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Research overview concerning the maritime industry: An evaluation of the trends and topics in the Black Sea area

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Abstract. The present study's main purpose is to concisely outline a general overview of the main activities which took place in the maritime field in recent years, not only at a global level but also in a specific area – the Black Sea, using the data and information from international and national publications, such as Review of Maritime Transport 2021 – UNCTAD and Romanian Naval Agency. From the analysis conducted over a prolonged period, based on the evaluation of the world seaborne trade, the main parameters which define the world fleet, the global maritime trade and its outcome from the COVID-19 pandemic, and last but not least, the Black Sea maritime area, it is demonstrated that the maritime industry has overcome any crisis which occurred in time and continues to provide a complex and dynamic mean of transport. Nevertheless, the results obtained in this study represent a benchmark in the future analysis of the naval industry development.
Keywords: Black Sea, maritime trade, navigation sector, offshore industry.

1. Introduction

Transportation is defined as the physical movement of beings and goods from one location to another. Namely, the action of transporting is represented as the movement of an organism or a thing from point A to point B. International trade, which takes place mostly on the world's oceans and seas, has become the engine of economic growth, highlighting that maritime transport is the most efficient way of economic exchange of goods, and also being the backbone of the international trading system [1].

Maritime transport has a vital role in developing a prosperous global market. The seas represent an inexhaustible source of exploitation, including navigation, the oil sector, food and renewable energy. The percentage of international trade carried by oceans and seas is approximate 80%, even higher for most developed or developing countries.

Although the overall 21st century maritime picture can be depicted from this paper, the analysis of the Black Sea maritime field represents the main approach of the research because of its dynamic environment with multiple possibilities for development. Despite the fact that this sea is a closed one, it serves as a bridge between Europe and Asia, thus there is a continuous regional development of port cities in this region which contributes to the economic prosperity of this region. Due to its geographical position, with maritime links to almost all major ports in Europe, the economic growth of the Black Sea is amplified by transport and trade of the region.

In this context, this study explores the activities in the maritime industry and identifies its characteristics in recent times, based on data and information obtained from various sources, highlighting its advancement over time. Therefore, this paper will focus on the main parameters which define the naval industry at a global scale but also will describe the status of the Black Sea region. This research can be considered as a comprehensive review in identifying maritime activities trends and changes, being extremely useful for future development in this respective area. This unceasing topic represents a proper benefit for academic community in identifying changes that occurred in this industry since there is significant growing interest in future projects concerning renewables, unmanned vehicles etc.

2. Research methodology

The analysis of the maritime industry, firstly on a global scale and secondly in the Black Sea coastal area is based on the collection of basic aspects defining the maritime transport trend and economic data concerning the Black Sea traffic evolution and the offshore field which in the past years have seen an incredible development by the Romanian authorities. The statistical data obtained from national and international sources were analyzed, thereby the conclusion of the article being depicted.

2.1. Global maritime industry

Shipping has a very long history of international trade and cooperation. From old times to the modern era the shipping industry in the global economy has shown continuous growth. As markets have become increasingly globalized, the extent of cargo maritime transported has grown. The greatness of this mean of transport is emphasized by the unceasing increase in its volume, registering in 2020 a value of 10.65 billion loaded, a decrease of 422 million (3.8%) compared to 2019 (11.07) due to the fact of the COVID-19 pandemic. As illustrated in Figure 1, the tendency of shipping has been continuously advancing, with few exceptions [2].

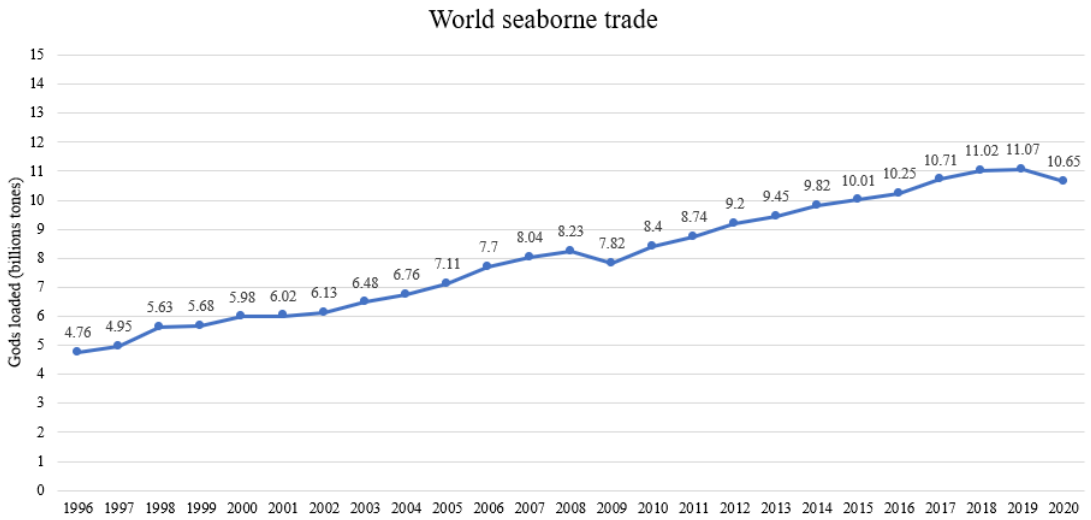

Figure 1. The world seaborne trade (billions of loaded tons) in the period 1996 – 2020. Values processed from [2].

2.1.1. The world maritime fleet

At the beginning of 2021, the overall maritime fleet was estimated at 99,800 vessels of 100 gross tons and above, equivalent to a capacity of 2,134,640 DWT. As can be observed in Table 1, bulk carriers occupy a leading position with a percentage of 42.77%, followed by oil tankers (29%), containers (13.20%), other types of vessels - offshore, chemical tankers, gas tankers, ferries and passenger ships

(11.43%) and last but not least by cargoes (3.60%). Most ship types have seen an increase compared to 2020, with the exception of cargo ships and other types of ships [2, 3]

Table 1. The main types of ships in 2021 year. Values processed from [2].

Main types of ships		**DWT**	**Percentage variation 2020 - 2021**
Bulk carriers		913,032 (42.77%)	+ 3.79%
Oil tankers		619,148 (29%)	+ 2.96%
Containers		281,784 (13.20%)	+ 2.48%
Other types of ships	Offshore ships	84,094 (3.94%)	+ 0.05%
	Chemical tankers	48,858 (3.39%)	+ 2.90%
	Gas tankers	77,455 (3.63%)	+ 5.12%
	Others	25,407 (1.19%)	- 0.36%
	Ferries and passenger ships	8,109 (0.38%)	+ 1.46%
Cargoes		76,754 (3.60%)	- 0.18%

Another aspect to be considered in describing the word maritime fleet is the advanced age of the ships. Aged ships release an alarming amount of carbon dioxide and are usually less productive than new ones. In 2021, the average age of the maritime fleet was 21.6 years, higher than the value registered in 2020 (20.2). If we refer to DWT, bulk carriers have the lowest age, 10.6 years, while oil tankers have an age of 19.5 years [2].

Another issue discussed is the increasing ship sizes. Container ship sizes have developed faster than any other type of ship, being facilitated by the very high demand for container shipping. Since 2000s, a considerable quantity of goods has been transported in mega-container ships (greater than 10,000 TEU). In the last decade, 97 new vessels with a capacity between 15,000 and 19,990 TEU have been constructed, whereas, starting with 2018, 74 vessels of 20,000 TEU and above have been built. At present, the largest container ship in the world is Ever Ace, with a capacity of 23,992 TEU, achieving the maximum container load record, carrying a total of 21,710 TEU from Yantian to Rotterdam [2–4].

2.1.2. The global maritime trade

Maritime trade is carried out predominantly in developing areas (two-thirds), thus developed countries benefit from a smaller proportion. Regarding the percentage of international maritime trade, the largest share has Asia, followed by America, Europe, Oceania and Africa (Figure 2). In 2020, Asia maintained its leading position, with a percentage of 41% in the contribution of total goods loaded and increased its percentage in terms of goods unloaded [2, 5].

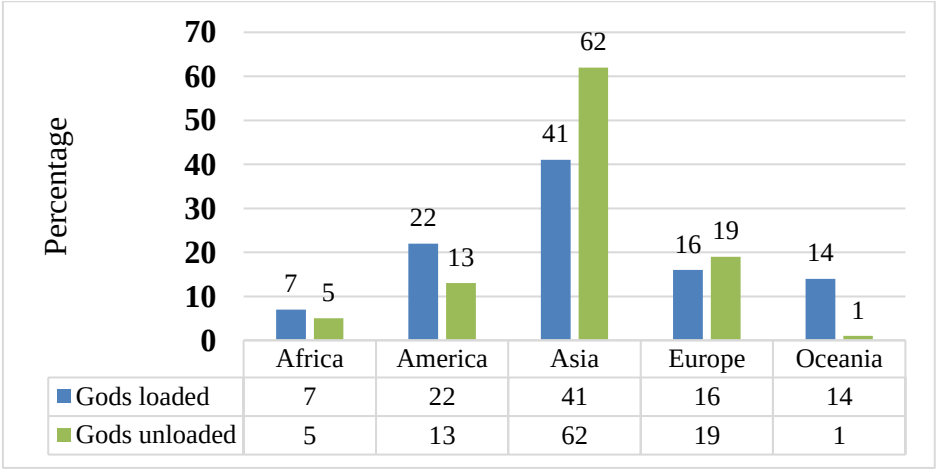

Figure 2. International maritime trade by region in 2020. Values processed from [2].

Taking into account ship ownership, the top three countries that excel in the number of ships owned, both in terms of tonnage and the commercial value of their fleets, are Greece, China and Japan. The three countries hold a combined 40.63% of the global deadweight tonnage and 30.24% of the total number of ships in the world fleet. In terms of flag registration, both loaded capacity and number of vessels, Panama, Liberia and the Marshall Islands register the highest values, accounting for 43% of the loading capacity and 16% of the number of vessels in the maritime fleet [2].

2.1.3. The impact of the COVID-19 pandemic on the maritime industry

The COVID-19 pandemic has had an overwhelming impact on the maritime industry, leading to a percentage decrease of 3.8%. In 2020, transport of crude oil, refined petroleum products and gas fell by a mixed percentage of 7.7%. The impact was smaller, however, for dry bulk trade (supported by strong Chinese demand for iron ore and grains), falling by 1.5%, while containerized trade fell by just 1.1% [2, 6].

Moreover, the imports and exports during the pandemic have decreased. Imports into the EU from non-EU countries were most affected, falling by 12.2% in 2020, followed by intra-EU trade (down by 7.1%) and then exports from the EU to non-EU countries (down by 4.3%). EU maritime trade is estimated to have declined more significantly than global trade by 9.3% in 2020 [6].

Globally, new ship orders fell by more than 30%, although production was well managed at 85% of 2019 levels. Shipbuilding in EU countries was affected due to their focus on cruise ships, a sector strongly affected by the pandemic. Cruise ship deliveries fell by 34% in terms of gross tonnage in 2020 compared to a 15% decline globally for all ship types [6].

While maritime transport activities have generally been able to continue and adapt to the pandemic, port and land operations have been more difficult to adjust and seafarers have found themselves in an unprecedented situation, creating a crisis of crews. Travel restrictions and the risks of contracting the virus have left hundreds of thousands of seafarers unable to return home, while an equivalent number have been unable to join ships [2, 7]

2.2. The Black Sea maritime transport

Black Sea is a semi-enclosed sea, representing a bridge between two continents, Europe and Asia. It is connected through the Bosporus Strait (Istanbul) to the Sea of Marmara, and through the Dardanelles Strait to the Mediterranean Sea. The Black Sea has a coastline of 4,075 km, having as riparian states Ukraine (36.6 %), Turkey (33.2%), Georgia (8.1%), Russia (9.4%), Bulgaria (6.7%) and Romania (6%). [8–10].

The Black Sea (Figure 3), represents a transit route, playing a key role in the cohesion and stability of this complex European area, with a continuous regional development of port cities and therefore competition between them. Maritime traffic in this area has undergone many changes over time, being governed by new legislation and regulations [11].

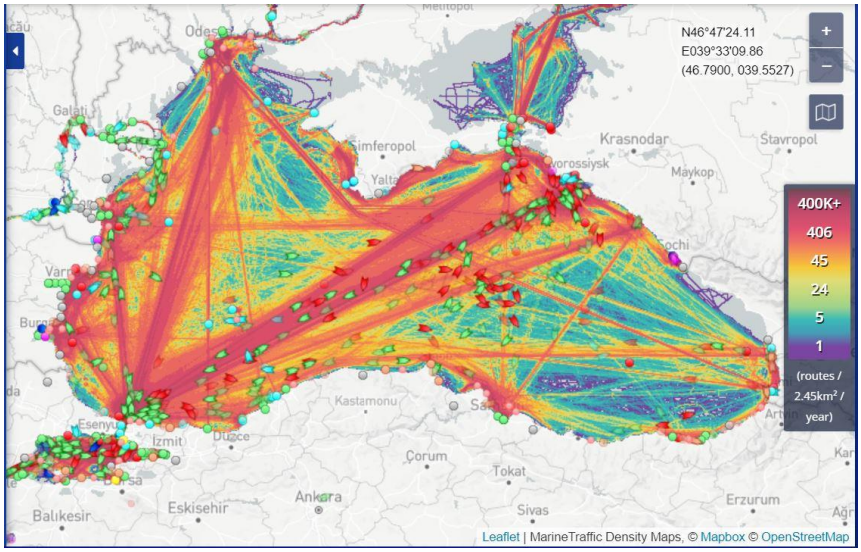

Figure 3. Live traffic in the Black Sea on 03.04.2022. Screenshot obtained from [10].

2.2.1. The Bosporus (Istanbul) and Dardanelles (Chanakkale) straits

One of the main factors which determine the Black Sea traffic evolution is the ships transit through the Bosporus and Dardanelles straits (Figure 4). The strategic importance of these two straits is enhanced by the fact that they are the only maritime connections that link the states bordering the Black Sea with the rest of the planetary ocean. The traffic in the Bosporus strait has significantly increased after the Montreux Convention signing in 1936, which stated the right of free passage for commercial ships without any restrictions on flag or type of cargo. In present time, the volume of traffic in the Bosporus is five times more intense than the traffic in the Panama Channel [12].

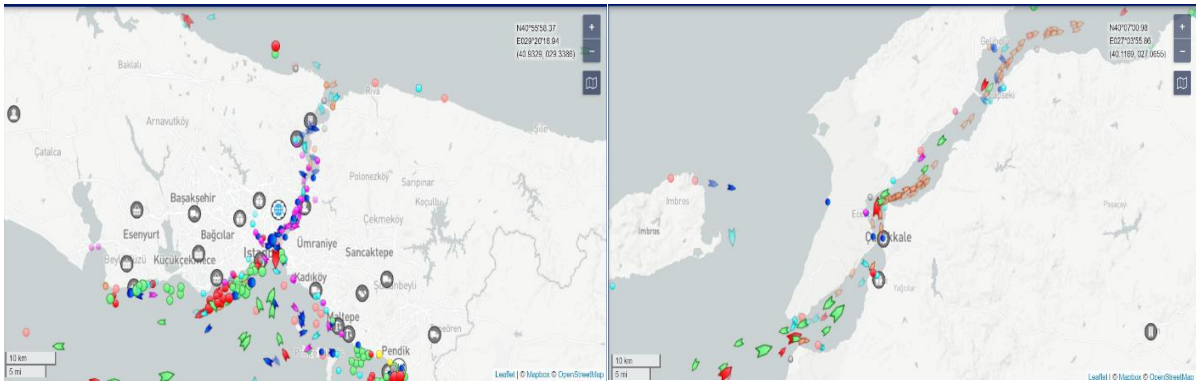

Figure 4. Live traffic from the Bosporus (left) and Dardanelles (right) straits on 15.04.2022. Screenshots obtained from [10].

The Bosporus Strait is one of the most critical sea routes when is referred to oil transportation from the Caspian Sea region and Russia to Asia, Western and Southern Europe. It is estimated that more than 3% of the global supply (about 3 million barrels of oil/day and 20 million tons/year of petroleum products) transit through this waterway [13].

In Figure 5 it can be seen the number of ships that transited the straits: 2005 – Bosporus – 54,794, Dardanelles – 49,077 and has remained approximately at this level until now, 2021 – Bosporus – 38,551, Dardanelles – 43,342. The figures show an increase in tonnage in 2021 (631.92 million tons), compared to 2020 (619.75 mt), but still lower than in 2019 (638.89 mt) [14–16].

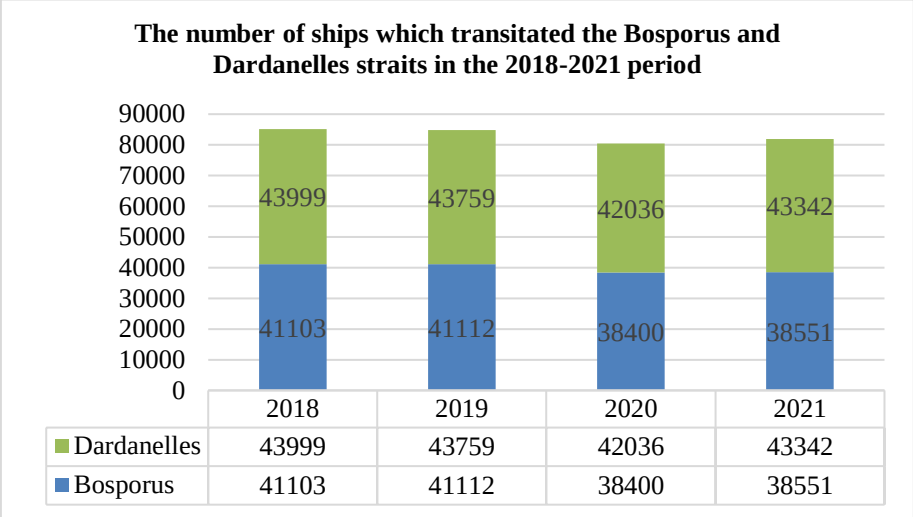

Figure 5. The number of ships that transited the Bosporus and Dardanelles straits in the 2018 – 2021 period. Values processed from [16].

2.2.2. The volume of goods transported to/from Black Sea ports

Another relevant aspect of the economic importance of the Black Sea is the volume of goods handled. Between 2015 and 2019, the volume of goods handled in the main Black Sea ports in Central and Eastern Europe increased, with a slight decrease in 2017 (Figure 6). Liquid cargo dominated cargo traffic in recent years. In 2019, approximately 198 million metric tons of liquid cargo were handled in the Black Sea ports of the CEE region [17].

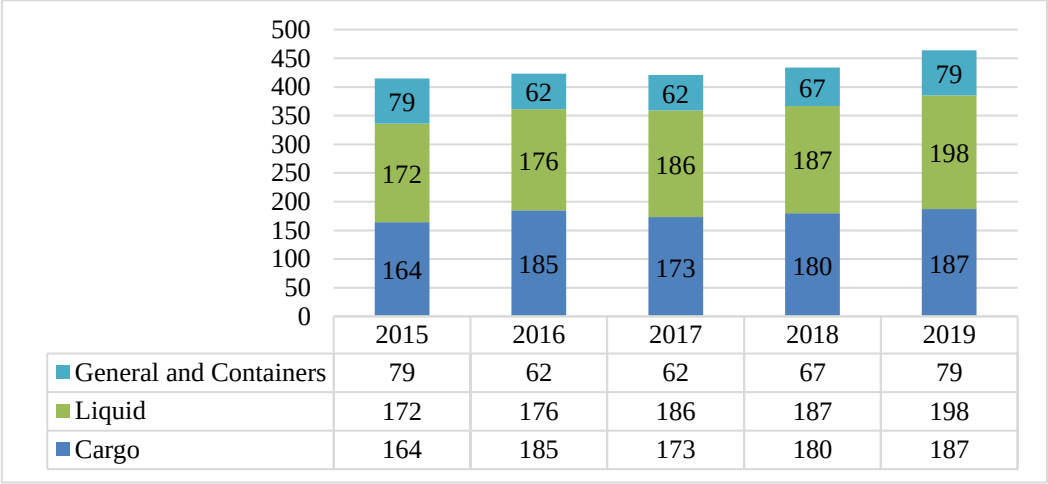

Figure 6. Volume of cargo traffic in CEE Black Sea region in the period 2015-2019, by type of cargo (millions of metric tons). Values processed from [17].

2.2.3. Imports and exports in the Black Sea region (CEE)

The volume of imports increased by 2.38% in 2021 compared to 2020, the largest increase being registered by Russian Federation (10.39%) and Romania (6.37%). In Ukraine and Bulgaria, there was an increase of 5.56% and 0.64%, respectively, while in Georgia the volume of imports decreased by 17.79%. Exports from the region increased by 2.88%, mainly due to increased export volumes from Russian Federation (14.01%) and Georgia (14.20%). Bulgaria had an increase in export volume of 4.68%, while the volume of exports from Ukraine and Romania decreased by 3.87% and 1.28%,

respectively. Thus, in Figure 7, it can be observed the percentage of loaded container volume for each country in 2021 [18].

Regarding the main carriers in the Black Sea region, the five largest shipping companies (Maersk – 25.51%, MSC – 21.29%, COSCO – 10.90%, CMA CGM – 8.35% and ZIM – 7.74%) controlled 73.77% of this market [18].

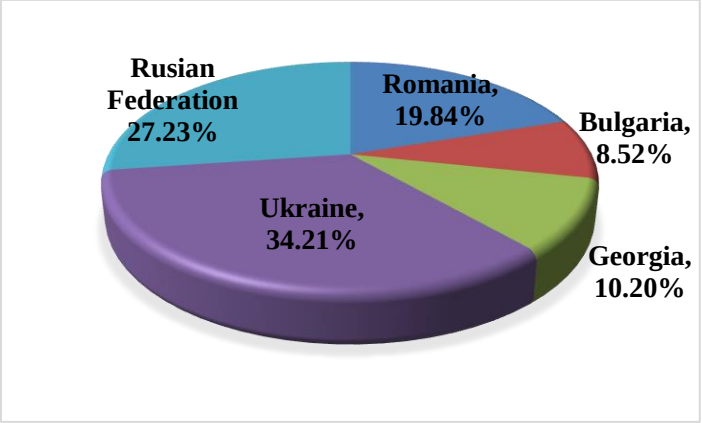

Figure 7. The total volume of containers loaded in 2021 (percentage). Values processed from [18]

2.2.4. Gross Domestic Product of the riparian countries of the Black Sea

The maritime economic development of the Black Sea is characterized by the exports and imports from the main ports. As can be observed in Table 2 and Figure 8, the Black Sea countries GDP fluctuated over time and in 2020 had a percent of 3.18% from the total world economy. In 2020, out of 194 registered GDP states, Russian Federation occupied the 11th place in the world (1.75%), Turkey - 19th place (0.85%), Romania - 45th (0.29%), Ukraine - 55th (0.18%), Bulgaria - 72nd (0.10%) and Georgia - 117th (0.02%) [19,20].

Table 2. Gross Domestic Product (billions of dollars) of the riparian countries of the Black Sea in the period 2015 - 2020. Values processed from [20].

Country	**GDP**						
	2015	**2016**	**2017**	**2018**	**2019**	**2020**	**Percentage of global GDP (2020)**
Romania	177,73	188,13	211,69	241,46	249,88	248,72	0,29
Bulgaria	50,78	53,95	59,20	66,36	68,91	69,89	0,10
Turkey	864,32	869,69	858,99	778,47	761,00	719,95	0,85
Georgia	14,95	15,14	16,24	17,60	17,48	15,85	0,02
Ukraine	91,03	93,36	112,09	130,89	153,88	155,50	0,18
Russian Federation	1.363,48	1.276,79	1.574,20	1.657,33	1.687,45	1.483,50	1,75
Total	**2.562,29**	**2.497,06**	**2.832,42**	**2.892,11**	**2.938,61**	**2.693,41**	**3,18**

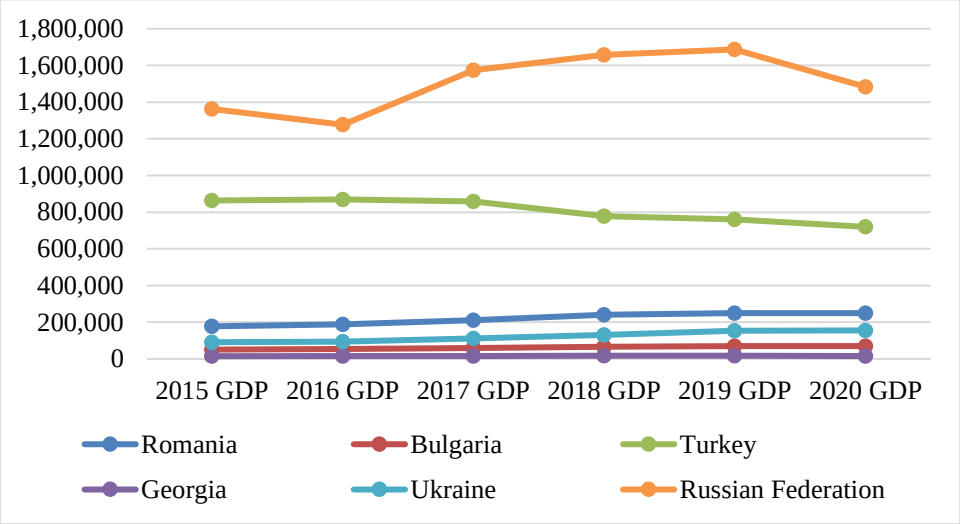

Figure 8. Gross Domestic Product (billions of dollars) of the riparian countries of the Black Sea in the period 2015 - 2020. Values processed from [20].

2.2.5. Main ports of the Black Sea riparian countries

According to article 7 of Ordinance no. 22 of January 29, 1999, regarding the administration of ports and waterways, the use of naval transport infrastructures belonging to the public domain, as well as the naval transport activities in ports and on inland waterways, ports are defined as "surfaces delimited from the national territory, located at the shore of the sea or of an inland waterway, built and equipped in such ways to allow the reception and accommodation of ships, carrying out naval transport activities provided for in art. 19" (activities of transporting goods and/or people by ships, as well as other regulated activities, activities related to maritime transport activities, auxiliary activities to maritime transport activities) [21]

The Black Sea coast features numerous seaports that contribute to the economic prosperity of this region, making this sea one of the busiest trade routes in the world. With maritime links to almost all major ports in Europe, Black Sea ports stimulate the economic growth of this area by boosting the region's transport and trade. Further, the main important ports of the Black Sea will be described [22].

Constanta Port

Constanta Port is the largest port of the Black Sea and the 17th in Europe. It is a maritime and river port located on the west coast of the Black Sea. It can accommodate various types of ships, with an annual handling capacity of 100,000,000 tons. It has 156 berths, of which only 140 are operational and the main cargo handling activities are: petroleum products, coal, ores, containers, general cargo, chemical products, steel, timber, heavy and bulk cargo, ro-ro, passenger, etc. [23,24].

In Figure 9 it can be observed that the total traffic in Constanta port had continuously advanced, with the exception of the Covid-19 pandemic from 2019-2020, registering in 2021 a traffic of 67,483,435 tons: liquid bulk - 12,821,712 tons, dry bulk – 44,562,451 tons, containers – 631,946 TEU, general cargo – 3,915,944 tons [25,26].

Another point to be discussed is the maritime traffic. From Figure 10 it can be depicted that the number of maritime calls by type of ships was 3,985, the most ships being those of the Cargo type - 1,751 ships, followed by bulk carriers - 645, tanks - 587, etc. Depending on the capacity of the ships that docked in the Constanta port, there were 3,276 calls, most of them being those made by ships with a capacity of up to 5,000 tons - 910 calls, followed by ships with a capacity between 5,001 – 10,000 tons – 874 calls, etc. [25].

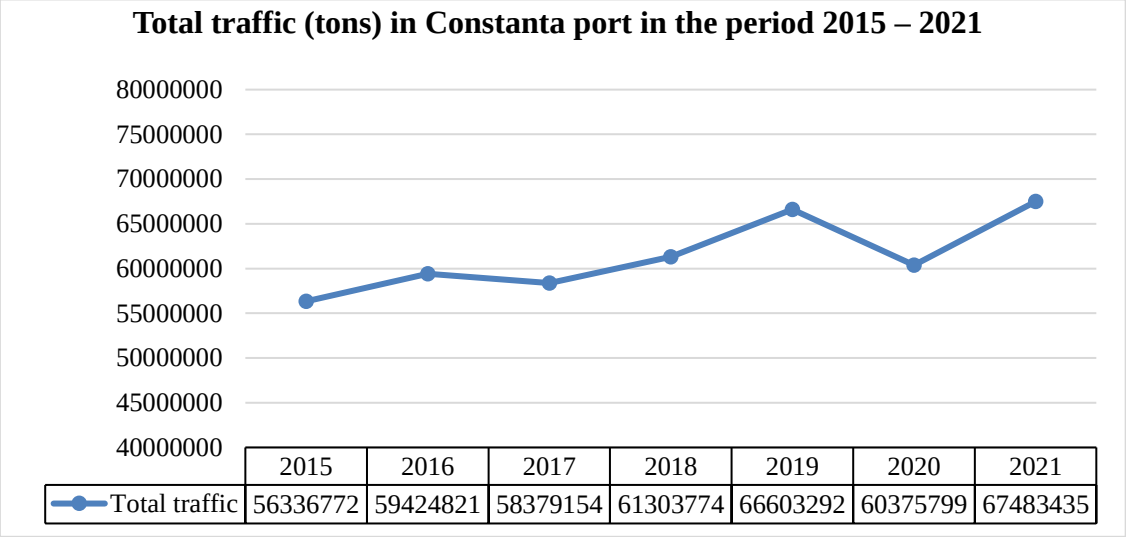

Figure 9. Total traffic (tons) in Constanta port in the period 2015 – 2021. Values processed from [25].

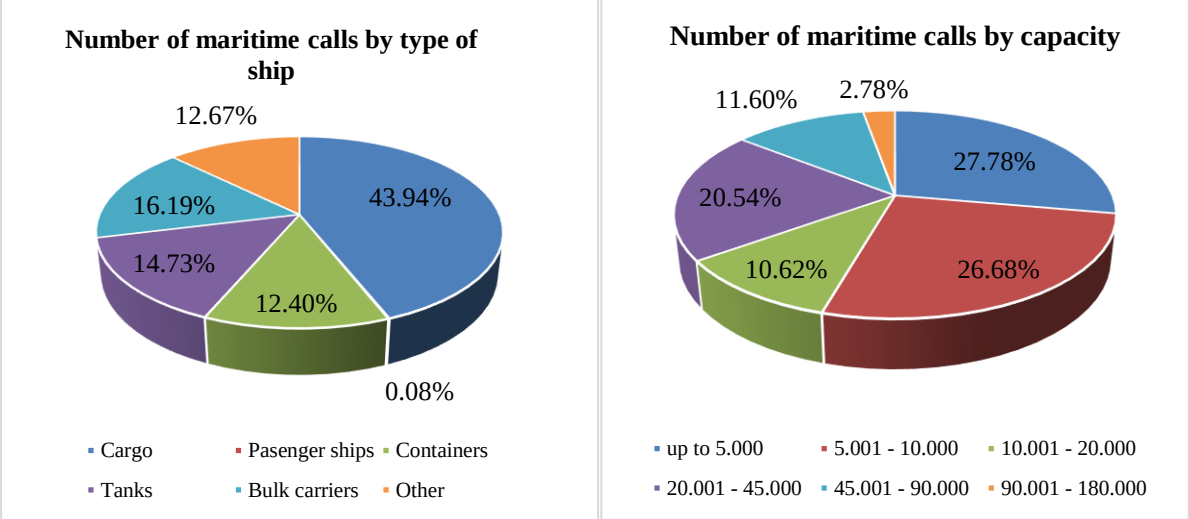

Figure 10. Constanta port maritime traffic in 2021 (left – by type of ships, right – by capacity). Values processed from [25].

Odessa Port

The port of Odessa is the largest Ukrainian seaport and one of the largest ports in the Black Sea basin, with a total sea traffic capacity of 40 million tons annually (15 million tons dry bulk and 25 million tons liquid bulk). It provides a handling capacity of 50 million tons and it deals with a variety of goods such as: oil, condensed gas, containers, metal products, iron, sugar, grains, etc. The port is divided into 17 terminals, the container terminals handling 950,000 TEU annually. The oil and gas terminal in this port is the largest in Ukraine, with a handling capacity of 90,000 tons. Nearby is also one of the gas terminals, with a storage capacity of 700,000 tons of liquefied gas [24,27].

Novorossiysk Port

The port of Novorossiysk is a major port on the Black Sea and the main port of Russia. In 2020, 142 million tons of goods were handled in this port. Novorossiysk mainly handles: grain, coal, mineral fertilizers, timber, oil and oil products, containers, food and general cargo. The port can handle approximately 350,000 TEU of containerized cargo annually. The main cargo in the port is timber,

having a terminal where approximately 3 million metric tons are handled annually. Other goods being used are general ones (405 thousand tons), aluminum, rolled iron, pipes, dangerous substances packed in boxes, etc. The annual turnover of this Russian port is given by liquid bulk (oil and petroleum products), followed by dry bulk and containers – 883,000 TEU [24,28].

Varna Port

The Port of Varna is an important port on the Black Sea and the largest in Bulgaria. The port comprises two main terminals namely the East Terminal and the West Terminal. The Eastern Terminal is the main terminal for grain exports from Bulgaria. It is also a multi-purpose port dealing with various cargoes: sugar, metal products, molasses, general cargo, etc. The West Terminal is in close proximity to the chemical plants and handles the following cargoes: soda ash, coal, fertilizers, ores, silica, phosphates, etc. [24,29].

The Port of Varna offers full services of: loading, unloading, stacking, shipping of goods, storage and various intermodal services. Existing port facilities handle all types of solid bulk cargo, containers and some liquid bulk cargo. The main exports from this port include: urea, carbon, cement, silica, fertilizers, grain, containers and ro-ro. The main imports are given by goods such as: coal, metals, ores and ore concentrates, oil, phosphates, timber, molasses, containers and ro-ro [24,29].

Samsun Port

Turkey has a very well-developed naval industry, owning an impressive number of both merchant ships and ports opening onto the Black and Mediterranean Seas and shipyards. Turkish port cities in the Black Sea area are: Eregli, Zonguldak, Inebolu, Samsun, Giresun, Trabzon, Hopa and Sinop, Rize. Among these, Samsun is the largest Turkish seaport located on the Black Sea, frequented by large bulk carriers for dry bulk and general cargo, fishing boats, oil and chemical tankers and ro-ro vessels. The port can handle ships with a maximum length of 230 m and a draft of 11.2 m [24,30].

Various types of goods such as pallets, metal goods and pipes, marble stone, paper rolls, bagged goods, etc. can be handled in this port. The area of the main terminal is approximately 440,000 m^2, with a capacity of 255,000 TEU. The port has 45,000 m^2 of protected storage space and 330,000 m^2 open storage areas. The length of the berths is approximately 1,550 m [24].

Samsun Port is equipped with modern equipment such as mobile cranes with a lifting capacity of 130 tons, 11 dock cranes with a capacity of 30 tons, etc. The port has grain silos with a storage capacity of 55,000 tons. Exports to Turkish ports are represented by products such as: tea, metallurgical products, hazelnuts, etc. and imports: coal, ores, fertilizers, construction materials, etc. [24,30].

Batumi Port

The Port of Batumi is located on the southeastern coast of the Black Sea and is an important port of Georgia. The primary industries in this port are oil and fuel refining, and there is also transport of metals, grain, cement, fertilizers, corn, timber, construction equipment and sugar. The port includes 5 specialized terminals and 11 berths with an annual handling capacity of 18 million tons. Batumi is a well-sheltered port with road and rail links to Turkey, the regions of Central Asia, Russia and the Caucasus [24].

In terms of traffic in Batumi, the turnover of dry bulk shown an increase in the year 2021 (1,211 tons) compared to 2020 (913 tons). Regarding the traffic of oil and oil products, the port again achieved an increase in the year 2021 (1.5 million tons) compared to 2020 (1.2 million tons). The transport of containers in 2021 decreased, being handled in 2021 only 99,187 TEU, compared to 2020 - 103,302 TEU [31].

2.3. Offshore industry in the Black Sea basin

The exact volumes of gas that are currently in the Black Sea are not yet known. Rough estimates show that the Ukrainian platform may contain more than 2 trillion m^3. Turkey reserves in its offshore exploration area, Tuna-1, could reach 405 billion m^3. Bulgaria's total reserves are unknown, Khan

Asparuh, is believed to contain 100 billion m^3. Georgia may have total gas resources of 266 billion m^3 [32].

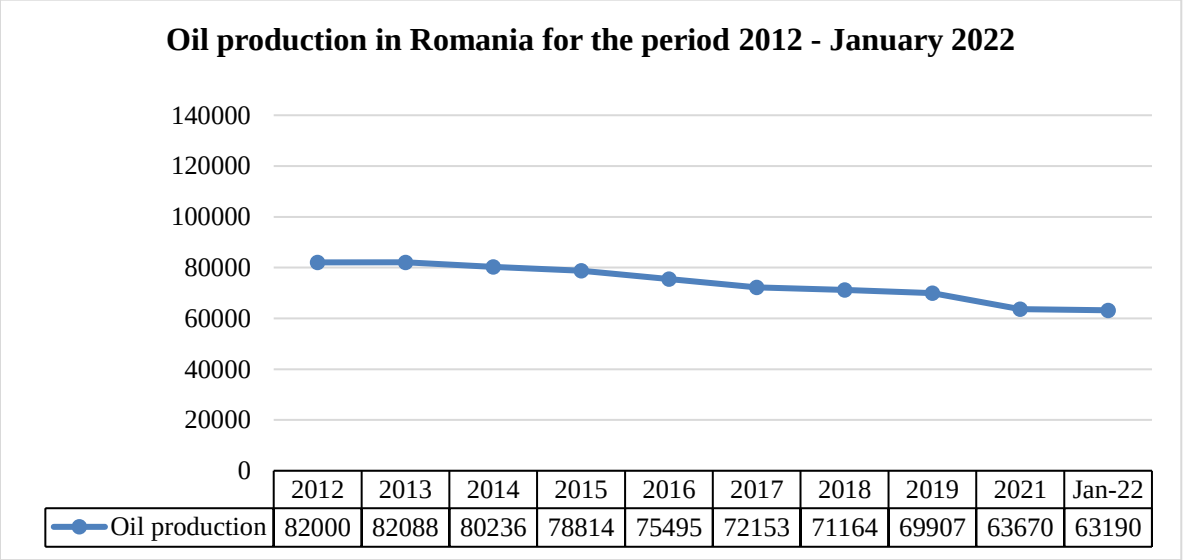

Figure 11. Oil production in Romania for the period 2012 – January 2022 [barrels/day]. Values processed from [33,34].

One of the oldest oil and gas producers in the world is Romania. The first offshore drilling platform was installed in 1975, while in 1987, it started the foundations of oil production. In the period 1987 - 2012, offshore operations took place only in shallow waters, and in 2012 the DOMINO-1 probe discovered in deep waters the first oil field, estimating an amount of 42 to 84 million m^3 [35].

In Figure 11 it can be seen that oil production in Romania decreased by 0.76% from 63,670 barrels/day in 2021 to 63,190 barrels/day in January 2022 [33,34].

The Romanian offshore area covers 22,000 km^2 and reaches depths of over 1,000 meters. This area is divided into blocks of different sizes, some of which are assigned to operators for exploration, development and exploitation activities (Figure 12 and Table 3) [35].

Block XVIII Istria composed of Lebăda Est (production started in 1987), Lebăda West (production started in 1993), Sinoe (production started in 1999), Pescărușul (production started in 2003) and Delta (production started in 2009) holds the oldest discoveries with 185 million barrels of oil and 48 billion m^3 of gas. The XV Midia A perimeter had two key discoveries: Doina (1995) and Ana (2008), together having an estimated potential of 9.5 billion m^3 of gas. In EX-27 MURIDAVA, exploration showed possible quantities of 4.85 billion m^3 and 11.7 million barrels of oil [35].

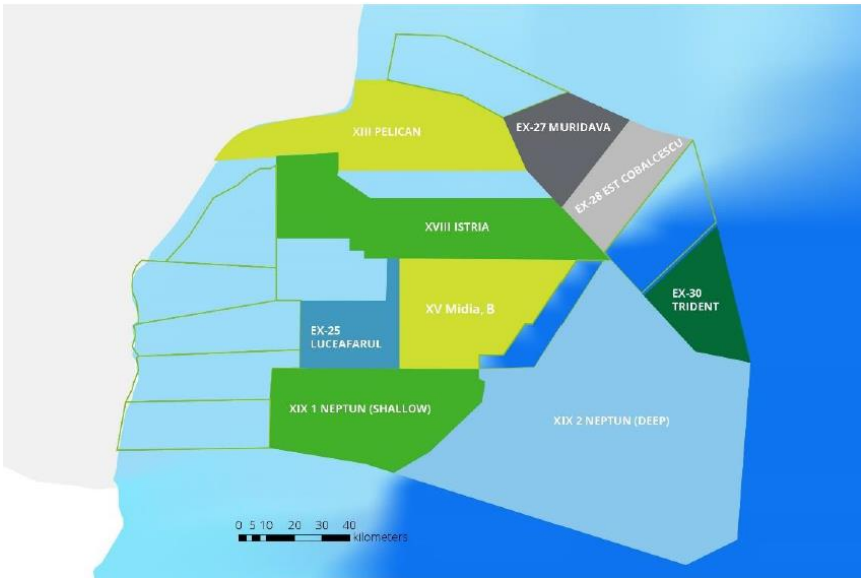

Figure 12. The Black Sea exploration, development and exploitation perimeters. Image obtained from [35].

Table 3. The Romanian offshore areas from the Black Sea and the share of the holders. Values processed from [35].

Zone	Ownership	Share
XIII PELICAN	Black Sea Oil & Gas S.R.L.	65%
	Petro Ventures Resources S.R.L.	20 %
	Gas Plus International B.V.	15 %
XVIII ISTRIA	OMV Petrom S.A.	100 %
EX-25 LUCEAFĂRUL	Petro Ventures Resources S.R.L.	50 %
	Black Sea Oil & Gas S.R.L.	50 %
XV MIDIA, B	Black Sea Oil & Gas S.R.L.	65 %
	Petro Ventures Resources S.R.L.	20 %
	Gas Plus International B.V.	15 %
XIX 1 NEPTUN (shallow waters)	OMV Petrom S.A.	100 %
XIX 2 NEPTUN (deep waters)	Exxonmobil Exploration & Production Romania Ltd.	50 %
	OMV Petrom S.A.	50 %
EX-27 MURIDAVA	S.C. Petromar Resources B.V.	80 %
	S.C. Petromar Resources S.A.	20 %
EX-28 EST COBĂLCESCU	S.C. Petromar Resources B.V.	70 %
	S.C. Petromar Resources S.A.	30 %
EX-30 TRIDENT	LUKOIL Overseas Atash B.V.	88 %
	SNGN Romgaz S.A.	12 %

3. Results

This study presents a general overview of maritime transport research. The main approaches of the paper are: firstly, understanding the main criteria which define the naval industry and secondly, describing the

Black Sea status regarding its importance as a bridge between two continents, having a tremendous role in the cohesion and stability of this complex area.

Maritime transport has seen a development over time, starting with a value of 4.76 billion loaded in 1966 (the first data obtained in the analysis) to 10.65 registered in 2022, which implies that the volume of goods loaded has more than doubled in 24 years. Another aspect underlined is the continuous increase in ship numbers, the bulk carriers being the most numerous in the 2021 year, registering a percentage variation compared to 2020 by 3.79% (913,032 DWT), whereas cargoes registered a decrease compared with 2020 by 0.18% (76,754 DWT). Other features regarding the maritime fleet discussed were the concerning advanced ship age on one hand and on the other hand, the hierarchy of the countries which excel in the number of ships owned (Greece, China and Japan) and the top three states in terms of flag registration (Panama, Liberia and the Marshall Islands) because of its flexible maritime trade regulations, being an easy way of registering ships and avoiding paying incoming taxes.

In addition, it is also highlighted that in 2020, Asia maintained its first position in international maritime trade with a total contribution of total goods loaded of 41% and 62% of unloaded, followed by America, Europe, Oceania and Africa. Moreover, it is revealed that the COVID-19 pandemic crisis had a negative impact on the maritime industry in 2020. Not only was it registered a decrease in the percentage of crude oil, refined petroleum products and gas transport by 7.7%, but also the imports and exports have fallen, the most affected being the imports from non-EU to EU countries and exports from the EU to non-EU countries. As expected, ship construction was drastically affected by the pandemic, with cruise ship deliveries falling by 34% in gross tonnage compared to a 15% decline globally for all ship types.

Further, the present research provides an image of the Black Sea naval industry, concluding with an emerging field - the offshore sector presented on the Romanian coast. The Black Sea has been the area of interest for the present study. It covers a surface of 423,000 km^2, having as riparian countries Romania, Bulgaria, Turkey, Georgia, Ukraine and Russian Federation. The site is considered a semi-enclosed sea, connected to the Mediterranean Sea through the Dardanelles and Bosporus straits and to the Sea of Azov through the Kerch Strait. The Black Sea represents a vital connection between Europe and Asia concerning maritime activities.

Speaking about the Black Sea traffic evolution, the main parameter illustrating its upward trend is the Bosporus and Dardanelles straits transits. In 2021, it was registered a value of 38,551 ships that transited the Bosporus straits and a number of 43,342 for the Dardanelles strait, representing an increase for both straits compared to 2020. The research trends shift to the economic side of the area. The imports increased by 2.38% in 2021 compared to 2020, the most significant increase being registered by Russian Federation (10.39%), while the exports have increased by 2.88%, once more the largest value being obtained by Russian Federation (14.01%). The riparian countries' GDP registered a percentage of 3.18% regarding the world economy in 2020, with Romania occupying the 45th place (out of 194 countries) with a GDP of 248,72. Another important issue illustrated was the main ports of the Black Sea riparian countries, emphasizing the Romanian port, Constanta, the largest in the Black Sea and the 17th in Europe. Constanta harbor presented a continuous increase concerning maritime traffic, recording in 2021 a value of 67,483,435 tons compared to 2015, when a value of 56,336,772 tons was registered. Also, in 2021 the number of maritime calls by type of ship was 3,985, whereas the number of maritime calls by capacity was 3,276. Other ports brought to attention were Odessa (Ukraine), Novorossiysk (Russian Federation), Varna (Bulgaria), Samsun (Turkey) and Batumi (Georgia).

Romania was once Europe’s largest gas and oil powerhouse and it is still holding an important place among Eastern European countries. The oil production in Romania decreased by 0.76% from 63,670 barrels/day in 2021 to 63,190 barrels/day in January 2022 but an increase is expected due to recently changed offshore oil and gas laws to encourage more investment in this particular field. The nation has total estimated offshore gas reserves of about 200 bcm, and these resources represents an important source since the war is happening in the Black Sea [36].

4. Conclusions

An overview of maritime activities both worldwide and in the Black Sea area has been outlined in this research in order to establish the current status reported by the maritime sector. Therefore, maritime transport has developed over the years, with few exceptions (the economic crisis of 2008-2009 and the COVID-19 pandemic of 2019-2020), registering in 2020 a transport volume of 10.65 billion of loaded tons [2].

The Black Sea is a geographical area of particular importance, representing a crucial trade corridor for Eastern European countries. Previous studies [37] have shown that due to its geographical position, in the vicinity of large reserves of natural gas and oil, the Black Sea region has a triple geostrategic and geo-economic dimension: source of renewable energy, major transport corridor for Eurasian energy resources to EU consumers, on the emerging axis Caspian Sea - Black Sea - Mediterranean Sea and a major energy security factor for the EU and Romania [38–40].

Finally, it can be concluded that maritime activities have countless challenges but also opportunities, thus highlighting the continuous dynamics of the economic sector attributed to this field. The benefits of these activities are considerable, emphasizing once again that this type of transport is the cheapest and safest.

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