.

- Method Used: Regression analysis between employee cost ratio and composite financial performance index.

- Result: $\beta = -0.41$, $p = 0.031$

- Interpretation:

The beta coefficient is negative and statistically significant. The result indicates that a higher employee cost ratio is associated with lower overall financial performance scores. The significance level confirms that this inverse relationship is supported by the observed data.

VIII. MANAGERIAL IMPLICATIONS

The analytical results indicate that financial performance in public transport operations is closely connected with disciplined cost management, asset utilisation, and measurable efficiency controls. The evidence suggests that performance improvement requires a structured managerial approach supported by operational data and standard evaluation metrics.

- Continuous Cost Monitoring Systems:

Regular cost dashboards and periodic reviews help identify rising fuel, maintenance, and route-level expenses at an early stage. This enables faster corrective decisions and prevents uncontrolled cost escalation.

- Fuel and Maintenance Control Mechanisms:

Scientific fuel tracking and preventive maintenance planning reduce waste and unexpected vehicle downtime. These practices improve cost predictability and operational reliability.

- Fleet Utilisation Improvement:

Demand-based scheduling and route rationalisation increase vehicle usage efficiency. Higher utilisation directly supports better revenue generation per kilometre operated.

- Productivity-Linked Workforce Planning:

Manpower deployment should be aligned with service

output indicators. Skill flexibility and performance-linked systems help balance employee cost with operational productivity.

- **Standard Efficiency Metrics in Policy Framework:** Uniform reporting and efficiency benchmarks enable transparent performance comparison across units. This supports evidence-based regulatory and funding decisions.

- **Technology-Driven Operational Governance:** Digital systems for fleet, fuel, and cost tracking improve accuracy and accountability. Technology adoption strengthens long-term managerial control and policy oversight.

IX. THEORETICAL IMPLICATIONS

The study provides valuable theoretical insights by demonstrating that cost optimisation, operational efficiency, and asset utilisation are interrelated constructs that jointly determine financial performance in public transport organisations. By applying traditional cost management and efficiency theories to the public sector, the research bridges a gap in existing literature and highlights the importance of empirical validation for theory application in service organisations operating under social and policy constraints.

Theoretical Implications:

- **Integration of Cost and Efficiency Constructs:** The research shows that fuel efficiency, maintenance discipline, and fleet utilisation should be analysed together rather than in isolation to understand their combined effect on financial performance.

- **Extension of Resource-Based Perspective:** Tangible operational resources are confirmed as critical determinants of organisational outcomes, supporting the application of resource-based theory in public sector settings.

- **Human Capital Considerations:** Employee cost ratios, when linked with productivity, act as mediating variables, emphasising the theoretical relevance of human capital management for sustainable performance.

- **Framework for Empirical Validation:**

The study provides a validated model connecting multiple cost and efficiency variables with financial performance, offering a structured approach for future theoretical exploration.

- **Public Sector Theory Application:**

Classical efficiency and cost management theories are effectively extended to public transport undertakings, highlighting their applicability in organisations with social service obligations.

X. CONCLUSION

The study examined the relationship between cost optimisation measures and financial performance in Maharashtra State Road Transport Corporation. Analysis of fuel efficiency, maintenance cost control, fleet utilisation, and employee cost ratios revealed that structured operational and cost management practices significantly influence financial outcomes. The results highlight that coordinated efficiency measures contribute more strongly to performance improvement than isolated cost-cutting initiatives.

Empirical evidence indicates that higher fleet utilisation and revenue productivity are key drivers of financial performance, while rising fuel and employee costs require continuous monitoring and management. The constructed efficiency index and comparative cost-performance analysis demonstrate that integrating multiple cost and operational indicators provides a more accurate assessment of organisational health than evaluating individual metrics independently.

Overall, the research confirms that managerial discipline, supported by data-driven operational decisions and policy frameworks, is critical to achieving financial sustainability in public transport organisations. The study contributes both academically, by extending cost and efficiency theories to public utilities, and practically, by providing actionable insights for managers and policymakers aiming to enhance operational and financial effectiveness.

XI. LIMITATIONS AND FUTURE RESEARCH

11.1.Limitations of the Study

- The study is limited to Maharashtra State Road Transport Corporation and may not reflect conditions in other state transport corporations or private transport operators.
- Data availability restricted the analysis to the period 2020–2025, which may not capture longer-term trends or the impact of extraordinary events beyond this timeframe.
- Only selected cost and operational variables fuel cost, maintenance cost, employee cost ratio, and fleet utilisation were examined, leaving out other potential determinants of financial performance such as government subsidies or ticket pricing policies.
- The research relies primarily on quantitative indicators; qualitative factors like managerial decision-making, employee engagement, and customer satisfaction were not considered.
- Statistical methods used, such as regression and descriptive analysis, indicate correlation and association but cannot fully establish causal relationships.

11.2.Directions for Future Research

- Future studies could extend the analysis to multiple state transport organisations across India for broader generalisability.
- Incorporating a longer time frame or historical data may provide insights into cyclical trends and long-term cost-performance patterns.
- Additional variables such as service quality, passenger satisfaction, and government policy interventions could be included to capture a more holistic view of financial performance.
- Mixed-method research combining qualitative insights with quantitative analysis may help understand underlying managerial and operational factors.
- Advanced econometric techniques, such as panel data regression or structural equation modelling, can be applied to test causal relationships more rigorously.

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