




“The impact of COVID-19 on the transportation and logistics industry”

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THE IMPACT OF COVID-19 ON THE TRANSPORTATION AND LOGISTICS INDUSTRY

Abstract

In this present age of globalization, the logistics and transportation industry has become an integral part of most businesses/firms as it is aimed at ensuring the effective movement of people, distribution of goods and services from one location to another on time. Therefore, this paper aims to analyze the impact of COVID-19 on the logistics and transportation sectors. The qualitative research approach was adopted using analysis and synthesis of scientific literature, data from news reports, organizational sites, and a case study of data contents. The paper presented the analysis of negative and positive effects of COVID-19 on the logistics and transportation industry. The study also discusses possible strategies and further steps for improvement of the logistics and transportation sector, including the automation and introduction of other technologies, a sustainable and flexible transportation system, cooperation of logistics and transportation business. Findings regarding the positive implications of COVID-19 show noticeable advancements in the logistics and transportation sector, such as the rise of e-commerce businesses with efficient delivery options, and the development of 3rd party logistics services as more companies outsource supply chain operations. The study revealed the importance of strategic planning with a joint effort from the research centers, public sector, private sector, and educational institutions as one of the proposed solutions for the logistics and transportation industry.

Keywords

economic sectors, transportation, logistics, strategy, pandemic, globalization

JEL Classification

M16, L91, L92

INTRODUCTION

According to Loske (2020), the recent COVID-19 and other forms of epidemic and pandemic outbreaks usually precede a severe effect on society especially in the area of economic activities. To control the spread of the COVID-19, which is extremely transmittable, governments in many countries were able to enforce several constraints such as restrictions on the movement of people within the country particularly without essential reasons, physical relations and proximity rules, compulsory use of face masks in public facilities, and the temporary shut-down of business and service firms.

These restraints have resulted in a huge impact on every sector of the economy including the logistics and transportation segments (Loske, 2020). Subsequently, the advancement of globalization in recent years places a great emphasis on logistics that has become an active part of most industries facilitating production and distribution operations. However, transportation is a major aspect of logistics, which is made up of one-third of the logistics cost, transportation functions from the process of manufacturing, production, and final delivery to consumers.

Hence, effective management of both logistics and transportation is necessary to achieve business goals (Tseng et al., 2005; Kim & Lee,

2008). Mouratidis et al. (2021) noted that new possibilities using different types of transportation and smart technologies, such as App City, can affect travel behavior and have a positive impact on the sustainable environment. It was noted that teleworking and teleconferencing introduced during the COVID-19 pandemic have reduced the total number of trips, but balanced and rational use of transportation can increase the number of long trips. For example, sharing vehicles such as cars, motorbikes, and bicycles can facilitate more active journeys. Ho et al. (2021) stated that since the outbreak of the COVID-19 pandemic, there has been a widespread study among researchers on the impact of the COVID-19 on various sectors. For instance, Mishra and Rampal (2020) investigated the medical industry, Vidya and Prabheesh (2020) researched the trade industry, Lee and Chen (2020) examined the tourism industry, and Yu et al. (2020) investigated the labor industry. Furthermore, there have been mixed conceptions on the effect of COVID-19; some studies have solely emphasized the adverse impact of COVID-19 on the transportation industry because of the high demand for goods placed on several production companies during the early stage of the outbreak.

On the contrary, Ho et al. (2021) stated that although the pandemic virus has resulted in state economic instability and led to high unpredictable tendencies, it has also generated new possibilities and business opportunities. Some of the new changes include the rise of e-commerce, and electronic payment, changes in consumers' purchasing patterns, and high demands for logistics services.

In a bid to reduce the spread of the COVID-19 pandemic around the world various government restrictions have been made, which have in turn affected the operations of economic activities including the transportation and logistics industry. This has resulted in an increased rate of movement of goods and consumables thereby placing a huge demand on logistics and transportation services (Leigh, 2020; Pranskuniene & Perkumiene, 2021).

The study was conducted using a qualitative methodology consisting of analysis of data from scientific literature, news reports, and organizational websites, the content of a case study, and diagrams and illustrations.

The paper aims to investigate the impact of COVID-19 on the logistics and transportation industry. To achieve this purpose, the following objectives are proposed:

- to analyze the challenges caused by the impact of COVID-19 on the logistics and transportation industry;
- to examine the improvement characterized by the impact of COVID-19 on the logistics and transportation industry;
- to analyze possible strategies and way-forward to reduce the negative impact on the logistics and transportation industry in the COVID-19 era.

1. LITERATURE REVIEW

The current COVID-19 pandemic has been an issue of concern to all economic sectors at local, national, and global levels with no exception for the logistics and transportation sector. The outbreak of COVID-19 began in China in the city of Wuhan in 2019 and has spread into more than one hundred and eighty-eight countries with about 67,500

COVID-19 cases recorded as of February 20, 2020 (Okeleke & Aponjolosun, 2020). Current reports show a total of 216,156,223 cases worldwide, 4,497,615 death cases, and 193,140,618 recovery ones, as of August 28, 2022 (Epidemic-stats, 2021).

Therefore, this paper analyzed the impact of the COVID-19 pandemic with a focus on the caused challenges and improvements resulting from the

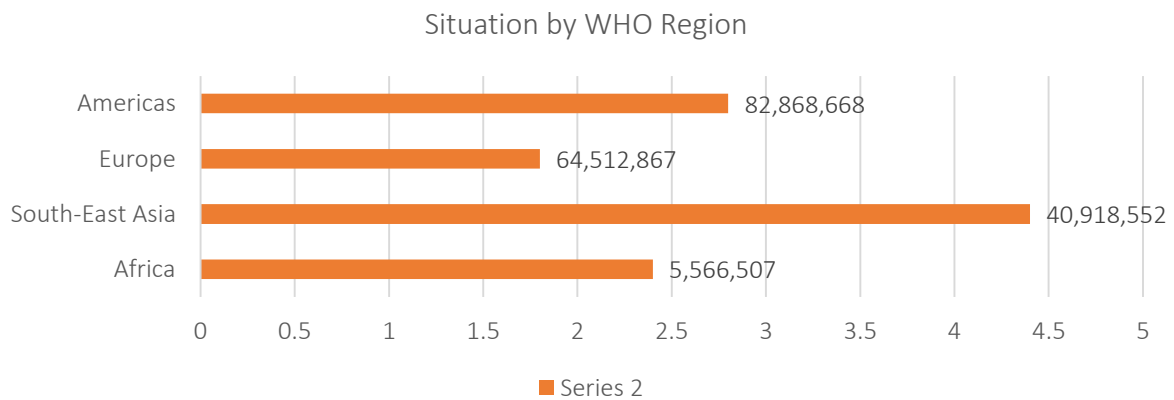


Figure 1. Total COVID-19 cases in some regions of the world

impact of the outbreak and possible solutions and strategies for the logistics and transportation industry in the present pandemic situation.

1.1. Challenges caused by the impact of COVID-19 on the logistics and transportation industry

The transportation and logistics sector has been faced with challenges as a result of the unpredicted outbreak of the COVID-19; it has experienced some setbacks affecting its operation such as the strict import and export restrictions, reduction in the demand for passengers' travels, changing the customer relationships situation of transportation companies during the COVID-19 pandemic, etc. (Karaman et al., 2020; Mitreğa & Choi, 2021).

Ho et al. (2021) investigated the impact of COVID-19 on freight transport, with a specific focus on China. It was shown that COVID-19 has a negative impact on China's road freight transportation turnover as the number of confirmed cases of COVID-19 increased, which has resulted in emergency stockpiling and mismanagement of vital resources and facilities, instability in market supply and demand, and changes in consumer purchasing and consumption patterns, such as increased fears and declining investment.

Subramanya and Kermanshachi (2021) analyzed the impact of COVID-19 on the transportation industry with a comparative study of transportation modes such as road, air, and rail transportation. COVID-19 has severely affected all forms of transportation based on the supply and number of trav-

Source: Ho et al. (2021).

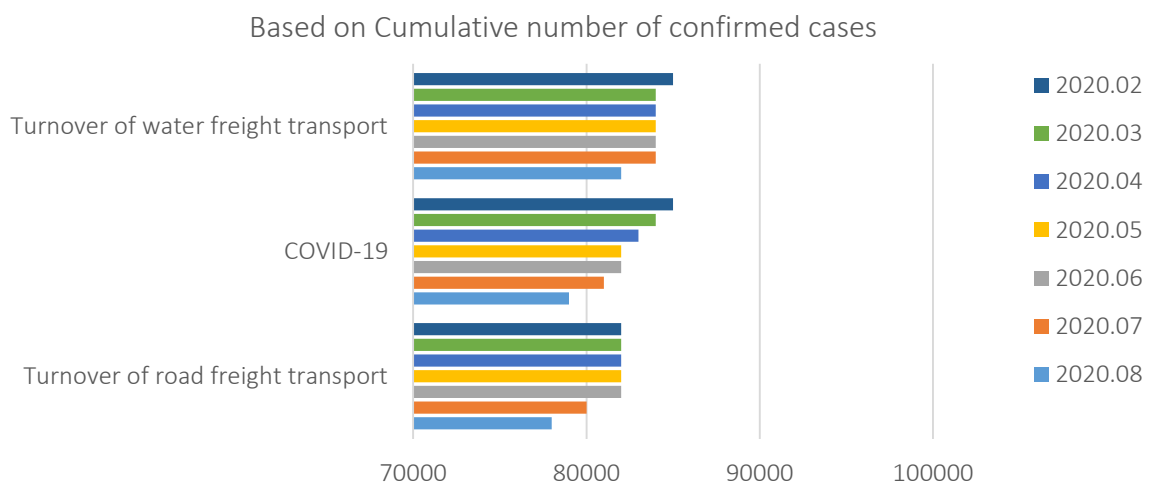


Figure 2. COVID-19 and China's freight traffic volumes

Table 1. Short-term and long-term effects of COVID-19 on modes of transportation

Modes of transport	Short-term implications	Long-term implication
Railways/Subways transport	The transmission of the virus	Future design of trains
	The decrease in the workforce	Substituting the material
	Human behavior and tendency	
	Government’s support to Rail Sector	
Road transport	Environmental impact	Digitization
	Impact on revenue	Autonomous vehicle
	Road safety	
Air transport	Government support	Enhanced security measures
	Ticket cancellations airports	Effect on revenue aircraft sales and manufacturers

el passengers. According to Kim (2021), travels to major cities and bus transportation have declined about 50-90% globally and solutions to this problem have been addressed to some extent by the transportation sector of different nations, as some companies had limited production of vehicles to invest more in the production of safety materials.

In addition, Subramanya and Kermanshachi (2021) found the implications of the COVID-19 impact on three major forms of transportation based on a short- and long-term basis. Concerning the short-term effects on rail transport, such consequences as the transmission of the virus in the form of droplets from an infected person, which may fall on various surface parts of the train, or through the body contact with people affected by the virus, and changes in people’s preferences have been mentioned. Tan and Ma (2021) found that more than 97% of people preferred walking or using personal transportation as a safer measure for transportation. Changes in train design are possible to curb future virus outbreaks, as well as changes in the materials used in the production of trains. The analysis also showed the duration of viruses on various surface materials.

The impact of COVID-19 for different forms of transportation can be found in Table 1.

According to Luman et al. (2021), the impact of COVID-19 on the global transportation and logistics sector, which includes aviation, freight, and logistics services, was quite severe. A dropdown of about 10% in global capacity in 2020 has been recorded due to the global economic crisis (5%). As a result of the social distance, regulations had also significantly affected passenger traffic. However, with the possibility of the vaccination, the current ease of travel restrictions could result in a predictable 7% rebound in 2021. Luman et al. (2021) also noted that aviation and public transportation will take several years to recover from the impact of COVID-19; and with the remote work and travel regulation, the demand for aviation and public transportation would possibly remain below 2019 levels even after economies fully re-open. Another negative impact is on the increased freight costs incurred from state grants given to industries during the pandemic.

The logistics and transportation industries are one of the key industrial sectors in many countries, and the impact of the COVID-19 outbreak has posed a variety of challenges to the sector worldwide. Some of the challenges include additional costs for logistics and transportation, declining demand for passenger travel, and strong demand for technological innovations.

Source: Luman et al. (2021).

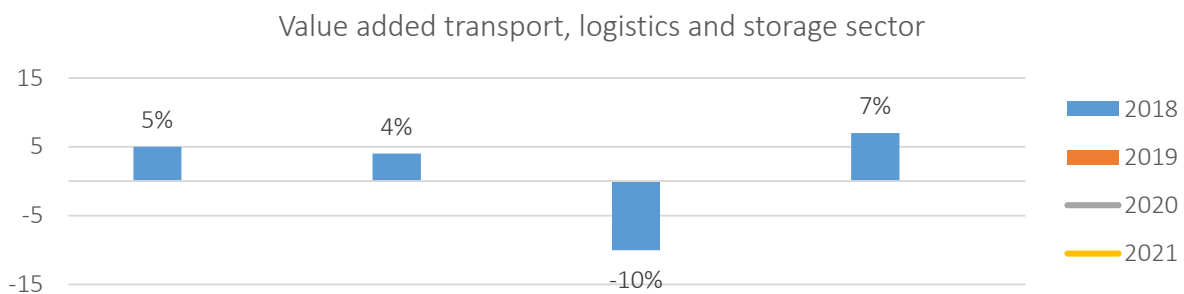


Figure 3. Global transportation and logistics sector performance and expectation for 2021

1.2. Improvements characterized by the impact of COVID-19 on the logistics and transportation industry

There is no doubt the impact of COVID-19 has negatively affected the operations of the logistics and transportation industry. However, the analysis of different studies has shown that some noticeable positive advancements are arising from the impact of the virus, in response to curbing the spread of the virus and meeting the demand and changes in the sector. This aspect also was noted by Borca et al. (2021). It was found that some of the key findings of the COVID-19 crisis can also cause some positive effects, such as reduced road and freight traffic, leading to significant reductions in global emissions and promoting sustainability. One of the major positive changes in the logistics and transportation industry that occurred during the COVID-19 pandemic is the rise of e-commerce businesses with efficient delivery options, and the development of 3rd party logistics services. More companies outsource supply chain functions encompassing various supply chain services such as order management logistics services and warehousing that have helped to create the positive market shift and have contributed to economic revenue despite the pandemic (Wang et al., 2021; Bratt et al., 2021; Lin et al., 2021).

Luman et al. (2021) argued that the impact of the COVID-19 outbreak has become a stimulating factor for improvement and financial asset creation for the future of the logistics and transportation industry. Some of the positive implication of COVID-19 in the logistics and transportation sector includes:

1. Improvement of digital knowledge and skills: The pandemic has facilitated and increased digital experiences and skills in logistics and transportation. Through hybrid working, transportation of passengers, personnel and products have become more efficient.
2. Increase in e-commerce and e-logistics services: There has been a high demand for e-logistics services, which has promoted the formation of more e-commerce/e-logistics businesses such as shipping companies like DHL and UPS, as

well as the rise of real estate logistics services, such as the e-commerce warehouse services render by Walmart to meet the demand in the logistics and transportation industry.

3. Increased outsourcing of supply chain services: Various strategies for more efficient logistics and supply chain have been suggested, which has resulted in the creation of more supply chain channels/ sourcing which has become a huge promoter of global trading activities.
4. Increase in logistics alliances and partnerships: There have been rapid logistics business diversification and integration in other to gain a competitive advantage for the supply chain market. Examples of logistics retailers are Alibaba and Amazon as market leads.

In addition, Ho et al. (2020) stated that the logistics and transportation industry has experienced a high freight transportation turnover as in the case of China, because of the increased setup of online business platforms promoted by the popular use of online payment methods. Furthermore, the impact of the pandemic has resulted in automation innovation in the logistics and transportation industry. According to Zeng et al. (2020), the transportation sector in China has incorporated the use of autonomous vehicles and artificial big data, intelligence (AI), and robotic services that have created an easy means to transportation essential and medical supplies during this pandemic. Regarding this implementation, the importance of automation innovations and artificial intelligence has been identified as a solution for global emergencies (Subramanya & Kermanshachi, 2021).

In summary, it can be stated that COVID-19 also has made some positive significant impacts in the logistics and transportation industry. The example is the increase in demand for logistics and transportation services through the rise of e-commerce/e-logistics companies, the implementation of artificial intelligence and automation in transportation services, the expansions of logistics services through business alliances and diversification, high freight transportation turnovers from online sales, and increased application of digital skills in logistics operations.

1.3. Possible strategies and way-forward to reduce the negative impact of the COVID-19 in the logistics and transportation industry

Based on the current COVID-19 pandemic, there is a need for strategic measures to be taken to prevent the drastic effect of such future pandemic situations on the logistics and transportation industry as well as ways through which the industry can increase its efficiency and growth regardless of the current pandemic. Shihui et al. (2021) also noted that the COVID-19 pandemic has put huge pressure on logistics and supply chain services like never in history such that logistics presently plays a significant role, especially for e-commerce companies. Therefore, various studies have proposed strategies and ways for the development of the logistics and transportation sector.

Subramanya and Kermanshachi (2021) researched the impact of COVID-19 on the transportation industry and showed changes in consumer behaviors. Since the impact of COVID-19 will remain for a long period and the world will likely never return to the norms, there is a need for stakeholders, transportation agencies, and the government to closely monitor the latest market trends, predict impending issues, and develop possible improvement solutions. Furthermore, they also emphasized the importance of designing a sustainable and flexible transportation system as a major focus of the transportation sector and this could be

achieved through innovative strategies and joint effort from the research centers, public sector, private sector, and educational institutions.

Ho et al. (2020) analyzed the availability of market data and stated that the government and other relevant stakeholders should implement strategies to minimize negative consumer behavioral patterns caused by the impact of the COVID-19 pandemic and price regulations. Regarding the way forward for the logistics and transportation industry to tackle the issues caused by the COVID-19 pandemic, innovative technologies are required. The digital logistics era of mobile payment options already in logistics would help to better facilitate visibility, know-how, and agility of the logistic/supply chains and transportation sector. Hence, it would play an important role in the prediction and monitoring of trends and changes such as outbreaks for better and socially responsibility management and a safer environment (Shihui et al., 2021; Rudmin, 2016; Vveinhardt & Andriukaitiene, 2014; Perkumienė et al., 2020).

According to Desai (2020), there are short, mid, and long-term strategies for improvement and sustainability specifically for companies in the logistics and transportation sector as regards the COVID-19 pandemic (Tables 2 and 3).

Wang et al. (2021) presented an overview analysis of four aspects of the logistics and transportation industry based on the impact of the COVID-19 pandemic. In terms of strategic planning for the logistics and transportation industry, “increasing risk” for the period of six months includes

Table 2. Short-term strategies for logistics and transportation companies to curb the impact of the COVID-19 pandemic

Source: Desai (2020).

Short-term strategies for logistics and transportation companies		
1	Activate emergency plans	This involves setting up response plans and quick response teams for the companies.
2	Communicate with carriers	Updated knowledge of current situations, capacity, and challenges of other logistics companies.
3	Stay informed on federal and state regulation	Knowledge of current government policies influencing the logistics and transportation industry.
4	Conduct supplier assessments	Investigate key players as sources of quick supplies.
5	Perform carrier capacity and service analysis	Conduct comparative analysis between companies to identify strengths, weaknesses, and possibilities for improvement.
6	Evaluate mode shifting	Conduct analysis of the different types of transportation to identify best options based on cost, timeliness, etc.
7	Consider fleet strategies	Partner with third party logistics and consider other fleet strategies to improve capacity.
8	Execute wave planning	A strategic plan should include modeling for possible challenging situations in the logistics and transportation industry.

Table 3. Mid-term to long-term strategies for logistics and transportation companies to curb the impact of the COVID-19 pandemic

Source: Desai (2020).

Mid-term to long-term strategies for logistics and transportation companies		
1	Perform a recovery assessment	Conduct analysis of a company to highlight challenges, ineffectiveness, and factors affecting cost margin.
2	Focus on resiliency	Create a more effective supply chain network that ensures, fast delivery, and quick response time to product demands.
3	Conduct a sensitivity analysis	The use of modeling and analytic software to analyze the overall performance of a company.
4	Establish leading partnerships for future state success	Create business partnerships with more advanced logistics and transportation companies for the formation of new business ideas and opportunities and improvement of services.
5	Redesign and refine the transportation and logistics delivery model	Adoption of innovative approaches in place of traditional approaches for the improvement of service quality and overall performance.
6	Embrace new technology solutions to drive automation	Incorporate the use of the latest technological innovation.
7	Enhance distribution capabilities	Design flexible and timely alternative means of distribution including investment in low-cost facilities among others.

demand for volatility as a result of COVID-19. While in the period of two years, partnership and alliances, emerging transportation concepts, and a slowdown in the economy have an “unchanged risk”, and for the period of five years, there is a shift in shopping mode to heavier e-commerce, adoption of new technologies, new modes of delivery, competition from logistics technology companies and international expansion for “reducing risk”. In the financial aspect, the increased risk for 6 months includes cost and working capital management also acting as a “reducing risk”. While for two years period – price volatility of fuel from oil price war, fluctuation in freight rates, liquidity risk from inaccurate forecasting of future capital, and credit risk, and for five years period – “unchanged risk” includes fraud corruption, and market movement in interest exchange rates.

In the operational and technological aspect, “increasing risk” in the period of six months includes drivers’ shortage and retention and crisis management for “unchanged risk”. While for two years period, “increasing risk” includes capacity bottleneck, operation efficiency, customer experience, security and identity verification, managing inventory, and cyber security. For five years period, “increasing risk” includes IT system implementation, supply chain visibility, and global initiatives to minimize pollution for “unchanged risk”. In the legal regulatory and compliance aspect, “increasing risk” for the period of six months includes cross borders trade policies, health, safety and security, and COVID-19 travel policies. While for two years period, “unchanged risk” includes en-

vironmental regulations, and for five years period, “unchanged risk” includes changes in laws, rules, policies, and tax regulation (Wang et al., 2021; Khan, 2019).

After analysis of different studies, strategies for improving the logistics and transportation industries can be presented. Proposed solutions include technological innovation, cooperation between logistics firms, cooperation between government, public and private sectors in implementing strategic strategies, methods, and policies for improving and designing a flexible transportation system.

2. GENERALIZATION OF THE MAIN STATEMENTS

Regarding the purpose of this study, various literature sources were discussed, focusing on the analysis of the negative effects of the COVID-19 pandemic on the logistics and transportation sector. The findings revealed that logistics and transportation activities have been affected by tight import and export restrictions, reduced demand for passenger travel, and increased requirements for standard service quality, leading to additional costs. Shopping has shifted from physical to online shopping, with huge demand for express delivery services also putting tremendous pressure on more technological innovation to keep pace with changes in the transportation and logistics industry. The impact of COVID-19 on various modes of

Source: Wang et al. (2021).

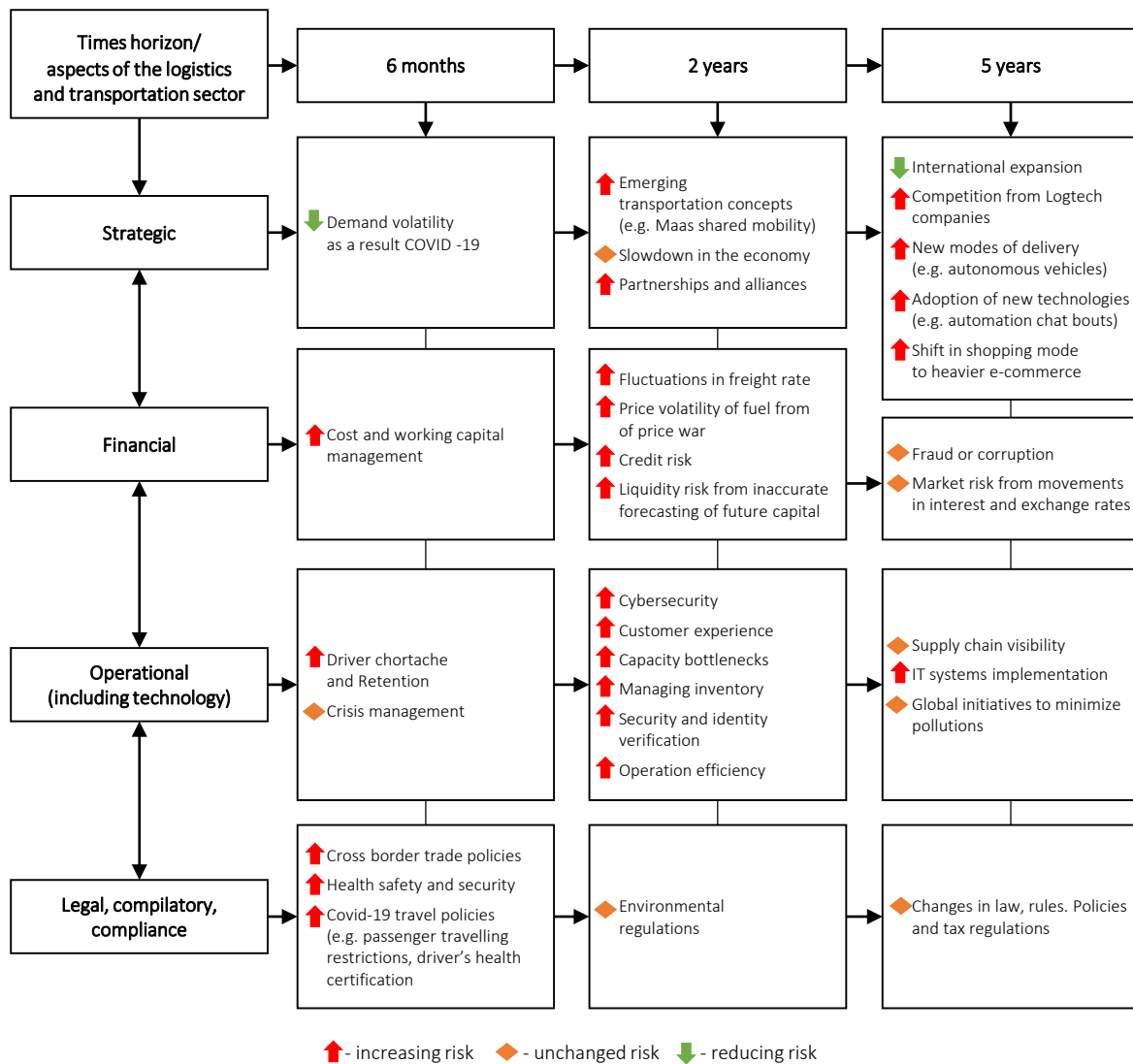


Figure 4. Predictive analysis (6 months to 5 years period) of the COVID-19 impact on major aspects of the logistics and transportation sector

transport, such as road, air, and rail, was also analyzed. Studies show that worldwide road transportation use has fallen by around 50-90%. Although the short-term effects on rail transportation suggest that the virus can be transmitted in the form of droplets from an infected person who may fall on various surfaces of the train, or through body contact with infected persons on the train, this will reduce the workforce. Subsequent results show that more than 97% of passengers preferred walking or personal transportation as a safer mode of transportation than rail or public transport.

Findings regarding the positive implications of the COVID-19 show noticeable advancements

in the logistics and transportation sector such as the rise of e-commerce businesses with efficient delivery options, and the development of 3rd party logistics services as more companies outsource supply chain operations. Additionally, Zeng et al. (2020) showed the rise in the use of automation innovation and artificial intelligence as in the case of China. There is a rapid growth of logistics services through business alliances and diversification, high freight transportation turnovers from online sales, and increased application of digital skills in logistics operations. Finally, the impact of COVID-19 was also linked to the significant decline of global emissions from the reduced traffic on roads and cargo transportation thus promot-

Source: Compiled by the authors according to Luman et al. (2021).

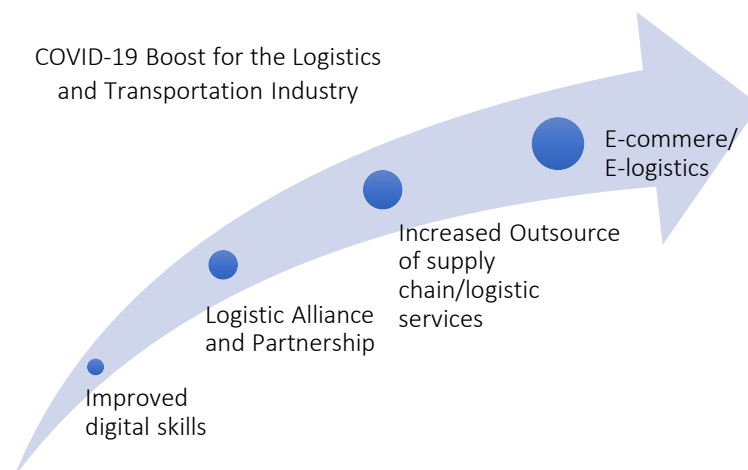


Figure 5. Positive impacts of the COVID-19 on the logistics and transportation sector

ing sustainability (Vienažindienė et al., 2021), the difficulties are reflected by the ever-fluctuating supply and demand caused by supply chain disruptions (Lin et al., 2021).

Another task of this paper was to discuss the possible strategies and way-forward to mitigate the impact of the COVID-19 outbreak and ways to improve the operations of the logistics and transportation industry. Findings reveal the need for stakeholders, transportation agencies, and the government to closely monitor the latest market trends, predict impending issues, and develop possible improvement solutions. Emphasis was also made on the development of a sustainable and flexible transportation system to combat impending outbreaks situation for the future. The development of innovative technologies is also required to meet the demands of the logistic/supply chains and transportation sector. Finally, studies revealed the importance of strategic planning with a joint effort from the research centers, public sector, private sector, and educational institutions as one of the proposed solutions for the logistics and transportation industry.

3. DISCUSSION

As a result of the ongoing COVID-19 impact on the logistics and transportation sector, some factors have been identified to have affected the operations of the industry. In line with Wang et al.' (2021) Risk Radar of Transport and Logistics Sector, the pandemic resulted in import and export activ-

ities restrictions, reduction in passengers' travels, and additional costs from demand for faster delivery services. Ho et al. (2021) further stated that the pandemic also affected consumers' purchase and consumption patterns leading to market instability in supply and demand and emergency storage of supplies and mismanagement of vital resources and facilities. Generally, these issues have affected the overall performance of logistics and transportation. According to Luman et al. (2021), the pandemic resulted in a 10% dropdown in global capacity in 2020 but with the possibility of the vaccination, and the current ease of travel restrictions, there could be a predictable 7% rebound in 2021.

New development strategies and technological innovations have been applied to the logistics and transportation industry more than ever to respond to the needs and changes arising from the severe impact of the COVID-19 outbreak. As a result of the ongoing pandemic, the logistics and transportation sector has become a key player in preventing the spread of the virus, delivering essential medical supplies, relocating medical personnel, and, most importantly, ensuring the availability and distribution of essential goods to the public. Against this background, Wang et al. (2021) anticipate that demand for logistics and transportation services has boosted e-commerce business growth with efficient delivery capabilities and the development of third-party logistics services as more and more companies shift supply chain functions across various supply chains services. For example, order management logistics services and warehousing helped create a positive market

shift and contributed to economic revenue and industry turnover. New development strategies and technological innovations have been applied to the logistics and transportation industry more than ever to meet the needs and changes arising from the severe impact of the COVID-19 outbreak.

The need to rise above the challenges posed by the COVID-19 pandemic has become an issue of concern for the logistics and transportation sector to improve performance and avoid such drastic effects of future pandemic situations. Likewise, Subramanya and Kermanshachi (2021) proposed that market trends should be closely monitored with adequate analysis to predict impending challenges and develop possible solutions on time. The use of technological innovations such as automation has equally gained relevance as a wayward solution in improving the operations of the sector. Strategic planning is also a possible solution

for logistics and transportation companies to combat the impact of the COVID-19. In line with this, Desai (2020) suggested short-term and long-term strategic plans. These plans include setting up response plans and quick response teams for the companies, current situations report on the capacity and challenges of other logistics companies, up-to-date knowledge of government policies influencing the logistics and transportation industry, development of a more effective supply chain network that ensures fast delivery and quick response time to product demands, and the use of modeling/modelling and analytic software to analyze the overall performance of company among others. Conclusively, the collaborative efforts and strategic planning and implementation from stakeholders, logistics and transportation agencies, and the government would help the development of a sustainable logistics and transportation industry during this COVID-19 pandemic.

CONCLUSION

The paper presented a theoretical analysis of the impact of COVID-19 on the logistics and transportation industry. An analysis of the negative and positive effects of the pandemic in this sector has been carried out. Despite the relatively high level of development of the logistics and transportation industry, the COVID-19 pandemic has severely affected it. Some challenges posed by the pandemic include additional costs for logistics and transport, declining demand for passenger travel, and strong demand for technological innovation. Findings based on the literature review also revealed some positive effects of the outbreak on the sector, some of which include an increase in demand for logistics and transportation services due to the growth of e-commerce/e-logistics, automation of artificial intelligence deployment and transportation services, development of logistics services through business alliances and diversification. The development of the logistics and transportation sector should include automation processes and the use and harmonization of smart technologies.

AUTHOR CONTRIBUTIONS

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