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Insights and Recommendations

India's Truck Fleet Operator Survey

2025

Disclaimer:

This report is based on surveys conducted in person by the Vasudha Foundation over a period of two months (September-October 2025). While every effort has been made to ensure the data's accuracy, neither All India Motor Transport Congress (AIMTC) nor the Vasudha Foundation guarantees its correctness or assumes responsibility for any consequences resulting from its use.

Authors:

Jaideep Saraswat, Nikhil Mall, Varun BR, Tushar Katiyar

Survey Team:

Dr. Preeti SIngh, Naveen Kumar, Mradul Sharma, Omkar Wakchaure, Bhagyasri Kala

Reviewers:

Srinivas Krishnaswamy, CEO, Vasudha Foundation

Bal Malkit Singh, Chairman-Core Committee, All India Motor Transport Congress

Naveen Kumar Gupta, Secretary General and CEO, All India Motor Transport Congress

Joymalya Bose, Assistant Vice President, Propel Industries Pvt. Ltd.

Editorial: Swati Bansal

Design: Aspire Design

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Executive Summary

India's trucking sector forms the backbone of national logistics, carrying nearly 70% of domestic freight volume and employing millions across its value chain. However, this vital sector faces mounting challenges—high emissions, fragmented operations, driving parnter attrition, and limited digitalisation—that impede efficiency and sustainability. As India pursues its net-zero by 2070 goal, transitioning to Zero-Emission Trucks (ZETs) represents a strategic imperative to reduce greenhouse gas emissions, enhance energy security, and modernise logistics.

To better understand industry readiness and barriers to adoption, the Centre for Zero Emission Truck Transition Support (CZETTS) conducted a nationwide survey of 217 fleet operators, representing over 3,600 trucks. The study offers rare, first-hand insights into operational realities, perceptions, and expectations shaping India's trucking ecosystem.

Key Insights

- Diesel dependency remains dominant (91% of fleets), though interest in cleaner technologies is growing rapidly.
- Operators travel an average of 344 km per day per vehicle, with range expectations for Battery Electric Trucks (BETs) around 382 km, indicating readiness once range and charging gaps are addressed.
- High upfront costs, lack of charging infrastructure, and unfamiliarity with technology are the top barriers to ZET adoption.
- 72% of operators expressed willingness to purchase BETs once these barriers are resolved.

Source: Freepik

- 81% of operators are ready to reskill their workforce for electric truck operations.
- Driving partner attrition and welfare challenges persist, driven by poor roadside amenities, long working hours, and limited insurance coverage.

Strategic Recommendations

The findings highlight the need for a coordinated ecosystem approach across policy, finance, and capacity-building fronts. Key recommendations include:

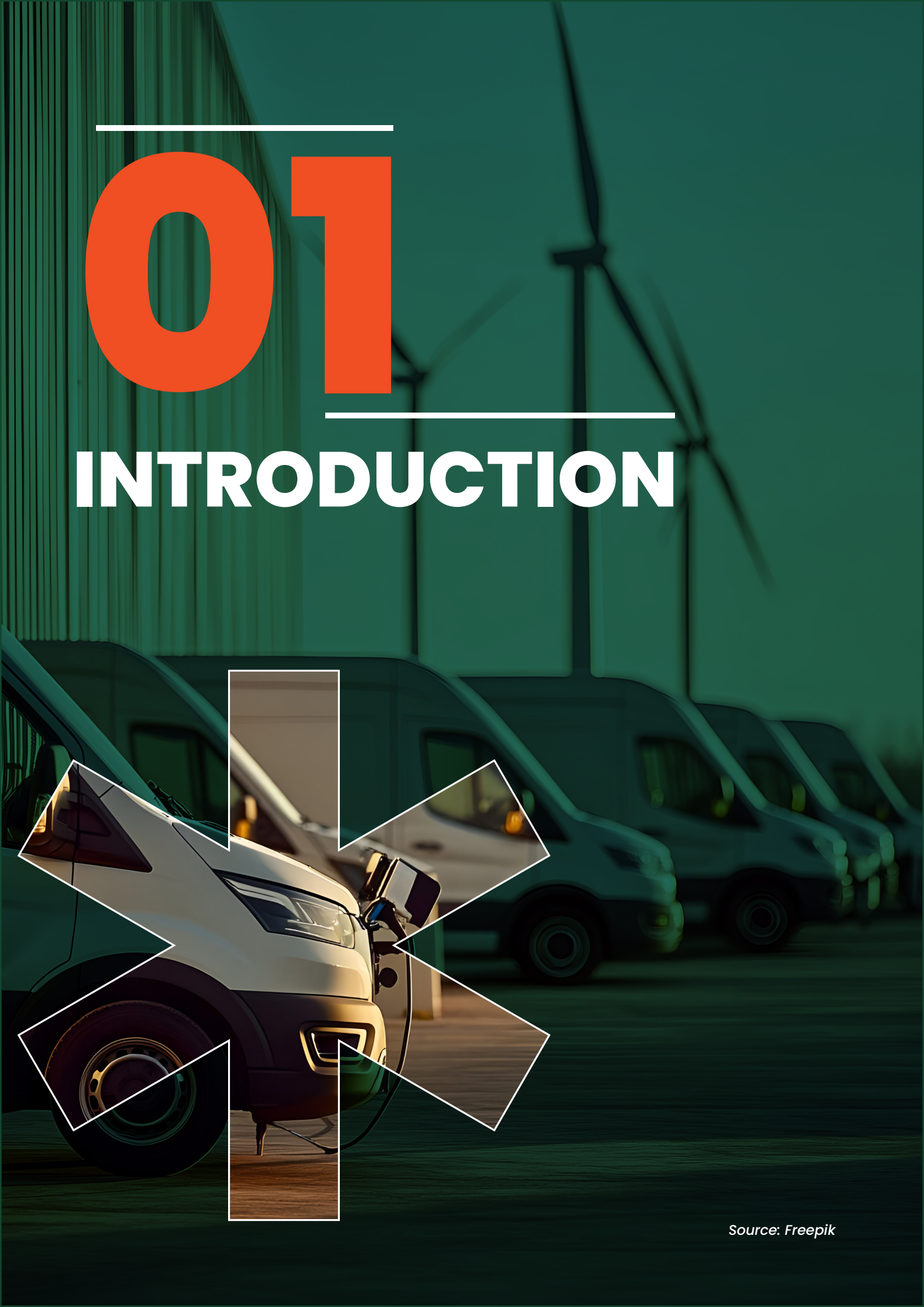
- Policy and Regulations: Mandate visibility of key metrics such as battery State of Health (SoH) and Remaining Useful Life (RuL); create battery refurbishment policies; and integrate low-emission freight obligations for clients.
- Financing: Develop shared insurance models, battery second-life financing, and OEM buyback or leasing mechanisms to reduce risk and improve affordability.
- Capacity Building: Implement large-scale training programmes for driving partners, mechanics, and fleet operators to strengthen operational readiness.
- Technology and Digitalisation: Promote data-driven fleet management and analytics adoption to reduce India's logistics cost-to-GDP ratio (currently 14–18%, nearly double the global average).
- Infrastructure: Accelerate charging network expansion through collaborative public–private frameworks aligned with operator route patterns.

The Way Forward

India's transition to ZETs is both an environmental necessity and an economic opportunity. Empowering fleet operators with the right policy support, financing access, and technological confidence can unlock a cleaner, more efficient, and future-ready freight ecosystem which will position India as a global leader in sustainable logistics.

01

INTRODUCTION



Source: Freepik

1.1 Background: Road Freight and Trucking in India

India's trucking sector is a cornerstone of the national freight transport ecosystem. It serves as the backbone of logistics and goods movement across the country, sustaining critical supply chains that drive commerce and economic growth. Road transport carries nearly 70% of domestic freight volume, predominantly through Medium-Duty and Heavy-Duty Trucks (MDTs and HDTs)[1]. As such, the sector plays a pivotal role in India's aspiration to become a developed nation by its centenary year of independence in 2047.

The Indian trucking industry is characterised by its immense scale and diversity. It stands as one of the largest truck markets globally. Currently, there are about 4 million MHDTs on the road, with an annual addition of approximately 0.3 million new trucks[2]. The sector caters to a wide array of industrial needs, including construction, mining, and logistics, using an extensive range of truck types and body configurations. Freight demand is projected to surge dramatically, from 2.214 trillion tonne-kilometres[3] in 2022 to 9.63 trillion tonne-kilometres by 2050[1], a growth trajectory fueled by urbanisation, rising income levels, and expanding e-commerce. Heavy-Duty Trucks (HDTs) currently handle the majority of this volume, fulfilling 76% of freight demand in 2022, a share projected to increase to 83% by 2050[4].

Despite its vital economic role, the transport sector faces significant environmental challenges. It is the third-highest Greenhouse Gas (GHG) emitting sector in the country, contributing approximately 14% of India's annual CO_2 emissions[5]. Of these emissions, road transport is the dominant contributor, responsible for around 90% of the total quantum[6]. Although MHDTs account for only about 2-3% of the total on-road vehicle population[7], they are responsible for a disproportionate share of road transport emissions, specifically 34% of CO_2 emissions and 53% of PM emissions. This imbalance highlights the urgent need for targeted strategies to improve efficiency, reduce emissions, and promote sustainable growth.

Compounding these challenges is the fragmented and largely unorganised structure of the industry. Persistent data gaps hinder a complete understanding of operational practices, cost structures, and emerging opportunities. These factors collectively underscore the importance of systematic insights into fleet operations which are critical not only for improving competitiveness but also for advancing India's decarbonisation goals.

1.2 The Case for Zero Emission Trucks (ZETs)

India's commitment to achieving net-zero emissions by 2070, as announced at COP26, places the decarbonisation of the transport sector at the forefront of national priorities. Road freight, heavily dependent on fossil fuels, is not only a significant source of GHG emissions but also a driver of rising oil import dependency which is estimated at 89% in FY 2022–23[8]. Transitioning to ZETs is therefore critical, both for advancing climate targets and for enhancing energy security by reducing exposure to the volatility of global fuel markets.

ZETs represent a technologically advanced and environmentally sustainable alternative to conventional diesel-powered trucks. By definition, they eliminate tailpipe emissions under all operating conditions. Three main technology pathways are emerging in this transition: Battery Electric Trucks (BETs), Hydrogen Fuel Cell Electric Trucks (FCETs), and Hydrogen-Internal Combustion Engine (ICE) trucks. Among these, BETs currently exhibit the highest level of commercial readiness, supported by ongoing advancements in battery performance, vehicle efficiency, and charging infrastructure.

One of the strongest arguments for ZET adoption lies in the potential for total cost of ownership (TCO) parity with diesel trucks. Although the initial acquisition cost of ZETs remains higher, long-term operating expenses are substantially lower due to reduced fuel costs and simplified maintenance requirements. This cost advantage is expected to strengthen as economies of scale improve and technology matures.

Despite the promise, significant challenges remain. High upfront capital costs, concerns around driving range and payload capacity, and the lack of widespread charging and hydrogen refuelling infrastructure present real barriers to adoption. Infrastructure deployment, in particular, is a critical enabler requiring expansion beyond metropolitan hubs into tier-2 and tier-3 cities to ensure equitable access and broad-based adoption. At the same time, regulatory clarity, financing mechanisms, and industry-wide awareness of ZET technologies and government support schemes will play an essential role in accelerating the transition.

The path forward is clear: scaling ZET adoption will require coordinated action across stakeholders like policymakers, manufacturers, financiers, and fleet operators to align technology readiness, infrastructure availability, and commercial viability. Done right, this transition offers India not only a pathway to cleaner freight movement but also a strategic opportunity to strengthen domestic energy security and competitiveness in the global logistics landscape.

1.3 Objectives of the Survey and White Paper

Driving the adoption of ZETs in India requires a clear understanding of the current operating environment and the specific challenges and expectations of fleet operators. The trucking sector remains largely unorganised, and the lack of structured data continues to impede modernisation and efficiency improvements.

A critical gap exists in the public domain that captures the perspectives of fleet operators in a nuanced and detailed manner. Without this information, it is difficult to design solutions that directly respond to industry needs. The purpose of this white paper is to assess the current state of fleet operations in India, evaluate the level of awareness about ZETs, and identify the specific barriers to adoption. The survey also captures the expectations and recommendations of fleet operators, providing insights into what is required to build confidence in new technologies and enable smoother transitions.

Fleet operators today face disruption on multiple fronts. At the same time, they have unprecedented opportunities to transform their operations by leveraging digital technology, connectivity, and data-driven insights. These tools can unlock higher levels of efficiency, safety, reliability, and sustainability while lowering costs. To fully realise this potential, operators need guidance, supportive policies, and access to the right resources.

This initiative has been undertaken under the ambit of the Centre for Zero Emission Truck Transition Support (CZETTS), which is dedicated to assisting fleet operators in their transition to ZETs. It seeks to bridge existing knowledge gaps, equip stakeholders with actionable insights to fast-track transition to a more sustainable future.

Source: Freepik

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METHODOLOGY

Source: Freepik

2.1 Survey Design and Approach

The research followed a multi-layered and scientifically validated approach to questionnaire design, with the objective of capturing both the breadth and depth of operational realities faced by India's fleet operators. Drawing on established international and national best practices, the survey instrument was structured to generate a balanced mix of quantitative and qualitative insights. It explored a wide range of dimensions including operator demographics, fleet size and composition, prevailing fuel mix, area of operation, and strategies for fleet upgrades and electrification. Please refer to the Annexure for the detailed survey questionnaire.

The questionnaire was pretested with a group of fleet operators, and their feedback was used to refine the instrument to enhance clarity, ensure logical sequencing, and minimise respondent fatigue. To achieve inclusivity and maintain broad relevance, stratification criteria were applied to capture diversity across regions, variations in fleet size, and the range of supply chains served.

2.2 Sample Profile of Fleet Operators

The survey generated responses from 217 fleet operators across India, representing a combined vehicle pool of 3,622 units in the category above 18 tonnes gross vehicle weight (GVW)[9]. The average fleet size reported was 56 vehicles per operator.

Fuel usage patterns remain overwhelmingly dominated by diesel, with 91% of fleets relying primarily on diesel-powered vehicles. An additional 7% reported using a mix of diesel and CNG or LNG (Figure 1).

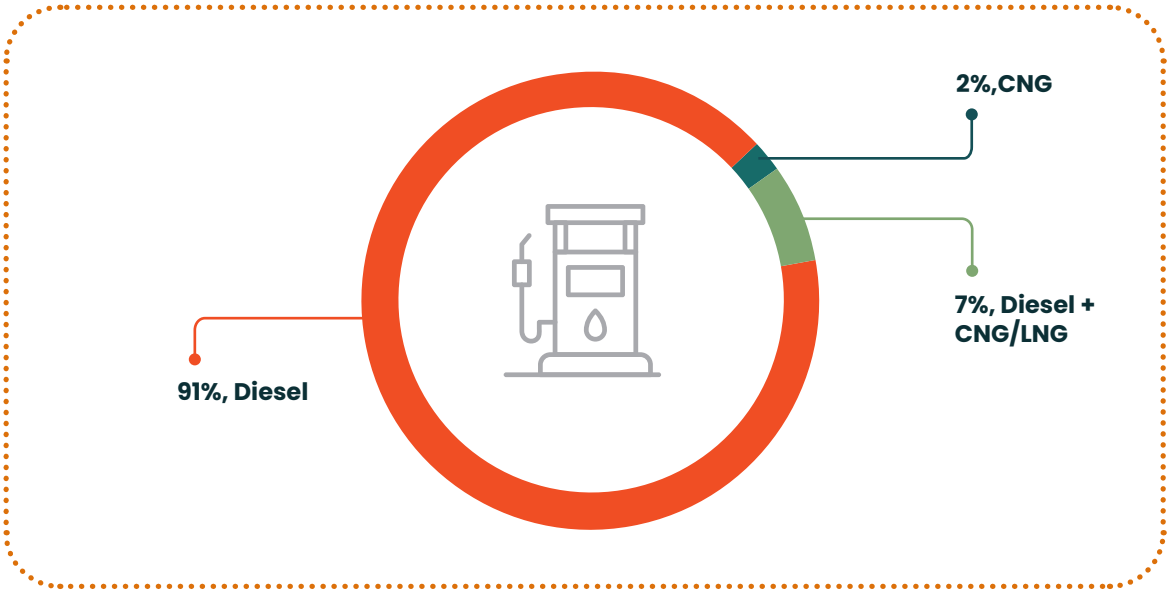


Figure 1: Fleet fuel-mix

In terms of operating areas, the majority of surveyed operators, around 160 respondents (or 73.7%), primarily serve inter-city routes. A further 31 operators (14%) operate across both inter-city and intra-city routes, while 26 operators (12%) conduct operations solely within cities (Figure 2).

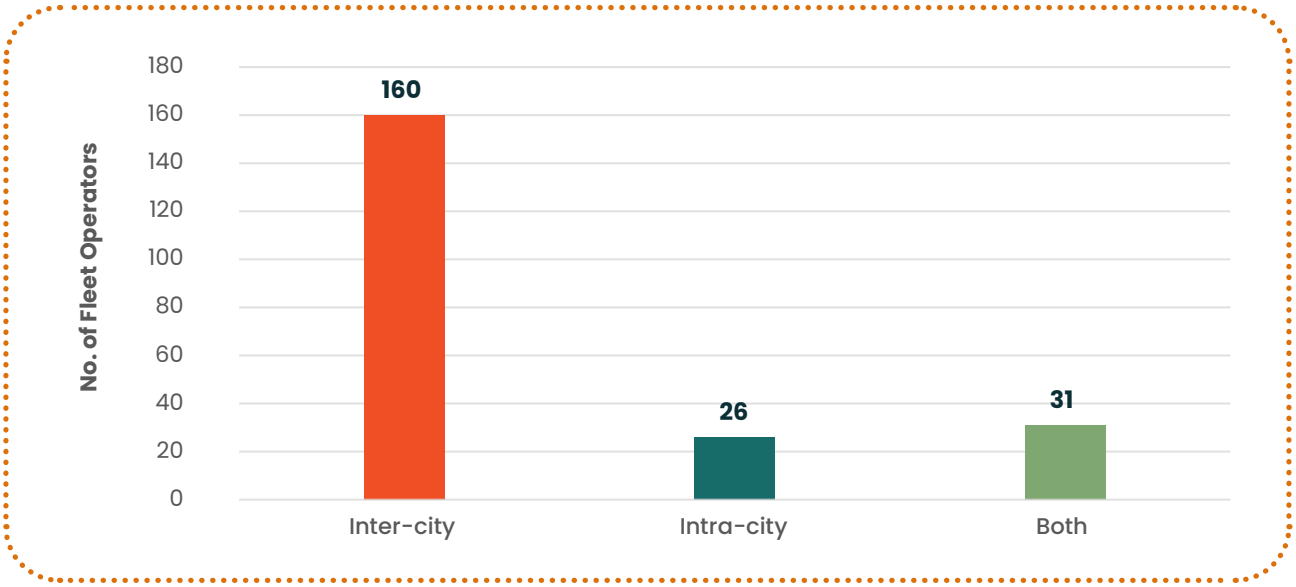


Figure 2: Fleet operators by area of operation

Route characteristics were also assessed. Findings show that only 8% of fleet trips on average were conducted along fixed routes. A closer look revealed that 84.3% of operators reported fixed-route operations falling within the range of 6 to 10% of their total trips (Figure 3).

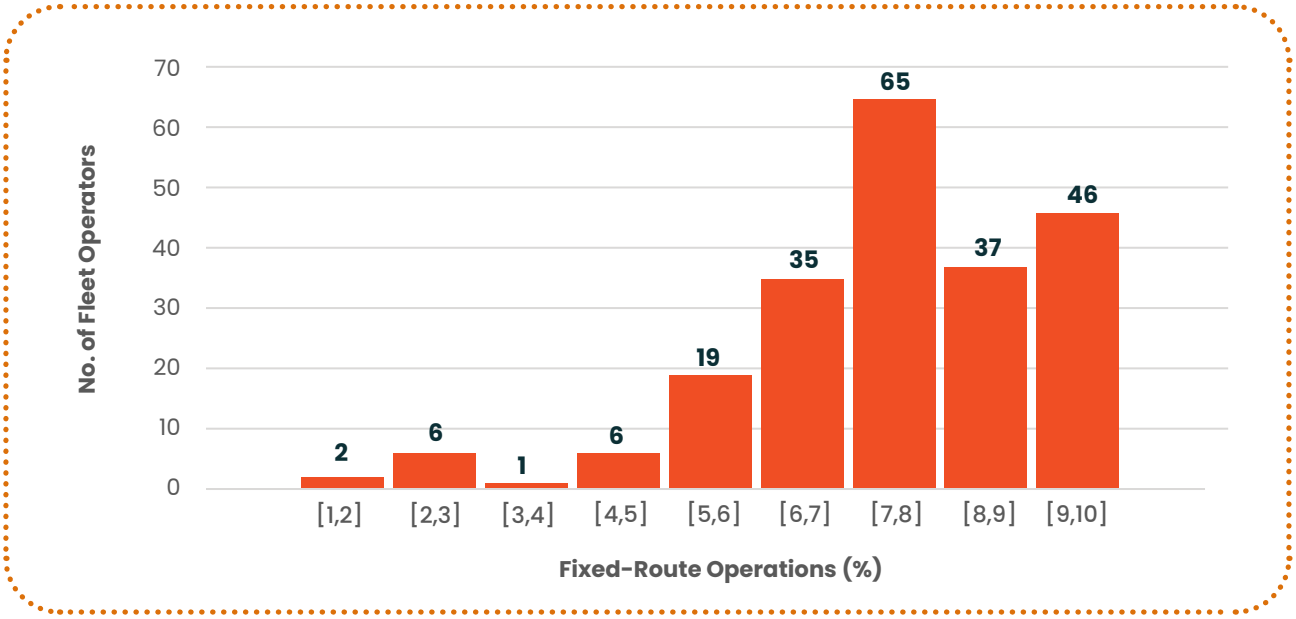


Figure 3: Share of trips on fixed routes

Another dimension of fleet operations relates to distance travelled. The average daily distance travelled per vehicle across all fleets was approximately 344 kilometres. Further analysis shows that nearly 78% of operators reported fleet-level daily averages of less than 414 kilometres (Figure 4).

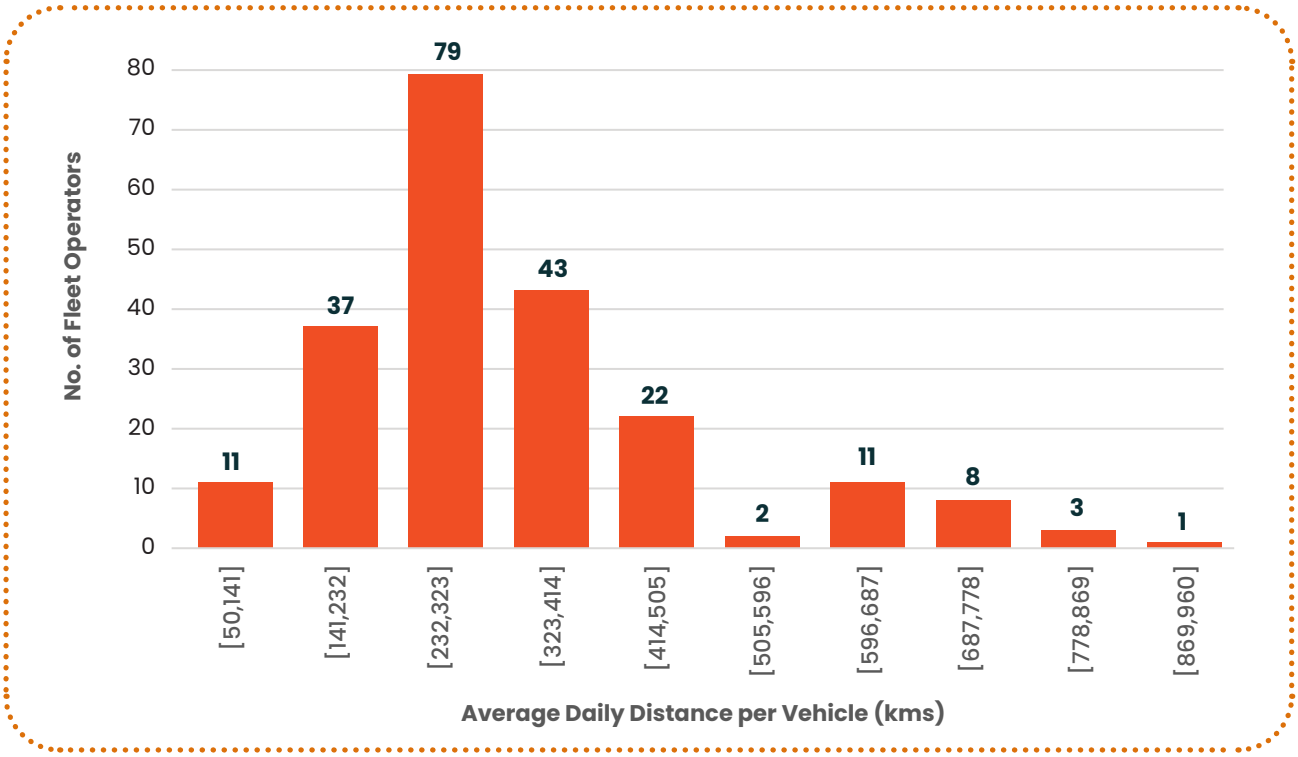


Figure 4: Distribution of vehicle daily distances

When distances are segmented by area of operation, inter-city fleets were found to travel nearly 60% more distance than intra-city fleets on a daily basis (Figure 5). This variation is largely explained by the inherent nature of operations. Inter-city freight transport typically involves longer haulage routes connecting production centres, warehouses, and markets located across states or regions. By contrast, intra-city fleets are engaged in shorter, last-mile or distribution runs that are constrained by urban traffic conditions, delivery windows, and regulatory restrictions on vehicle movement in city limits.

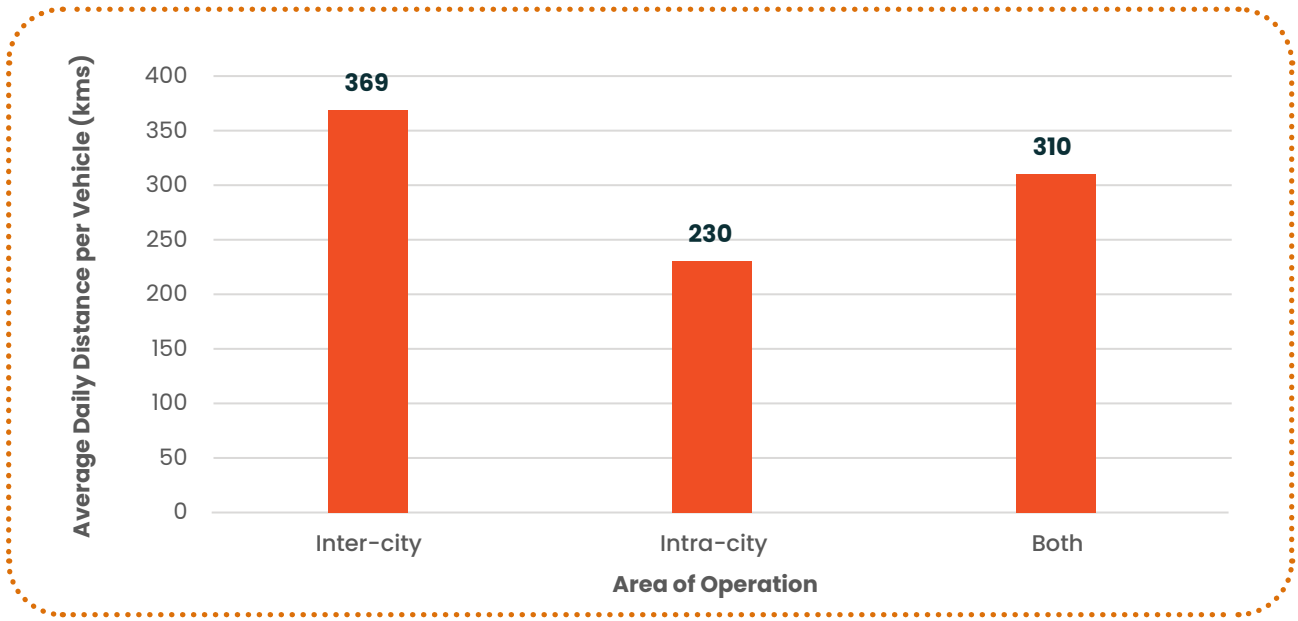


Figure 5: Average daily distance per vehicle by area of operation

Beyond operational characteristics, the survey also explored how fleet operators view the extent of change required to address sectoral challenges. The responses reveal a spectrum of perspectives. About 22% of operators reported a significant need for change, while the majority (56%) expressed a moderate need. A smaller share (12%) saw only a minor need, and 10% believed there was no need at all (Figure 6).

This distribution suggests that while most operators acknowledge the importance of transformation, there is considerable variation in the urgency they attach to it. These differences will be critical in shaping targeted interventions, as strategies for early adopters must differ from those designed for cautious or resistant operators.

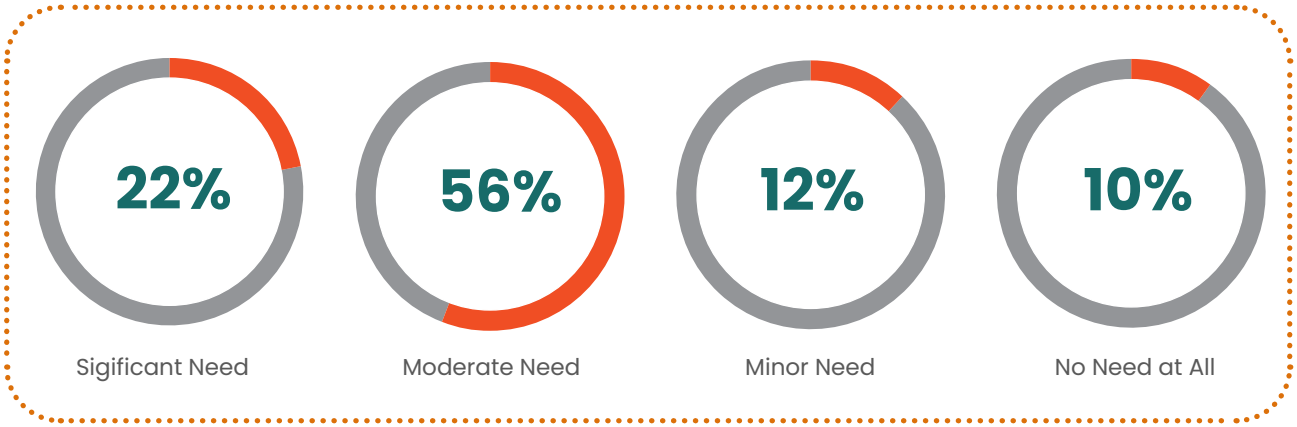


Figure 6: **Fleet operator views on the extent of change needed to address challenges**

2.3 Data Collection

A comprehensive Google Form facilitated the collection of quantitative and qualitative responses, ensuring a structured approach. In-person surveys lent further depth and accuracy, conducted from July to September 2025 across various states and urban centres, enabling direct engagement with operators for richer insights. Technical nuances of data collection included stratified sampling to ensure representation from different regions and fleet sizes, data validation steps to cross-check response reliability, and the integration of graphical and statistical tools to capture nuanced responses about technology transition, charging/refuelling infrastructure needs, and policy support. Data cleaning and anonymisation protocols were observed to uphold ethical standards and confidentiality.

Source: Freepik

03

DIGITAL TRANSFORMATION AND TECHNOLOGY ADOPTION

Source: Freepik

3.1 Current Awareness and Adoption of Digital Technologies

The survey revealed that approximately 59 fleet operators, representing around 27% of respondents, were unable to identify the key aspects of digitalisation that could benefit their fleet operations (Figure 7). The remaining operators, managing a total of 2,618 trucks, reported using some form of digital tools, either desktop-based or mobile-based, to monitor various aspects of their fleet. The average satisfaction score with existing digital solutions was moderate at 3.68, indicating a limited understanding of the full potential of digitalisation. Consequently, the benefits realised remain modest, reflecting the need for a more holistic approach to digital adoption.

Fleet Operators Unaware of Digital Solutions

Moderate
Fleet operators' cotentment with digital tools

Figure 7: Adoption and satisfaction of digital tools among fleet operators

3.2 Critical Features Driving Digitalisation Value

When asked about the digital features they value most, fleet operators rated driving partner analytics as the top priority. This functionality allows them to monitor driving behaviour and capabilities, directly impacting fleet maintenance and safety (Figure 8). Tyre analytics have also emerged as an important focus, highlighting the role of monitoring tyre health to ensure driver safety, protect consignments, and maintain timely deliveries. Proper tyre management also reduces fuel consumption and minimises labour required for constant manual monitoring.

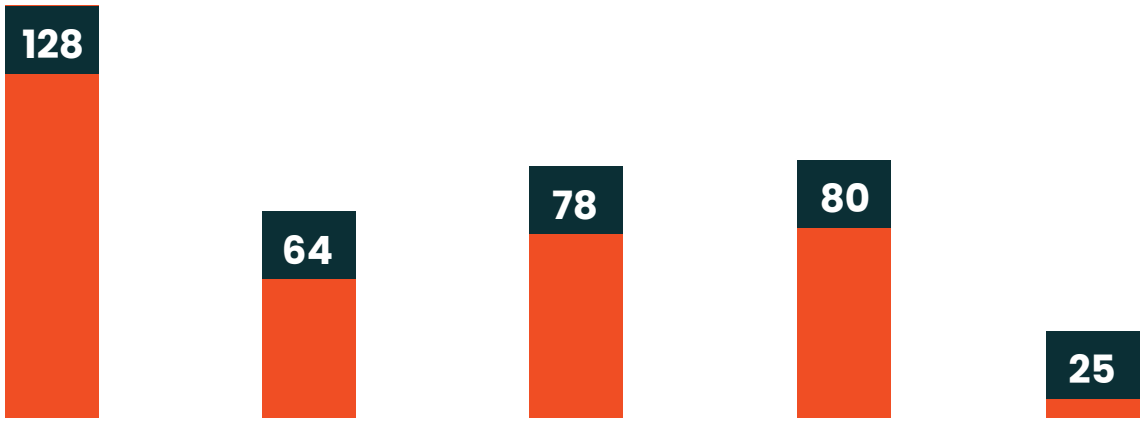


Figure 8: Key digital features prioritised by fleet operators

3.3 Operator Interest and Readiness for Digital Solutions

While awareness of all digital solutions is limited, fleet operators demonstrated strong interest in adopting new technologies, provided the benefits are clearly communicated and suitable solutions exist for fleets of varying sizes (Figure 9). Cost pressures remain a primary concern, driven by decreasing fleet rates, tighter margins, rising borrowing costs, and challenges associated with transitioning to ZETs, including new vehicle acquisition and labour costs. Digital solutions that clearly demonstrate tangible monetary benefits and a strong return on investment are most likely to gain traction among operators.

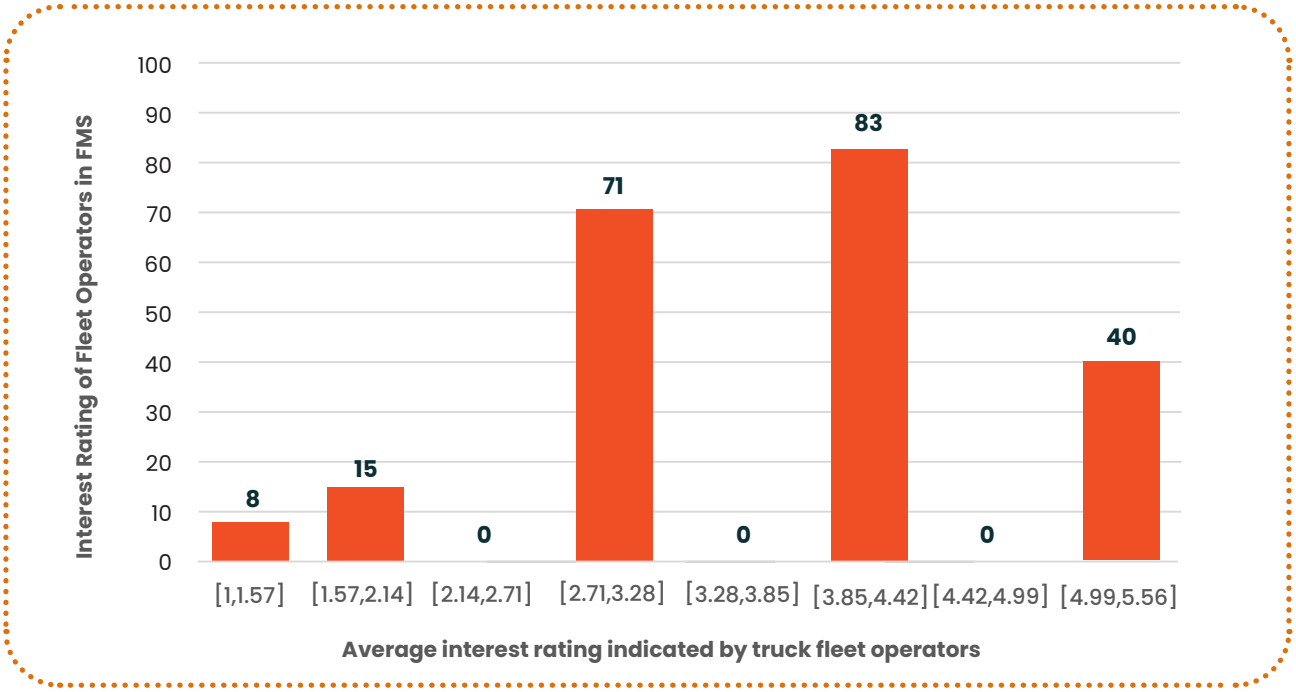
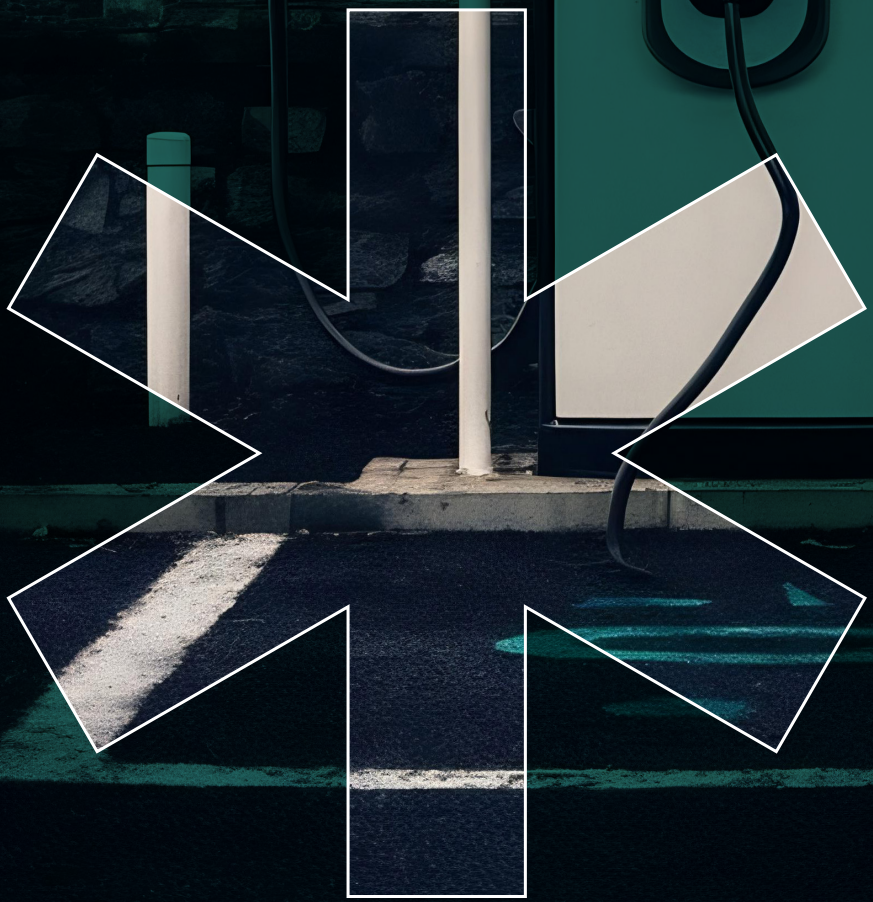


Figure 9: Operator interest in adopting new digital technologies

Source: Freepik

04

DRIVING PARTNER MANAGEMENT AND RETENTION



Source: Freepik

4.1 Compensation Models and Practices

The survey explored how fleet operators engage with their driving partners, including compensation practices and social safety measures. A majority of operators reported using a dual compensation strategy. Driving partners with long-term association typically receive a fixed monthly salary, ensuring stability and loyalty, while newer or temporary partners are paid on a per-trip basis (Figure 10). Some operators also integrate performance-based incentives, such as rewards for fuel efficiency, timely deliveries, and safe driving practices. This approach allows operators to balance cost control with motivating high performance among experienced drivers.

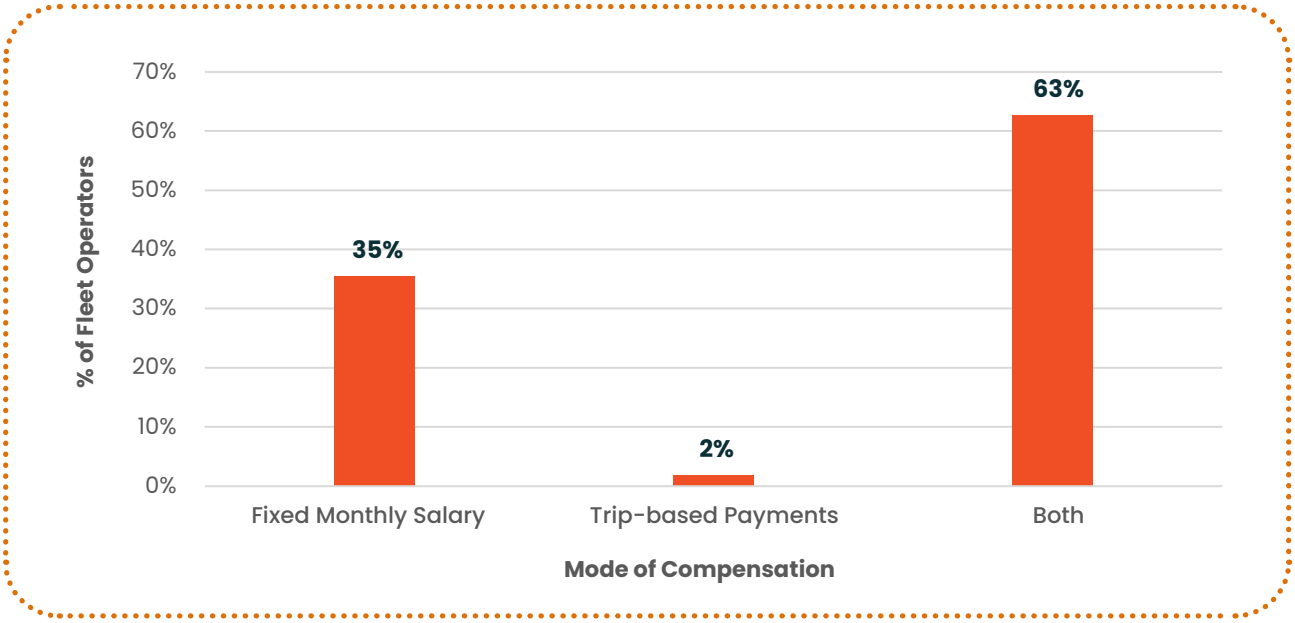


Figure 10: Compensation models adopted for driving partners

4.2 Life Insurance Coverage for Driving Partners

Regarding social protection, around 63.5% of fleet operators reported providing insurance coverage for driving partners in addition to vehicle insurance (Figure 11). This demonstrates a growing recognition of the importance of driving partner welfare within the sector.

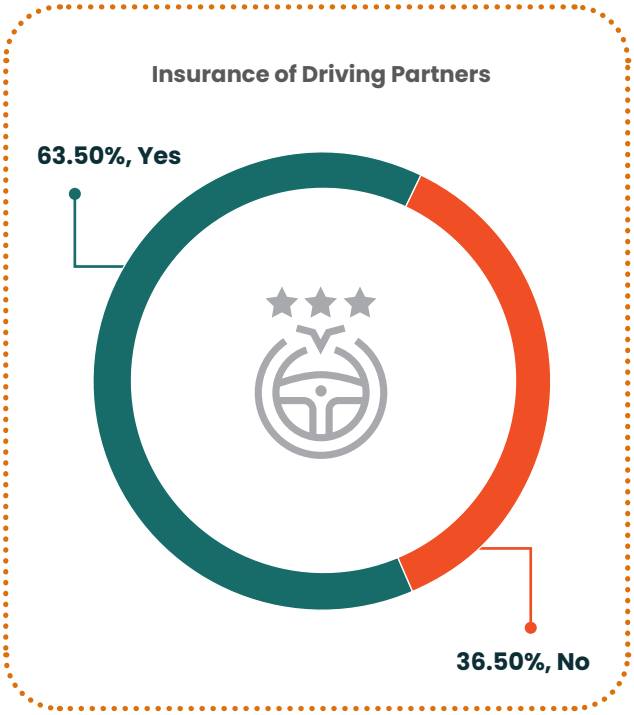


Figure 11: Proportion of fleet operators providing insurance for driving partners

4.3 Barriers to Providing Driving Partner Insurance

Despite the significant coverage, a notable proportion of fleet operators have not extended insurance benefits to their driving partners. Figure 12 presents the reasons cited by these operators. High attrition among driving partners was the most frequently mentioned barrier, making the initiation and management of insurance processes less practical. Cost concerns also remain a significant factor. Addressing these barriers may require innovative solutions such as portable insurance schemes, shared insurance pools, or incentives tied to retention.

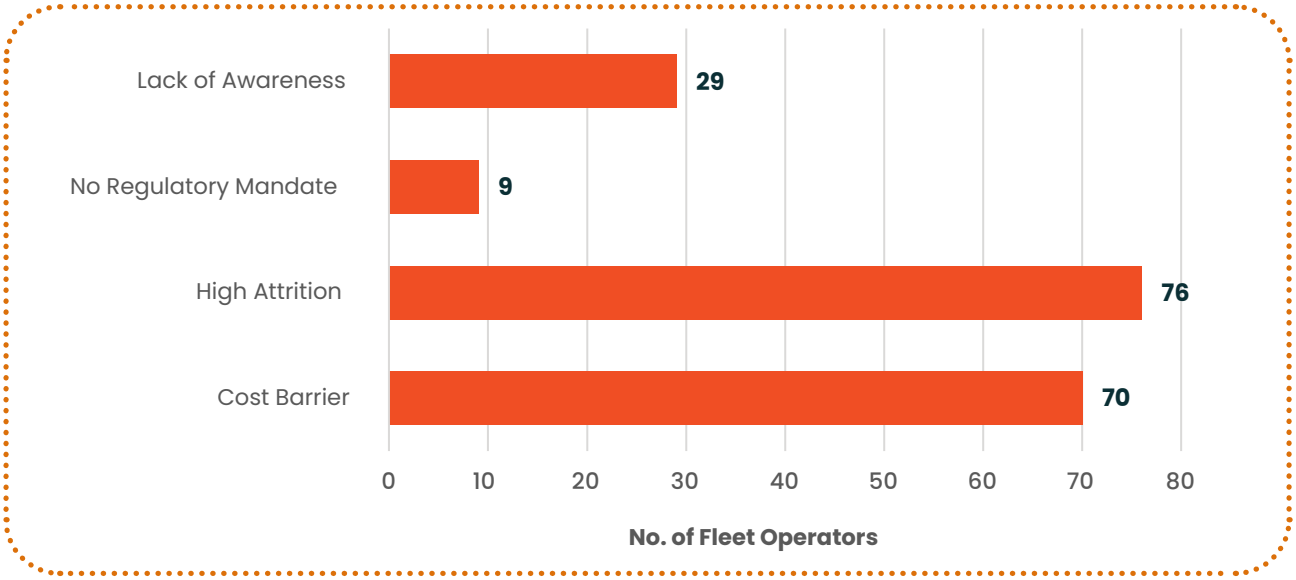


Figure 12: Reasons for not providing insurance to driving partners

Source: Freepik

4.4 Key Aspects of Driving Partner Attrition

High attrition is a critical challenge in the sector and directly influences decisions around insurance and welfare. Interviews and discussions with fleet operators revealed several contributing factors. Prolonged periods away from home lead to homesickness, while inadequate roadside amenities and lack of support during trips reduce job satisfaction (Figure 13). In comparison, intracity taxi services such as Ola and Uber allow driving partners to return home each evening, providing a strong pull even if truck driving offers higher compensation. Addressing attrition will require holistic strategies, including improved amenities, flexible scheduling, and welfare-focused policies to make long-haul trucking a more attractive career choice.

Figure 13: Factors contributing to driving partner attrition

05

ZETS: READINESS, EXPECTATIONS, AND BARRIERS

While ZETs represent a broad decarbonisation pathway for the trucking sector, BETs currently exhibit the highest level of technology readiness and market availability, with multiple OEMs offering vehicles commercially. Consequently, the survey primarily focused on BETs to gain actionable insights.

5.1 Climate Change Impact on Fleet Operations

Fleet operators were asked whether they have begun experiencing the impacts of climate change. All respondents reported at least one impact, with many citing multiple challenges, indicating an awareness of climate-related operational risks (Figure 14). Key concerns included delays in deliveries due to extreme weather events, which disrupt the just-in-time delivery system and affect revenues. Operators in hilly regions also highlighted risks to vehicle and driving partner safety due to intensified rainfall and landslides.

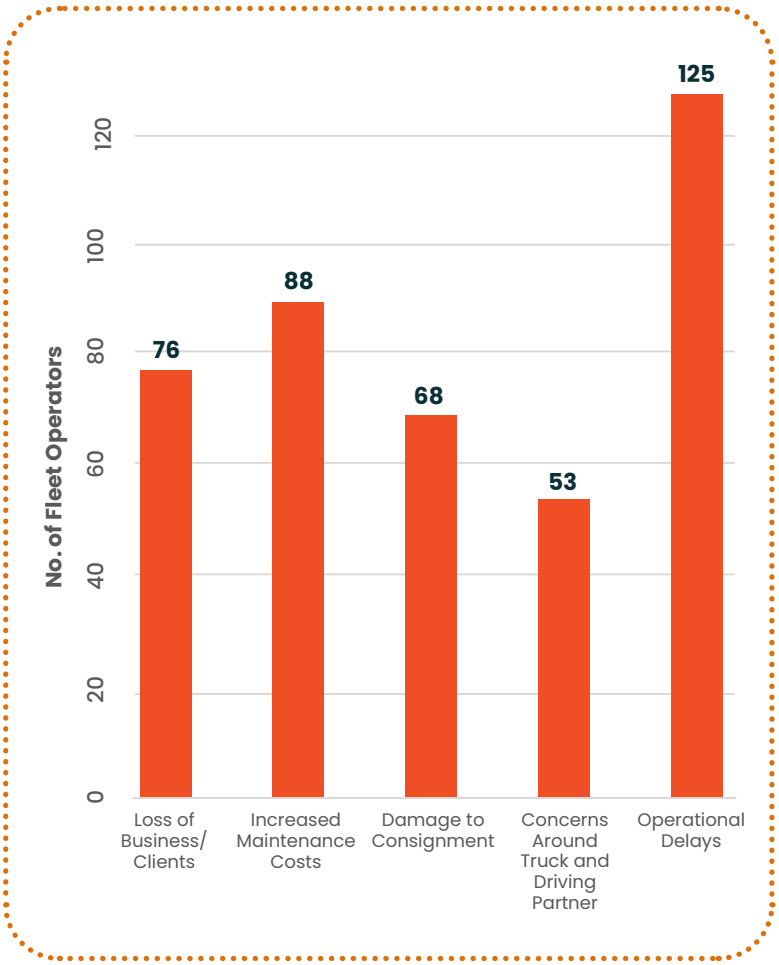


Figure 14: Fleet operators reporting climate change impacts on operations

5.2 Preparedness for End-of-Life Vehicle Retirement

When asked about the retirement of trucks at the end of their life, around 67% of operators (146 respondents) indicated a firm intention to scrap vehicles. This aligns with the Ministry of Road Transport and Highways (MoRTH) vehicle scrapping policy and available incentives, as well as operators' willingness to transition to newer, cleaner technology (Figure 15).

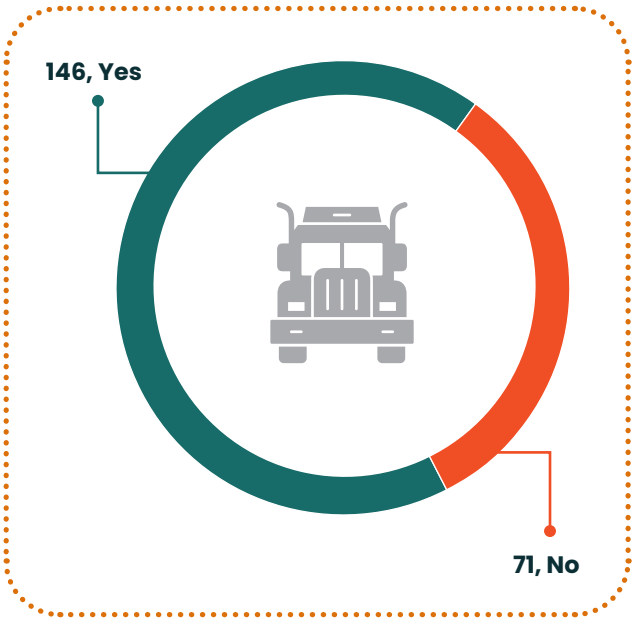


Figure 15: Fleet operators' preparedness for end-of-life vehicle retirement

5.3 Perceived Advantages of BETs

Fleet operators identified several benefits of BETs. Environmental and climate-related benefits received the highest acknowledgement, followed by long-term economic advantages. Operators also recognised improvements in public health through zero tailpipe emissions and reduced noise, indicating a growing awareness of sustainability impacts beyond operational efficiency (Figure 16).

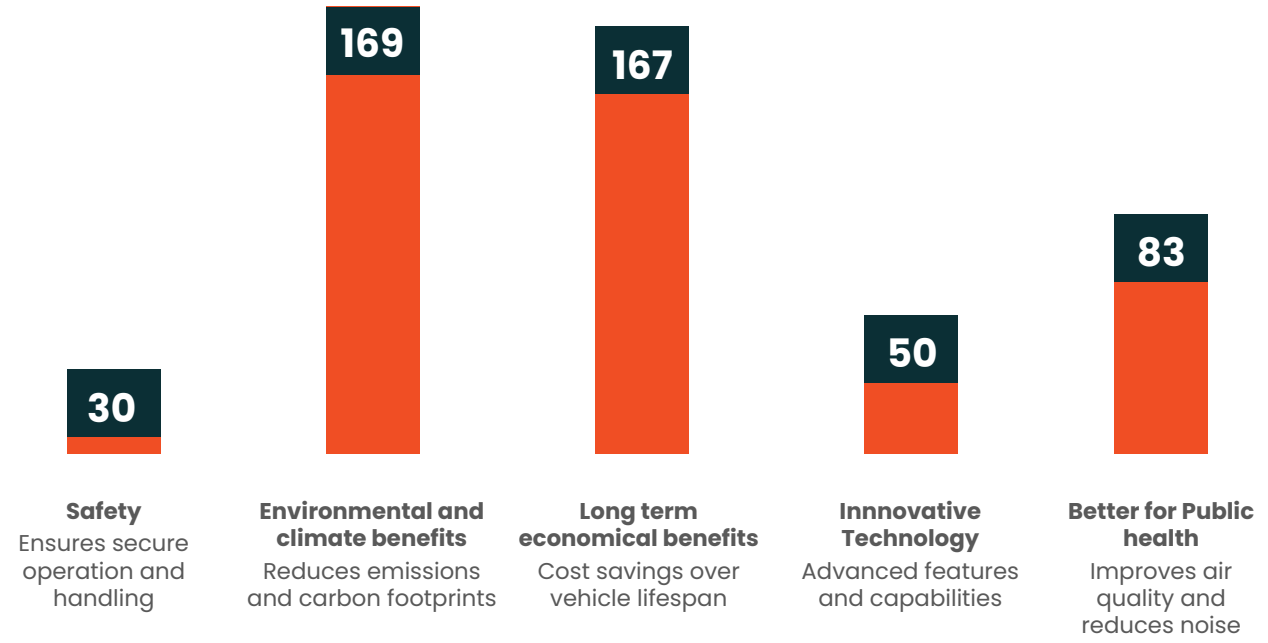


Figure 16: Fleet operators' perceived benefits of BETs

5.4 Market Demand for Sustainable Freight Solutions

From a market perspective, approximately 95% of operators reported no client demand for low-emission freight options (Figure 17). This highlights a gap in awareness and communication between supply and demand sides of the market. It underscores the need for educational initiatives and incentives to stimulate interest in sustainable freight solutions across the value chain.

Figure 17: Client demand for low-emission freight solutions

5.5 Range Requirements and Expectations for BETs

Fleet operators indicated an average expected range of 382 kms for BETs, aligning closely with the observed average daily distance per vehicle of 344 kms. Approximately 74% of operators expect BETs to cover distances between 100 and 400 kms, providing OEMs with clear guidance for designing vehicles that meet operational needs and build confidence among operators (Figure 18).

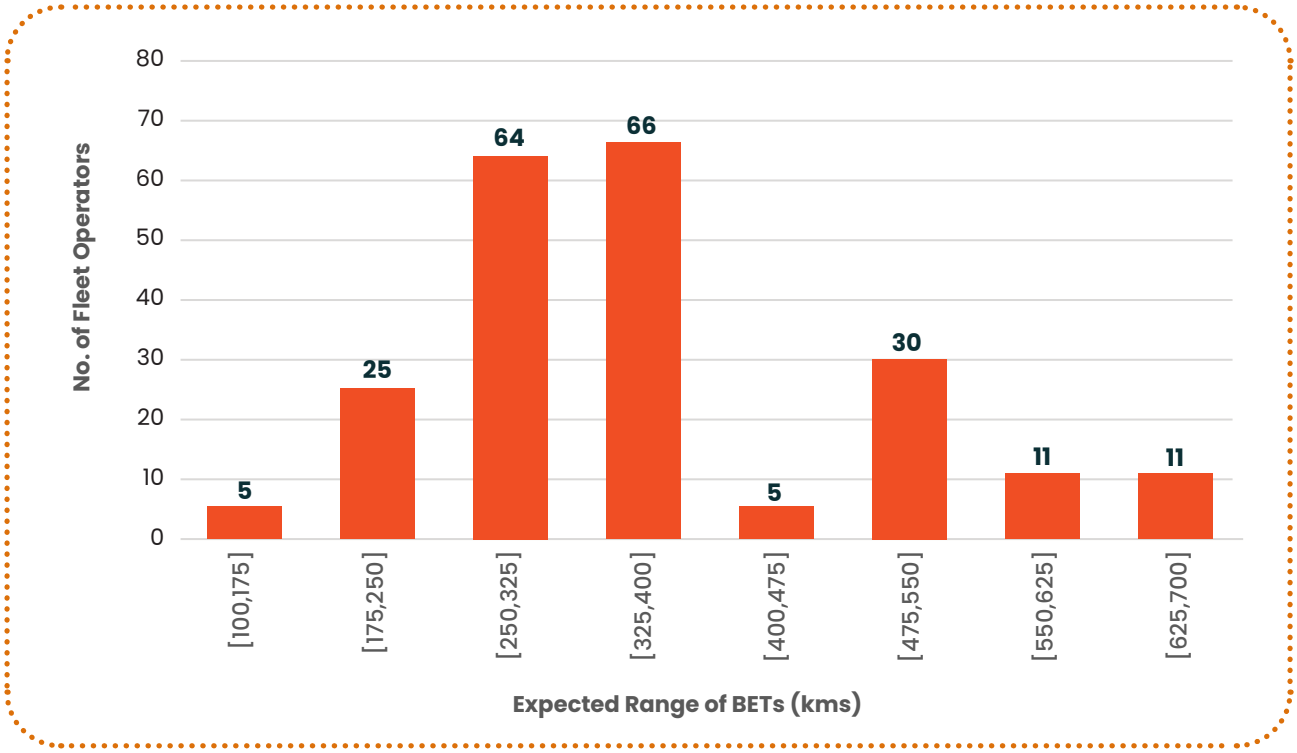


Figure 18: Expected daily range of BETs

5.6 Gap Analysis: Daily Distance Requirements vs. BET Range Capabilities

Comparing average daily distances with expected BET range reveals important insights. Operators with lower daily distances often expect higher BET range, reflecting underlying range anxiety.

Addressing this concern will require the expansion of public charging infrastructure to build confidence in the technology (Figure 19).

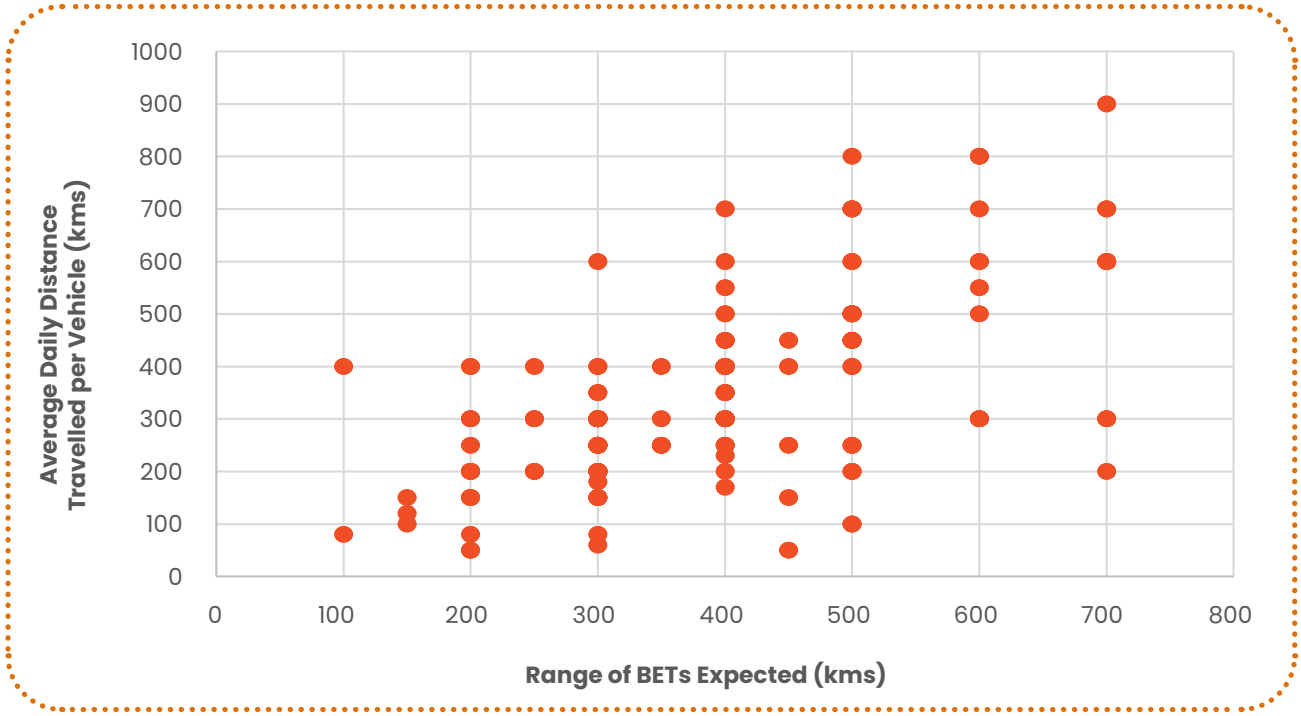


Figure 19: Comparison of fleet daily distance and expected BET range

5.7 Charging Infrastructure Requirements

To address range anxiety, operators were asked about the expected spacing of public charging stations on highways. The average expectation was 39 km between stations, which is notably lower than the Government of India guideline of 100 km for heavy-duty vehicles[10]. Operators expecting higher BET ranges also prefer shorter charging station distances, suggesting a need for greater awareness and education regarding optimal charging strategies (Figure 20).

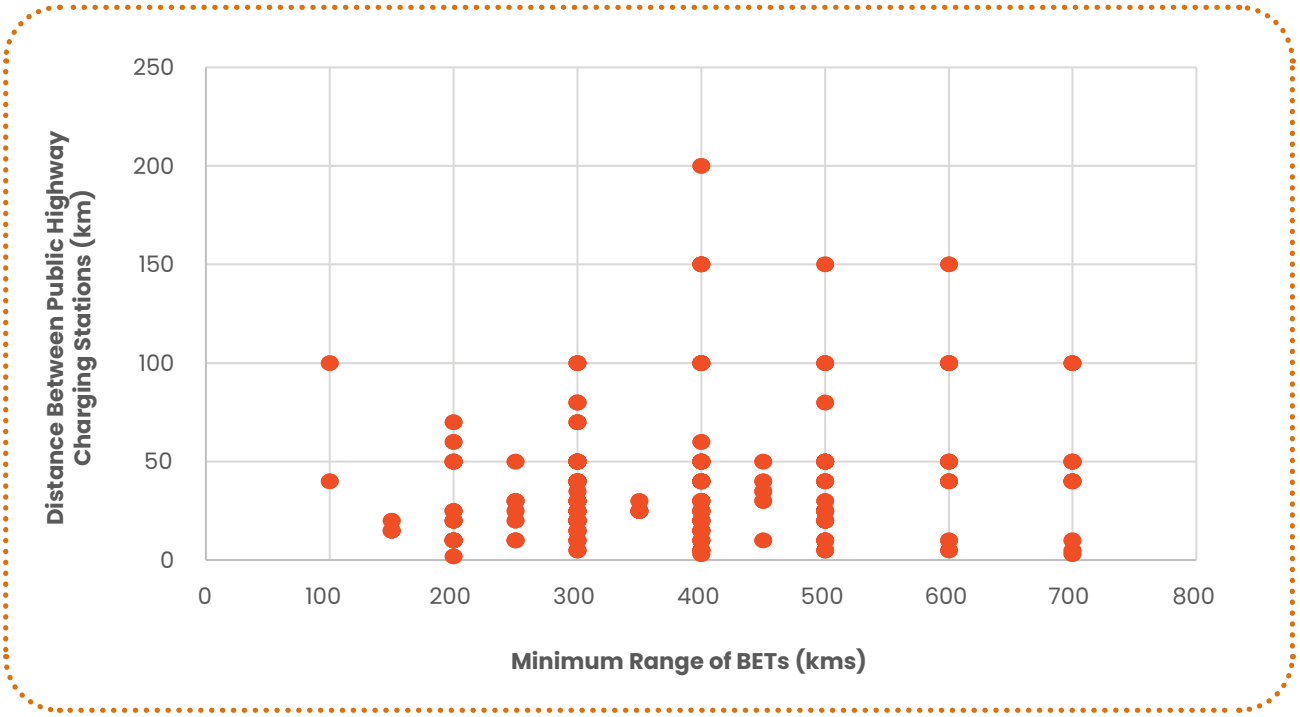


Figure 20: Fleet operators' expectations for highway charging station distances

The survey also explored operators' willingness to participate in the development of highway charging infrastructure through collaborations with other stakeholders. Approximately 78% of operators indicated they were not interested in such partnerships (Figure 21). This suggests that many operators perceive infrastructure development as outside their responsibility, expecting it to function similarly to traditional fuelling stations.

Furthermore, operators may not be fully aware of partnership models that could reduce charging costs, ultimately reducing their operational expenditure. For example, a potential framework could involve charge point operators (CPOs) deploying stations while fleet operators commit to a minimum usage guarantee. This arrangement could help CPOs secure financing at lower rates, creating a mutually beneficial scenario for all three parties.

Figure 21: Fleet operators' willingness to collaborate on highway charging infrastructure development

5.8 Critical Barriers Hindering BET Adoption

Key barriers to BET adoption were identified through operator feedback. The highest-rated concerns included unfamiliarity with technology, unclear return on investment, and lack of a defined investment strategy. Other significant barriers included high upfront costs, limited charging infrastructure, and low awareness. Addressing these concerns through clear communication, pilot programmes, financial incentives, and infrastructure expansion can facilitate BET adoption (Figure 22).

Figure 22: Key barriers to adopting BETs

Key Parameters	Very High	High	Moderate	Slight	Not at all
High upfront cost	59	124	26	6	2
Lack of financing options	73	83	17	16	28
Lack of electric truck availability	76	59	50	24	8
Lack of technical support from OEMs	79	86	43	8	1
Lack of charging infrastructure	35	178	2	2	0
Unfamiliarity with technology	101	75	32	8	1
Concerns about electric truck performance	89	93	32	3	0
Unskilled workforce	81	31	82	21	2
Insufficient government support	79	42	71	22	3
Rigid operational schedules	84	41	71	18	3
Lack of awareness and acess to support	66	122	25	2	2
Unclear return on investment	111	57	26	13	10
Lack of clear investment strategy	78	76	58	3	2

5.9 Confidence-Building Factors for BETs Technology Acceptance

Operators highlighted several factors that would increase their confidence in BETs. These include resale value assurances, training programmes for driving partners and in-house technicians, effective roadside assistance, and clear support from OEMs. Integrating these elements into OEM strategies can accelerate adoption and build trust among fleet operators (Figure 23).

Second-Life Solutions
Addresses concerns about the vehicle reuse

Training Programs
Offers free training for driving partners and technicians

Maintenance Services
Provides complimentary maintenance

Replacement Vehicle
Offers a substitute vehicle during repairs

Spare Parts Availability
Ensures ready access to necessary components

Roadside Assistance
Provides reliable breakdown support

Comprehensive Warranty
Covers the entire vehicle lifespan including the battery

Figure 23: Key factors to build operator confidence in the adoption of BETs

5.10 Addressing Concerns Around Resale Value

As seen in the previous section, resale value emerged as a significant concern. Operators indicated that OEM buyback guarantees and clear validation of the remaining useful life of the battery for second-life buyers are the most effective ways to address this concern (Figure 24).

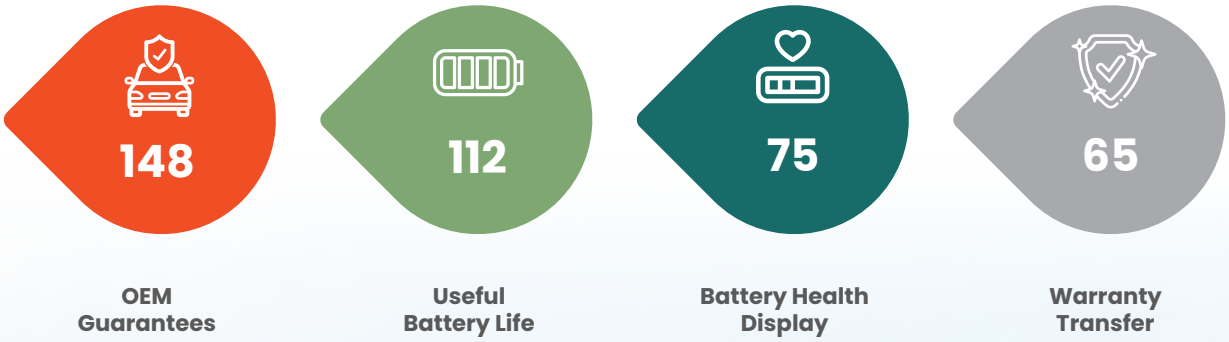


Figure 24: Solutions to address resale value concerns

5.11 Purchase Intent Following Resolution of Key Concerns

When asked if they would purchase a BET once their key concerns were addressed, 72% of operators responded affirmatively. This demonstrates that addressing barriers and building confidence can significantly transform the adoption landscape for BETs in India (Figure 25).

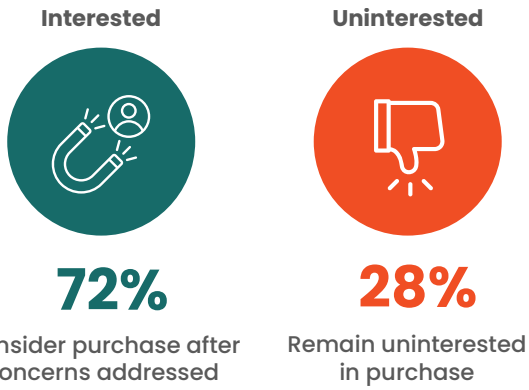
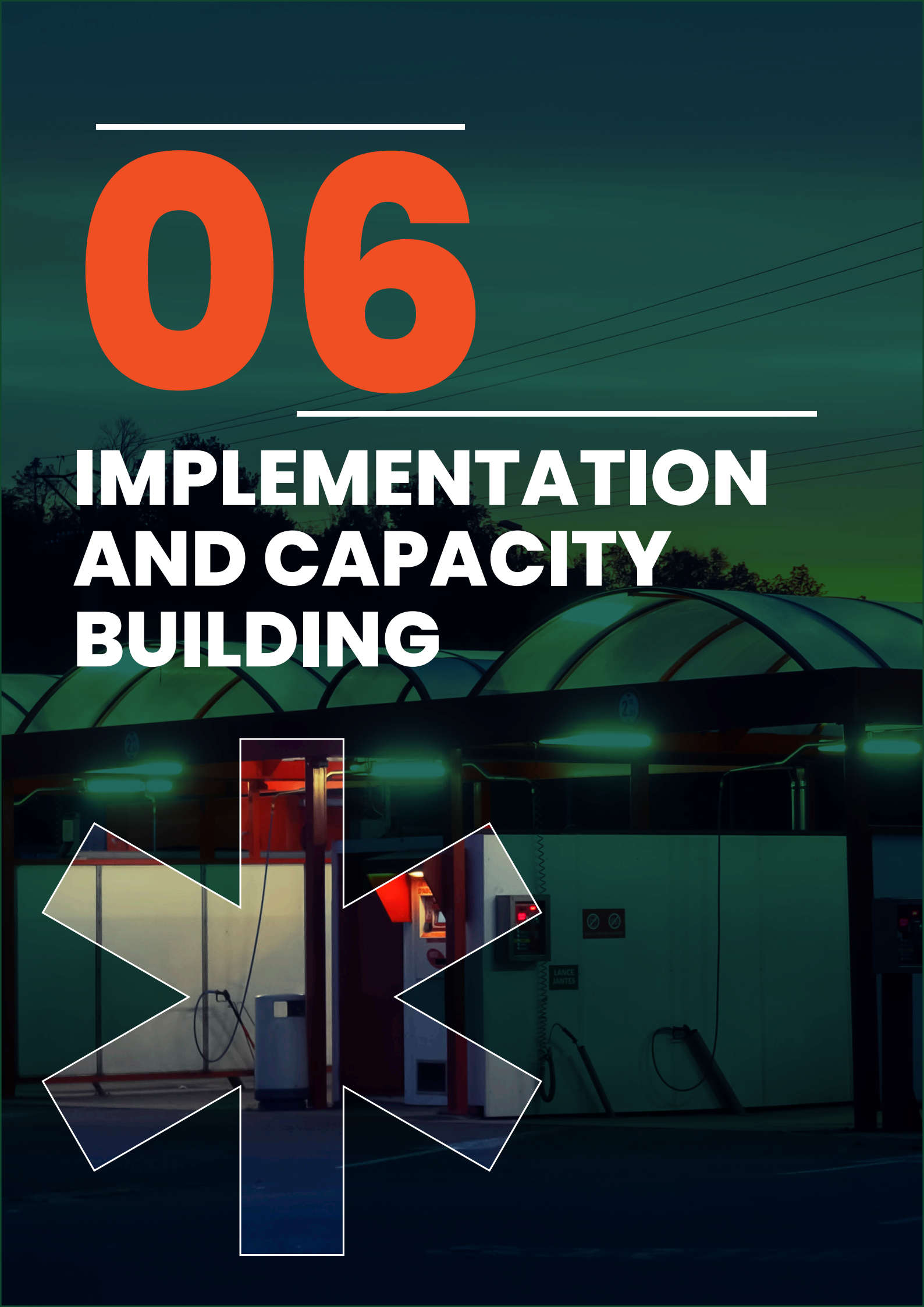


Figure 25: Fleet operators' purchase intent after resolving key concerns

Source: Freepik

06

IMPLEMENTATION AND CAPACITY BUILDING



6.1 Interest in Developing Long-Term Organisational Decarbonisation Roadmaps

Fleet operators were asked about their interest in developing organisation-specific ZET transition roadmaps. Approximately 76% of respondents expressed interest in creating such roadmaps (Figure 26). This underscores the importance of CZETTS, which provides a model roadmap to guide fleet operators in strategising their transition and offers handholding support where needed[11].

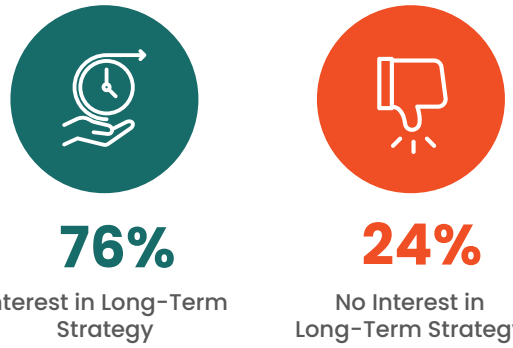


Figure 26: Fleet operators' interest in developing organisational decarbonisation roadmaps

6.2 Openness to BET Pilot Programmes

Pilot projects are a critical step in encouraging BET adoption, particularly among operators with smaller fleets who often face narrow profit margins, high credit risks, and limited access to technology and financial resources. Conducting pilots allows operators to gain firsthand experience with the technology, build confidence, and understand the practical aspects of managing the transition. Survey responses indicate strong enthusiasm among fleet operators to participate in BET pilot programmes (Figure 27).

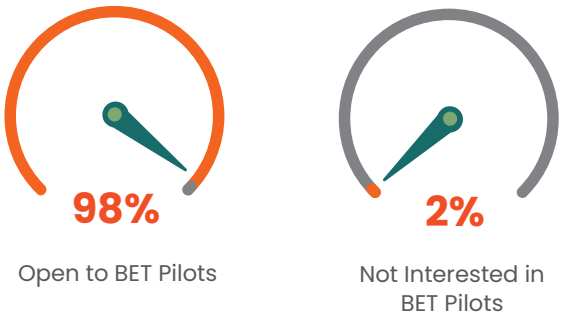


Figure 27: Fleet operators' willingness to participate in BET pilot programmes

6.3 Commitment to Workforce Reskilling for BETs

Successful transition to BETs requires an equitable and inclusive approach that equips the workforce with the knowledge, skills, and resources needed to navigate new technology. This ensures that the benefits of BETs are accessible across all levels of the organisation. Approximately 81% of surveyed operators confirmed their readiness to reskill existing staff to become proficient in BET operations (Figure 28), demonstrating a people-centric commitment to sustainable transformation.

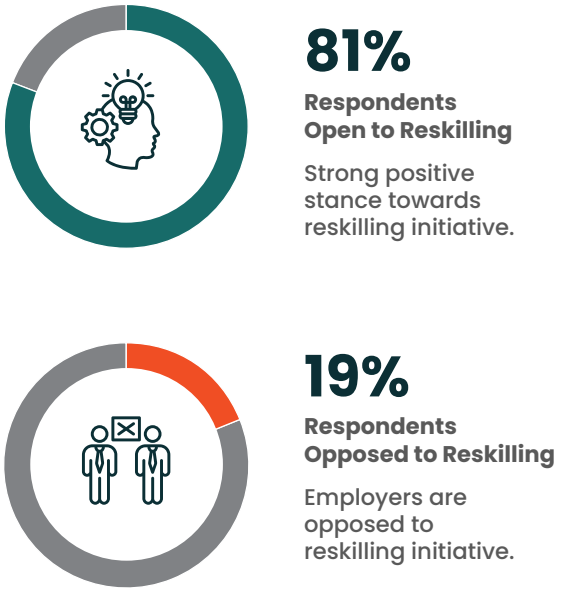


Figure 28: Fleet operators' commitment to reskilling staff for ZET adoption

Insights gathered through the fleet operator survey reveal both the promise and the pain points of India's trucking ecosystem. The findings underscore the need for coordinated interventions across policy, financing, technology, and human capital to enable an inclusive and rapid transition to ZETs. The following recommendations aim to address systemic inefficiencies in the existing freight sector while fast-tracking the shift toward cleaner, more resilient, and digitally enabled trucking.

07

KEY RECOMMENDATIONS

Source: Freepik

Figure 29: Core elements of the recommendations

Drawing on insights from the survey of India's fleet operators, the following recommendations are proposed to accelerate the adoption of ZETs and ensure a smooth and equitable transition:

1. Policy and Regulatory Measures

- Introduce regulatory mandates to ensure transparency and visibility of key vehicle metrics such as battery State of Health (SoH) and Remaining Useful Life (RuL), strengthening trust in emerging electric technologies.
- Formulate battery refurbishment and second-life policies to establish a structured market for battery reuse, ensuring fair residual value for vehicle owners. Efforts such as those initiated by Madhya Pradesh under its Electric Vehicle Policy 2025 can serve as useful references.
- Develop logistics policy provisions that guarantee improved roadside amenities for truck driving partners and promote digitalisation of permitting processes, reducing direct interactions with law enforcement.
- Create progressive freight decarbonisation mandates, requiring clients and logistics users to transition a defined and gradually increasing share of their freight movement to low-emission or zero-emission modes.
- Ensure that vehicle and battery warranties offered by OEMs are aligned with the vehicle's full lifecycle, extending coverage up to the end-of-life stage.

2. Financing and Market Mechanisms

- Design financial instruments that support battery second-life value recovery and create aftermarkets for refurbished components, improving the economics of ZET adoption.
- Promote public–private partnerships (PPPs) and usage-based business models (e.g., OEM buyback guarantees, battery leasing, truck leasing, and pay-per-use schemes) to de-risk early adoption and improve financing access for small fleet operators.
- Promote innovative and flexible insurance models such as shared, usage or behaviour-based, and performance-linked schemes that reward safe, efficient driving and provide coverage for EV components.

3. Capacity Building and Workforce Development

- Scale up training and reskilling programmes for driving partners, mechanics, and fleet managers to ensure workforce readiness for ZET operations.
- Provide awareness programmes through fleet operator associations on topics such as health insurance, accident protection, and strategies to enhance driving partner retention and welfare.
- Develop technical capacity-building initiatives for second-hand truck buyers and small fleet

operators to help them understand warranty coverage, maintenance requirements, and resale value preservation.

4. Technology and Digital Enablement

- Promote digital fleet management systems that optimise routing, monitor performance, and enhance efficiency. This is critical given India's high logistics cost-to-GDP ratio (14–18%), which far exceeds the global average.
- Encourage adoption of advanced analytics tools for tracking driving partner behaviour, tyre health, and energy efficiency to improve operational performance and reduce costs.
- Ensure that digital solutions for fleet operators clearly demonstrate return on investment (ROI) and are designed to suit the needs of small fleet operators.

5. Infrastructure and Ecosystem Development

- Expand highway charging infrastructure in alignment with fleet operational patterns, ensuring equitable distribution across key freight corridors and tier-2/tier-3 hubs.
- Ensure access to charging facilities at highway truck terminals and bays, while strengthening grid infrastructure to accelerate large-scale charging infrastructure deployment.
- Encourage OEMs and energy providers to co-develop charging and maintenance ecosystems, reducing range anxiety and enhancing confidence in ZET reliability.

Annexure

Survey Questionnaire for Fleet Operators

FLEET

1. How many vehicles are in your fleet? (Enter Number)
2. What is the primary fuel type used in fleet?
   (Select all that apply)
   - ☐ Diesel
   - ☐ LNG
   - ☐ CNG
   - ☐ Electricity
3. Select all the types of operations your fleet is involved in
   - ☐ Inter-city
   - ☐ Intra-city
4. What percentage of your routes are fixed? (Scale 0-100%)
5. What is the typical daily distance travelled (in kms) per vehicle? (Enter Number)
6. Minimum average hours of operation (hrs)- Numerical
7. Are you willing to scrap trucks that have reached their End-of-Life (EoL)? Y/N

DRIVING PARTNERS - SOCIAL SECURITY

8. How do you compensate your drivers?
   - ☐ Trip/Distance-based payment
   - ☐ Fixed monthly salary
   - ☐ Others, specify:
9. Do you provide insurance to your driving partners? (Y/N)

BARRIERS TO SOCIAL SECURITY

10. If no, what are the factors influencing provision of social security to driving partners? (Select all that apply)
    - ☐ Cost barrier
    - ☐ Lack of awareness
    - ☐ High attrition
    - ☐ No regulatory mandates

DRIVING PARTNERS – ATTRITION

11. Major reasons of driver attrition (Select all that apply)
    - ☐ Unsatisfactory compensation
    - ☐ Homesickness from prolonged absence
    - ☐ Inadequate roadside amenities
    - ☐ Harassment by law enforcement authorities
    - ☐ Lack of social recognition and respect
    - ☐ Alcohol dependency issues
    - ☐ Misconduct or behavioural challenges
    - ☐ Attractive alternative opportunities

TELEMATICS

12. Which of the following Fleet Management System (FMS) benefits are you aware of? (Select all that apply)
    - ☐ Improve operational efficiency
    - ☐ Real-time vehicle tracking
    - ☐ Monitor vehicle performance
    - ☐ Enhance driver safety
    - ☐ Data security
    - ☐ Avoid diesel pilferage

13. How interested are you in adopting new digital tools for route planning, energy tracking, or vehicle diagnostics? (On scale 1-5)

14. Do you currently use mobile or desktop-based fleet management platforms? If yes, please specify (If Mobile-based, desktop-based, jump to Q.26)
    - ☐ Mobile-based
    - ☐ Desktop-based
    - ☐ Both
    - ☐ Not Applicable

FLEET MANAGEMENT

15. How many trucks in your fleet are equipped with Fleet Management Systems (FMS)? Numerical

16. What features and capabilities of FMS are most important for optimizing your fleet operations? (Select all that apply)
    - ☐ Fleet analytics
    - ☐ Smart alerts
    - ☐ Driver analytics
    - ☐ Stakeholder analytics
    - ☐ Route optimisation
    - ☐ Tyre analytics

17. How satisfied are you with their fleet management system? Linear scale 1-5 (satisfaction)

AIR POLLUTION AND CLIMATE CHANGE

18. Which of the following incidents have you experienced due to climate events like hurricanes, floods, excessive temperatures, etc

    (Select all that apply)

    - ☐ Operational delays
    - ☐ Concerns around truck and driving partner safety
    - ☐ Damage to consignment
    - ☐ Increased maintenance costs
    - ☐ Loss of business/clients

ELECTRIC TRUCK

19. Which of the following factors of e-trucks attracts you? (Select all that apply)
    - ☐ Long-term economic benefits
    - ☐ Environmental and climate benefits
    - ☐ Innovative technology and operational feasibility
    - ☐ Safety
    - ☐ Public health

20. Have any of your clients specifically requested low-emission or electric truck-based transportation services?
    - ☐ Yes
    - ☐ No

ELECTRIC TRUCK ADOPTION READINESS

21. Evaluate the following barriers to electric truck adoption based on the current situation of your organisation. Scale 1-5(significance)
    - ☐ Upfront cost
    - ☐ Lack of financing options
    - ☐ Lack of electric truck availability
    - ☐ Lack of technical support from OEMs
    - ☐ Lack of charging infrastructure
    - ☐ Unfamiliarity with technology
    - ☐ Concerns about electric truck performance
    - ☐ Unskilled workforce
    - ☐ Insufficient government support
    - ☐ Rigid operational schedules
    - ☐ Lack of awareness and access to support
    - ☐ Unclear ROI
    - ☐ Lack of clear investment strategy

22. Rate your willingness to invest in electric trucks if financial assistance is available.
    On scale 1-5(very unlikely to most likely)

23. What is the minimum range (in km) an electric truck must provide to be viable for your day-to-day operations? Numerical

24. As per your requirement, how far should the nearest public charging station suitable for heavy-duty vehicles be situated from your main depot? In kms (Numerical)

25. Would you be willing to co-invest in shared charging infrastructure with other fleet operators? Y/N

26. If you are concerned about resale value of electric trucks, which of the following would mitigate those concerns? (Select all that apply)
    - ☐ OEM buyback guarantees
    - ☐ Remaining useful life of battery
    - ☐ Battery SOH validation
    - ☐ Warranty transfer to second owner

27. Would you consider purchasing an electric truck for your next acquisition after your concerns are addressed? Y/N

FUTURE OUTLOOK

28. Are you interested in developing a long-term fleet decarbonising strategy? Y/N

29. Would you be open to government or NGO-led pilots to demonstrate electric truck effectiveness in real-world settings? Y/N

30. Would you be open to re-skilling the existing staff in electric vehicle operation and maintenance? Y/N

Endnotes

1 https://www.niti.gov.in/sites/default/files/2023-02/ZETReport09092022.pdf

2 https://vahan.parivahan.gov.in/vahan4dashboard/vahan/view/reportview.xhtml

3 https://openknowledge.worldbank.org/server/api/core/bitstreams/f2a9c192-12e7-5c1a-8594-b76919d50a6d/content

4 ttps://www.niti.gov.in/sites/default/files/2021-06/FreightReportNationalLevel.pdf

5 https://www.niti.gov.in/decarbonising-transport-redefining-mobility-policies-india

6 https://www.researchgate.net/publication/350596826_Emissions_inventory_for_road_transport_in_India_in_2020_Framework_and_post_facto_policy_impact_assessment

7 https://www.theclimategroup.org/our-work/publications/early-market-outlook-report-electrification-medium-and-heavyduty- trucks

8 https://www.mospi.gov.in/sites/default/files/publication_reports/EnergyStatistics_India_publication_2024N.pdf

9 https://morth.nic.in/sites/default/files/Advisory_regarding_revision_of_safe_axle_1.pdf

10 https://powermin.gov.in/sites/default/files/Guidelines_and_Standards_for_EVCI_dated_17_09_2024.pdf

11 https://www.vasudha-foundation.org/wp-content/uploads/ZET-Model-Roadmap-2.pdf

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