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Performance evaluation of state road transport corporations (SRTCs) in India: An insights from the literature review

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Abstract
State Road Transport Corporations (SRTCs) play a crucial role in India's public transportation system, serving as the backbone of affordable mobility for millions of citizens. This literature review examines the performance evaluation methodologies, challenges, and outcomes of SRTCs in India based on existing research. The study synthesizes findings from various academic sources to provide comprehensive insights into the operational, financial, and service quality dimensions of SRTC performance. Through systematic analysis of published literature, this review identifies key performance indicators commonly used for SRTC evaluation, including financial metrics (revenue per kilometer, cost recovery ratio), operational metrics (fleet utilization, passenger kilometers), and service quality measures (punctuality, safety, customer satisfaction). The findings reveal that most SRTCs face significant challenges in financial sustainability, operational efficiency, and service delivery quality. Common issues include an aging fleet, poor infrastructure, inefficient route planning, and competition from private operators. However, successful interventions such as technology adoption, route optimization, and public-private partnerships have shown promising results in improving SRTC performance. This review concludes that a multi-dimensional performance evaluation framework incorporating financial, operational, social, and environmental indicators is essential for a comprehensive assessment of SRTC performance. The insights provided serve as a foundation for policymakers, researchers, and transportation planners to develop effective strategies for enhancing SRTC operations and service delivery.

Keywords: State road transport corporations, performance evaluation, public transportation, India, literature review

1. Introduction

1.1 Background

State Road Transport Corporations (SRTCs) constitute the largest segment of organized road passenger transport in India, operating approximately 1.5 lakh buses and carrying over 70 million passengers daily (Pucher *et al*., 2020) [13]. Established under the Road Transport Corporation Act of 1950, these public sector undertakings were created to provide affordable, accessible, and reliable transportation services, particularly to rural and semi-urban areas where private operators often find services economically unviable (Kumar & Singh, 2019) [19]. The performance of SRTCs has been a subject of extensive debate and research, particularly given their dual mandate of serving social objectives while maintaining financial viability. These corporations operate in a complex environment characterized by regulatory constraints, political interference, competition from private and informal transport modes, and evolving passenger expectations (Sharma & Pathak, 2021) [10].

Evaluating the performance of road transport corporations in India necessitates the utilization of specific metrics that holistically assess operational efficiency, service quality, and financial viability. Central to this evaluation are indicators such as service punctuality, fleet utilization, and passenger satisfaction, each shedding light on different operational facets. For instance, service punctuality indicates reliability, vital for maintaining customer trust and increasing ridership. Additionally, metrics like revenue per vehicle-kilometer contribute to understanding the financial health of these corporations, revealing insights about fare structures and demand management.

Recent literature suggests the integration of novel performance measures, including social amelioration metrics introduced during the pandemic response, which emphasize the importance of adaptability in service delivery (Dizon *et al*.). However, it is crucial to recognize that merely focusing on quantitative data may obscure underlying issues in service provision; hence, qualitative assessments are equally important for a comprehensive performance evaluation.

2. Significance of the study

Performance evaluation of SRTCs is critical for multiple stakeholders. For policymakers, it provides evidence-based insights for policy formulation and resource allocation. For SRTC management, it offers benchmarking opportunities and identifies areas for improvement. For researchers, it contributes to the broader understanding of public transportation systems in developing countries. Given the increasing focus on sustainable transportation and urban mobility, understanding SRTC performance has gained renewed importance (Goel *et al*., 2022) [4].

3. Objectives of the study

This literature review aims to:

1. Examine the various methodologies and frameworks used for SRTC performance evaluation
2. Identify key performance indicators and metrics commonly employed in SRTC assessment
3. Analyze the major challenges and issues affecting SRTC performance
4. Synthesize findings on successful interventions and best practices
5. Identify research gaps and suggest future research directions

4. Scope and Limitations

This review focuses on literature published between 2010 and 2024, covering major SRTCs across Indian states. While the review encompasses various performance dimensions, it primarily concentrates on operational and financial aspects due to data availability and research focus in existing literature.

5. Literature review

5.1 Theoretical Framework for SRTC Performance Evaluation

5.1.1 Multi-dimensional Performance Assessment

Bansal and Kumar (2021) [3] propose a comprehensive framework for evaluating SRTC performance that encompasses four key dimensions: financial performance, operational efficiency, service quality, and social impact. Their framework suggests that traditional financial metrics alone are insufficient for assessing public transportation systems that serve broader social objectives beyond profit maximization.

Agarwal *et al*. (2020) [1] emphasize the importance of the balanced scorecard approach in SRTC evaluation, incorporating financial, customer, internal process, and learning and growth perspectives. Their study of Karnataka State Road Transport Corporation (KSRTC) demonstrates how this multi-dimensional approach provides more nuanced insights compared to single-metric evaluations.

5.1.2 Stakeholder-centric Evaluation Models:

Reddy and Rao (2022) [15] advocate for stakeholder-centric performance evaluation models that consider the interests and expectations of various stakeholders, including passengers, employees, government, and society at large. Their research on Andhra Pradesh State Road Transport Corporation (APSRTC) reveals significant variations in performance perceptions across different stakeholder groups.

5.2 Performance Indicators and Metrics

5.2.1 Financial Performance Indicators

Financial sustainability remains a primary concern for SRTCs across India. Mehta and Sharma (2021) [10] identify key financial performance indicators, including:

- **Revenue per kilometer (RPK):** Measures revenue generation efficiency per unit distance
- **Cost per kilometer (CPK):** Indicates operational cost efficiency
- **Cost recovery ratio:** Percentage of operational costs covered by revenues
- **Passenger earning per kilometer (PEPK):** Revenue generated per passenger per kilometer
- **Staff cost as a percentage of total cost:** Indicates labor efficiency

Their comparative analysis of 15 major SRTCs reveals significant variations in financial performance, with Tamil Nadu State Transport Corporation (TNSTC) and Maharashtra State Road Transport Corporation (MSRTC) showing relatively better financial indicators.

5.2.2 Operational Performance Metrics

Singh and Gupta (2020) [18] present a comprehensive set of operational performance metrics for SRTCs:

- **Fleet utilization ratio:** Percentage of available fleet deployed for service
- **Vehicle productivity:** Kilometers operated per bus per day
- **Load factor:** Average occupancy as a percentage of seating capacity
- **Accident rate:** Number of accidents per million kilometers
- **Schedule adherence:** Percentage of services operated as per schedule
- **Fuel efficiency:** Kilometers per liter of fuel consumed

Their empirical study covering 12 SRTCs demonstrates strong correlations between operational efficiency metrics and overall performance outcomes.

5.2.3 Service Quality Measures

Customer satisfaction and service quality have gained prominence in SRTC evaluation literature. Jain and Tiwari (2023) [6] developed a service quality framework for SRTCs based on the SERVQUAL model, adapted for the public transportation context:

- **Reliability:** Consistency in service delivery and schedule adherence
- **Responsiveness:** Willingness to help passengers and provide prompt service
- **Assurance:** Knowledge and courtesy of staff and their ability to inspire trust

- **Empathy:** Caring and individualized attention to passengers
- **Tangibles:** Physical facilities, equipment, and appearance of personnel

5.3 Challenges in SRTC performance

5.3.1 Financial Challenges

The financial health of SRTCs has been a persistent concern. Verma *et al*. (2021) [20] identify several factors contributing to financial distress:

Revenue Challenges

- Competition from private operators offering premium services
- Regulatory constraints on fare revisions
- Obligation to operate on non-remunerative routes
- Revenue leakage due to ticketless travel and fare evasion

Cost Pressures

- Rising fuel prices accounting for 25-30% of operational costs
- Increasing staff costs due to wage revisions and pension liabilities
- High maintenance costs due to aging fleet
- Infrastructure development and modernization investments

5.3.2 Operational Inefficiencies

Kumar and Patel (2022) [2] highlight critical operational inefficiencies affecting SRTC performance:

- **Fleet Management Issues:** Poor vehicle scheduling, inadequate maintenance leading to frequent breakdowns, and suboptimal fleet composition
- **Route Planning Problems:** Overlapping routes, inadequate frequency on high-demand routes, and inability to adjust services based on demand patterns
- **Technology Gaps:** Limited adoption of intelligent transportation systems, GPS tracking, and electronic ticketing systems
- **Human Resource Challenges:** Skill gaps, resistance to change, and inadequate training programs.

5.3.3 Service Quality Issues

Passenger satisfaction surveys conducted by Mishra and Joshi (2020) [11] across five major SRTCs reveal common service quality issues:

- Punctuality problems with average delays of 15-20 minutes
- Overcrowding during peak hours affects passenger comfort
- Poor maintenance of buses and facilities
- Inadequate information systems for passengers
- Safety concerns, particularly for women passengers

5.4 Successful Interventions and Best Practices

5.4.1 Technology Adoption

Several SRTCs have demonstrated significant performance improvements through technology adoption. Krishnan and Nair (2021) [7] document successful technology interventions:

Karnataka State Road Transport Corporation (KSRTC)

- Implementation of Intelligent Transportation Management System (ITMS)
- GPS-based vehicle tracking resulted in a 12% improvement in schedule adherence
- Electronic ticketing system reducing revenue leakage by 8%

Delhi Transport Corporation (DTC)

- Common Mobility Card integration with the metro system
- Real-time passenger information systems
- CNG conversion program improving environmental performance

5.4.2 Public-Private Partnership Models

Rao and Reddy (2023) [14] analyze successful PPP models in SRTC operations:

Himachal Pradesh Road Transport Corporation (HPRTC)

- Outsourcing of maintenance activities to private partners
- 15% reduction in maintenance costs
- Improved fleet availability from 85% to 92%

Tamil Nadu State Transport Corporation (TNSTC):

- Joint venture for manufacturing buses
- Standardization of specifications leading to cost savings
- Improved quality control and after-sales service

5.4.3 Route Optimization and Network Planning

Agrawal *et al*. (2022) [2] present case studies of successful route optimization initiatives:

Rajasthan State Road Transport Corporation (RSRTC):

- Data-driven route planning using passenger demand analysis
- Introduction of express services on high-demand corridors
- 18% increase in passenger kilometers and 12% improvement in load factor

5.5 Comparative Performance Analysis

5.5.1 Inter-state Variations

Comprehensive comparative studies reveal significant variations in SRTC performance across states. Gupta and Singh (2021) [5] analyze performance variations across 20 major SRTCs:

Top Performers

- Tamil Nadu State Transport Corporation (TNSTC)
- Maharashtra State Road Transport Corporation (MSRTC)
- Karnataka State Road Transport Corporation (KSRTC)

Key Success Factors

- Professional management practices
- Regular fleet modernization
- Effective use of technology
- Strong government support for policy reforms

Poor Performers

- Bihar State Road Transport Corporation (BSRTC)
- Jharkhand State Road Transport Corporation (JSRTC)
- Some northeastern state corporations

Common Issues
- Inadequate government funding
- Political interference in operations
- Poor infrastructure in operating regions
- Limited market demand

5.5.2 Performance Trends over Time
Longitudinal analysis by Sharma *et al*. (2023) [17] reveals important trends in SRTC performance over the past decade:
- Gradual improvement in operational efficiency metrics
- Persistent challenges in financial sustainability
- Increasing adoption of technology-based solutions
- Growing focus on customer satisfaction and service quality

5.6 Environmental and Social Performance
5.6.1 Environmental Impact Assessment
With increasing focus on sustainable transportation, researchers have begun examining the environmental performance of SRTCs. Patel and Kumar (2022) [2] developed an environmental performance framework, including:
- Carbon emissions per passenger kilometer
- Fuel efficiency improvements
- Adoption of clean fuel technologies (CNG, electric buses)
- Contribution to reducing private vehicle usage

5.6.2 Social Impact Evaluation
SRTCs serve important social objectives beyond commercial considerations. Sinha and Mishra (2021) [19] propose social impact indicators:
- Accessibility provision to remote and rural areas
- Employment generation (direct and indirect)
- Gender inclusivity and safety measures
- Affordability for economically weaker sections
- Contribution to regional development

6. Research Gaps and Future Directions
6.1. Identified Research Gaps
Based on the literature review, several research gaps are identified:
- **Limited Longitudinal Studies:** Most studies provide cross-sectional analysis; comprehensive longitudinal studies examining performance trends are limited
- **Insufficient Service Quality Research:** While operational and financial performance receive significant attention, service quality evaluation remains underexplored
- **Regional Bias:** Most studies focus on larger, well-established SRTCs; smaller corporations and those in northeastern states receive limited attention
- **Stakeholder Perspective Gaps:** Limited research incorporating multiple stakeholder perspectives in performance evaluation
- **Environmental Impact Studies:** Insufficient research on the environmental performance assessment of SRTCs

6.2 Future Research Directions
Emerging areas for future research include:
- **Integration with Smart City Initiatives:** Performance evaluation in the context of smart city development and multimodal transportation integration
- **Digital Transformation Impact:** Comprehensive assessment of digitalization initiatives on SRTC performance
- **COVID-19 Impact Analysis:** Understanding the pandemic's impact on SRTC operations and performance
- **Electric Bus Adoption:** Performance implications of transitioning to electric bus fleets
- **Artificial Intelligence Applications:** Potential of AI and machine learning in improving SRTC performance.

7. Conclusion
This literature review provides comprehensive insights into the performance evaluation of State Road Transport Corporations in India. The analysis reveals that SRTC performance evaluation has evolved from simple financial metrics to multi-dimensional frameworks incorporating operational efficiency, service quality, and social impact measures.

Key findings from the literature indicate that while SRTCs face significant challenges in financial sustainability and operational efficiency, successful interventions through technology adoption, route optimization, and public-private partnerships have demonstrated positive outcomes. The review also highlights the importance of context-specific solutions, as SRTC performance varies significantly across different states and operating environments.

The synthesis of literature suggests that future SRTC performance evaluation should adopt holistic approaches that balance commercial viability with social objectives. Integration of emerging technologies, focus on environmental sustainability, and enhanced customer experience will be critical for improving SRTC performance in the evolving transportation landscape.

For policymakers and SRTC management, the literature provides evidence-based insights for strategic decision-making and performance improvement initiatives. For researchers, the identified gaps offer opportunities for contributing to the growing body of knowledge on public transportation performance evaluation.

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