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Road Logistics' Performance Constraining Export Competitiveness in Pakistan

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Abstract

This paper investigates the structural, operational and regulatory deficiencies of Pakistan's road transportation industry coupled with their performance-related impact on export competitiveness. From an empirical analysis based on primary-data collection, a bespoke Export-Linked Logistics Performance Index (E-LPI) was created to compare Pakistan's logistics performance against regional averages via Principal Component Analysis (PCA). Despite the industry representing over 10% of Pakistan's GDP, it remains an informal, fragmented and undercapitalized niche due to legacy regulations, insufficient public and private governance and a geologically dispersed network compounded by an ineffective, fuel-wasting vehicle fleet. However, the compounded E-LPI results suggest 13% performance in international standards versus 72% - suggesting a 138% deficit in sustainability, 51% in technological tools and 67% in freight costs. The latter two extremes are detrimental since sustainability could prevent the country from meeting the EU Green Deal and other global standards and it could become excluded from regulated markets. The gap in technological facilitation means that there is not enough tracking and tracing to facilitate digitization and approvals for further operations. Third, a huge percentage of freight costs related to top exporting industries - textiles, agriculture, heavy industries - undermine global competitiveness since buyers will not accept elevated prices - and thus, Pakistan is not benefitting from its geo-strategic advantage. Thus, to more effectively position itself as a cross-border trading partner with regional developments - including the China-

Pakistan Economic Corridor (CPEC) and the Central Asia Regional Economic Cooperation (CAREC) - this inconsistent, inefficient structure must be transformed. Otherwise, Pakistan will fall farther behind in global rankings and miss out on valuable opportunities. Lastly, this study highlights a comprehensive reform potential that is aligned with international standards from the introduction of a Ministry of Transport and Logistics to interprovincial regulatory harmonization, enforcement of axle load restrictions, modernization of fleets and green technologies through subsidies and digitization through comprehensive logistics efforts. It's expected that such reforms will promote reduced costs and emissions while providing transformative export capabilities to establish Pakistan as a valuable, low-cost yet climate-resilient regional logistics partner.

Key Words: Road logistics performance, Export competitiveness, Pakistan trade infrastructure, Supply chain constraints, Transportation efficiency, Logistics costs

1. Introduction

The logistics management system helps in the efficiency of production, movement as well as supply of goods and services in any economy. Moreover, it is the greatest creator of wealth-generating potential in the country. Logistics do not only create time utility or place utility but also enhance the potential of export and the flow of investment (World Bank, trade logistics: Connecting to compete 2010, 2010). For developing countries, logistics costs are generally between 12–15% of GDP, while developed countries see costs of 18–20% (Pakistan Bureau of Statistics, 2023). The logistics sector not only constitutes traditional modes (road, rail, water and air transport) but also expanding domain of digital logistics, such as data transmission of high-value goods.

According to Arvis J. F. in 2018, improvements in logistics performance have been found to directly support industrial diversification and trade openness (Arvis J. F., 2014). Lowering transport costs boost trade volumes, especially when they are below the global average. But the trade benefits decline rapidly as logistics inefficiencies increase. Pakistan's logistics performance is amongst the weakest links in its economic link chain. Logistics costs determine more than fifteen percent of the variation in trade costs among countries. Tariffs, on the other hand, only explain less than 1% of the variation (World Bank, trade logistics: Connecting to compete 2010, 2010). Also, about one-third of the trade cost is distance-related, which cannot be changed. Thus, logistics reform is among the most do-able policies for Pakistan.

Today, transport and logistics in Pakistan contribute over 10.5% to GDP and employs 5.4% of the labor force. Even though it has such a significant role, it is still underdeveloped. For the past seven years, the performance has shown a constant downtrend and is 2.5 times more volatile than the economy, on average. While public investment has gone up, private investment in transport and communication has fallen by over 30% from 2021 to 2023, indicative of a lack of confidence of investors (Pakistan Bureau of Statistics, 2023).

The road transport sector dominates freight logistics in Pakistan, accounting for approximately 94% of total freight movementdespite being the most expensive mode of transport (World Bank, trade logistics: Connecting to compete 2010, 2010). Pakistan's road network extends over 501,169 km, compared to only 7,791 km of rail. The country has about 300,649 registered trucks, equating to just one truck per 800 people, while India has one truck per 115 people, and Afghanistanhas one truck per 259 people. Pakistan has not expanded its rail network in over three decades, forcing an overreliance on roads and causing serious structural inefficiencies including increased fuel consumption, traffic congestion, road deterioration, and higher greenhouse gas emissions (Road Logistics Report, 2023).

The regulations are outdated and the institutions are weak and require some improvement. The Carriage of Goods by Road Act, 2003 is still not approved while National Freight & Logistics Policy, 2020, is not properly implemented. Delays in the process of clearing goods through customs, old infrastructure in major ports, lack of cold storage facilities and poor joining of rail and air are the operational inefficiencies further aggravated. Due to these issues, Pakistan is steadily falling in the LPI – Logistics Performance Index (Naseer M. A., 2024). As per World Bank (2022), Pakistan LPI ranking had steep decline from 68th position in 2007 to 122nd position in 2022 which puts it behind almost all regional peers (World Bank Open Data (n.d.)).

The presence of 85% of informal players using old vehicles, uncertified drivers and overloading of trucks frequently damaging the infrastructure and increasing safety issues (Road Logistics Report, 2023) cripples the sector further. The shipping costs rise because of such practices which also affect reliability. Moreover, these practices reduce the competitiveness of exports from Pakistan. Road transport, which already uses nearly three times more fuel than rail, is a growing concern. Also, overloading by more than 30% of the six- and four-axle trucks and 30% of the two- and three-axle trucks on continuous basis cause more damage to the road and accident (Tariq, 2024). Excessive informality prevents access to finance and does not encourage domestic and foreign investment in the sector.

The ongoing logistics pathway of Pakistan poses a considerable threat to its economic future, especially when viewed against the backdrop of emerging global environmental benchmarks like the EU Green Deal and the Paris Agreement. In the absence of inclusive modernization, the country risks missing out key global markets where the disclosure of carbon emissions and compliance with the green supply chain become mandatory (Road Logistics Report, 2023). Pakistan was unable to effectively use its strategic geo-graphical position to serve as a regional trade corridor for China, Central Asia and the Middle East under CPEC (China-Pakistan Economic Corridor) and Central Asia Regional Economic Cooperation (CAREC) trade and connectivityinitiatives.

Due to the major economic transfiguration role of the sector and the prominent performance difference in the logistics ecosystem of Pakistan, the study is both timely and essential. Pakistan's GDP contribution is over 10.5%, while it employs nearly 5.4% of the national workforce. However, the road logistics sector continues to suffer from significant fragmentation, low regulation and chronic underfunding (Pakistan Bureau of Statistics, 2023).

In the last two decades, multiple policy frameworks have been provided, notably the 2007 Trucking policy and 2020 National Freight and Logistics Policy. However, most of their key recommendations were not implemented. Pakistan has seen a steady deterioration of in its relative logistics performance compared with regional peers. After ranking 68 in 2007, it has since fallen to 122nd out of 160 countries in the 2022 World Bank Logistics Performance Index (World Bank Open Data, 2022). About 94% of freight is moved by road and the rail network has not expanded in more than 30 years. The country is highly dependent on its most costly and environmentally damaging mode of transport (World Bank, trade logistics: Connecting to compete 2010, 2010). Moreover, informal operators, dominating the trucking sector with an 85% market share, are still using old fleets and don't observe safety protocols nor environmental norms. Pakistan risks exclusion from regulated export markets due to its failure to modernize its logistics infrastructure, in the face of tightening global climate regulations like EU Green Deal. Because of the persistent deficiencies, rapid growth in volumes, rise in international compliance regulations, and the emergence of strategic opportunities through CPEC, targeted evidence-based assessment has become not only important but urgent.

As shown in **Table 1**, overtime, the logistics sector of Pakistan has performed below par as compared to the regional peers as well as the global average. India has continuously improved their LPI - its score has gone from 3.07 in 2007 to 3.40 in 2022. Pakistan, on the other hand, has shown an erratic improvement pattern, with clear downward movement since 2016. The LPI score of Pakistan dropped from 2.923 in 2016 to below South Asia average of 2.420 in 2018. This indicates Pakistan's failure to keep up with logistics capacity improvements taking place in South Asia. Inability to keep up with the improvements dampens the competitiveness of Pakistan's exports and the appeal of the country as a supply chain partner. There is a need to immediately intervene in policy-making and systematic performance improvement in the logistics sector. In the case of road transport, it is the most dominant mode of freight movement in Pakistan.

Table 1: Logistics Performance Index (LPI) Scores – South Asia vs. World (2007–2022)

Year	Bangla-desh	Bhutan	India	Sri-Lanka	Maldives	Nepal	Pakistan	South Asia	World
2007	2.470	2.160	3.070	2.400		2.140	2.620	2.296	2.740
2010	2.740	2.380	3.120	2.290	2.400	2.200	2.530	2.488	2.866
2012		2.520	3.080	2.750	2.550	2.040	2.830	2.581	2.871
2014	2.563	2.290	3.080	2.695	2.748	2.588	2.825	2.607	2.894

2016	2.664	2.321	3.420		2.513	2.377	2.923	2.623	2.884
2018	2.580	2.170	3.180	2.600	2.670	2.510	2.420	2.510	2.866
2022	2.600	2.500	3.400	2.800				2.640	3.000

This study seeks to deliver a comprehensive diagnostic of Pakistan's road logistics sector, with particular emphasis on its implications for export competitiveness and supply chain efficiency. To this end, it develops a customized Export-Linked Logistics Performance Index (E-LPI) by adapting the World Bank's LPI methodology and supplementing it with primary data collected through structured surveys and stakeholder interviews across Pakistan. The E-LPI assesses performance across eight critical dimensions: strategic positioning, institutional capacity, value-added services, network optimization, cost efficiency, transport time efficiency, environmental sustainability, and technology adoption. The purpose of this study is not only to identify performance deficiencies but also to advance data-driven recommendations for policy reform, institutional strengthening, and private sector mobilization in alignment with international standards and climate-conscious trade practices.

2. Literature Review

Academic propositions and official discussion are focusing on the strategic role logistics can play in economic development. Road freight is considered highly strategic as it plays a key role in trade, industrial connectivity and regional integration. Studies conducted on an international level show a strong connection between logistics performance and GDP growth. According to the World Bank, merely increasing logistics performance by 1% will yield an increase of 3.2% in export growth and 2% in GDP growth (World Bank W. , 2023).

Pakistan's road logistics sector is crucial to national and regional trade, yet the sector is significantly underperforming due to deep-rooted structural, policy and infrastructure challenges. According to Road Logistics Report (2025), in Pakistan 94% freight is moved over road so it is widely used but least cost-effective mode of transport. This modal imbalance is corroborated by (Haque, 2023), who indicates that Pakistan's logistics sector has an over USD 30 billion latent potential but features a severe over-reliance on road with 96 percent of freight moved by road, which is well above the global average of 60 percent. The Pakistan Business Council (2023) agrees with these observations, stating that there is inadequate multimodal development, especially in the rail and inland waterways. These issues suppress competition, increase freight rates, and reduce export competitiveness (Pakistan Business Council, 2023).

Empirical research has consistently confirmed that improvements in logistics infrastructure significantly enhance productivity and economic growth. (Arshed, 2022) Noman Arshad found that logistics infrastructure acts as a moderator of real sector productivity in Pakistan, whereby investment in logistics networks directly correlates with growth in industrial

output. These findings reinforce the Road Logistics Report's argument that low logistics performance is a major impediment to industrial competitiveness and export diversification. Similarly, logistics infrastructure in developing countries like Pakistan improves total factor productivity and supports long-term economic development, particularly through reduced operational costs and better delivery reliability (Hanif, 2020).

The role of strategic economic corridors such as the China-Pakistan Economic Corridor (CPEC) is central to discussions around logistics modernization. Sumbal emphasizes that despite significant investments in hard infrastructure under CPEC, the corridor's potential has not materialized due to poor adoption of digital technologies and a lack of trained logistics personnel (Sumbal M. S., 2024). This aligns closely with the *Road Logistics Report*, which describes weak integration between physical and digital systems, limited adoption of GPS-based fleet management, and absence of centralized route optimization. Similarly, Ilyas, Jin, and Ullah analyze hub placement strategies along CPEC and find that optimization of logistics hubs and infrastructure could drastically reduce transport costs. Their findings validate the report's recommendations on targeted infrastructure upgrades and the development of dry ports and border warehouses (Ilyas, 2024).

Agricultural supply chains provide another lens through which the deficiencies of Pakistan's logistics systems become evident. Naseer et al. reported that only 1% of goods transport in Punjab's agricultural sector uses refrigerated vehicles, and more than 40% of perishable produce is lost due to a lack of cold chain logistics (Naseer M. A., 2024). These failures in temperature-sensitive supply chains significantly diminish Pakistan's ability to export high-value produce, especially meat, dairy, and fruits, to global markets.

The lack of technological adoption within the logistics sector is another widely cited constraint. Siddique, Javed, & Rao propose the integration of intelligent vehicles and real-time tracking to optimize transport efficiency, recommending clustering algorithms and QR-based tracking for route planning (Siddique, 2024). Their solutions align with the Road Logistics Report's recommendation to adopt e-logistics platforms, intelligent transport systems, and tracking technologies such as geofencing and GPS. Moreover, Besselink demonstrate that platooning technology (coordination of freight vehicles in a convoy) can reduce fuel costs by 5–10% and improve safety. These studies underscore the importance of modernizing Pakistan's logistics fleet, which remains outdated and non-compliant with Euro-5/Euro-6 standards, as noted in both the trucking policy analysis and environmental performance section of the Road Logistics Report (Besselink, 2015).

Spatial and hub optimization strategies have also been explored in literature with practical implications for Pakistan. Faisal and Khalid use a GIS-based P-median model to determine optimal e-commerce hub placements in Lahore, achieving a 16% reduction in average delivery distances. This supports the report's argument for spatial reconfiguration of Pakistan's freight network, especially in urban logistics planning, development of industrial clusters, and integrated cold-storage hubs (Faisal, 2024).

The World Bank Logistics Performance Index (LPI) has been ample global reference. The efficiency of supply chain and logistics environment of a country will be assessed through

this indicator. The LPI was unveiled in 2007, updated in 2023. The method has evolved from an expert-only approach to a hybrid that incorporates survey data from freight forwarders and logistics professionals and real time indicators such as port dwell times and shipping reliability (World Bank, World Development Report 2023, 2023). It measures the performance of customs, the quality of infrastructure, the ease of international shipments, the competence of logistics services, tracking and tracing and the timeliness of deliveries. A score of 1 indicates a low level of recovery while a score of 5 indicates a high level of recovery. These signs indicate that trade facilitation and implementation is conditional. The Road Logistics Report submitted by a foreign study shows that Pakistan's LPI score was 2.42 in 2018. In E-LP I 2023 (Export-Linked LPI), Pakistan's score has fallen to 2.3. This shows that Pakistan has lost its competitiveness primarily due to inefficiencies in customs, infrastructure and technology uptake.

Each dimension of the LPI has been studied in literature for its individual and systemic impact. For example, infrastructure quality is consistently found to have the most direct influence on LPI rankings and trade outcomes (Arvis J. F., 2014). In Pakistan's case, the report highlights serious infrastructural gaps like the outdated road fleet (with over 65% of trucks being single- or double-axle), limited warehousing, and absence of cold chain logistics, all contributing to a 46% performance gap in infrastructure-related logistics. Customs and border processes, another vital LPI domain, are often plagued by bureaucratic delays and corruption in developing countries, as also emphasized by (Seabra, 2016). The Road Logistics Report confirms these inefficiencies in Pakistan, with long permit issuance cycles and poor TIR adoptionfewer than 5% of freight operators are TIR-compliant, compared to over 90% in neighboring countries.

Similarly, logistics competence, tracking, and timeliness are influenced by network optimization and technological integration. Studies employing fuzzy DEMATEL methods have concluded that logistics service quality and infrastructure are the most influential (cause) factors; while tracking and timeliness are dependent (effect) factors (Stević, 2024). The Road Logistics Report validates this dynamic: outdated fleet technology, lack of real-time tracking, and no integrated corridor planning contribute to a 60% deficit in time efficiency and a 65% shortfall in value-added services. Furthermore, environmental effectiveness, now increasingly emphasized due to global agreements like the Paris Accord, also lags: Pakistan's fleet is dominated by Euro-2 standard trucks while Euro-5 compliance is required by many export markets. This has created a 46% performance gap in environmental metrics, threatening Pakistan's access to green-sensitive markets such as the EU (Government of Pakistan, 2024).

Collectively, these studies provide strong empirical support for the Road Logistics Report's multidimensional analysis and reinforce its call for reforms across infrastructure, regulation, technology, and governance. The literature emphasizes that without modernizing its logistics sector (through digital transformation, environmental compliance, and multimodal integration) Pakistan will remain regionally uncompetitive. As Pakistan aspires to integrate into global value chains and transit trade corridors such as CPEC, the implementation of the long-pending National Freight and Logistics Policy (NFLP), harmonization of regulatory frameworks, and fleet renewal programs are not just necessary but urgent (Pakistan Business Council, 2023).

3. Materials and Methods:

This study adopts a comprehensive and theory-informed methodological framework to evaluate the performance of Pakistan's road logistics sector in the context of export competitiveness and structural reform. Grounded in Logistics Performance Theory, Trade and Transport Cost Theories, Environmental Externality Theory, Institutional Economics, and Value Chain Theory, the approach investigates how inefficiencies in logistics systems elevate trade costs, impair environmental performance, and exacerbate institutional weaknesses. These interlinked theoretical lenses provide the conceptual foundation for the development of a novel, export-oriented performance measurement tool.

The E-LPI is a composite index based on perception, tailored to Pakistan's operational system and export logistics circumstances. The index was created using a three-step method: a review of existing policy, collection of primary data, and running the model. The government had created a three-tiered approach, and the first tier had a methodical review of key national logistics policies like the 2007 Trucking Policy and the 2020 National Freight and Logistics Policy which were implemented to identify the long-term implementation gaps along with infrastructure bottlenecks.

In the second tier, primary data was collected through a field-validated, structured questionnaire specifically developed for this research (questionnaire given at Annex A). Drawing from well-known international logistics evaluation models but tailoring them to Pakistan's operating realities, the study used a survey instrument designed to capture stakeholder views across eight essential performance areas. These included the sector's strategic direction, the efficiency of its network structure, the availability of value-adding logistics functions, the systems used to monitor performance, transportation cost efficiency, operational speed and timeliness, the adoption of modern technological tools, and the extent of environmentally responsible practices. All indicators were rated on a five-point Likert scale, with 1 reflecting a very low level of performance and 5 representing a very high level. The sample included a diverse pool of stakeholder's freight forwarders, customs officials, dry port managers, trucking operators, and government representatives that engaged in export-related road logistics and registered with relevant trade and transport institutions. Key assumptions guiding the questionnaire design included: (i) that stakeholders possess operational knowledge to rate logistics accurately; (ii) that perception-based evaluation is a valid proxy for performance in data-constrained environments; and (iii) that stakeholder diversity ensures a representative understanding of the logistics value chain.

The third tier of the methodology involved benchmarking and triangulation using secondary data sources such as the (World Bank Open Data, 2022) (Pakistan Bureau of Statistics, 2023), and national transport statistics. These data were used to validate insights from primary responses and to benchmark Pakistan's performance against regional peers. For instance, Pakistan's LPI score declined from 2.62 in 2007 to 2.44 in 2018, ranking 122nd out of 160 countries, while India and Sri Lanka scored 3.18 and 2.60, respectively, in 2022 (LPI score given in **Table 1**). These trends underscore the country's persistent underperformance in regional logistics competitiveness.

The analytical core of the study lies in the construction of the E-LPI through Principal Component Analysis (PCA). Prior to applying PCA, all perception-based indicators were standardized using z-scores to eliminate scale-related bias and ensure comparability. PCA was then applied to the correlation matrix of the eight core indicators, with component selection based on the Kaiser Criterion (eigenvalue > 1) and validated through scree plot analysis. The first principal component, which accounted for over 73% of the total variance, was retained to compute the E-LPI. The final index score was derived using the following weighted formula:

$$\text{E-LPI} = \sum_{i=1}^{n} w_i x_i$$

where $\mathbf{x_i}$ denotes the standardized score for each indicator, and $\mathbf{w_i}$ represents the weight derived from PCA, ensuring maximum explained variance.

Pakistan's road logistics system has structural inefficiencies reflected in an E-LPI score of 2.3 out of 5. This lagging score shows a 54% gap with regional averages. These inefficiencies arise from an over-reliance on road transport (94% of freight), modal imbalances, old vehicle fleets, non-compliance with environment norms and fragmented governance structure. The findings highlight the urgent need for sectoral reformation. Furthermore, these findings tally with the Big Push Theory which states that underdevelopment can be overcome through large scale and well-coordinated investment. In addition, it will enhance export competitive capability as also verified with improved logistics performance.

4. Results and Discussion:

The findings show that Pakistan's road logistics system is weighed down by long-standing structural problems, aging infrastructure, and a highly fragmented operational environment—all of which limit the country's ability to compete in international markets. While many developing economies see logistics expenses amounting to roughly 12–15% of their GDP, Pakistan faces even higher costs, largely because freight movement is overwhelmingly dependent on road-based transport. Approximately 94% of freight is transported by road, predominantly using a fragmented fleet, with 85% of operators owning fewer than five vehicles (Haque, 2023). This structural imbalance, coupled with aging fleets results in fuel consumption that is nearly three times higher than rail and contributes heavily to greenhouse gas (GHG) emissions (MDPI, 2022). These emissions pose a serious threat to compliance with international standards such as the European Union's Green Deal and the Paris Agreement.

Quantitative evidence from the Export-Linked Logistics Performance Index (E-LPI) underscores inefficiencies. Formal-sector freight costs show a 67% performance gap compared to regional benchmarks. Further shortcomings appear in several areas, including value-added logistics functions (65%), speed and reliability of transport operations (60%), the adoption of digital tools and modern technologies (51%), network design efficiency (48%), and environmental as well as strategic performance (46%) (Sumbal M. S., 2024). These weaknesses

point to long-term neglect in upgrading vehicle fleets, a shortage of sophisticated tracking and storage solutions, and weak implementation of environmental and sustainability guidelines (Waseem ul Hameed, 2019).

TABLE 2: PCA SCORES (DIMENSION WISE):

VARIABLE	SCORE	DISTANCE FROM REGIONAL AVERAGE
Strategic Positioning	**0.337**	**0.29**
Network Optimization	**0.324**	**0.30**
Value Added Services	**0.214**	**0.41**
Performance Evaluation	**0.334**	**0.29**
Freight Transportation Cost	**0.201**	**0.42**
Transportation Time Efficiency	**0.254**	**0.37**
Adoption of Technology / Digitization	**0.308**	**0.32**
Environmental Effectiveness	**0.334**	**0.29**
Average Total Score	**2.3**	

As detailed in **Table 2**, the PCA-based dimensional scores of the E-LPI provide deeper insight into where Pakistan's logistics system diverges from regional norms. While strategic alignment, environmental practices, and monitoring mechanisms receive comparatively better ratings, the composite score of 2.3 still places Pakistan well below the performance levels seen across the region. The most significant shortfalls reveal deeper structural issues within the logistics system. The evidence indicates that without purposeful, large-scale improvements Pakistan's road logistics sector will remain at a disadvantage compared with other countries in the region.

Table 3 indicates a falling performance of Pakistan on the Logistics Performance Index of the World Bank. Over the years 2007 and 2018, the score of the country reduced from 2.62 to 2.42. In comparison, India with 3.18 and Sri Lanka 2.60 scored better effectively indicating the logistics gap of Pakistan with its regional neighbors (World Bank Open Data (n.d.)). In fact, regional and other global partners had better improvement trends. This stagnation is the result of continuous failures, especially the non-implementation of the 2007 Trucking Policy and the 2020 National Freight and Logistics Policy. Lack of unified transport ministry has

caused fragmented governance and regulatory inconsistencies, further complicating operational ineffectiveness (Pakistan Business Council, 2023).

TABLE 3: VALUE CHAIN ANALYSIS & PCA FINDINGS

Estimated by World Bank in 2018	2025*	Degradation (%)
2.42	2.3	39%

As shown in **Table 4**, The stakeholder matrix highlights the fragmented governance of Pakistan's road logistics sector. Public bodies like NHA, EDB, and FBR have moderate authority but limited capability and industry acceptance, leading to weak policy enforcement and overlapping mandates. Dominance by the NLC, backed by state funding, has skewed competition against private operators. Often, the provincial authorities are more focused on controlling than enabling smooth operations. Major private stakeholders play a significant operational role but have little effect on policies. Typically, industrial groups push for savings on a short-term basis and not for long-term structural changes. The discord between the powerful private interests and those of the regulators continues to hamper the coordination, weaken compliance and restrict the efficiency of the sector.

The axle load laws are not effectively enforced on most national highways and provincial roads. It is estimated that 40% of four-to-six axle trucks and 30% of two-to-three axle trucks operate above legal weight limits. Roads get damaged, accidents take place very often and the economy incurs losses of $12.55 billion annually, or 4.5% of GDP (World Bank & LUMS, 2011). The situation is made worse by problems in enforcement, coordination among provincial authorities, and monitoring systems.

The trade data from Pakistan reveals the unexploited potential of its regional logistics. In the last fiscal year, only about 3,000 containers, worth $50 million, were sent to Tajikistan and $60 million to Uzbekistan via Afghanistan. This is very low in view of the $15 billion estimate in regional trade (Haque, 2023). There is an urgent need to reform logistics to be able to position Pakistan as a competitive regional trading hub. Also, logistical inefficiencies result in spatial competitiveness as export industries tend to cluster near seaports to avoid costly and unreliable inland transport. This use of area hampers industrial diversification and regional development.

In Pakistan's agricultural sector, many perishable goods are lost after harvesting due to weak farm-to-market roads, limited cold storage facilities, and spotty digital connectivity, with losses reaching as high as 40% (Pakistan Business Council, 2023). These losses represent missing opportunities for food security and Agri-export expansion. The lack of modern ICT systems among operators, evidenced by a 51% technological performance gap, limits

participation in contemporary supply chains that require "just-in-time" deliveries and visibility for international buyers (Waseem ul Hameed, 2019).

Several policy measures, including a proposed truck renewal program incentivizing Euro-5 compliance, the establishment of dedicated freight corridors, and harmonization of federal and provincial regulations, remain unimplemented (Choudary, 2011). Instead of catalyzing sector modernization, the National Logistics Cell (NLC) has evolved into a monopolistic actor that distorts competition by leveraging public financing while competing with private operators for contracts (PBC, 2023).

Despite large-scale road infrastructure investments under projects like CPEC and CAREC, including upgrades to the N5 highway, the absence of multimodal integration, particularly with rail and inland waterways, limits the efficiency of the system (World Bank & LUMS, 2011). This continued road dependency not only raises operational costs but also inflates Pakistan's carbon footprint, creating further obstacles to international trade compliance.

According to stakeholder interviews, there are no incentives for fleet renewal as well as tall import tariffs (which is more than 300% on completely built unit (CBUs)) have led to older trucks not being replaced (Pakistan Business Council, 2023). Furthermore, it has been observed that a whopping 95% of heavy transport vehicle (HTV) drivers do not have any proper licensing, owing to a certification process that is complex and hard to access. This only weakens compliance, safety and reliability within the sector (Haque, 2023). To unlock the country's logistics sector potential, urgent and coordinated policy intervention is essential.

TABLE 4:

Stakeholder	**Ability (A1), Authority (A2), Acceptance (A3) High-Medium-Low**	**Influence High-Medium-Low**	**Interest High-Medium-Low**	**Remarks**
Ministry of Communication (National Highway Authority (NHA))	A1 – Low A2 – Medium A3- Medium-Low	Medium	Medium-Low	As the central policy making body and administrative authority in roads infrastructure and road transportation it has the relevant institutions, however, the focus is not aligned with the growth of private sector service providers and there is limited technical capacities. The policies framed have remained largely unimplemented.
Ministry of Industries & Production via Engineering	A1 - Medium A2 – Medium A3 - Low	Medium-Low	Low	EDB under MoIP regulates the import and manufacturing licenses and sets standards. The tariff policy for the import of vehicles under EDB and in

Development Board				that aspect it exerts influence. However, the focus has been on two and three wheelers.
Ministry of Planning & Special Initiatives as Parent Ministry of National Logistics Company (NLC)	A1 - Medium High A2 – Medium A 3 – Medium High	High	High	NLC is considered as the third standalone segment of the road logistics eco-system (other two being private informal transporters and formal fleet operators). NLC has emerged as a large player financed by public resources and in view of private sector has distorted the competition in the market. It enjoys significant influence and control over policies, contracts, and resources.
Pakistan Standards Quality Compliance Authority (PSQCA)	A1 - Low A2 – Low A 3 – Low	Low	Low	PSQCA is standards setting body and sets standards for compliance. However, the ability to set standards and enforce is inadequate. Also, there is some role duplication with EDB.
FBR	A1 - Medium High A2 – Medium A 3 – Low	High	Low	FBR determines the tax policy and the customs process, procedures, and infrastructure. As road logistics is not seen as a separate industry there are no considerations based on the business models. The customs processes suffer from corruption and inefficiencies, while PSW is making some effort in digitalizing the overall eco-system of goods flow and integrating all players.
Ministry of Commerce	A1 - Medium A2 – Medium A 3 – Low	Medium	Medium-High	The tariff policy for trucks is with EDB, while MOC advocates for trade facilitation measures, however, most that are linked to road logistics are not under its direct control. MOC's interest in increasing as soon GHG compliance requirements for exports will have to be managed.
Ministry of Climate Change & Provincial Environment Departments	A1 - Low A2 – Low A 3 – Low	Low	Low	Climate concerns have recently become important; however, the role of these stakeholders is primarily advocacy for move towards green transition and report on NDCs.
Ministry of Defense	A1 - Medium A2 – Medium A 3 – Low-	Medium	Low	The ministry mostly looks after transport function relating to defense. Limited interest in road logistics

	Medium			operations of the private sector.
Provincial Excise Departments and Transport Departments	A1 - Medium A2 – Medium A 3 – Low	High	Low	These are critical functionaries as act as the registration authorities of vehicles and also manage the route permits to transport goods. The have substantial authority, however, more inclined towards control rather than enabling actions.
OEMs and Truck Assemblers	N/A	Low	High	While the OEMs and truck assemblers have high interest, they are nowhere able to influence reform decisions. The tariff policy controlled by EDB is real driver of growth in this sector.
Formal Fleet Operators	N/A	Low	High	These comprise only a few entities, and have a high interest in expanding investments, but have little control over policy making.
Fleet Operators Association of Pakistan (FOAP) and Pakistan International Freight Forwarders Association (PIFFA)	N/A	Low-Medium	High	As sector bodies the associations have been making contributions to the sector, however, due to fragmented nature of governance, the influence has been limited.
Informal Truckers and Transporters	N/A	Medium	High	These are main segment of road logistics and mostly operating in violation of rules and regulations. Mostly based out of Norther part of the country, hold good influence within the sector.
Freight Forwarders	N/A	Medium	High	There are mainly two types of the freight forwarders operating in Pakistan. One, are those forwarders who have a single network and a global presence. The others are acting below Principal & Agent contract. Both have their own dynamics with pros and cons. Forwarders also act as 3PL solution providers, Contract Managers and Ship Agents. They provide multiple value-added services and thus have a good amount of influence and high interest in

				the sector.
Large Industrial Sectors (Cement, Sugar, Steel, Fertilizer, etc.)	N/A	High	High	These industries are main users of road transport providers and continue to press for low costs. These are strong lobbies, and this influence the policies substantially.
Terminal Operators	N/A	Medium	Medium	TOs act as the bridge between the shipping line and the forwarders. Their main offer is container yard services. Their role is increasing as some are offering integrated services.
Third-Party Logistics Service Providers	N/A	Medium	High	These are entities other than freight forwarders that are offering 3PL services in both road and train freight services. The offer a mic of services such as warehouse management, contract management, and transport. They are mostly linked with the informal supply chain.
Warehouse Operators	N/A	Low	Low	This covers both cargo warehouses and cold storage. Some of these are operated by freight forwarders. They do play a critical role in managing the overall logistics supply chain.

5. Conclusion

The findings of this study demonstrate that Pakistan's road logistics sector, despite its critical role in the economy and its contribution of over 10% to GDP, remains a significant constraint on export competitiveness and industrial growth. The sector is marked by fragmentation, chronic underinvestment, aging vehicle fleets, and an excessive reliance on road transport, which accounts for 94% of freight despite being the costliest mode of transportation. This modal imbalance inflates logistics costs to 12–15% of GDP, while weak integration with rail and waterways, coupled with inadequate cold chain infrastructure, generates severe inefficiencies. The Export-Linked Logistics Performance Index (E-LPI), developed using Principal Component Analysis (PCA), highlights a 54% gap in Pakistan's logistics performance compared to regional standards. The most critical weaknesses are seen in cost efficiency, which lags by 67%, value-added services at 65%, transport time efficiency at 60%, technology adoption at 51%, and both environmental performance and strategic positioning at 46%. These issues are compounded by the sector's heavy reliance on aging trucks, many of which consume nearly three times the fuel of rail transport and emit substantially higher levels of greenhouse gases. Beyond affecting operational efficiency, these inefficiencies also risk putting Pakistan out of step with international climate commitments, including the EU Green Deal and the Paris Agreement, potentially jeopardizing its future access to regulated export markets.

According to Logistics Performance Index (LPI), Pakistan's position has deteriorated rapidly from 68 in 2007 to 122 in 2022, LPI score of Pakistan in the year 2018 was 2.62, which was much lower than that of India 3.18, while it was slightly above that of Sri Lanka 2.60. Pakistan's logistics system continues to suffer from inefficiencies even as regional neighbors are making headway. The underperformance is mainly due to policy failure and uncoordinated, fragmented institutions. The failure to implement the Trucking Policy (2007) and the National Freight and Logistics Policy (2020) have created a vacuum in regulations. The lack of a common transport ministry has added to the problem because it leads to fragmentation. Further, high tariffs (over 300) on trucks and licensing bureaucracy have discouraged the renewal of fleets. As a result, it is causing a trap in informality, with 85% of operators owning less than five vehicles and working out of compliance. The Ministry of Planning and Special Initiatives, the Ministry of Commerce, and the Ministry of Industries and Production these ministries are assessed to have a medium to high level of influence as well as interest. Their overlapping mandates and a lack of coordination inhibit cohesive reform. Also, National Logistics Cell (NLC) earns a huge advantage from the easy finance it gets which makes it an uncompetitive factor instead of a modernizing factor in the industry.

Pakistan has invested significantly in road development through initiatives like CPEC and CAREC. However, lack of an integrated multimodal approach and meagre use of digital tracking remain a bottleneck. Thus, the country misses out on opportunities to join high-value, time-sensitive global supply chains requiring real-time visibility and reliability. According to the Trade Data, only around 3,000 containers, valued at about $50 million, have been sent to Tajikistan and the figure for Uzbekistan is $60 million. The two figures pale in comparison to the estimated $15 billion regional trade potential. This difference in freight rate shows that Pakistan needs a comprehensive reform of its logistics to become the hub of trade and transit in the region. Also, pollution caused by old vehicle fleets and common overloading is damaging roads and causing congestion and pollution. Moreover, accident-related damage in the transport sector costs roughly $12.55 billion a year or about 4.5% of GDP.

As the evidence suggests, for Pakistan to lessen trade costs, enhance the competitiveness of her exports and meet the regional and international benchmarks, there is need for an orderly modernization of the road logistics sector. Important reformation can be fleet renewal program as per Euro-5 and Euro-6 norms, strict implementation of axle load norms, digital fleet and route management systems, cold chain and warehousing infrastructure, and the convergence of the State and Central regulations under one transport ministry to resolve institutional multiplicity. Pakistan can continue with the ongoing blurring of the line between customs duties and the tariff policy of the country, according to the permanent representative of Pakistan to the UN. Moreover, the statement comes as a part of the "Big Push Theory" speech so here the ecologist Kenneth Boulding talks about the idea of development. With the right reforms, Pakistan could turn its road logistics sector from a persistent constraint into a powerful engine for sustainable development and deeper integration into global value chains. These changes would not only enable the country to meet its international climate targets but also create the conditions for increased exports and higher productivity throughout the industrial sector.

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