



THE IMPORTANCE OF ELECTROMOBILITY IN THE LOGISTICS INDUSTRY

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Abstract

The logistics industry is experiencing digitalization and faces growing customer demands, fierce competition, and internationally connected markets. At the same time, the logistics industry is under pressure through political environmental decisions. It is estimated that there are 278 million commercial vehicles in the world, most of which are trucks used to transport goods. In addition, there are millions of privately owned trucks that contribute to even more trucks in the world. The logistics and transport sector contributes a third of global CO₂ emissions, making it the most emitting sector in many countries. This proportion is still growing. Therefore, emphasis must be placed on the use of green fuels in the logistics industry. Electric trucks are an innovative technology that could increase the efficiency of freight transport and contribute to a more sustainable logistics future. Electric trucks are one of the most important advances in urban logistics in parallel with the Smart City concepts. Electric trucks are equipped with one or more electric motors to drive. This system reduces the CO₂ footprint because no greenhouse gases are emitted. In 2023, many companies are looking to reduce the environmental impact of their operations, and electric trucks could contribute to a more sustainable supply chain. This article discusses the importance of electromobility in logistics and the importance of including electric trucks in the logistics industry's fleets. The methodological part of the article consists of an analysis of secondary sources from which the connections between logistics and e-mobility were derived. In the discussion and conclusion of the article, possible recommendations are presented through which it is possible to understand the importance of implementing electric trucks in the fleet of the logistics industry.

Keywords: Logistics, electromobility, electric trucks, supply chain, management, decision-making

1. INTRODUCTION

In recent decades, logistics and transport have undergone significant transformations, driven by the rise of digital technologies, and interconnected global networks. The exponential growth of e-commerce has spurred the need for faster and more efficient logistics solutions. [1] Fleet management has made remarkable progress thanks to digital technology. Information and communication technologies, the fusion of GPS and mobile communications, allow enterprises to oversee and control their fleets with remarkable efficiency. [2] These systems offer an up-to-date overview of a vehicle's whereabouts, engine power, fuel consumption and other related information. This capability enables companies to fine-tune routes, plan vehicle maintenance and improve road safety measures. Transport involves the movement of goods from their place of origin in the supply chain to the final consumer. Given that goods are rarely produced and consumed in the same place, the importance of transport in the logistics chain cannot be overestimated. [3,39] The efficiency of any supply chain depends heavily on its skilful use of transport. In order to optimize profits, every business uses a variety of modes of transport and routes. [4]

In the supply chain, companies decide what form of transport for their products they will have. Individual companies have the opportunity to choose between four main modes of transport in the logistics sector. The shipping method that is chosen depends on what is being sent, from where and where it is sent. The priority given to the company is between air, road, sea and rail transport. [5, 40] Trucks demonstrate exceptional flexibility, responsiveness, and cost-efficiency for most freight transport needs, and also play an important role



in maintaining an interconnected logistics network within the EU. [6] In 2022, the EU boasted a fleet of over 6.2 million trucks. These trucks are responsible for transporting 77% of ground freight across the EU. [7] This volume of means of transport has an unintended impact on the environment. In 2021, 740 million tonnes of CO₂ were emitted in the EU, with heavy and light trucks accounting for 35% of output. [8] The volume of trucks using fuel from limited resources to transport materials in logistics does not comply with regulations and standards promoting the environment. Based on legislative modifications and the impact of innovation, the logistics industry implements innovations in the form of electric motors in fleets. Building infrastructure for efficient charging of electric trucks plays a key role in European countries' progress towards their goals of 1 million charging points by 2025 and 3.5 million by 2030.[10] The growth of the market in the coming years will be driven by the implementation of emission regulations governing the use of internal combustion engine vehicles. [10,11,42] The development of autonomous driving technology, the use of lightweight components and innovative materials are all poised to open new market opportunities. According to PwC the dawn of electrified trucking, the use of electric trucks will continue to consolidate in the coming years. Electrically powered trucks will replace conventional trucks within the next 15 years. [12]

2. METODOLOGY OF THE RESEARCH

The article used the method of analysis of secondary documents. The methodological part of the article consists of an analysis of secondary sources from which the connections between logistics and e-mobility were derived. In the creation of the article, primary secondary sources were used, which were primarily drawn from Internet portals, scientific articles and discussions. Secondary sources were selected based on parameters such as relevance, timeliness, expertise of authors in the given issue, and others. The main objective of this article is to point out the importance of implementing electric trucks in the logistics industry based on theoretical knowledge, analyses, professional articles, discussions and press releases.

3. ANALYSIS OF THE EV TRUCK MARKET

In 2023, the European electric truck market is estimated to be valued at \$0.71 billion. This amount represents a compound annual growth rate of 57.13% over the forecast period from 2023 to 2028.[13] As noted on Figure 1, it is expected to grow to \$11,087 billion by 2032.

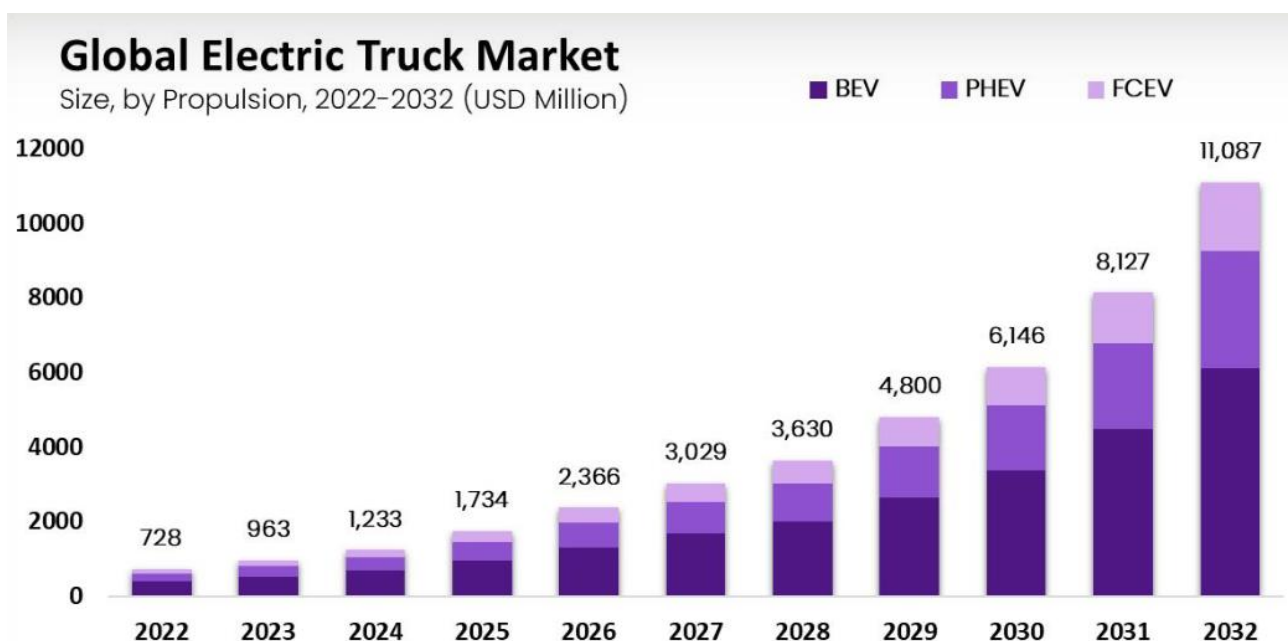


Figure 1 The market for electric trucks by [11]



In the medium term, electric trucks will be a priority choice due to their advantages, which include, among others, robust torque, reduced noise emissions, lower maintenance costs. [14] Green supply chain strategies are being put into practice, forcing businesses to switch to electric for last-mile delivery operations. This shift is driven by the imperative to remain competitive considering sustainability trends. Among other things, this transition brings positive results, benefiting society as a whole as well as distribution companies. Many of the large and small supply chain businesses employ environmentally friendly logistics practices. Amazon, for example, was among the first signatories to the climate pledge, which pledged to achieve net carbon neutrality by 2040. Amazon has ordered 100,000 electric trucks from Rivian. [15,16] FedEx, which has set sustainability targets and plans to electrify its entire fleet by 2040. To support this initiative, FedEx has allocated \$2 billion to invest in vehicle electrification. [17] The transition from internal combustion engines to battery electric vehicles is a complex process for trucks. Last-mile urban deliveries account for 41% of total supply chain costs and reduce profits. 97% of retailers believe last-mile delivery patterns in 2022 are not sustainable. [20] The use of electric trucks is used on last-mile routes because such routes are short, falling within a range of 200 kilometers, thus adapting to the capabilities of the battery. [21] After short distances, trucks return to the depot where they can be charged overnight, reducing concerns about charging infrastructure. Electric trucks produce no tailpipe emissions while driving, reducing air pollution, and contributing to cleaner urban air. This is in line with environmental regulations and sustainability goals. [21,22] In parallel, electric trucks operate without noise, reducing noise in urban areas, which is an important factor in early morning or late-night delivery in residential areas. [23] Electric trucks show higher energy efficiency compared to vehicles equipped with internal combustion engines. When braking or idling, they consume 20% less energy, which is a difference from up to 75% of the energy consumption of gasoline engines. [24] Some cities have low emission zones where only zero-emission vehicles are allowed. By introducing electric trucks into logistics operations, the transport industry can significantly reduce its carbon footprint and contribute to improving air quality in urban areas. [25] Vehicles equipped with electric motors require less maintenance. [26] A growing number of governments have committed to curbing emissions. As a result, they are adopting legislation that encourages the transition from internal combustion engine vehicles to electric motors. Overall, electric trucks are suitable for last-mile delivery in urban areas, offering benefits in terms of sustainability, cost savings and improved living conditions. Successful adoption requires careful planning, including setting up charging infrastructure, optimising the route and taking into account vehicle types and range limits. [27] In addition to the positives, there are also negative responses to electromobility. Total cost of ownership and purchase price remains a significant negative aspect, and insufficient charging infrastructure poses a significant risk to the adoption of electric trucks. For businesses seeking to maximize profitability, these initial expenses are proving challenging to absorb. [29] In the EU, electric trucks are seen as a direct replacement for traditional trucks, which is in line with electric truck deployment policies similar to those in place for electric passenger cars. [30] Such a policy is viewed negatively by many quarters due to the lack of diversification of the fuel portfolio. [31] Limited driving range is another negative. In 2023, electric trucks offer a lower range compared to diesel. Electric truck owners need to plan their trips carefully. This restriction means long-distance trips may not be practical for electric trucks. [31] The availability of charging facilities for electric vehicles remains limited in the regions, posing a challenge in finding recharging points for an electric truck. In parallel, the time spent charging is also negatively perceived. Charging an electric truck is listed to range from 30 minutes to 8 hours, depending on the scenario of whether the truck is charging while driving to a charging station, at its destination during loading and unloading, or overnight. [32,41] Under the optimistic scenario, drivers would still spend 6 times more time at a charging station than when refuelling diesel vehicles. [32] In 2023, the diversity of electric truck models available on the market is more limited compared to traditional trucks. [43] Companies may have specific requirements for their fleet that cannot be met by available electrical options. Electric trucks tend to be heavier because of the weight of the batteries. This can reduce payload capacity, which may not be suitable for certain logistics applications. The battery life of electric trucks and the rate of battery degradation over time are crucial factors. Resistance to change within the industry and among drivers can be a significant obstacle.



4. CONCLUSION

Green electromobility is part of a global technology industry that is seeing a significant increase in new green policies that are becoming more popular, primarily in the EU. These policies support the transition to green energy based on renewable energy.[42] In 2015, the Paris Agreement on climate change was ratified. [33] That year, the transport and logistics sector was responsible for 23% of global greenhouse gas emissions. In response to this environmental challenge, the United Nations has issued the Paris Declaration on electromobility and climate change and the call to action. [34] This report highlighted the need for stakeholders to unite in their commitment to promoting sustainable electrification of transport. A key target in the report was the ambition that 20% of all road vehicles should be powered by electricity by 2030. [35] In order to avoid the relocation of polluting emissions, it is essential that increased electricity demand is met by renewable sources, preferably distributed throughout the region. In addition, government policies aimed at encouraging the uptake of electric trucks are ready to stimulate market demand. For example, in 2022, European Union member states adopted new legislation that mandates the implementation of a revised road toll system by 2023. This system offers significant incentives for zero-emission truck operators. [36,37] The agreement states that by 2023, operators using zero-emission trucks, including battery electric vehicles and hydrogen-powered vehicles, had to be granted a 50% discount on distance-based road tolls. Member States can flexibly introduce additional CO₂-based charges for trucks powered by fossil fuels or introduce a combination of measures. [37] Given that road tolls can reach up to €25,000 per truck per year, switching to zero-emission vehicles can reduce operating costs. [38] This legislation also requires countries to impose air pollution charges on trucks from 2026. [37] The global trend towards clean transport is rapidly gaining momentum, forcing goods transport companies to convert their existing fleets to electric vehicles. As demand for electric trucks continues to grow, vehicle manufacturers plan to introduce a wider range of electric truck models.[38] Given these factors, the introduction of new electric truck models, escalating investment in electric truck manufacturing, and supportive government policies promoting electric vehicles are expected to drive growth in the battery electric truck market over the forecast period.

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