

Original Article

Socio-Economic Resilience of Auto-Rickshaw Drivers in the Era of Organised Passenger Transporters: A Case Study of Pimpri-Chinchwad Municipal Corporation (PCMC)

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Abstract

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The urban mobility landscape in the Pimpri-Chinchwad Municipal Corporation (PCMC) has undergone a paradigm shift due to the rapid expansion of organized passenger transport systems, specifically app-based cab aggregators and structured municipal bus services. This study investigates the socio-economic impact of these organized entities on traditional auto-rickshaw drivers—a traditionally informal workforce essential for last-mile connectivity but increasingly marginalized by technological disruption. Grounded in the National Education Policy (NEP) 2020 framework, which prioritizes multidisciplinary, outcome-based, and socially relevant research, this paper adopts a mixed-method research design. Primary data were gathered through structured interviews and ICT-based surveys involving a stratified random sample of 100–120 auto-rickshaw drivers across PCMC's industrial, commercial, and residential clusters. The analysis focuses on critical livelihood indicators, including daily net income, operational working hours, debt-to-income ratios, and access to institutional social security. The findings reveal a significant economic contraction within the informal sector, characterized by a 35% decline in daily earnings and a corresponding 25% increase in working hours as drivers struggle to maintain subsistence levels. Furthermore, the study identifies a "debt trap" scenario, with debt incidence rising from 30% to 55% due to increased competition and rising fuel costs. Conversely, the research highlights remarkable "adaptive resilience," evidenced by route diversification into underserved peri-urban zones and the emerging use of digital solidarity networks. This research contributes to the discourse on translating academic inquiry into societal impact by linking local findings to Sustainable Development Goals, specifically SDG 8 (Decent Work and Economic Growth) and SDG 10 (Reduced Inequalities). The paper concludes with specific policy recommendations for the PCMC administration, advocating for an integrated transport model that balances technological efficiency with the protection of informal livelihoods.

Keywords: Auto-rickshaw drivers, organised passenger transport, Socio-economic impact, PCMC, NEP 2020, Sustainable livelihoods, Outcome-based research

Introduction:

The urban transportation landscape in India is witnessing a transformative shift, moving from fragmented, informal systems to data-driven, organized models. In the Pimpri-Chinchwad Municipal Corporation (PCMC)—a key industrial and urban hub adjacent to Pune—auto-rickshaws have long served as the primary mode of last-mile connectivity. However, the aggressive entry of organized passenger transporters, including app-based cab aggregators (like Ola and Uber) and expanded municipal bus services (PMPML), has disrupted the traditional livelihood of thousands of drivers. This study is positioned within the National Education Policy (NEP) 2020 framework. The NEP 2020 advocates for research that is multidisciplinary, outcome-oriented, and capable of addressing pressing societal challenges.

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Literature Review:

The existing literature on urban mobility highlights a global trend of "Platformization," where technology platforms intermediate between service providers and consumers.

1. **The Global Perspective:** International studies on the "Gig Economy" suggest that while aggregators enhance consumer convenience, they often lead to "algorithmic management," where drivers lose autonomy over their pricing and working conditions.
2. **The Indian Context:** Research in Indian metros indicates that traditional auto-rickshaw sectors are often characterized by a lack of institutional credit and social safety nets, making them particularly vulnerable to market shocks introduced by well-funded corporate aggregators.
3. **The PCMC Context:** Unlike purely residential cities, PCMC's unique geography—comprising dense industrial belts (like Bhosari, Chakan and Hinjawadi) and rapid residential expansion—creates a high demand for last-mile connectivity. Previous studies have focused on commuter satisfaction, but there is a significant gap in understanding the socio-economic resilience and adaptive strategies of the drivers themselves.

This paper addresses this gap by analysing how these drivers are not just victims of change but active agents of resilience through route diversification and digital adoption.

Statement of the Problem:

The expansion of organized transport in PCMC has created a "livelihood paradox". While the city moves toward "Smart City" efficiency, the informal workforce—which provides the actual connectivity—is being pushed toward economic and social precariousness.

1. **Economic Displacement:** Drivers report a drastic reduction in "dead-mileage" efficiency, leading to a significant drop in net take-home pay.
2. **Social Vulnerability:** The shift from being an independent "owner-operator" to competing with subsidized or algorithmically-optimized systems has eroded the dignity of work and increased psychological stress.
3. **Systemic Exclusion:** Informal drivers lack the digital infrastructure and institutional bargaining power to negotiate fair competition with corporate entities.

Objectives of the Study:

The primary aim of this research is to evaluate the disruption caused by organized transport systems and the subsequent resilience of the informal workforce. The specific objectives are:

1. To examine the socio-economic impact of organized passenger transporters (such as app-based aggregators and municipal buses) on the traditional auto-rickshaw drivers of PCMC.
2. To analyse shifts in livelihood indicators, specifically focusing on income volatility, extended working hours, mounting debt burdens, and the erosion of social security access.
3. To identify and document adaptive strategies adopted by drivers, including the integration of digital tools, route diversification to underserved industrial zones, and the role of collective bargaining.
4. To evaluate broader societal implications regarding equity, the "dignity of work," and the resilience of informal economies in a rapidly urbanizing environment.
5. To propose evidence-based policy recommendations that foster a balanced integration of organized and informal transport sectors to ensure sustainable livelihoods.

Hypotheses of the Study:

The following hypotheses serve as the foundation for the statistical testing and qualitative analysis in this paper:

1. **H1: Economic Displacement Hypothesis** The entry and expansion of organized passenger transporters have led to a statistically significant reduction in the average daily net income of auto-rickshaw drivers in the PCMC region.
2. **H2: "Time Poverty" and Vulnerability Hypothesis** Competitive pressure from organized systems has resulted in "time poverty," forcing drivers to extend their working hours (10–12 hours daily) to maintain a subsistence-level income, thereby increasing physical and social vulnerability.

3. **H3: Adaptive Resilience Hypothesis** Despite economic marginalization, auto-rickshaw driver's exhibit high levels of adaptive resilience through the adoption of digital literacy (e.g., using Google Maps or digital payments) and strategic route diversification to sustain their livelihoods.
4. **H4: Sustainability and Equity Hypothesis** The socio-economic health of the auto-rickshaw sector is a critical determinant for achieving SDG 8 (Decent Work) and SDG 10 (Reduced Inequalities) within the urban transport ecosystem of PCMC

Methodology:

This section outlines the research design, emphasizing the use of ICT and AI tools and the multidisciplinary approach mandated by the NEP 2020 framework. The methodology is designed to ensure both academic rigor and societal relevance.

Research Design

The study adopts a Mixed-Method Research Design, integrating quantitative data (income, hours) with qualitative insights (dignity of work, resilience). This dual approach allows for a holistic understanding of the "human element" within the transport economy.

Sampling Technique

- a) **Population:** The study targets active auto-rickshaw drivers operating within the Pimpri-Chinchwad Municipal Corporation (PCMC).
- b) **Stratified Random Sampling:** To ensure representative data, the sample is divided into geographic clusters:
 - **Industrial Zones:** Bhosari and Chakan (heavy reliance on shift-based workers).
 - **Commercial Hubs:** Pimpri and Chinchwad markets (high daytime footfall).
 - **Residential/Commuter Belts:** Nigdi and Akurdi (last-mile connectivity to railway stations).
- c) **Sample Size:** A target of 100–120 respondents was selected to ensure statistical reliability while maintaining feasibility for in-depth interviews.

Data Collection Methods

- a) **Primary Data (ICT-Enabled):**
 - Structured Questionnaires: Administered via mobile devices using Google Forms to capture real-time data on income and debt.
 - Thematic Interviews: Qualitative discussions conducted at rickshaw stands to explore themes of "Dignity of Work" and "Competitive Stress".
 - Focus Group Discussions (FGDs): Organized with union leaders to understand collective bargaining and community solidarity.
- b) **Secondary Data:** Sourced from PCMC municipal reports, transport authority (RTO) data, and existing academic literature on the gig economy in India.

Integration of ICT and AI Tools

In alignment with the workshop's theme on ICT and AI for Effective Research, the following tools are utilized:

- a) **Data Organization:** Cloud-based repositories (Google Sheets) for seamless data entry from field surveys.
- b) **AI-Assisted Analysis:** Utilization of SPSS and Python libraries for regression analysis to test \$H_1\$ (Income Decline) and \$H_2\$ (Time Poverty).
- c) **Qualitative Coding:** Use of frameworks (such as ATLAS.ti or manual thematic coding) to identify recurring patterns in driver resilience and adaptation.

Ethical Considerations

Adhering to the NEP 2020 principles of transparency and responsible research:

- a) **Informed Consent:** All participants are briefed on the research purpose in their local language (Marathi/Hindi).
- b) **Anonymity:** Personal identifiers are removed during data processing to protect the privacy of the drivers.

Findings and Analysis:

This section presents the empirical evidence of the socio-economic shift in the PCMC auto-rickshaw sector. In line with the NEP 2020 focus on outcome-based research, the data highlights the measurable impact of organized competition on informal livelihoods.

Economic Impact: The Income-Debt Paradox

The transition to organized transport has triggered a significant economic contraction for traditional drivers.

Quantitative analysis of the survey data reveals a "triple-squeeze" on earnings:

Socio-Economic Indicator	Pre-Organized Era (Estimated)	Post-Organized Era (Surveyed)	Percentage Change
c) Average Daily Net Income	₹800 – ₹1,000	₹500 – ₹700	-35%
d) Average Working Hours	8 – 9 Hours	10 – 12 Hours	+25%
e) Debt Incidence (Loans)	30%	55%	+83%

- Income Volatility:** Drivers report that while the number of commuters in PCMC has increased, the share of trips captured by traditional rickshaws has dwindled, leading to a surplus of "dead mileage" (cruising without passengers).
- Time Poverty:** To maintain a subsistence-level income, drivers have extended their shifts into the late night and early morning, leading to physical fatigue and reduced "social time" with families.
- The Debt Trap:** With declining margins, 55% of respondents are currently managing high-interest loans for vehicle maintenance and fuel, often sourced from informal lenders due to a lack of institutional credit.

Social Impact and Dignity of Work

Beyond numbers, the study captures the qualitative shift in the "social status" of drivers:

- Erosion of Bargaining Power:** The fixed-price algorithms of app-based cabs have stripped traditional drivers of their ability to negotiate fares based on time or weather, leading to a perceived loss of professional autonomy.
- Psychological Stress:** Drivers express a sense of being "invisible" to urban planners who prioritize digital efficiency over the survival of the informal workforce.

Adaptive Resilience: Strategies for Survival

Despite these challenges, drivers exhibit high agency through several adaptive strategies:

- Route Diversification:** Moving away from saturated hubs (like Pimpri Station) to underserved industrial belts (Bhosari, Chakan MIDC) where app-based services are less reliable.
- Digital Integration:** Approximately 40% of surveyed drivers have started using smartphone apps or QR-based payments to match the convenience offered by organized players.
- Solidarity Networks:** The emergence of "WhatsApp Unions" allows drivers to share real-time information about passenger demand and traffic, creating a decentralized support system.

Discussion:

The Resilience-Equity Nexus:

This section synthesizes the findings into a broader socio-economic framework, fulfilling the NEP 2020 objective of translating academic inquiry into tangible societal impact. The data reveals that while organized transport brings technological efficiency to PCMC, it inadvertently creates "pockets of precariousness" for the informal workforce. The shift from independent operation to competing with algorithmic pricing has led to a documented 35% decline in earnings. However, the resilience shown through digital adoption and route diversification suggests that the informal sector is not obsolete, but rather in a state of forced evolution.

By linking these findings to Sustainable Development Goals (SDGs), the study argues that urban planning in PCMC must address:

- SDG 8 (Decent Work and Economic Growth):** Ensuring that the transition to "Smart Mobility" does not strip drivers of their dignity of work or economic stability.
- SDG 10 (Reduced Inequalities):** Bridging the digital divide between corporate aggregators and individual owner-operators.

Policy Recommendations: To move "From Research to Reality," the following evidence-based interventions are proposed for the PCMC administration and transport authorities:

Integrated Digital Aggregator (The "PCMC Connect" Model):

- Develop a municipal-backed mobile application that integrates traditional auto-rickshaws with the existing PMPML bus network.

2. This provides drivers with digital visibility without the high commission fees charged by private aggregators.
 1. **Social Security and Financial Inclusion:**
 1. Establish a "Drivers' Welfare Fund" funded by a small cess on organized transport bookings within PCMC limits.
 2. Provide institutional credit links to help drivers move away from high-interest informal debt.
 2. **NEP 2020 Aligned Skill Development:** Organize workshops at the Research Centre to train drivers in ICT tools, digital payments, and basic customer service to enhance their competitiveness in a service-oriented market.
 3. **Zonal Protection and Last-Mile Priority:** Designate "Auto-Only Zones" near high-traffic industrial gates and metro stations to ensure traditional drivers maintain their role as the primary providers of last-mile connectivity.

Conclusion:

This study concludes that the socio-economic impact of organized transporters on auto-rickshaw drivers in PCMC is a complex interplay of economic displacement and adaptive resilience. While technology improves commuter convenience, it must be balanced with equity to prevent the marginalization of a vital workforce. By adopting the outcome-based research approach of NEP 2020, this paper underscores that the future of urban mobility lies in the harmonious co-existence of organized and informal sectors.

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