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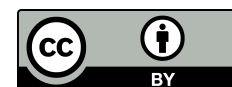
## Challenges and Optimisation Issues in Logistics and Truck Loading in the Connected States

**Abstract**

The article is dedicated to an exploration of the logistics and truck loading challenges in the USA. The research aims to identify and analyse the key challenges in the logistics and truckload sector and develop solutions to optimise them. Key findings include that the industry is actively working to mitigate challenges such as rising fuel prices by investing in energy-efficient technologies and addressing the driver shortage through comprehensive training programmes and incentive structures. The study of the logistics sector, with a particular focus on truck loading in the United States, revealed a number of challenges, both operational and economic. The research found that the industry is actively engaged in addressing these issues. Steps are being taken to mitigate the impact of rising fuel prices by investing in fuel-efficient technologies. The ever-present issue of driver shortages is being addressed through extensive training programmes and attractive incentive structures. The study also highlighted the industry's adaptive strategies to overcome regulatory hurdles. Enhanced compliance monitoring systems are being implemented to address these challenges and optimise operational efficiency. Furthermore, the industry's commitment goes beyond economic considerations. In recognition of pressing issues such as infrastructure decay and environmental concerns, proactive measures such as advocacy for infrastructure development and the adoption of sustainable practices are underway. Practical implications of the research: The research highlights the importance of adapting to changing market conditions and provides actionable recommendations for companies in the sector. The findings can be used as a basis for developing more effective management strategies in logistics.

**Keywords**

logistics, truck loading, optimisation, challenges, USA, strategic solutions, energy efficiency, training programmes

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**DOI:** <https://doi.org/10.30525/2500-946X/2023-3-1>**1 Introduction**

The United States, with its vast geography and diverse economic landscape, presents a myriad of challenges and opportunities for the logistics and transportation sector. Coastal ports along the Pacific and Atlantic oceans, combined with the bustling hubs of the Midwest, create an intricate web of supply chains. Essential to the nation's economic vitality, this network is not without its complexities, inefficiencies and potential pitfalls that can impede the seamless flow of goods, impacting both businesses and end consumers.

At the heart of this logistical puzzle is the area of truck loading. With an extensive network of highways and interstates, trucks remain the dominant mode of transporting goods across the country. But truck loading is not just about the physical act of placing products in a vehicle. It is the holistic process of understanding demand patterns, developing optimal

routes, minimising vehicle wear and tear, and ensuring strict adherence to regulations and safety protocols.

During the study, it is important to identify key logistical challenges, including complex issues related to truck loading. The focus will be on understanding the technological solutions that can address these challenges. The nuances of these issues, their implications and potential directions for their resolution will be the cornerstones of this research. Drawing on a rich tapestry of stakeholder experience, technological advances and industry insights, this research aims to provide a comprehensive overview of the current logistics landscape in the US and the road ahead for its evolution.

**2 Marketing Research**

Looking ahead to trends in 2023, trucking is expected to account for approximately 82.5% of US freight costs, a notable increase from the 80.4%

observed in 2019. This progression is also reflected in gross freight revenue, which is forecast to approach 865 billion USD, up from 91.7 billion USD in 2019. Cross-border trade with Canada and Mexico, which is vital to the US economy, is also forecast to increase, with trucks potentially moving around 69.5% of freight with Canada and around 85% with Mexico, a slight increase from the 67.7% and 83.1% respectively observed in 2019 (Statista, 2023).

By 2023, the freight transport industry is expected to employ around 8.3 million people, up 7.95 million from 2019. In this context, the number of professional drivers could reach 3.8 million, up from 3.6 million. Small fleet operators remain the backbone of the industry. It is forecast that by 2023, the vast majority of fleets will continue to operate with 20 or fewer trucks, which underlines the trend that has prevailed since 2019.

The freight market grew from 193.21 billion USD in 2020 to 196.34 billion USD in 2021, and is expected to grow further by 2023. Similarly, the light-duty truck market, which reached 80.16 billion USD in 2021 from 76.41 billion USD in 2018, is expected to continue its growth trajectory. Operating costs, such as driver salaries and fuel costs, play a crucial role in

the industry's economics. In 2020, driver salaries and benefits accounted for 42% of all freight-related costs. These percentages may change by 2023, taking into account inflation and market dynamics, but driver remuneration is likely to remain a significant cost. Fuel, which accounted for 26% of freight costs in 2020, is also subject to fluctuations due to trends in global energy markets and domestic policy decisions.

The industry is facing challenges, including rising insurance premiums, which have been in the range of 12,000 to 14,000 USD in recent years. In addition, factors such as driver-related costs, insurance liabilities, and customer acquisition and retention remain major concerns for stakeholders.

Overall, comparing the data for 2019 with the forecasts for 2023, it can be said that the US trucking industry is growing, adapting to challenges and continues to play a key role in the country's economy (Kirkpatrick, 2020).

### 3 Challenges and Solutions Overview

The logistics industry today is a testament to modernity and technological progress. Despite its significant progress, it faces a number of challenges.

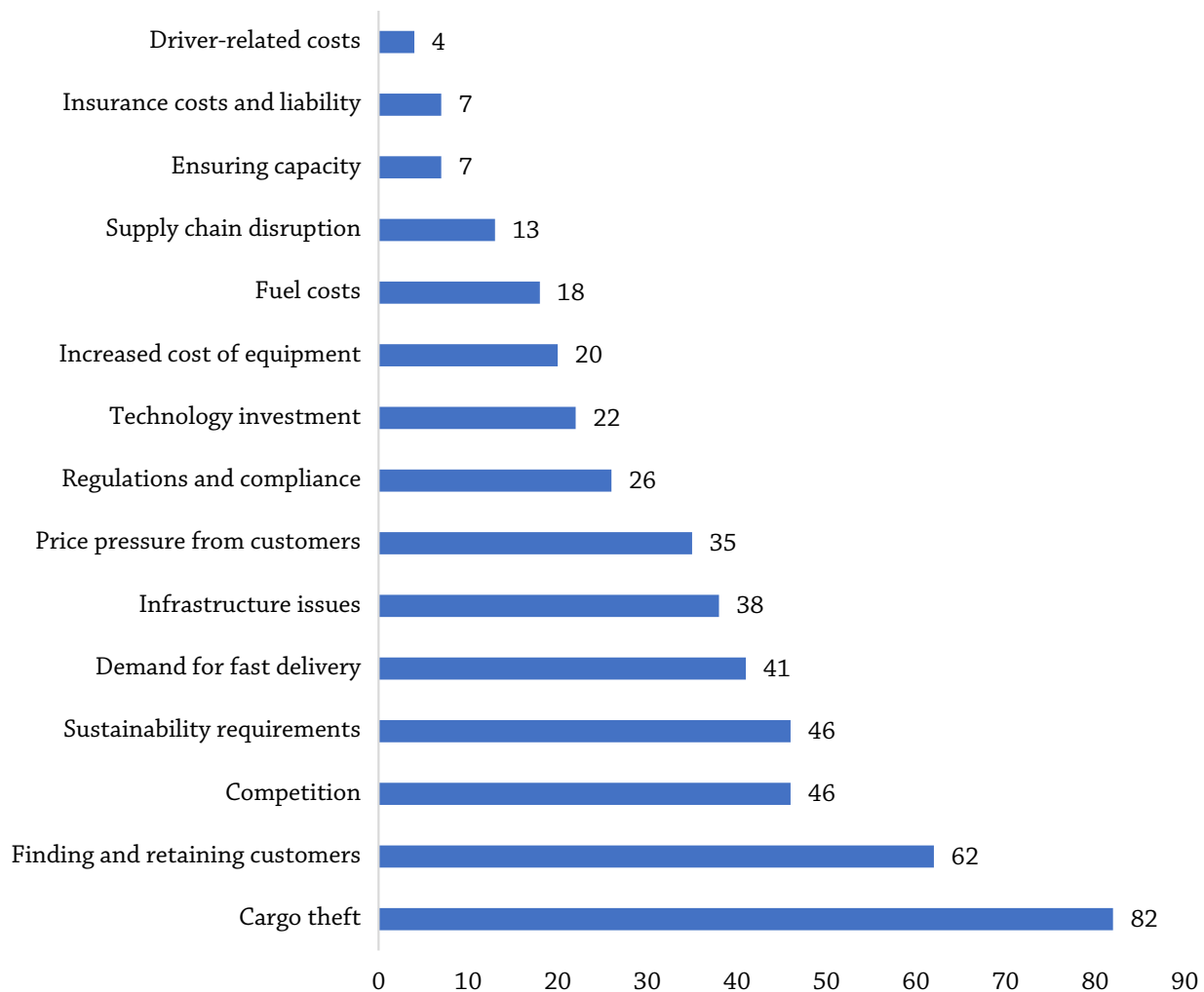


FIGURE 1 The most significant logistics challenges in the US in 2022 (LaBotz, 2022)

The data presented here is drawn from a survey of logistics companies and highlights the pressing concerns they face.

Consider these challenges in more detail:

- Driver-related costs. These are costs associated with hiring, training and remuneration of drivers. These costs may include salaries, benefits, training programmes and other driver-related expenses.
- Insurance costs and liability. Logistics companies must insure their fleet, cargo and operations. Increases in insurance premiums and potential liabilities, such as accidents or cargo damage, can have a significant impact on the financial result.
- Ensuring capacity. Providing sufficient capacity to meet demand is a balancing act. Companies need to optimise the size of their fleet, storage capacity and operational scale.
- Supply chain disruption. Unexpected events, such as natural disasters, strikes or geopolitical issues, can disrupt the supply chain, causing delays and potential losses.
- Fuel costs. Fluctuations in fuel prices can lead to unpredictable operating costs, which affect profitability.
- Increased cost of equipment. Investments in new vehicles, equipment and technology can be capital-intensive, and rising costs can strain budgets.
- Technology investment. While technological advances can streamline operations, the initial investment required for integration can be high.
- Regulations and compliance. Compliance with the ever-changing regulations in the transport and international trade sector can be challenging and requires constant monitoring.
- Price pressure from customers. With customers demanding lower prices, logistics companies must find ways to reduce costs without compromising on service quality.
- Infrastructure issues. Inadequate or outdated infrastructure, such as roads or ports, can lead to inefficiencies and delays.
- Demand for fast delivery. The e-commerce boom has led to customers expecting fast delivery, which puts pressure on logistics operations.
- Sustainability requirements. As the global focus shifts towards sustainability, logistics companies are faced with the challenge of greening their operations, which may require significant changes and investments.
- Competition. The logistics industry is competitive, with companies constantly vying for market share, which often leads to price wars and reduced profits.
- Finding and retaining customers. Building long-term relationships and ensuring customer loyalty is key to sustainable growth.
- Cargo theft. Theft in transit can lead to direct financial losses and damage the reputation of a logistics provider (LaBotz, 2022).

The pandemic has had a significant impact on the trucking sector, especially on transport infrastructure. In particular, in March and April 2020, there was a noticeable decrease in road congestion, which coincided with widespread business closures and orders to stay at home. ATRI's (2020) study confirmed a noticeable decrease in congestion at major truck congestion points in March 2020, related to COVID-19. Although transport infrastructure and congestion issues remain a constant concern, this temporary traffic relief has likely led to the topic dropping to 12th position in this year's ranking (Gurtu, 2023).

Ultimately, it can be argued that excessive costs are the most pressing problem faced by logistics companies and need to be addressed. The solution to these problems can be divided into two main strategies.

1) Reducing the number of customers. Although it may seem counterintuitive, optimising the customer base can lead to more focused operations, higher quality service and better resource allocation. By focusing on a specific market segment or prioritising larger, more regular customers, logistics companies can reduce operational complexity and improve service delivery.

2) Improving cost efficiency by focusing on two key areas:

- *Optimisation of deliveries.* Effective route planning, the use of real-time tracking technology and predictive analytics can optimise delivery processes. For instance, data shows that optimised delivery routes can reduce fuel consumption by 20%.

- *Reduction of fuel costs.* In addition to route optimisation, logistics companies can invest in fuel-efficient vehicles, train drivers in fuel-efficient driving techniques, and track their fuel consumption patterns. According to statistics, a well-implemented fuel management system can lead to savings of up to 15% in fuel costs (Keshavdas, 2019).

In a specific study of the problems associated with truck loading, this area emerges as a separate subfield of logistics research with its own unique characteristics.

According to the companies surveyed, 70% say that the speed and accuracy of the Estimated Time of Delivery (ETD) associated with truck loading is currently their biggest challenge. In the transport sector, the efficient loading of trucks and the timely movement of these loads is becoming a paramount asset. It is therefore logical to conclude that automation tools that address time-related issues in truck loading offer significant potential for achieving logistics objectives.

However, specific challenges arise when implementing automation tools tailored to truck loading, such as freight tracking and routing software. Research shows that the main obstacles that reduce truck loading efficiency and related delivery requirements are the following:

- Inaccurate traffic forecasts. Forecasting traffic flows is crucial for optimal route planning, especially when trucks have tight loading and unloading schedules. Miscalculations can lead to significant delays.

- Fuel costs. Fluctuations in fuel prices have a direct impact on the economic efficiency of freight transport. Forecasting and managing these costs is vital.

- Unreliable weather forecasts. Adverse weather conditions can have a significant impact on truck loading and subsequent delivery. Accurate weather forecasts allow for better preparation.

- Fleet maintenance costs. Regular maintenance ensures that trucks can withstand the rigours of constant loading and unloading. Unexpected breakdowns can disrupt this process, resulting in delivery delays.

- Lack of qualified drivers. A well-trained driver is vital for efficient truck loading. A shortage of them can complicate the process and increase the associated costs.

- Inefficient routing strategies. Choosing the right route is crucial for trucks loaded with goods. Suboptimal strategies can lead to longer delivery times and higher costs (Estep, 2022).

- Optimising space during loading. Proper management of truck space ensures the efficient and safe transport of goods. Inefficient use of space can result in the need for additional trips, increased costs and potential damage to goods. Effective space optimisation can lead to cost savings and more timely delivery (Panasenko, 2023).

Transparency across all logistics processes is paramount in today's fast-paced global business environment. By providing clear visibility at every stage of the supply chain, companies can improve efficiency, reduce costs and increase customer satisfaction. The introduction of software solutions further enhances these benefits, as they provide tools tailored to both logistics management professionals and frontline workers.

The emergence of logistics management software solutions offers many benefits that can change the way supply chains and related processes are managed. Consider some of these benefits:

- Centralised information. Most software solutions provide a single platform where all logistics data can be accessed and analysed.

- Real-time monitoring. Many modern tools allow to track shipments, inventory, and other important metrics in real time.

- Predictive analytics. Advanced software solutions use artificial intelligence and machine learning for predictive analysis, offering insight into potential future trends and challenges.

- Improved communication. These tools often include integrated communication functions to ensure that all stakeholders are kept up to date.

- Customisation. Many logistics software solutions are adaptable, allowing companies to customise features to meet specific needs.

- Scalability. As the company grows, the software can be expanded or scaled to meet growing needs without major overhauls.

- Security. Modern software solutions are equipped with robust security protocols that ensure that sensitive data remains protected (Bulatovych, 2022).

In the logistics sector, harnessing the power of technology through automation is leading to transformational change. Beyond the basic benefits of increased speed and reduced errors, there are additional layers of benefits that are specific to the logistics sector. These benefits, if effectively integrated, can redefine the trajectory of an organisation's logistics operations. Below is a detailed list of them:

- Route and cargo planning. The ability to plan routes efficiently is of paramount importance for logistics. An optimised route ensures that the truck's carrying capacity is fully utilised, maximising efficiency. This not only reduces fuel costs by minimising distances, but also ensures on-time delivery. When routes are carefully planned, companies can make the best use of their fleet, thereby reducing vehicle wear and tear and potentially extending the life of their transport assets.

- Advanced order management (AOM/DOM). Tools designed for advanced and distributed order management can be a godsend for logistics managers. They allow to make strategic decisions about which warehouses to ship from, maximising cost savings. By choosing the closest warehouse or the warehouse with the largest inventory, they can ensure faster delivery and lower shipping costs, increasing customer satisfaction.

- Communication tool. Uninterrupted communication is the backbone of any logistics operation. A dedicated communication tool facilitates real-time communication between logistics managers, drivers and warehouses. This direct line of communication helps to quickly resolve issues in the field, ensuring that drivers are not left alone with problems and warehouses are always informed of any changes.

- Analytics and reporting. In the age of data, having a robust analytics and reporting tool is a game changer. They provide a comprehensive overview of operations through graphs and tables. By visualising data in real time, companies can identify bottlenecks, evaluate performance and make informed decisions. This proactive approach can help solve problems before they become critical.

- Task management. A centralised task management system allows logistics managers to keep their finger on the pulse of every activity. From understanding what needs immediate attention to planning future tasks, this feature ensures that every



responsibility is tracked and addressed. With every task assigned, there is a clear path to completion, ensuring smooth operations.

– Except for management. In logistics, not all days are the same. While most situations may be within the norm, there are always exceptions that require human intervention. An exception management system helps to identify such non-standard situations, whether they are accounting discrepancies, transport issues, or inventory problems. By flagging them immediately, the right personnel can be alerted to resolve the issue, ensuring minimal disruption.

– Document flow and personnel management. Once the goods are delivered, it is important to have an efficient invoicing system. Instant invoicing with all the accompanying documentation can increase cash flow for the business. In addition, a dedicated HR module tracks employees' working hours, manages leave, and ensures timely payment of salaries, contributing to employee satisfaction and motivation (Pelaez, 2022).

Given the numerous studies and opinions of logistics experts, it becomes necessary to systematically analyse these challenges in a systematic manner. To achieve a clearer understanding and facilitate a strategic approach to addressing these issues, a comprehensive table will be presented that describes each challenge and its potential solutions in detail.

The US logistics and freight industry is facing a host of challenges, ranging from rising fuel prices to environmental concerns. To address these challenges, it is imperative that companies invest in optimisation strategies that not only address immediate issues, but also promote long-term sustainability and efficiency. By integrating technology, training and sustainable practices, companies can stay ahead of these challenges

and ensure a smooth, efficient and environmentally friendly logistics process.

#### 4 Conclusions

The US trucking industry is projected to experience significant growth and economic impact through 2023, further cementing its role as a key component of the national economy. The industry's expansion is reflected in projected increases in freight costs, gross revenues and cross-border trade. Notably, employment in the sector is also expected to increase, particularly among professional drivers and small fleet operators, who continue to form the backbone of the industry. However, the industry faces a number of challenges, including rising operating costs related to driver wages and fuel, as well as external factors such as insurance premiums and customer acquisition hurdles. Despite these challenges, the outlook for the industry remains broadly positive, underpinned by its vital contribution to the US economy and trade dynamics.

Navigating the intricacies of the logistics sector, particularly truck loading within the United States, reveals a landscape dotted with challenges. However, it's clear that the industry is not resigned to these difficulties. From economic constraints such as rising fuel costs to operational challenges such as driver shortages, solutions are constantly being sought and implemented. The use of fuel-efficient technologies can significantly reduce operating costs, while targeted training and incentive programmes can address the pressing driver shortage. Regulatory constraints, while strict, can be circumvented through improved compliance systems, turning potential pitfalls into streamlined processes.

Furthermore, the industry is not only driven by profit motives; there is a growing recognition of wider

TABLE 1 Challenges in logistics and truck loading

Challenge	Optimisation direction	Explanation
Rising fuel costs	Investments in fuel-efficient technologies	By investing in modern trucks and technology, companies can improve fuel efficiency and reduce costs.
Shortage of drivers	Training and incentive programs	Addressing the shortage by investing in training programmes and providing incentives can help attract and retain drivers.
Regulatory constraints	Improved compliance monitoring	Implementing digital systems for tracking and ensuring compliance can help avoid regulatory fines and business disruptions.
Infrastructure decay	Advocating for infrastructure improvements	Participation in industry groups to advocate for public investment in transport infrastructure.
Traffic congestion	Advanced route planning systems	Using advanced GPS and traffic forecasting tools can help to avoid congested routes and save time.
Environmental issues	Implementation of sustainable practices	Using environmentally friendly technologies and practices can help reduce carbon trace and improve the environment.
Space optimisation during loading	Implementation of smart loading solutions	Proper management of truck space ensures efficient and safe transport of goods. Inefficient use of space can result in the need for additional trips, increased costs and potential damage to goods. Implementing smart loading solutions and technologies can improve space efficiency, resulting in cost savings and more timely delivery.

societal issues. This is evidenced by the proactive steps being taken to address the challenges of deteriorating infrastructure and environmental protection. By advocating for better transport infrastructure and adopting sustainable practices, the sector is demonstrating its commitment to playing a role in achieving wider socio-economic and environmental goals.

The US logistics and truckload industry is therefore at a crucial juncture. The challenges are many, but so are the solutions. With the right combination of technology, policy advocacy and sustainable practices, the industry is well positioned to not only overcome the current challenges, but also pave the way for a more efficient and sustainable future.

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