

Impact of Oil Price Evolution on Logistics Industry

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Abstract

Since 2020, two major crisis impacted the global environment: the COVID-19 pandemic and the Russia-Ukraine war. Both had a major impact on international trade and on the evolution of oil prices which has a direct effect on the logistics industry. The scope of our paper is to investigate the effects of oil price evolution on logistics activities, especially transport. Costs of shipment represent an important component of final prices for consumer products and they can influence the general rate of inflation. This is a major concern among government officials in all countries, as high inflation rates can have negative effects on national economies. Our paper is focused on analyzing price trends on each mode of transport, but also prices for integrated logistics services. The results of our analysis offer insight on the logistic market trends and can be useful to professionals from companies, but also for academics interested in this field and consumers worldwide concerned about prices going up.

Keywords: Oil price, logistics, transport, energy sector, European policies

JEL Classification: Q41, Q43, R41

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1. Introduction and the aims of the research

Two major events have affected the global economy during the past two years: the COVID-19 pandemic which emerged at the beginning of 2020 and the Russia-Ukraine war that started in February 2021. These crises have brought increased levels of uncertainty as they created new barriers in the international market and disruptions in the movement of commodities and the energy resources exports. This has led to high volatility of oil and gas prices. As a result, many businesses, as well as customers are experiencing economic difficulties and lack of resources.

Our paper is aimed at researching the effects of oil price evolution on the logistic industry, focused on the main modes of transport by sea, road and air.

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2. Oil price trends and supply chain disruptions: recent evolutions

Crude oil is the most important energy resource at the moment and also the most traded commodity in the world. Oil price trends are mainly determined by supply and demand, but are influenced by other factors such as international events, political instability, economic growth or slowdown, business cycle and financial market speculation. Oil price high fluctuations are creating uncertainty and negatively impacting economic activities. (Peng et al., 2020).

Significant oil price fluctuations were caused by the COVID-19 pandemic in 2020 and by the Russia-Ukraine war since 2021, continuing to this day. We will further analyze how these two events impacted the oil price volatility.

2.1 Impact of the COVID-19 pandemic

The global economy and international trade have been affected by the coronavirus pandemic. The first half of 2020 was marked by widespread lockdowns, travel restrictions, rapidly rising unemployment which caused a collapse of the oil market. Compared with Q4 of 2019, the volume of global trade in goods decreased by 12,2% and trade in services decreased by 21,4%, in Q2 2020 (IMF, 2022).

The impact of the pandemic on the global economy is presented in the figure below. Four phases are highlighted: the first phase - the shock wave was felt in the supply process; second phase - the shock felt at the demand level; the third phase - progressive adjustment, involved a rebalancing of supply and demand, leading to a fourth phase - marked by divergent trends in different economies (United Nations, 2022).

Table 1. Impact of COVID-19 pandemic on the global economy

Supply Shock	Demand Shock	Adaptation	Divergence
<ol style="list-style-type: none"> 1. Decline in induced demand (Chinese production) 2. Lockdown of most of the workforce 3. Shortages in key sectors (pharmaceuticals and medical equipment) 4. Industrial base shut down 	<ol style="list-style-type: none"> 1. Decline in global derived demand 2. Switch to basic goods 3. Lockdown of a large consumer base 4. Less commercial demand 5. Travel & tourism collapse 	<ol style="list-style-type: none"> 1. Decline in economic activity and income 2. Diversion of savings and capital 3. (+) lockdown = (-) deferred demand 4. Rebalancing of supply and demand 	<ol style="list-style-type: none"> 1. Divergence in epidemiological outcomes 2. Quick bounce-back in some cases only 3. Basic goods and medicals in demand 4. Consumption pattern: the dematerialization of buying practices 5. Lockdowns in some economies
Mid-January – early March	Early March – May	Early May – October	Ongoing

Source: United Nations, 2022

The measures taken in order to counter the spread of COVID-19 virus had economic effects such as the decrease in production in some sectors and the decline in transport demand which pushed oil prices to the lowest point in 18 years, as the benchmark for US crude oil fell into negative territory for the first time ever in April 2020, and the price of Brent Crude, the benchmark for Europe and the rest of the world, also fell significantly (22,58\$) (OECD, 2020). In April 2020, the daily demand for oil was 29 million barrels lower than April 2019 (International Energy Agency, 2020).

Another important factor for the major drop of oil price was the disagreement between Russia and OPEC nations regarding limitations of production. In March 2020 Saudi Arabia decreased the price of crude oil by 20% which caused a crash in financial markets (9 March 2020 – “Black Monday”). Overproduction combined with extremely low demand for oil, led to reaching the limits for oil storage for many producers and this translated in negative levels of WTI⁴ crude oil price, for the first time in history. Traditionally, a lower oil price should be good news for the transportation industry, but national lockdowns, local quarantines and traffic blockades have diminished the benefits for logistics companies (Le, Thai-Ha et al., 2021).

To summarize, the pandemic has reduced the global aggregate demand for oil with its lockdowns while increasing market uncertainty, particularly through disruptions in the global supply chain (Vidya and Prabheesh, 2020).

2.2 Effects of Russia-Ukraine war

After the military attack launched by Russia in Ukraine, the price for oil increased sharply. One year after the pandemic, the global economy was starting to recover, but investments in oil production were at a low level. This situation was in the background when the war started in February 2021. All of these factors combined contributed to sky levels of oil price. The high energy resources prices have been transferred to consumers when paying for gasoline/diesel, heating and electricity. Also, inflation rates have gone up, as companies had to rise prices for products and services, because of high energy costs. This situation was carefully considered by governments around the world and policies were set in place in order to avoid an energy crisis and to help both companies and consumers to cope with the new price levels.

⁴ West Texas Intermediate

The Russia-Ukraine war represents the biggest challenge for the logistics industry in 2022, having a profound impact on international supply chains, because of new barriers in the market that disrupted the movement of commodities like oil, cereals and other raw materials and products. Because of these disruptions and high oil prices we see a general increase of prices for all commodities leading to huge inflation rates and economic difficulties for companies and consumers. Connecting with suppliers located near the war zone becomes a very difficult task to achieve. Solutions like cloud-based supply chain are proposed in order to optimize purchasing process and prevent stock outs. (Forbes, 2022).

The Russia-Ukraine war is having an outsized impact on the global supply chain, impeding the flow of goods, fueling dramatic cost increases and product shortages, and possibly creating food shortages around the world (MIT Sloane, 2022).

3. Research methodology

Our paper is structured in five main parts in which we used different methods of research.

1. First we introduce the current context of the global economy and formulate our research question: how does the evolution of oil price impact the logistics industry?
2. In the second part we review the major events that impacted the evolution of oil prices recently. The main publications on this subject were identified, classified and summarized in order to highlight the most important factors influencing the evolution of oil price and impacting global supply chains.
3. Third we draw up our methodology
4. In the fourth part we present our findings regarding the effects of oil price evolution on transport sector. The main methods used are: presentation and interpretation of relevant statistics and studies/reports published by international agencies and organizations, comparison between the effects on the main modes of transport, analysis of the measures taken by national and transnational authorities in order to counter the implication of rising prices of transport on inflation rates.
5. In the last part we formulate the main conclusions of our analysis highlighting the relevance of understanding the complex relationship between oil price evolution and logistics industry.

4. Impact of oil price evolution on transport sector

The transport sector uses approx. 60% of the world's oil supply (United Nations, 2022). Fuel price volatility continues, as a result of concerns regarding energy

security followed by the outbreak of the war in Ukraine. For example, in Europe, in certain regions prices have almost doubled, generating difficulties in the cash flow of operators or even a limitation of some products as a result of the tension felt by the supply chain. Two-thirds of the European Union's oil demand is directed towards transport (fuel used by trucks, cars, ships, planes) (Transport & Environment, 2022). We will further analyze how the main modes transport have been affected by oil price evolution in the past two years.

4.1 Impact on maritime shipping

Maritime transport is the main means of transport for goods subject to export/import operations (approximately 80% of global traffic). Goods are transported by cargo ships (non-specialized), specialized container ships (e.g. oil tankers, bulk carriers) or mixed ships (Popa, Belu).

Recently, the price in maritime transport has been influenced by a number of factors:

- a. The COVID-19 pandemic has had a major impact on global supply chains and the port and maritime industry. Any sudden drop in consumer demand is immediately reflected in shipping activity levels and port operations and can alter corporate strategies or even market structures. (Notteboom Theo, Pallis Thanos, and Rodrigue Jean-Paul 2021)
- b. Container Crisis: At the end of 2020, another problem began to take shape, namely the container crisis, caused by supply constraints, which led to an increase in costs, affected the reliability of services and undermined the functioning of value chains.
- c. Oil price evolution: a large part of the price of ship's fuel growth is caused by the high prices of oil. Obviously, this is the raw material from which most fuels for ships are produced. Rules implemented in 2020, which oblige shipping carriers to use more Low-Sulphur fuel, have also contributed to higher costs. It should be noted that in Europe the price of very low sulfur marine fuel (VLSFO) has increased much faster than the price of oil.
- d. The conflict in Ukraine: According to a study, the price of fuel registered an important increase in the first two weeks after the invasion of Ukraine, reaching the value of 139 dollars per barrel, a level not reached in the last 14 years. Thus, these particular increases were also reflected in shipping rates (The Editorial Team 2022).

From the second half of 2020 there was an increase in shipping rates until the beginning of 2022. The demand for containerized cargo was increasing day by day,

although the shipping capacity was conditioned by logistical obstacles and bottlenecks and lack of equipment containerized transport. Continually changing timetables and port congestion have also led to an increase in fees, including demurrage and detention. Rising costs have been a challenge for all retailers and supply chain managers, and in particular for smaller shippers who, compared to the big players in the market, have been unable to sustain the additional expenses and have been disadvantaged in terms of negotiating rates and reserving space on shipping vessels (UNCTAD, 2021).

The main indices that give relevant information on the evolution of maritime transport rates are: Freightos Baltic Index and Shanghai Containerized Freight Index. Freightos Baltic Index (FBX), a reference indicator regarding the cost of transporting a cargo container on major shipping routes, From the graph below, an increase in this index can be seen from 1709 dollars (1.01.2017) to 3452 dollars (1/01/2021), to a peak of 11109 dollars (10/09/2021). This year, FBX has a downward trend from a value of 9745 dollars (18.02.2022) to a value of 3699 dollars (7.10.2022) (Freight Rate Index / Freightos Baltic Container Index).

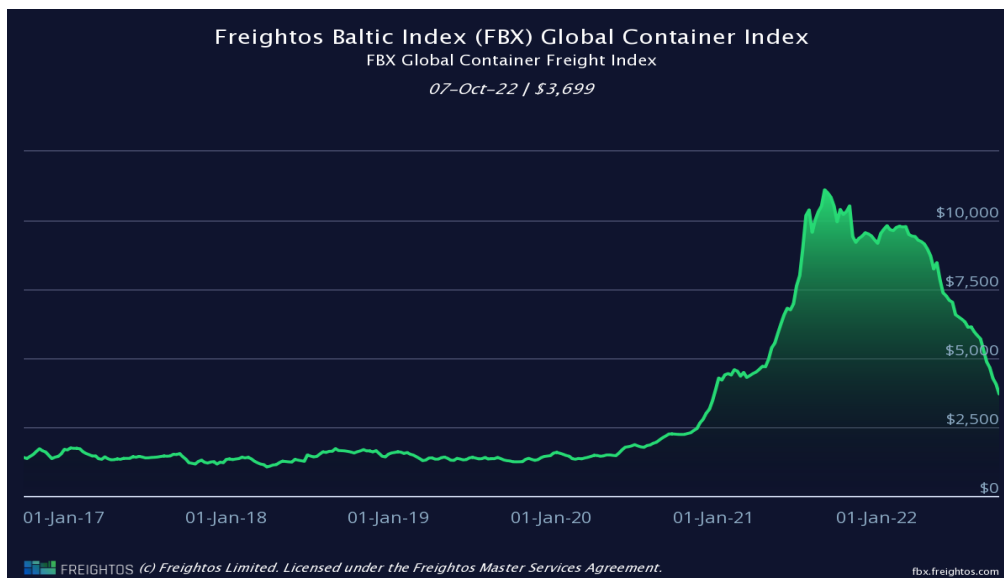


Figure 1. Evolution of FBX for the past 5 years

Source: Freightos Data, 2022

The Shanghai Containerized Freight Index is the most widely used index for shipping rates for imports from China. Since 2009, this index has been calculated weekly and shows freight rates for container shipping from major Chinese ports, including Shanghai.

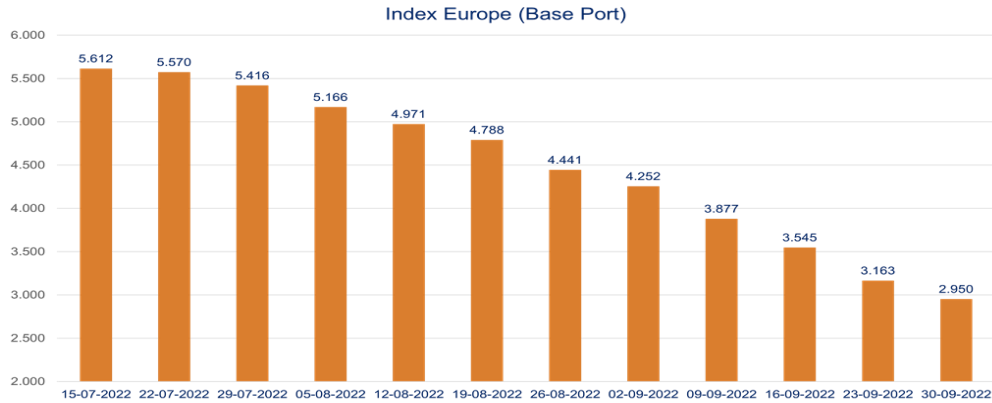


Figure 2. Evolution of Shanghai Containerized Freight Index

Source: DSV, 2022

Container freight rates registered a strong increase in the period January 2019-September 2022. In the year 2021, the highest values were recorded, a record price of 10,400 dollars in September 2021. In September 2022, the global freight rate index had a value of 4,000 dollars.

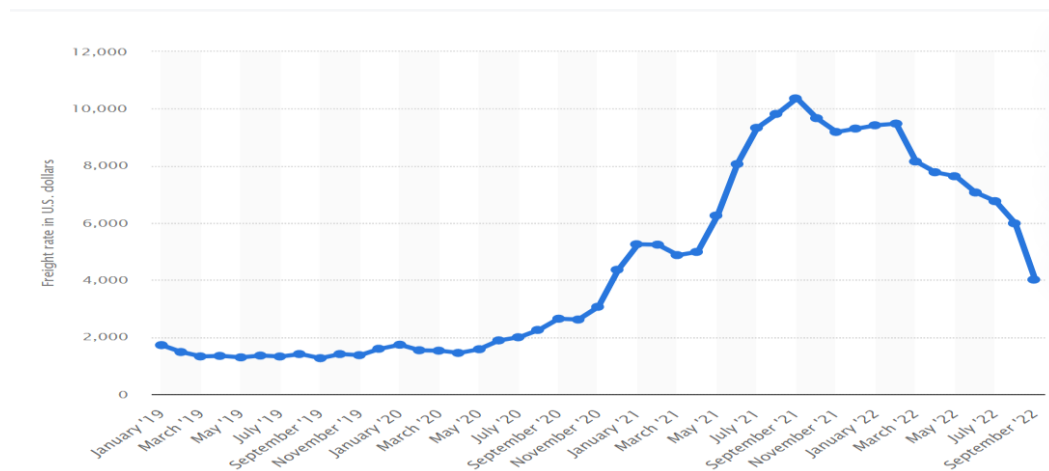


Figure 3. Global container freight rate index from January 2019 to September 2022 (in U.S. dollars)

Source: Statista, 2022

4.2 Impact on road freight

One of the most important piece in the puzzle of global logistics is the road freight, which is an essential element of most supply chains, ensuring an efficient and fast

circulation of both raw materials and products, on international as well as local markets.

The Transport Intelligence, Upply, and IRU produced the European Road Freight Rates Benchmark which examines European road freight rates and market outlooks on a quarterly basis to assist shippers, carriers, and haulers in making decisions (IRU, 2022).

According to the figure 3, in Q1, the index was 110.9, increased by 7.5 points compared to the same period last year and by 4.3 more than Q4 2021. From these data we see that the road freight transport costs in Europe have increased for the fourth straight quarter. The lack of labor, particularly truck drivers, is another issue pushing up the costs for haulers, due to the pressure for salary hikes (Upply, 2022).

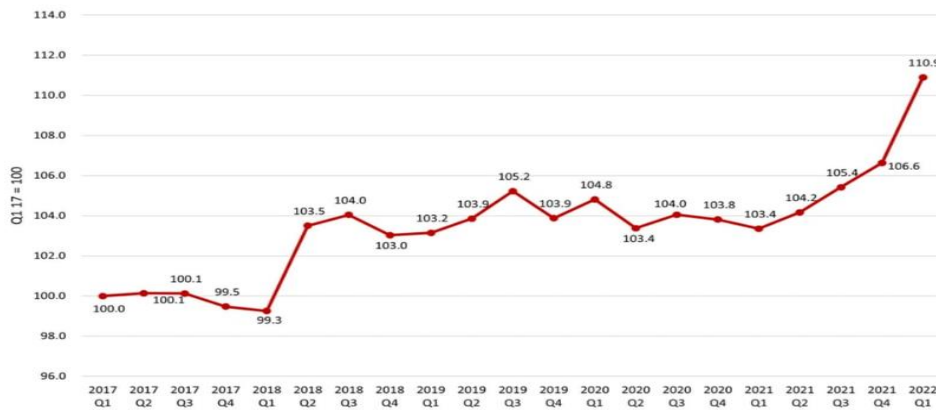


Figure 4. Ti x Upply x IRU European road freight benchmark European road freight rates index, Q1-2022

Source: Upply, 2022

In Q2 2022, the European contract road freight rate index increased 6.1 points from the previous quarter and 13.1 points from the previous year, hitting an all-time high of 121 points (IRU, 2022). Also, the index reached 134 point, 20.1 points from the second quarter of 2021 and 11.8 points from the first quarter of 2022 (Upply, 2022).



Figure 5. European contract road freight rate index

Source: Uply, 2022

The large increase in energy prices is a burden on logistics; transport businesses are finding it difficult to keep up with the rapid rise in oil, gasoline and electricity prices (DHL, 2022). Because of the rise in inflation, businesses and consumers are less confident during this time.

Although the main European road freight markets were expected to grow in 2022 by 4.9%, the main markets in this sector are recovering from the epidemic at a slower pace in 2022 (Transport Intelligence, 2022). For example, Poland has maintained strong growth projections for the PIB that have not wavered in the face of the threat of the war in Ukraine, while in Spain the recovery was slow (Transport Intelligence, 2022). Numerous supply and demand factors affect the European road freight transport market, with an impact on growth, opportunities or demand.

Although in 2021 there was a recovery, in the current year, as a result of the war, unemployment, the increase in energy prices, the discontinuity of the supply chain, the forecast is not very optimistic, the demand levels being determined to an important extent by inflation (Transport Intelligence, 2022). Thus, the prices in this sector are continuously rising as a result of high demand for road freight services and increase of basic costs, especially in the case of diesel.

4.3 Impact on air transport

The air transport industry represents an important engine of economic growth, having a relevant contribution in the social and economic development of a state. (Daley, 2009; Boon and Wit, 2005; Ginieis et al. 2011). One crucial component in calculating the cost of operations within airline companies is fuel, which is a necessary indicator to evaluate the price of a flight and any change or growth of oil

price represents a concern for actors involved in air transport (Sherali et al. 2006; Ginieis et al. 2011)

At the international level, inflation increased at an alarming rate. Although this, at the level of the OECD member countries, reached the threshold of 10.3 in June 2022, the highest value in the last 30 years, it cannot be compared with the recorded increase in the price of fuel for airplanes, which practically doubled compared to last year, reaching a value of 123% in the same period (IATA, 2022).

According to the graph below, an increase, in the first 6 months of 2022, of approx. 70% of the fuel price, generating pressure and concerns about the proper management of costs from the perspective of the airline industry, which occupies a percentage of up to 25% of the total costs. The main causes were, on the one hand, the outbreak of the war in February 2022, which caused a 25-30% increase of crude oil price (Mckinsey, 2022), as a result of the loss of supply from one of the largest producers in world, Russia, and on the other hand, the gap between the price of crude oil and the price of fuel for the airline industry. Thus, against the background of increased demand in the airline industry as a result of the return after the pandemic and the lack of supply, resulting in a value of 67 dollars per barrel in June (IATA, 2022).

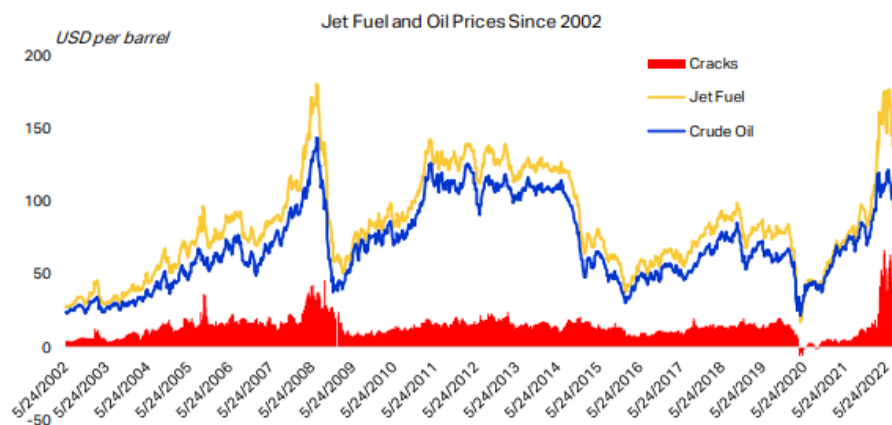


Figure 6. Jet Fuel and Oil prices evolution for the past 10 years

Source: IATA Economics using data from Platts

According to the study published in July 2022 by McKinsey, based on the data provided by the Federal Reserve Bank of St Louis and the US Energy Information Administration, the price of fuel in the airline industry increased by 90%, which translates into an increase of 120%, in contrast to the same period in 2021. The Covid-19 pandemic and the war in Ukraine led to political tensions and supply

problems that spread over the price of a barrel of crude oil, WTI which in August 2022 had an average of 93.67 dollars, with an increase of 25.94 dollars, compared to the same month of 2021 (Statista 2022). WTI (West Texas Intermediate) often represents the benchmark for oil pricing.

Also, the Jet Fuel Price Index which represents the weighted average according to Platts evaluations in terms of jet fuel from the most important trade centers, supply, demand, offering a global perspective on fuel demand. Comparing the fuel price analysis between 2021 and 2022, a significant increase can be seen in the graph below in regions such as Europe, Asia & Oceania, North America, etc. (IATA, 2022).

Table 2. Jet Fuel and Oil prices evolution for the past 10 years

7 October 2022	Share in World Index	cts/gal	\$/bbl	\$/mt	Index Value 2000 = 100	vs. 1 week ago	vs. 1 month ago	vs. 1 yr ago
Jet Fuel Price	100%	370.89	155.77	1230.14	425.83	19.8%	11.7%	64.7%
Asia & Oceania	22%	311.35	130.77	1033.05	373.63	14.9%	0.9%	40.9%
Europe & CIS	28%	358.54	150.59	1188.13	405.73	22.9%	5.8%	59.2%
Middle East & Africa	7%	325.10	136.54	1078.09	407.75	18.9%	4.0%	47.9%
North America	39%	420.12	176.45	1393.96	469.09	20.1%	22.6%	84.4%
Latin & Central America	4%	388.10	163.00	1287.73	451.54	20.1%	12.2%	68.4%

Source: Jet Fuel Price Monitor, IATA, 2022

In the "Air freight state of the industry" report produced by DHL 2022, an important role in volume movement worldwide is played by inflation, the situation in Russia and Ukraine generates interruptions or delays in supply, purchasing power is low, as is the demand for air transport as a result of the improvement of conditions in the case of maritime transport. The challenges in the logistics field (sustainability and trade lane disruption) resulting after restrictions during the pandemic and the war are addressed by DHL with the help of early planning, using innovative technologies and tools to counteract geopolitical tensions or oil fluctuations. Thus, the share of the fuel price in the case of DHL is a 3% weight in the total costs, being intended for the DHL Express aircraft fleet (DHL 2022).

4.4 EU policies for energy sector and transport sector

It is desired, at the European level, to reduce the dependence on Russia in terms of oil, coal, gas until 2027, a fact that can be achieved through the measures taken in 2020 in transport regarding the decrease in oil demand with the help of the Fit for 55 package, but also by other measures to contribute to the process of accelerating and consolidating energy independence. In the report carried out by Transport & Environment (2022), the most relevant measures are in the direction of increasing efficiency in the case of ships and road freight transport, but also speeding up the electrification of trucks, cars, etc. (T&T, 2022, p.2).

States have taken measures, independently in the case of road transport, to mitigate the effects caused by the increase in oil prices:

- Czech Republic: starting on July 1, 2022, the law came into force that reduces the road tax for trucks or cars up to 12 tons (Grant Thornton, 2022);
- France: allocates an amount of 600 million euros towards discount schemes (for example: 1 liter of diesel has a discount of 0.15 euros without VAT, fiscal or social obligations may have certain payment delays) (IRU, 2022);
- Germany: adopted two sets of tax exemptions, the main one canceling the renewable energy tax from July 1, 2022, one-time allowance for heating costs; and the secondary one - Lowering of the Energy Tax on Motor Fuels for a Limited Period, etc. (Library of Congress, 2022);
- Romania: limited amounts of help in the form of direct grants are provided under a program to support businesses engaged in the road transportation of goods and people (Government of Romania, Ministry of Transport and Infrastructure and Ministry of Finance, 2022);
- Spain: direct support for transportation businesses (IRU, 2022).

5. Conclusions

The global pandemic and the conflict in Ukraine heavily impacted the logistics industry, generating uncertainty, supply shortages, congestions, disruptions in supply chains and economic difficulties. The volatility of oil prices has increased during the past two years, thus influencing all transport modes. The shipping industry and participants in specific maritime transport activities must prepare for the energy transition in maritime transport. In the EU, maritime transport has improved its ecological footprint, but still faces major challenges in terms of decarbonization and pollution reduction. (EMSA, 2021). The airline industry has faced difficult challenges because of the events we analyzed, with very low demand caused

by the lockdowns and restrictions during the pandemic and sharp increases of fuel price since the outbreak of Russia-Ukraine conflict.

In the future, risks and uncertainty will hang over global supply chain operations. Therefore, companies operating in the logistics sector are considering a series of measures aimed at ensuring resilience at the level of the logistics chain. From the category of risk hedging actions, we mention: the reconfiguration of global logistics chains, the orientation towards regional/national logistics chains, the use of new technologies in logistics activities (UNCTAD, 2022)

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