A Comparative Study of the Indian and UK Road Logistics Industries with Alternate Fuel in Focus.

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Abstract

India and the UK differ significantly in factors impacting their road logistics industries, such as geography, economic structure, and demographic profiles. India, with a vast area of 3.3 million square kilometers, faces unique logistical challenges due to its diverse terrains and varying population densities. Conversely, the UK, spanning just 242,500 square kilometers, benefits from a compact geography, high population density, and urbanization, with 83% of its population living in urban areas compared to India's 34%. While India's urbanization is rapidly increasing, its logistics sector grapples with underutilized fleets, insufficient driver training, outdated technology, and weak safety regulations, leading to inefficiencies and higher costs. These challenges are exacerbated by road congestion, increasing fuel consumption, and environmental impacts. In contrast, the UK's mature economy, valued at $2.83 trillion in 2021, leverages advanced logistics systems and efficient infrastructure to ensure timely deliveries. India's logistics sector, despite being part of a $2.87 trillion economy, requires investments in technology, driver training, and infrastructure to overcome inefficiencies and enhance competitiveness.

Key Words: Logistics, Road Transport, Trucking, UK, India, Economy Comparision, Electrification.

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1. Introduction

India and the UK have significantly different road logistics industries due to contrasts in size, development, and demographics. India's vast land area of 3.3 million square kilometers and 34% urbanization make logistics challenging, with long distances and varied terrains. In contrast, the UK, with 242,500 square kilometers and 83% urbanization, benefits from compact geography and higher population density, enabling more efficient operations.

India's 2021 GDP of $2.87 trillion ranks fifth globally (Niti Aayog, 2022), slightly ahead of the UK's $2.83 trillion (DFT, 2023). However, India's logistics sector faces greater hurdles, including fleet underutilization, driver shortages, and poor safety regulations. Idle fleets increase costs, reduce efficiency, and harm the environment. Limited driver training exacerbates delivery delays, accidents, and fuel theft, while weak safety protocols result in higher road risks. Implementing technologies like tachographs and Operator Compliance Risk Score (OCRS) could enhance compliance and safety standards, as seen in the UK.

India's cost-sensitive market relies on vehicles with poor engine dynamics, leading to high fuel consumption and slower turnaround times. Lack of road discipline further discourages better engine adoption. Conversely, the UK benefits from advanced vehicle technology and better road practices. It also leads in adopting telematics, tracking systems, and route optimization, with autonomous delivery trials underway. India is gradually adopting digital tools, driven by e-commerce growth.

While the UK faces high costs and environmental concerns, its compact size and strong regulations support efficient logistics. India, on the other hand, grapples with challenges related to its large size and infrastructure, requiring tailored solutions. However, there are valuable lessons the UK can learn from India, particularly in how cost-effectively more load is carried with fewer vehicles. Additionally, India can benefit from the UK's emphasis on training, safety, and technology to enhance logistics efficiency.

2. Basic Statistics

A key data point highlighting the difference between India and the UK is their population, with India housing 1.4 billion people compared to the UK's 67.33 million as of 2021.

Table 1 - Provides Some Basic Statistical Data Comparing the Logistics Industries in India and UK

Particulars	India	UK	Units
GDP	2.87 trillion	2.83 trillion	US Dollars
Share of Logistics	14	8	% of GDP
Inventory	34	18	% of Logistics GDP
Transportation	66	82	
Road Transport	77	81	% of share of transportation in logistics GDP.
Rail Transport	9	7	
Water Transport	14	12	

Share of Road Logistics in Transportation Costs	78	77	%
Light Commercial Vehicles (LCVs)	1,670,000	4,400,000	Units
Heavy Goods Vehicles (HGVs)	4,900,000	529,400	Units
Total mass lifted (Material Transport)	2,200 billion	216 billion	Tonnes
Population (2021)	1.4 billion	67.33 million	People
Average Trip Distance	338	108	Kilometers
Total Number of Accidents	461,312	135,480	Count
Total Deaths	168,491	1,711	Count

Data From: (Niti Aayog, 2022) (DFT, 2023)

2.1 GDP Decoupling Analysis

The share of logistics in an economy is often misinterpreted as logistics cost, leading to misleading comparisons. A higher logistics share does not necessarily mean higher logistics costs; instead, it reflects sectorial contributions to GDP. For instance, a country where 80% of GDP comes from retail and wholesale will have higher logistics contribution than one where 80% comes from financial services, as the former relies more on logistics. A decoupling analysis is essential to accurately evaluate logistics contributions relative to the sectors driving them.

Table 2 – Compares the Contributors to GDP of Various Sectors of India ((Niti Aayog, 2022) and UK (National statistics office UK, 2023) Economies

Industry	India	UK
Manufacturing	18%	10%
Agriculture	20%	1%
Infrastructure	8.2%	6.5%
Wholesale trade	5.5%	17%
Retail trade	9.1%	
Total of logistics-intensive sectors	60.8%	34.5%
Logistics	14%	8%
Logistics relative to logistics-intense sectors.	23.02%	23.18%

It shows Table-2 that atleast 60.8% of Indian economy uses logistics-intensive sectors vs 34.5% in case of The UK. The remaining contributions are from the services sector like IT, Financial services etc. Hence, if we measure relative contribution of logistics sector to the sectors using logistics services the contribution is almost the same.

2.2 Contribution of Road in Overall Logistics GDP

The contribution of road logistics to the overall logistics GDP shows the dominance of transportation costs in both India and the UK. In India, transportation accounts for 66% of logistics GDP compared to 82% in the UK, while inventory comprises 34% and 18%, respectively (Table-1). Within the transportation segment, road logistics plays a critical role,

with roads accounting for 78% of transportation costs in India and 77% in the UK (Table-1). This comparable reliance on road logistics highlights the importance of road infrastructure and efficient operations in sustaining economic activities in both countries. (National statistics office UK, 2023) (Niti Aayog, 2022)

2.3 Vehicle Population

The vehicle populations in India and the UK (Table-1) highlight distinct logistics strategies, driven by their unique economic and geographic needs. In India, the significantly large number of Heavy Goods Vehicles (HGVs), at 4.9 million, reflects the country's reliance on heavy trucks for long-haul and bulk cargo transportation, necessitated by its vast geography and high logistics demand. In contrast, the UK, with 4.4 million Light Commercial Vehicles (LCVs), emphasizes urban and regional deliveries, supported by its compact geography and advanced retail and e-commerce sectors. This disparity showcases how each country's logistics fleet composition aligns with its specific operational priorities and infrastructure. (Niti Aayog, 2022) (DFT, 2023)

2.4 Material Lifting

The material lifting activities (Table-1) of India and the UK highlight the importance of various transportation modes in each country. India, with a total mass lifted of 2,200 billion tonnes, demonstrates a robust capacity for material movement, with road transport as the dominant mode, accounting for 77%. Rail transport contributes 9%, and water transport 14%, both playing critical roles in bulk and long-distance movement across the country's vast and diverse terrain. In comparison, the UK, with a total mass lifted of 216 billion tonnes, reflects a lower quantity of transported materials despite its well-developed economy. Road transport dominates at 81%, followed by water transport at 12% and rail at 7%, emphasizing the UK's reliance on efficient road networks and proximity to waterways. This data underscores the heavy dependence on road transport in both countries, while India also leverages rail and water transport more extensively due to its geographical scale. (DFT, 2023) (Niti Aayog, 2022)

2.5 Population Comparison

The population size of a country directly impacts its logistics needs, influencing demand for goods, transportation volume, and infrastructure requirements. In 2021, India's population was 1.4 billion, while the UK's population was 67 million. India's large and widely spread population creates unique logistical challenges, requiring extensive infrastructure development to meet the demands of both urban and rural areas. In contrast, the UK's smaller population allows for a more condensed logistics network, with a greater emphasis on urbanization and streamlined supply chains. This large population difference highlights the complexity of logistics demand in India, where vast distances and diverse regions necessitate much more extensive transportation infrastructure compared to the UK. (Know India.gov, 2023) (National statistics office UK, 2023)

2.6 Average Trip Distance.

The average trip distance is a crucial metric for understanding logistics efficiency, vehicle utilization, and cost implications. In 2021, the average trip distance in India was 338 kilometers, significantly longer than the 108 kilometers in the UK. This difference reflects the different

logistical needs of each country, with India's vast geography necessitating longer trips, while the UK's urbanized structure supports shorter and more frequent journeys. The difference in average trip lengths highlights the distinct operational challenges and requirements in each country's logistics sector. (DFT, 2023) (Niti Aayog, 2022)

2.7 Road Accidents and Deaths

Road safety is a significant concern in both India and the UK, with the number of road accidents and fatalities offering insights into the safety challenges in each country (Table – 1). In 2022, India, with a population of 1.4 billion, reported 461,312 accidents and 168,491 deaths, while the UK, with a population of 67 million, recorded 135,480 accidents and 1,711 deaths. India's population is 20 times larger than that of the UK. However, the number of road-related deaths in India per head of population is approximately 5 times higher than the UK. The relatively low level of reported non-fatal accidents per head of population in India is thought to be due to significant under reporting compared to the UK. (Niti Aayog, 2022) (DFT, 2023)

3 Comparison of Fleet Operations

3.1 Driver Shortage.

Both India and the UK are facing truck driver shortages in their respective road logistics industries, but the underlying factors differ significantly. Table-3 below outlines the key factors contributing to the driver shortage in both countries:

Table 3 – Driver Shortage Comparison

Factor	India	UK
Cost of Entry	Moderate	High
Smoking in Cab	Smoking allowed	No smoking in cab (strict)
Training	No formal training	CPC (Certificate of Professional Competence) modules required
Brexit	N/A	Impact due to reduced European Union labour mobility
IR35 (Tax Changes)	N/A	Impact of IR35 affecting self-employed drivers
Employment Status	Self-employed	Self-employed to SPV (Special Purpose Vehicle)
Pay	Low pay	Moderate to high pay
Social Acceptance	Social rejection	Social acceptance

(India, 2023) (UK, 2023)

In India, the truck driver shortage is driven by factors such as low pay, minimal formal training, and the prevalence of self-employment. While the cost of entry is moderate, the lack of structured training programs makes it challenging for individuals to develop the necessary skills. Additionally, truck driving is often perceived as a less desirable job, contributing to a shortage of trained professionals. In contrast, the driver shortage in the UK is largely influenced by the high cost of entry, the cost of entry to become a truck driver in the UK is high, with Class

2 training ranging from £1,500 to £3,000, excluding the additional costs of CPC training. and regulatory changes, such as IR35, which have made self-employment less attractive to drivers. The introduction of stricter regulations, like CPC modules, along with the impact of Brexit, which reduced labor mobility, has made it harder for the UK to maintain an adequate workforce. The UK has a stricter licensing model with mandatory CPC (Certificate of Professional Competence) training, periodic renewals, and tachograph enforcement to ensure compliance. In contrast, India's licensing system is less regulated, with no formal CPC equivalent and limited enforcement of training standards. Strengthening India's driver training and certification process by adopting structured modules like the UK's could significantly improve road safety and efficiency.

3.2 Fuel Theft.

Fuel theft is a persistent issue in the logistics industry, particularly in India, where it has become integrated into the business model. The way drivers are compensated in both the UK and India reflects how fuel theft is managed within each country's logistics ecosystem. There are broadly 4 models for compensating drivers in India, all of which factor-in fuel theft as a standard part of driver remuneration, see Table - 4

Table 4 – Payment Models in India Accounting for Fuel Theft

Payment Model	Description
1) Very low salary with fixed diesel per km	Drivers receive a minimal salary, and diesel costs are fixed per kilometer, assuming theft.
2) No salary, per km compensation including diesel	No base salary is paid; drivers are compensated per kilometer traveled, including fuel cost adjustments for theft.
3) Decent salary with overall reasonably achievable mileage	Drivers receive a reasonable salary with fix mileage expectations, factoring in fuel theft.
4) Average salary but below reasonable mileage expectation	Drivers receive a base salary but with a low mileage expectation, reflecting the cost of fuel theft.

In the UK, fuel theft is not as prevalent within the logistics model, as drivers are typically salaried or compensated per trip. Where fuel theft occurs, it is clearly recognized as criminal activity and not part of the driver's standard remuneration. This structure enables companies to have better control over fuel expenses and ensures transparency in fuel management. In contrast, the various payment models in India aim to address the impact of fuel theft on operations, attempting to balance the increased fuel consumption caused by theft. However, these models also highlight the inefficiencies in fuel management that continue to affect the Indian logistics sector. While fuel theft drives up costs and complicates payment structures in India, the UK benefits from better regulation and pay structures that help minimize such issues. Both countries face challenges in ensuring cost efficiency, but their approaches to managing fuel theft are markedly different. (India, 2023) (UK, 2023)

3.3 Driving Hours and Rest Periods

Regulating driving hours and rest periods is essential to ensure driver safety and prevent fatigue-related accidents. Both India and the UK have specific rules governing truck driving hours, but the enforcement and structure of these regulations differ significantly. These differences contribute to varying levels of road safety and accident statistics in the two countries.

EU Rules on Driving Hours and Breaks (UK)

The UK, in line with European Union regulations, follows strict rules on driving hours and breaks to ensure that drivers do not exceed safe working limits, which helps reduce fatigue-related accidents. Drivers are allowed a maximum driving time of 9 hours per day, extendable to 10 hours twice a week. The weekly driving limit is set at 56 hours, with a fortnightly maximum of 90 hours. A tachograph is required to record all driving activity, ensuring compliance with these rules. Drivers must take at least 11 hours of rest daily, which can be reduced to 9 hours on up to three occasions per week. Weekly, drivers must have an unbroken 45-hour rest period, which can be reduced to 24 hours every other week. Additionally, drivers must take a break of at least 45 minutes after 4.5 hours of continuous driving. The tachograph plays a crucial role in monitoring driving times and enforcing these regulations, ensuring that drivers adhere to safe working hours and rest periods. (DFT, 2023)

India's Truck Driving Hours and Rest Regulations

In India, truck driving hours and rest periods are regulated by the Motor Vehicles Act of 1988 and the Central Motor Vehicles Rules (CMVR) of 1989. These rules are designed to prevent fatigue and ensure road safety. However, their enforcement is often less stringent compared to the UK, leading to a higher risk of accidents. According to the regulations, drivers are restricted to a maximum of 8 hours of driving within a 24-hour period and should not drive continuously for more than 5 hours without taking a rest. Drivers are also required to take at least 24 hours of rest each week. Additionally, a minimum break of 30 minutes is mandated after 4 hours of continuous driving. Despite these regulations, inconsistent enforcement and the lack of tools like tachographs in India contribute to the high number of accidents and fatalities on the country’s roads.

3.4 Road Worthiness and OCRS Compliance

Road Worthiness Regulations in India

In India, commercial vehicle road worthiness regulations are governed by the Motor Vehicles Act of 1988 and the Central Motor Vehicles Rules (CMVR) of 1989. Unlike the UK's dynamic compliance system, India's regulations focus on basic safety, mechanical, and environmental standards. Commercial vehicles must undergo an annual fitness test after 8 years of operation, covering brake systems, suspension, lighting, tires, and emissions compliance. These tests are conducted at authorized Vehicle Inspection and Certification Centres (VICCs), and vehicles must pass the Pollution Under Control (PUC) test to meet environmental standards. A valid fitness certificate is required, and failure to pass the test or drive without it can result in fines or vehicle impoundment. Any vehicle modifications must be approved by the Regional Transport Office (RTO) for roadworthiness. These measures aim

to reduce accidents and ensure compliance with emission norms like BS-VI. (Central motor vehicles rules India, 2022)

OCRS: The UK's Approach to Vehicle and Operator Compliance

The Operator Compliance Risk Score (OCRS) is a system used by the UK Driver and Vehicle Standards Agency (DVSA) to assess and monitor the compliance of road transport operators, particularly those in commercial vehicle operations. The OCRS provides a clear view of operator behaviour, focusing on road safety and environmental standards. Its main purpose is to identify operators and vehicles at higher risk of non-compliance, allowing regulators to focus on those most likely to pose safety risks. Operators are assigned a score based on their compliance history, including vehicle checks, inspections, infringements, and adherence to road safety regulations. The scoring system uses a color-coded approach: green indicates good compliance with low risk, amber signals moderate risk and may trigger further checks, and red signifies high risk, leading to frequent roadside inspections and potential penalties. The score is influenced by the frequency and severity of violations, as well as the operator's track record and inspection history. Operators with higher scores may face more rigorous inspections and penalties. The OCRS plays a crucial role in the UK's strategy to improve road safety, enhance compliance in the commercial transport sector, and reduce accidents and violations. Figure 1 below Summarises the scoring system. (DFT, 2023)

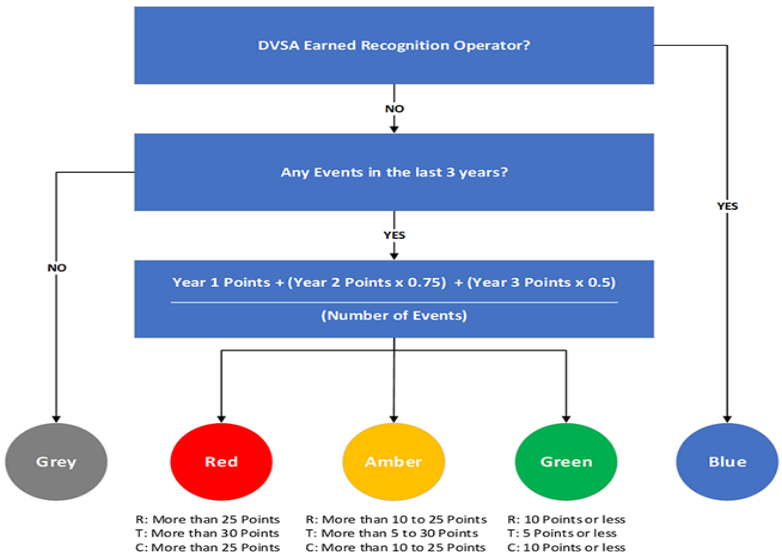

Figure 1. OCRS scoring methodology. (DFT(OCRS), UK, 2023)

Key Differences.

There are key differences between India and the UK in terms of vehicle compliance systems. While India's fitness regulations focus on periodic vehicle inspections, the UK's Operator Compliance Risk Score (OCRS) takes a more dynamic approach by continuously monitoring operators' compliance and assigning a risk score. This ongoing monitoring helps identify non-compliant operators before they cause significant issues. Enforcement also differs, as the UK benefits from a more detailed tracking system through OCRS, which enables more frequent and targeted inspections. In contrast, India's system primarily relies on annual checks and basic certifications, creating potential gaps in enforcement and monitoring. The UK's proactive

approach with OCRS helps improve safety by regularly identifying high-risk operators and ensuring stricter compliance. India's fitness test ensures that vehicles meet safety standards, but the lack of continuous monitoring increases the risks on the road due to irregular checks and under-reporting. While both countries recognize the importance of vehicle compliance in road safety, the UK's real-time monitoring system offers a more comprehensive approach, whereas India's reliance on periodic checks may result in greater risks.

3.5 Vehicle Specifications

The specifications of vehicles used in road logistics play a significant role in determining their efficiency and suitability for different operational environments. Table-5 is a comparison of vehicle specifications between India and the UK:

Table 5 – Vehicle Specification Metrics

Specification	**India**	**UK**
Vehicle (Gross Mass Kgs)	42500	44000
Torque (Nm)	950	1900
Horse Power (HP)	250	530
Engine (cc)	6700	12600

This contrast in engine specifications reflects the different logistical needs and infrastructure in each country. The UK's higher engine capacities are optimized for speed and efficiency on well-maintained roads, while India's lower capacity engines are better suited to the country's value-driven market and its more diverse and often challenging road conditions.

3.6 Weights and Dimensions Limit

Both the countries have evolved over time in terms of weights and dimensions limit. The highest gross weight capacity for an Indian HGV is 55 tonnes, whereas, its 44 tonnes for its UK counterpart. Table-6 below gives a clear view of the same. (Central motor vehicles rules India, 2022) (DFT, 2023)

Table 6 – Weights and Dimensions

Parameter	India	UK
Max GVW (2-axle)	18,000 kg	18,000 kg
Max GVW (3-axle)	25,000 kg	26,000 kg
Max GVW (Articulated)	55,000 kg	44,000 kg
Max Length	12 meters (truck only), 16.2 meters (with trailer)	12 meters (rigid), 16.5 meters (articulated)
Max Width	2.55 meters	2.55 meters
Max Height	4.75 meters	4.95 meters
Max Rear Overhang	3 meters	3 meters
Axle Weight (Single)	10,000 kg	10,000 kg

Axle Weight (Twin)	18,000 kg	18,500 kg
Axle Weight (Tridem)	22,500 kg	24,000 kg

Key Differences:
1. India has a higher GVW limit for articulated vehicles (55,000 kg vs. 44,000 kg in UK).
2. The height limit for trucks in India is slightly higher (4.75 meters) compared to the UK (4.95 meters).
3. The length limit for articulated vehicles is slightly longer in the UK (16.5 meters vs. 16.2 meters in India).

India's logistics system allows a higher maximum Gross Vehicle Weight (GVW) for articulated trucks at 55,000 kg, compared to the UK's 44,000 kg. This means Indian transporters can move more goods per trip, improving cost-efficiency in a price-sensitive market. The ability to carry higher cargo volumes in a single journey reduces fleet deployment. India's approach enables greater cargo movement efficiency for long-haul transportation. However, proper enforcement of axle load limits and road maintenance remains crucial to balance efficiency with infrastructure sustainability.

3.7 Utilization Case Study

A comparative analysis of vehicle utilization between India and the UK highlights differences in operational efficiency. The author tracked five vehicles in each country, carrying powder cargo. Table-7 summarises the two operations.

Table 7 – Utilization Specific Details

Parameter	**India**	**UK**
Gross vehicle weight	42.5 tonnes	44 tonnes
Route	Vishakhapatnam to Jharsuguda (1350 km)	West Thurrock to various locations
Total Distance Traveled monthly	5400 km	13,800 km
Distance on motorway	61%	58%
Number of Loadings/Unloadings	8	44
Average Loading/Unloading Time	13 hours	1.4 hours

There are significant differences in vehicle utilization, largely caused by variations in infrastructure, operational efficiency, and vehicle capabilities. In the UK, more efficient route planning and higher motor way speed contribute to better vehicle utilization. Additionally, the UK benefits from shorter loading and unloading times, highlighting operational efficiency and well-developed infrastructure. The superior vehicle engines in the UK also enable quicker turnaround times, allowing for more efficient operations and reduced delays. In contrast, vehicles in India face challenges such as extended loading and unloading times, less frequent utilization, and constraints related to the value-driven market that limit vehicle engine performance. These issues result in longer turnaround times and lower overall efficiency. To improve logistics performance, India would need to address these challenges through

infrastructure improvements, process optimization, and investment in higher-capacity, more efficient vehicles. Figure 2 shows vehicle routes in The UK. Figure 3 shows vehicle routes in India.

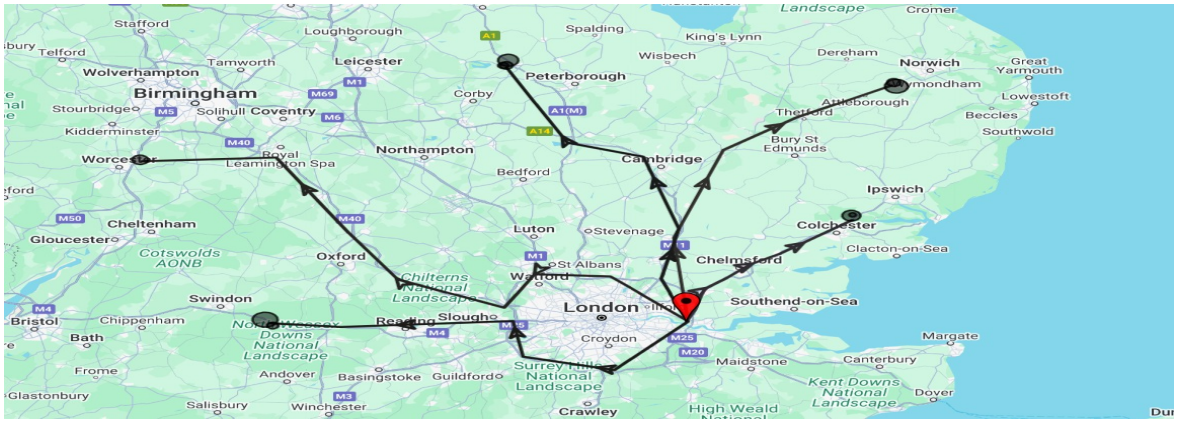

Figure 2 - Vehicle Routes in The UK.

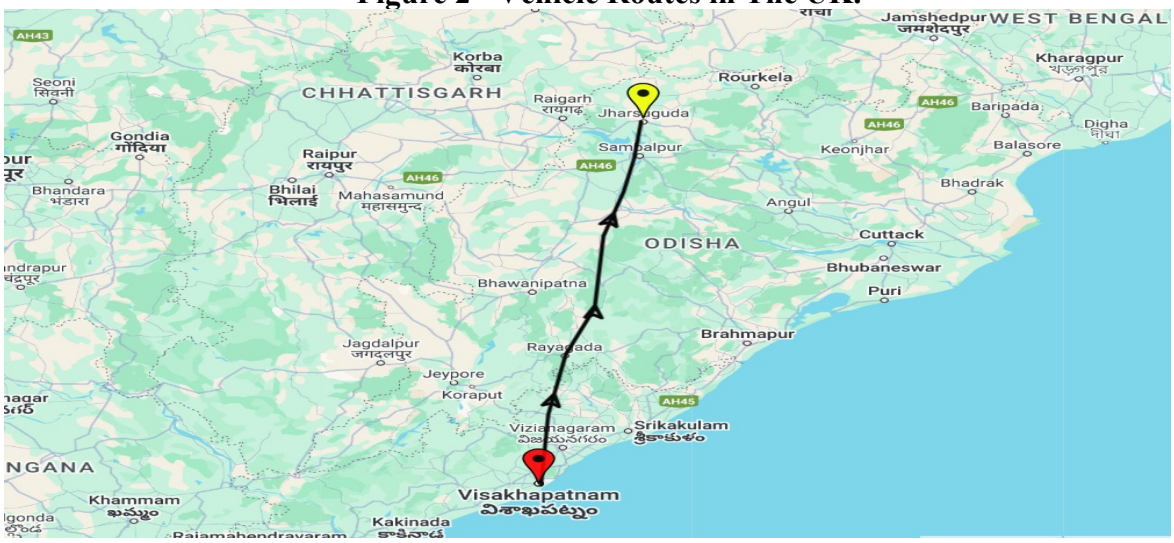

Figure 3 - Vehicle Routes in India.

4 Discussion and conclusion.

This analysis compared the road logistics sectors of two distinct economies: the UK, a developed nation, and India, a developing country. The comparison revealed stark contrasts in infrastructure, vehicle specifications, operational practices, and electrification strategies, each shaped by the unique economic and logistical needs of the respective countries.

For India to transition toward a greener, safer, and more efficient logistics system, key improvements are essential. Digitizing fleet operations and introducing automated scheduling can reduce vehicle idling, while enforcing rest-hour compliance will improve driver safety. Infrastructure upgrades, such as dedicated freight corridors and weigh-in-motion stations, can help curb overloading. Technology adoption—telematics, fuel monitoring, and alternative fuels like EVs and LNG—will cut inefficiencies and emissions. Given India's vast geography, implementing Electronic Road Systems (ERS) for dynamic charging can accelerate decarbonization, offering a scalable solution for long-haul freight. The UK's OCRS and CPC training models provide a strong framework for improving driver training and regulatory

enforcement. A structured roadmap integrating these elements will enhance India's logistics sector's sustainability and safety.

In the UK, the shorter average haul distance and dense population result in a higher reliance on smaller commercial vehicles for urban and regional logistics. This makes the transition to electrification more feasible, as smaller electric vehicles (EVs) can meet daily range requirements without significant operational disruptions. To accelerate decarbonization, the UK should prioritize expanding its charging infrastructure, particularly in urban centers and along key freight corridors. A well-developed charging network will support the widespread adoption of EVs, ensuring a seamless shift toward a cleaner and more efficient logistics system.

Going forward, this comparative framework can be extended to include more economies, both developed and developing, to identify the best practices and takeaways from different logistical landscapes. By analyzing a broader range of economies, insights can be drawn to develop tailored strategies that address common challenges and leverage opportunities for innovation in the global logistics industry.

The UK has higher asset utilization, driven by superior infrastructure, shorter loading and unloading times, and better operational efficiency. UK vehicles, with more powerful engines (1900 Nm torque and 530 HP), travel longer distances (13,800 kilometers on average per month) and handle more frequent loadings and unloadings in significantly less time (1.4 hours). This is further supported by disciplined traffic behavior, stringent regulations, and a mature logistics network. In contrast, India faces challenges such as less powerful vehicles (950 Nm torque and 250 HP), longer loading/unloading times (13 hours), and lower average monthly distances (5400 kilometers). These inefficiencies stem from a value-sensitive market, underdeveloped infrastructure, and manual logistics practices.

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