



Volume XXI 2018

ISSUE no.2

MBNA Publishing House Constanta 2018



## Scientific Bulletin of Naval Academy

SBNA PAPER • **OPEN ACCESS**

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To cite this article: R. Boşneagu and S. I. Mihalica, *Scientific Bulletin of Naval Academy*, Vol. XXI 2018, pg. 97-103.

Available online at [www.anmb.ro](http://www.anmb.ro)

ISSN: 2392-8956; ISSN-L: 1454-864X

doi: 10.21279/1454-864X-18-I2-010

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# A first approach of the seaborne bulk trade future

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Abstract: bulk goods trade has a large share in the world economy, this paper analyzes the perspective, the quantity and the main types of bulk goods carried at sea concerning the evolution of the world economy. Bulk carriers are in continuous development. Often these vessels transport cargo in only one way, which is economically disadvantageous. An advantage of these vessels is that they can operate with their equipment in the case of ports without specific facilities for handling bulk cargo. Port terminals for bulk cargo are a key factor in the evolution of this industry. Currently, these terminals are equipped with cranes and fast-paced installations and with specialized personnel who often work throughout the day. Emphasis is placed on the fast operation of the ships, but at the same time, the safety of the people is taken into account in such a way that things run smoothly.

Keywords: seaborne trade, bulk, future

## 1.Introduction

A bulk carrier is a ship specially built to transport bulk cargo such as grain, coal, iron ore, cement, etc. Since the first bulk ship was made, the development of the world economy, the need for more and more resources, has forced the construction of these ships by increasing their size and the degree of technology. In 1852, the first steamship, recognized as a bulk ship, was the British ship for transporting coal *SS John Bowes*. It had a metal keel, a steam engine and a ballast system that used seawater instead of sandbags, characteristics that ensured its success in its competitiveness on the coal market in England. In 1902 appeared the first ship capable of unloading with its means, the Hennepin riverboat which led to a significant decrease in the time of unloading of the goods. Starting with 1911, the first bulk carrier with diesel propulsion began to appear [1]. The main bulk products transported by sea are iron ore, coal, and cereals. Minor products carried in bulk at sea are ferrous products, wood products, agricultural products, fertilizers, bauxite, cement, scrap. Ferrous products (21% of total) are in the form of bars, iron pipes or iron rollers, etc. Wood products (18% of the total) include any wood-derived product that can be divided into raw materials or processed products. Raw materials include logs (round wood), timber, wood pallets, pulp, and wood. Agricultural products include various commodities, the most important being sugar conveyed either in raw sugar cane sugar or beet sugar or fine sugar in bags. Fertilizers, the most important ones are nitrates, phosphates, and potassium. Bauxite is another bulk ore used to produce aluminum for the production of aluminum products. Cement raw material used in the construction industry is usually transported as gray or white powder and clinker. Bulk cement accounts for almost 60% of the total, while clinker accounts for about 25% of total cement trade, the remaining 15% is cement transported in bags. Another category of cargo carried in bulk is that of steel/metal/iron scrap used for recycling purposes. Oil coke can be considered as part of the coal market, but it is a by-product of oil refining and is mainly consumed in the cement industry. Bulk carriers are categorized according to categories such as load capacity, length, width, areas where they can navigate, etc.: cereal, with or without dedicated loading/ unloading facilities; mining, with a stacking index of 0.34 - 0.51 m<sup>3</sup>/t, cement, with a stacking index of 0.79 - 0.83 m<sup>3</sup>/t; bulk carriers operating in the Great Lakes region, between the US and Canada, with a width of maximum 22.8 m, with a loading capacity ranging from 26,000 to 38,000 t; mixed bulk carriers for the transport of bulk containers and cargoes, generally with very wide shelves and their own operating

systems. By size, the bulk carriers are [13]: small displacement < 10,000 tdw; Handysize bulk carrier with a displacement between 10,000 and 39,999 tdw; Handymax bulk carrier with a displacement between 40,000 and 64,999 tdw; Supramax with a displacement between 50,000 and 60,000 tdw; Panamax bulk carrier with a displacement between 65,000 and 99,999 tdw., and with the Horn or Good Hope route with a displacement of more than 100,000 dwt; Kamsarmax, a Panamax of 82,000 tdw, with a length of 229 m (for the Kamsar port of Equatorial Guinea); Dunkirkmax, 175,000 tdw, Capesize bullet with a maximum length of 229 m and a maximum width of 45 m (for the Dunkirk harbor); Newcastlemax, a Capesize of 185,000 tdw, with a maximum width of 47 m (for Australian port Newcastle); Setouchmax, a Capesize of 205,000 tdw, with a maximum draft of 16.1 m and a length of 299 m (for the ports of Japan); Very Large Bulk Carriers with a displacement of more than 200,000 tdw.

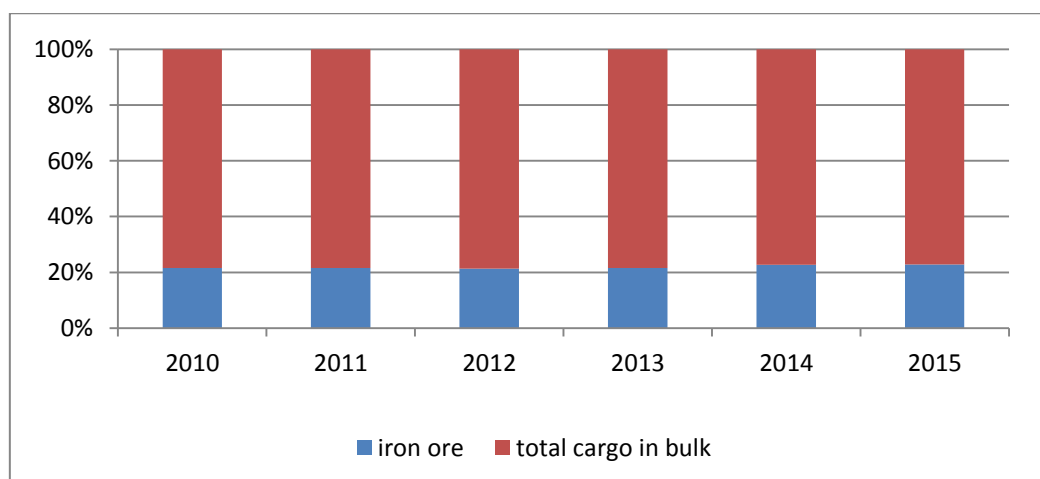
## 2. Materials and Methods

The primary three commodities in bulk, transported in bulk at sea are iron ore, coal, and grain. Iron ore is bulk cargo carried by sea with the highest volume (Table 1 and Figure 1) [2]. It is found in nature in the form of rocks, often mixed with other minerals, and after processing, it is used for the production of steel. The main criteria for classifying iron ore are quality and size. The quality is expressed as a percentage of the total amount of ore (iron ore containing iron ranging from hematite - first-class ore to low-grade mineral rock), with a standard percentage of 62% iron content, the index reference for iron ore. The size is given by the granulation of iron ore (fine iron ore with a grain size of up to 10 mm and iron ore castings with a grain size greater than 10 mm).

Table 1 Iron ore carried by sea, 2010-2015 în mil mt, % annual

Year	2010	2011	2012	2013	2014	2015
Iron ore	991	1,053	1,110	1,189	1,337	1,354
Total cargo in bulk	3,605	3,841	4,099	4,333	4,553	4,553
Iron ore /total cargo in bulk	27.49%	27.41%	27.08%	27.44%	29.37%	29.74%

Figure 1

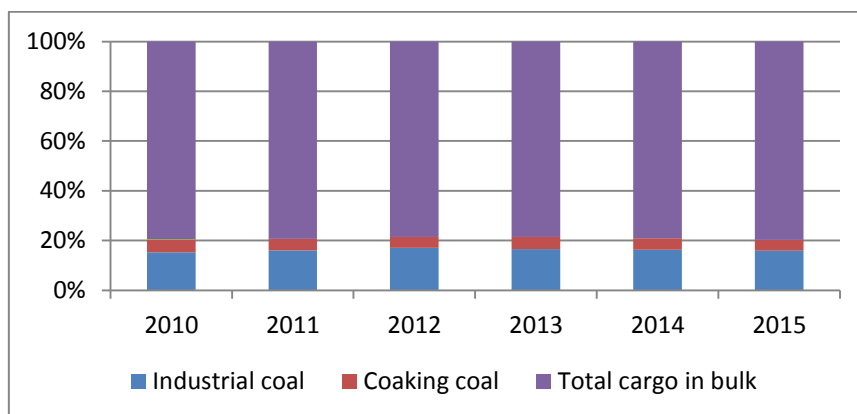


Coal represents about 25% of all bulk cargo carried by sea (Table 2 și Figure 2) [3]. There are two main categories of coal: coal industrial coal coking. Coking coal is coal used for metallurgical purposes to make coke. This type of coal represents 25% of the volume of coal transported. On the other hand, the coal that burns in the power plants to generate electricity represents the remaining 75% of the coal transport

Table 2 Volume of coal carried by sea, 2010 –2015, mil. mt, % annual

Year	2010	2011	2012	2013	2014	2015
Industrial coal	694	776	889	915	950	906
Coking Coal	236	224	234	264	262	255
Total coal	930	1,000	1,123	1,179	1,212	1,161
Total cargo in bulk	3,605	3,841	4,099	4,333	4,553	4,553
Coal/Total cargo in bulk	25.80%	26.03%	27.40%	27.21%	26.62%	25.50%

Figure 2

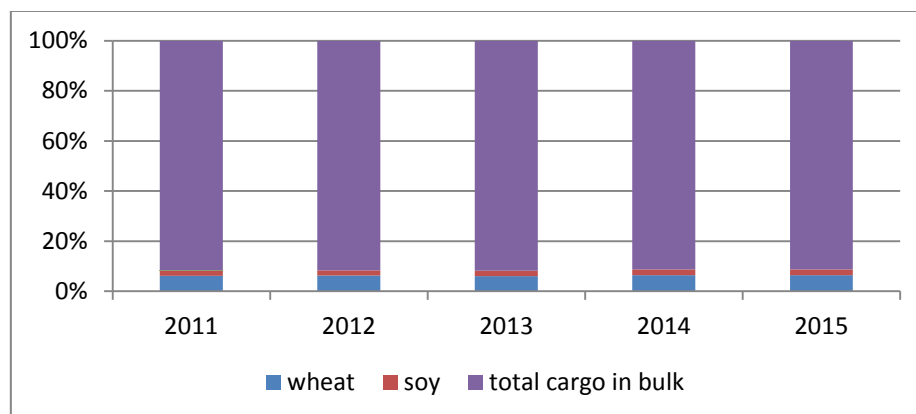


Cereals, as volume of transport at sea, reach 9.5% (Table 3 and Figure 3) [4] of the total bulk shipments of approximately 430 million tonnes annually, of which 320 million tonnes (about 74%) of wheat and rough grain and 110 million tonnes transported are soybeans (about 26%). Gross grains are cereals other than wheat and rice and are mainly used for animal feed and brewing.

Table 3 Volume of bulk cereals transported by sea, 2011 –2015, mil. mt, % annual

Cargo/Year	2011	2012	2013	2014	2015
Wheat /coarse grain	255	279	287	317	320
Soy	91	96	103	117	117
Total grain	346	375	390	434	437
Total cargo in bulk	3,841	4,099	4,333	4,553	4,553
Cereals/ total cargo in bulk	9.01%	9.15%	9.00%	9.53%	9.60%

Figure 3



### 3.Results

The primary three bulk goods (iron ore, coal, and grain) occupy two trimesters in bulk cargo. Other commodities, called small bulk goods, cover the remaining one-third and, in many cases, strongly influence the bulk cargo market. The evolution of the small bulk market has a different trend than the big bulk market (Table 4 and Figure 4). For example, in 2009, even though bulk goods had a 4% increase, the 12% drop in bulk goods led to a 4% drop in total bulk cargoes throughout the year. In 2015, the volume of significant bulk goods declined by 1%, but the bulk commodity market remained at the same level because the other commodities transported in bulk had a 1% increase.

Table 4 Annual percentage rate of bulk market transported by sea, 2008 - 2016

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016
Major bulk	5	4	12	6	9	6	8	-1	2
Minor bulk	-2	-12	13	7	2	5	1	1	0
Total bulk	2	-4	12	6	6	6	5	0	1

The main goods belonging to the category of bulk goods transported in bulk are ferrous products, wood products, agricultural products (other than cereals), fertilizers, bauxite & alumina, cement, scrap, coke, other minerals (Table 5 and Figure 5) [5]. In general, small bulk goods are transported in smaller quantities by mini-bulk carriers (short routes) or by Handysize or Supramax bulk carriers (over long distances). The volume of bulk cargo in bulk in 2015 accounted for 38% of the total bulk cargo carried by sea.

Figure 4

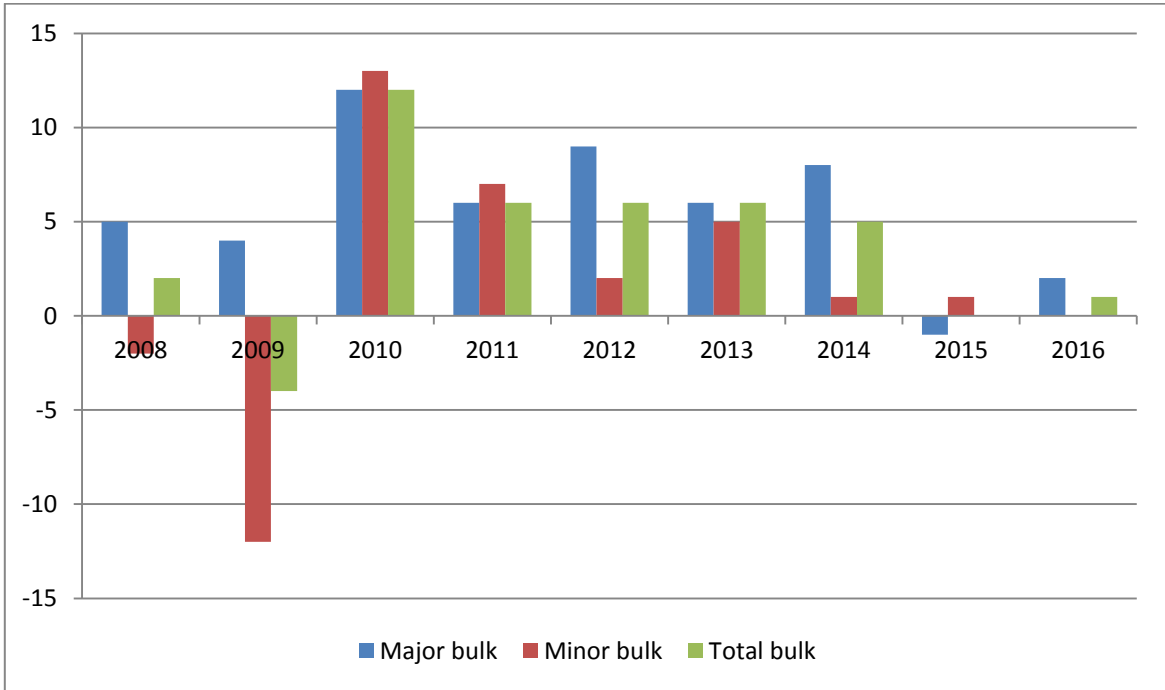
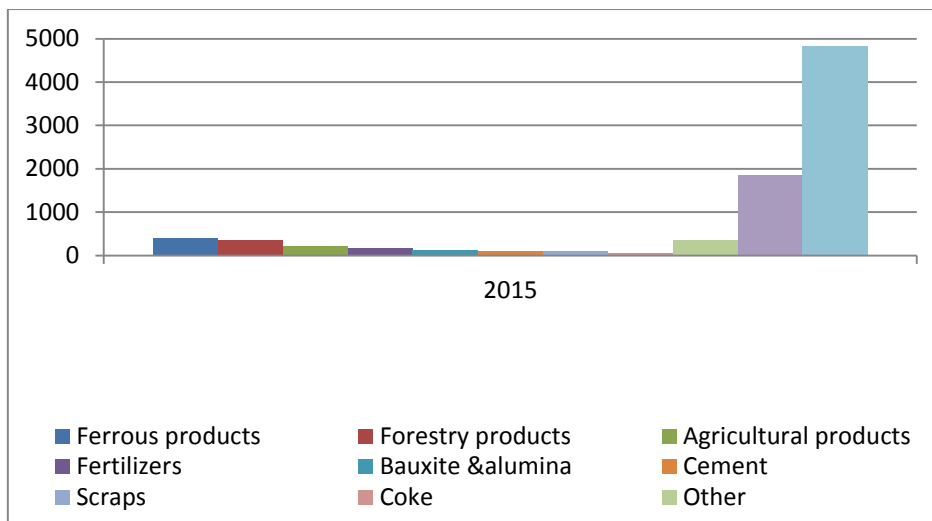


Table 5 Seaborne trade minor bulks volume in 2015

Bulk cargo	Million tonnes
Ferrous products	406
Forestry products	344
Agricultural products	219
Fertilizers	157
Bauxite and alumina	126
Cement	103
Scrap	101
Coke	65
Other bulk cargo	342
Total minor bulk cargo	1,863 38% of the total bulk cargo
Total bulk cargo	4,819

Figure 5



#### 4. Conclusions

1. The bulk trade in bulk cargo has increased since 2007 by 40%, (in 2016, 3,172 million tonnes of iron ore, grain, coal, bauxite, alumina and phosphate rock, 30.8% - a total of 10.287 million tons), [19] being primarily determined by the development of the Asian countries. Currently, demand for bulk goods has reached a peak in developed economies (eg, in Europe), but demand in North America and Japan have returned to levels before the recent global crisis and is unlikely to return to the near future. The volume and forecast of dry bulk seaborne trade for 2024 is about 4,892 millions of tons [17, 18, 19], (Table 6 and Figure 6).

2. Bulk cargo transport is firmly based on the activity of heavy industry and the use of fossil fuels. Future demand for reference goods appears to be limited and uncertain. While China's economy slowed down, is headed for a service-based economy. This change has already led to a decline in bulk imports and will continue to play an essential role in the coming years.

3. Different countries have announced their willingness to end the use of fossil fuels and have started to shut down coal-fired power plants. Heat coal imports in the United Kingdom were down 80% in the first half of 2016.

4. The maritime industry as a whole is forced to invest heavily in new equipment in line with environmental regulations on ballast water and greenhouse gas. Although this will have a negative financial impact for shipowners, it will also have a positive one that will lead to rebalancing the market supply and speeding up the recovery of the freight.

5. At present (1 January 2017), the bulk of the bulk carrier represents 43.2% of the total displacement and 17.2% of the value (in USD), out of a total of over 93,000 vessels - the world fleet. The current model of the bulk cargo shipping industry is characterized by fragmentation. There are only four companies that hold more than 100 bulk carriers and based on the displacement; the most significant company accounts for less than 4% of the total fleet. This means that each owner has very little influence and negotiating power with potential customers and is often reflected in low levels of mutual trust. Many fleet owners today have fleets focused on minimal investment and maximum profit (buy cheap, sell expensive) instead of acting as logistics suppliers concentrate on profitability. Some owners are more conservative and have had a strategy to rent many of their long-term vessels... They have been caught up by the long and severe crisis, and most of the lease contracts have expired. Today, when the bulk cargo market shakes the ground, renting ships over a certain amount of time is not an attractive option for shipowners.

6. On the other hand, bulk freight customers are huge on the global market and are increasingly increasing their influence and bargaining power.

7. Due to the small business of shipowners, today much of the chartering of bulk transport continues to be done through brokers. This means that the relationship with the shipping client is effectively controlled by the broker, further weakening the owner's negotiating ability.

8. The trend in the construction of new bulk carriers was as follows: from 2011, 34 Valemax ships (380,000 tdw and more) were launched. In 2016, another 30 Valemax ships were commissioned for delivery in 2018 by three Chinese owners for a \$ 2.5 billion 25-year return plus a COA with the Brazilian mining giant Vale. The Valemax fleet will be able to carry over 50% of the current export volume of Brazilian ore and will outperform the current business of the current Capesize [15] fleet.

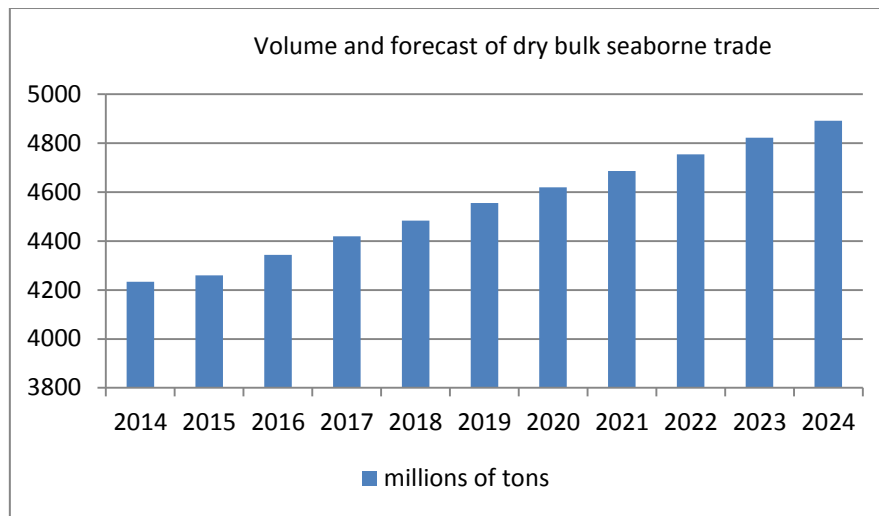
9. The bulk freight is expected to recover from the second quarter of 2018, against the backdrop of rising demand for iron ore for Asia, with similar medium and long-term developments. The Chinese government plans to invest heavily in infrastructure development to revive the Silk Road from the 16th century through Central Asia and the Middle East to Europe, expanding the maritime route linking China to Southeast Asia and East Africa. These will involve building new ports, roads, railways, power stations and pipelines. This very ambitious project will have a positive influence on bulk cargo shipping, also taking into account the massive development of the planned Chinese government infrastructure worth up to \$ 8 trillion by 2020.

10. The fleet of bulk carriers will grow at a slow pace in the coming years. The expected increase in ship value will make shipowners' interest grow in new shipbuilding. However, fleet growth will remain under control due to low demand and new IMO regulations. Therefore, much of the demand for new ships will replace the tonnage of the quit [21].

Table 5 Volume and forecast of dry bulk seaborne trade, in millions of tons

year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
	4,233	4,260	4,344	4,420	4,484	4,555	4,619	4,686	4,754	4,826	4,892

Figure 6 Seaborne bulk trends by 2024, in millions of tons



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