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ECONOMIC ANALYSIS OF THE ROAD FREIGHT TRANSPORT MARKET: TRENDS AND GROWTH PROSPECTS

Summary. *Introduction. Road freight transport performs a fundamental function in the global economy, facilitating the movement of goods along domestic and international routes. The International Transport Forum estimates that approximately 80 % of inland cargo movements occur by road. Over the last decade, the market structure shifted significantly under influences of economic expansion, technological advancement and deeper integration of global trade networks.*

Objectives. Conduct an economic assessment of the road freight sector and identify prevailing trends alongside future growth trajectories. Specific tasks include analysis of cargo volume indicators, revenue and growth rate evaluation, characterization of competitive landscape, examination of regional market variations and identification of factors shaping development prospects.

Materials and Methods. Sources comprised reports from the OECD, World Bank, leading consultancy firms, statistical databases and peer-reviewed open-access studies. Employed methodologies involved comparative analysis, statistical processing, growth rate extrapolation and scenario modeling that integrates e-commerce evolution and environmental regulations. Industry association data supported evaluation of market structure and fragmentation.

Results. In 2023 the market value reached approximately $4.05 trillion, with forecasts indicating growth to about $5.70 trillion by 2031 at an annual

growth rate of roughly 5 %. According to OECD/ITF projections, freight turnover could rise to 30 trillion tonne-kilometers by 2050. Energy intensity remains high, with 97 % of fuel consumption from fossil sources, prompting investments in alternative energy solutions. The COVID-19 outbreak initially caused a temporary demand decline, quickly offset by rapid expansion of e-commerce; last-mile delivery services maintained robust growth.

Prospects. Future market expansion will align with global trade growth and intensified e-commerce activities. Digital freight matching platforms and autonomous vehicle technologies are expected to enhance efficiency and reduce empty miles. Electrification of fleets and development of hydrogen fuel cells will lower emissions and grant access to low-emission zones. Implementation of intelligent transport systems and urban logistics infrastructure upgrades will optimize final-mile operations. Projected annual growth averages between 3 % and 5 %, with accelerated rates in Asia-Pacific and Africa.

Key words: *road freight transport, market, economic analysis, fragmentation, e-commerce, digitalization, competitive environment, environmental standards, freight turnover, logistics.*

Introduction. Road freight transport holds a pivotal position in the global economy, ensuring the movement of goods and passengers across the planet. According to estimates by the International Transport Forum, road transport accounts for approximately 80% of all inland freight movements. While around 90% of the world's trade volume is measured in maritime transport, road freight remains critically important for regional and intercontinental logistics [4]. Over recent decades, the road transport market has undergone significant transformations driven by economic growth, technological innovation, and globalization.

The purpose of this article is to conduct an economic analysis of the road freight transport market, identify current trends, and assess prospects for future growth. The objectives of the study include:

- analyzing the key economic indicators of the market (freight volumes, revenue, growth rates);
- characterizing the competitive structure of the industry;
- accounting for regional specificities in market development;
- defining growth trajectories and identifying the factors influencing the future of road freight transport.

Materials and Methods. This research is analytical in nature and is based on open-source data and scientific-analytical literature. The material used includes reports by international organizations and transport consulting firms [2; 5; 8–10], statistical databases (OECD, World Bank) [3–4; 11], and findings from academic studies published in open-access journals such as *Scientific Reports*, *Sustainability*, *Electronic Markets*, and others [6–7; 12]. Source selection prioritized recency (primarily from 2019 to 2024) to reflect the most up-to-date market developments.

The study employs methods of comparative and statistical analysis. In particular, it compares the dynamics of freight turnover and revenue from road freight transport across different regions, analyzes market concentration (the share of the largest companies), and examines trends (technological and regulatory) alongside forecast estimates. Elements of economic trend modeling were used, including growth rate extrapolation and scenario analysis incorporating demand-side factors (e.g., growth of e-commerce) and constraints (e.g., transport decarbonization policies). To assess competitive structure, data were gathered from industry associations (e.g., the American Trucking Associations for the U.S. market) and studies on market fragmentation [1]. A regional comparative analysis was also conducted, reviewing the European, North American, and Asian road

transport markets by indicators such as market size, growth, and company ownership structures.

Market Size and Economic Indicators. As of the early 2020s, the global road freight transport market has reached multi-trillion-dollar values in monetary terms. According to a report by Verified Market Research, the global road freight market was valued at approximately USD 4.05 trillion in 2023, with projections indicating growth to around USD 5.70 trillion by 2031 at a compound annual growth rate (CAGR) of about 5% [12]. These estimates confirm the general trend of steady industry expansion driven by the growth of global trade and consumption (see Fig. 1).

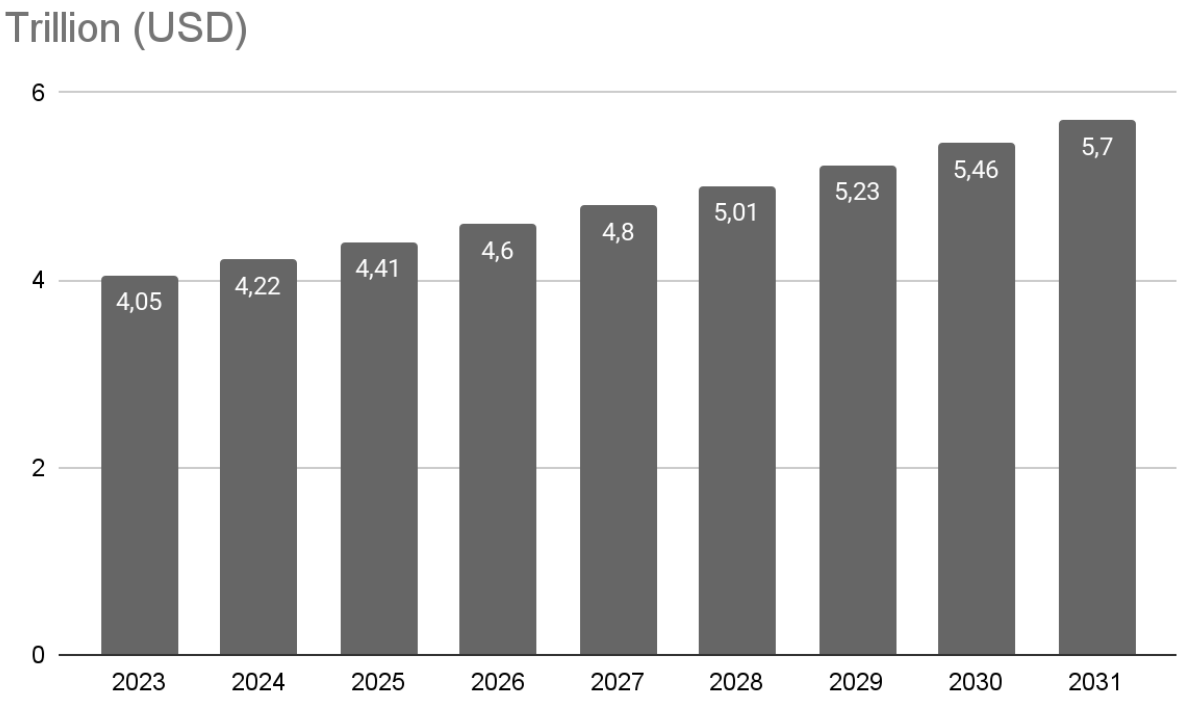

Fig. 1. Road Freight Transportation Market Size and Forecast

Source: compiled by the author based on [12]

In physical terms (measured in tonne-kilometers), freight turnover is expected to grow severalfold: according to OECD/ITF forecasts, the total volume of road freight could rise from approximately 6.4 trillion tkm in 2010 to 30 trillion tkm by 2050 [4], an almost fivefold increase. This growth trajectory is closely tied

to economic development: historically, demand for transport services increases in proportion to GDP. For example, research shows a correlation between rising road freight turnover and economic expansion; if current trends continue, the global volume of road freight may double by mid-century [2].

In addition to value and volume, another critical economic parameter is the sector's energy intensity and efficiency. Road transport remains heavily dependent on fossil fuels—about 97% of its energy consumption comes from petroleum. As a result, the sector accounts for a significant share of greenhouse gas emissions. Between 2010 and 2019, energy consumption and CO_2 emissions from trucks increased by approximately 2.2% annually [3]. This has prompted investments in more efficient technologies and alternative fuels. However, in the short term, fuel costs and environmental levies remain a substantial component of transport economics. Moreover, rising fuel prices and tightening environmental regulations in several countries are leading to higher freight rates, impacting the industry's overall cost structure.

By 2022–2023, the market had felt the effects of global disruptions such as the COVID-19 pandemic and supply chain breakdowns. In early 2020, during the onset of the pandemic, freight demand temporarily dropped in many countries—particularly in sectors serving industrial production—but was quickly offset by the rapid growth of e-commerce. For instance, in Poland, total road freight turnover in 2020 showed a slight year-on-year increase compared to 2019, despite significant declines during the spring lockdown period (see Fig. 2) [7].

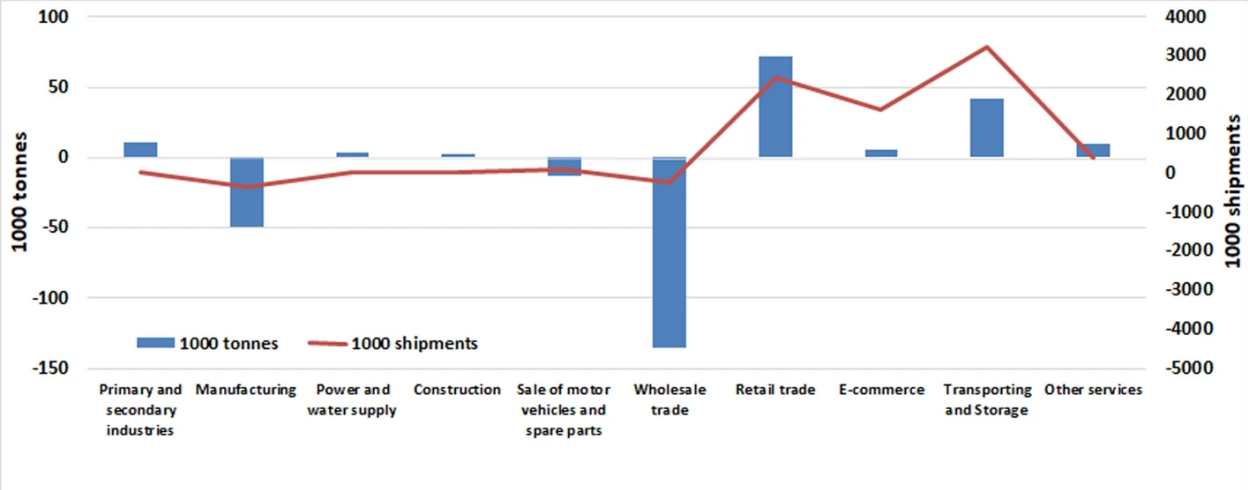

Fig. 2. Absolute changes in number of tonnes and shipments by main industry in the COVID-19 period (week 11–52) in 2020 compared to same period in 2019

Source: compiled by the author based on [7]

This phenomenon is closely linked to the explosive growth of B2C delivery: the closure of brick-and-mortar stores and the population's shift to online shopping triggered a surge in demand for courier and last-mile delivery services. As a result, the sector's economic indicators in 2020–2021 demonstrated resilience: declines in certain segments (e.g., freight for traditional retail) were offset by growth in others (e.g., e-commerce deliveries, medical goods transport). This underscores the high adaptability of the road freight market to changing demand structures.

Market Structure and Industry Participants. The structure of the road freight transport sector is marked by extreme fragmentation. Globally, there are hundreds of thousands of transport companies, with the largest players accounting for only a modest share of the market. For instance, in the United States—one of the largest national trucking markets with an annual revenue of approximately $700 billion—97% of carriers operate fleets of 20 or fewer trucks, and 91% operate fewer than six trucks. The top 10 companies collectively control only about 5% of market revenues in the full truckload (FTL) segment. The remainder of the market is dominated by small and medium-sized enterprises, along with independent owner-operators. This structure is largely a result of low entry

barriers: launching a freight company typically requires only minimal investment (such as purchasing or leasing a truck) and a license—unlike the rail or air freight sectors, where capital requirements are substantially higher [1].

A similar pattern is observed in Europe. The European road freight market is characterized by a large number of small carriers and logistics providers operating within each country. Studies show that hundreds of thousands of transport companies are active in Europe, making the industry highly competitive with extremely low market concentration. This fragmentation fuels intense price competition, as carriers primarily compete on freight rates, suppressing price growth and resulting in low business margins. For example, in Germany and several other EU countries, the profit margin for trucking companies in the freight segment does not exceed 2% [6], meaning that profits amount to just a few cents for every euro in revenue. This is explained by the surplus of capacity and high demand elasticity—shippers can easily switch to providers offering lower rates.

Despite the fragmented nature of the market, a number of large players are present in the form of international logistics groups. Some of the leading companies in the global road freight industry include DHL Supply Chain, XPO Logistics, DB Schenker, FedEx Freight, and UPS Freight. However, even these giants do not hold global dominance; instead, they command market shares within specific segments or regions. In Europe, large logistics operators often work through networks of contractors and subcontractors, which further reinforces the atomized structure of the industry.

Also noteworthy is the emergence of new organizational formats for freight transport—namely, digital freight matching platforms such as Uber Freight, Convoy, Sennder, and others. These platforms act as intermediaries, connecting shippers with independent carriers through online services. Their rise is a response to the market's high fragmentation and inefficiencies (e.g., the historical prevalence of empty return trips). Digital platforms improve market transparency, facilitate fuller utilization of truck fleets, and can influence competition by

aggregating demand. While their current market share remains relatively small, it is growing rapidly. Data show that venture capital investments in logistics platforms amount to billions of dollars, and the digital freight brokerage market is projected to exceed $766 billion by 2034 (see Fig. 3) [10].

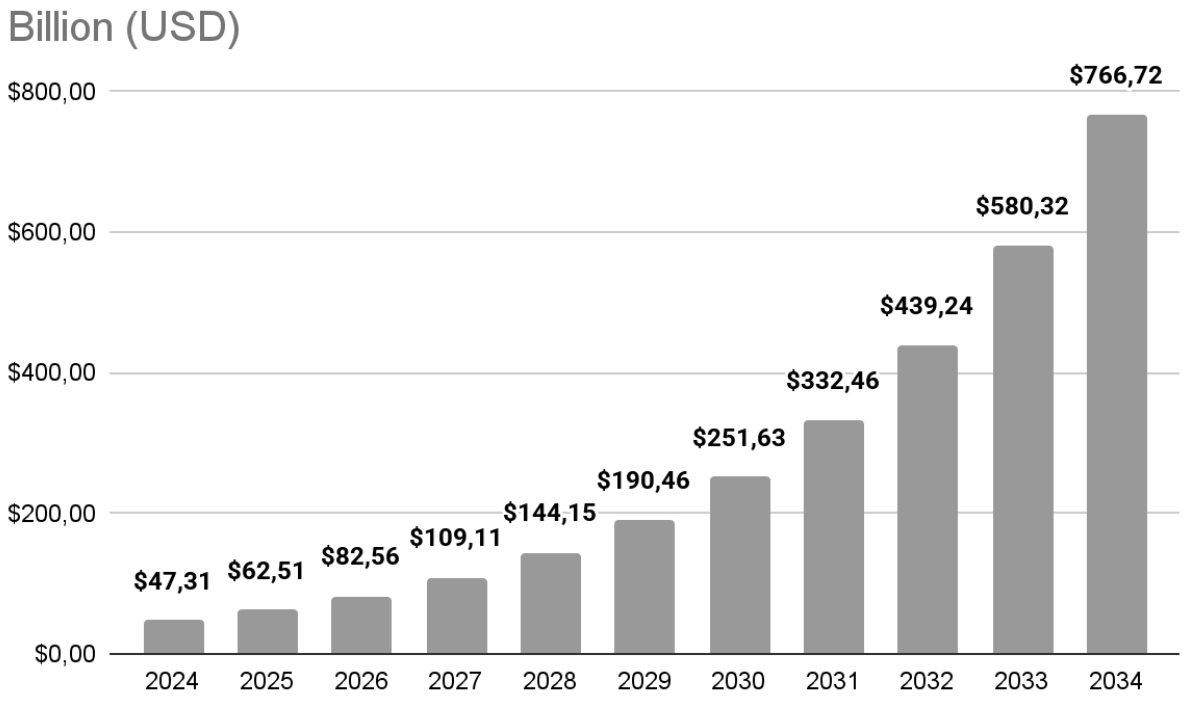

Fig. 3. Digital Freight Matching Market Size and Forecast 2025 to 2034

Source: compiled by the author based on [10]

Thus, the competitive landscape of the industry is gradually evolving: alongside a multitude of small carriers, aggregators are emerging with the potential to influence market dynamics. Nevertheless, from a scholarly perspective, the road freight market continues to exemplify a competitive market structure, albeit with elements of oligopolistic competition at the local level (e.g., in specific niches or routes, a few firms may dominate, but globally, market power remains widely dispersed among thousands of players).

Regional Characteristics and Differences. The development of the road freight market varies significantly across regions. North America (the United

States, Canada, Mexico) is one of the largest regional markets, characterized by high demand for road freight services due to extensive trade between the U.S. and its neighboring countries. The U.S. trucking market alone was valued at approximately $563 billion in 2025 [9]. North America is typified by long-haul routes, advanced infrastructure (a vast network of highways), and strong freight interconnectivity with seaports, facilitating transcontinental shipments from Pacific ports to inland regions. While competition is intense, the level of market consolidation is somewhat higher than in Europe, owing to the presence of several large companies. However, as previously noted, the market remains highly fragmented overall.

Europe (EU) represents a market with strong internal demand and a complex regulatory environment. In 2021, road transport in the 27 EU member states carried 13.65 billion tonnes of goods. Road freight accounts for roughly 75–80% of the total freight turnover in the EU, while rail transport accounts for less than 15%. There are notable differences between countries: in some (Latvia, Lithuania, Estonia), rail holds a substantial market share, while in major economies such as France, Italy, and Spain, the share of rail freight does not exceed 10–15%, with the remainder handled by road transport [4]. The European market is defined by intense competition and relatively low freight rates compared to the U.S.—partly due to shorter average transport distances and market saturation. The region's specific features also include strict regulations, such as EU directives on driver working hours, environmental standards (e.g., Euro 6), and safety measures, all of which impose additional costs on carriers and affect the industry's cost structure.

Asia-Pacific (APAC) is the largest and fastest-growing road freight market. China and India lead the region, demonstrating rapid expansion in the transport sector driven by industrial growth, urbanization, and increased trade. Analysts estimate that APAC already holds the largest global share of the road freight market and is expected to continue growing at an accelerated pace [8]. In China,

the domestic road network handles an enormous volume of freight, often in combination with rail and water transport. Several APAC governments are implementing large-scale infrastructure development programs, including new highways and logistics hubs, laying the groundwork for continued sectoral growth. Another defining feature of the Asian market is the high share of urban freight transport—much of the activity involves short-distance deliveries within metropolitan areas. This trend encourages innovations such as the use of light-duty vehicles and the development of freight-dedicated public transport infrastructure.

The Middle East and Africa currently represent a smaller segment of the global road freight market, but one with growing potential. Activity is concentrated in a handful of countries—Saudi Arabia, the UAE, South Africa, Nigeria, among others. In many cases, road transport is the only reliable mode of delivery due to the lack of a developed rail network. Prospects for growth are closely linked to improvements in road infrastructure and regional market integration.

In summary, regional differences in the road freight industry can be broadly outlined as follows: in developed economies (North America, Europe, Japan), the market is mature and growing moderately (1–3% annually), with an emphasis on efficiency and sustainability; in developing economies (Asia, Africa, Latin America), growth is more rapid (5–7% annually or higher) due to economic expansion and urbanization, though infrastructure limitations may act as a constraint. These distinctions must be taken into account when assessing the global outlook for the road freight sector.

Growth Trajectories and Development Drivers. Trend analysis indicates that the road freight market will continue to expand, although the pace and nature of this growth will depend on several influencing factors. Below are the key drivers and constraints shaping the development trajectories of the sector:

1. Historically, demand for freight transportation has grown in proportion to GDP and trade volumes. As the global economy recovers from the pandemic and supply chains continue to globalize, freight volumes are expected to increase. International trade—especially e-commerce—stimulates transcontinental trucking (e.g., deliveries from seaports to distribution centers). According to forecasts by the World Bank and other institutions, global trade growth of approximately 3–4% per year is expected to correspond with similar growth in transportation demand, thereby supporting a positive trajectory for road freight services [12].

2. E-commerce has become a powerful driver of the industry. The surge in online sales necessitates increasingly efficient last-mile delivery—from distribution centers to end consumers. Between 2020 and 2022, online commerce grew by dozens of percentage points, triggering a spike in courier deliveries [7]. Major retailers (Amazon, Alibaba, etc.) have invested heavily in their own logistics networks, delivery vans, and technology solutions. Even if the pace of e-commerce growth slows, the high level of online retail already achieved is expected to persist, ensuring a steady flow of orders for freight carriers. Studies show that increased demand for home delivery is opening up new market niches and driving overall revenue growth in the freight sector [5].

3. The transport industry is undergoing digital transformation. The implementation of telematics, GPS tracking, and big data analytics enables route optimization and reduces empty mileage, thereby improving cost efficiency. Automation is also on the horizon: pilot projects for driverless trucks and vehicle platooning are underway. While fully autonomous freight trucks are not yet in widespread use, partial automation features—such as adaptive cruise control and emergency braking—are already enhancing safety and fuel efficiency. Over the next 10–15 years, autonomous and semi-autonomous trucks are expected to lower labor costs and increase road capacity through tightly coordinated convoys [8]. Another technology—freight exchange platforms—was mentioned earlier: these

improve fleet utilization and reduce empty hauls. Collectively, such innovations enhance industry productivity and can contribute to its growth, although they require significant investment.

4. Transportation remains one of the largest sources of CO_2 emissions (freight vehicles account for up to 5% of global energy-related emissions). Governments are tightening environmental standards, introducing carbon taxes, and encouraging the transition to alternative fuels. A shift toward electrification of commercial transport is already visible: major manufacturers (Tesla, Volvo, Daimler, etc.) have launched electric truck models in the medium-duty segment. For long-haul freight, hydrogen fuel cell technology is in development. Forecasts suggest that in the coming decades, a substantial share of vehicle fleets may adopt electric or zero-emission technologies [2]. This marks a turning point: on one hand, massive investments will be needed (fleet replacement, charging and refueling infrastructure), temporarily increasing costs. On the other, the adoption of green trucks will unlock new markets (e.g., urban zero-emission delivery zones mandated by local laws) and allow operators to avoid movement restrictions in low-emission zones. Overall, the environmental agenda acts as both an innovation driver and a challenge for traditional freight carriers, and their ability to adapt will determine their growth trajectory: those that fail to transition may lose competitive ground.

5. Urban freight growth is constrained by road capacity. Congested transport networks already result in substantial time and financial losses. If infrastructure investment fails to keep pace with traffic volumes, stagnation or modal shifts may occur. For example, the European Union actively promotes shifting some freight to rail or inland waterways to reduce road congestion and emissions. However, road freight's flexibility and speed remain difficult to replace. Consequently, the development of intelligent transport systems (traffic management, congestion pricing, urban logistics hubs) is anticipated to sustain acceptable operating conditions.

In conclusion, the base-case forecast for the road freight market over the next 10–15 years remains moderately optimistic. Quantitative models predict global road freight turnover will grow at an average annual rate of 3–5%, with higher growth rates in Asia and Africa and lower rates in Europe and North America [8]. By 2030, the global road freight market may exceed $6 trillion [11]. The primary growth drivers include economic development, trade, and e-commerce, while the main challenges lie in environmental regulations, driver shortages, and infrastructure constraints.

Conclusion. This study presents a comprehensive analysis of the current state of the global road freight market. The main scientific and practical conclusions are as follows:

The global road freight market is growing. Freight volumes transported by road are increasing both in monetary terms and in physical units, with further expansion projected at an average global rate of 4–5% annually, driven by trade and the growth of e-commerce. By the mid-21st century, the global road freight turnover may double.

The industry remains highly fragmented, dominated by small businesses. This supports high levels of competition and restrains prices, but also leads to low profitability (margins of approximately 1–3%). New market entrants—digital platforms—are beginning to virtually consolidate the sector, enhancing efficiency through improved matching of supply and demand.

Regional differences are significant. In developed regions (the EU, North America), the market is approaching saturation, with a strong emphasis on efficiency and environmental sustainability. In developing regions (Asia, Africa), rapid growth necessitates investment in infrastructure. Regional policy and conditions influence dynamics—from environmental regulations in Europe to large-scale infrastructure initiatives such as the Belt and Road Initiative in Asia.

Key trends shaping future growth trajectories include:

- The digitalization of logistics and automation of freight management, which contribute to productivity gains;
- The greening of the sector (transition to electric and hydrogen-powered vehicles), which is expected to become a central factor in fleet renewal and market redistribution over the medium term;
- The continued rise of e-commerce and shifting consumer preferences, which are sustaining demand for fast and flexible delivery services.

Practical recommendations include: for freight operators—accelerate the adoption of digital technologies (GPS navigation systems, freight-matching platforms) and prepare for the transition to low-carbon transport, which may provide a competitive edge in regulated markets; for industry associations—focus on attracting new talent (particularly drivers) and enhancing the sector's appeal; for governments—balance environmental objectives with business support by offering incentives for fleet renewal, investing in road infrastructure, and streamlining cross-border logistics.

In conclusion, road freight remains a dynamic component of the transport system, capable of flexibly adapting to emerging challenges. Its economic significance in maintaining supply chains ensures that even as new technologies and models emerge (autonomous vehicles, hyperloops, etc.), the conventional truck will continue to be an indispensable element of logistics for the foreseeable future. The sector's growth outlook is positive, but realizing its full potential will require innovation and coordinated action between businesses and policymakers to overcome existing limitations.

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