

# **Cover Page**

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## ABSTRACT

The shipping market is very volatile and has encountered many fluctuations and turbulence due to several economic and environmental factors. The volatility in the dry bulk shipping sector increases the investment risk. Apart from the challenges that impact the investment decision, however, a couple of challenges impact the organisation of the shipping business. The ebb and flow research analyses the gamble and investment administrations in the dry bulk shipping region. The dry bulk shipping industry, moreover, faces gigantic roughness. The ship proprietors and the monetary patrons about their investment in the overall dry bulk shipping market as per the condition of the market. The feebleness of the cargo material and the boat costs are the essential issues influencing the ship proprietors' investment decision, and these variables, in like manner, control the market designs. The shipping industry has been highly affected by the current pandemic situation; the pandemic is implemented in the countries of the world, and the demand for dry bulk influences the freight rates of the market. The researchers estimate that due to the continuous growth of the world and effective recovery from the covid-19 pandemic, the demand for dry bulk products will increase by 3.3% while the shipping capacity will be growing at lowered rates due to the availability of the products and the risk of the dry bulk shipping sector. The ship owners of the investors at this stage are willing to order new ships, which is driven by the high freight rates in the market. However, due to the complexity of the shipbuilding process, there is a huge possibility of turbulent freight rates, which can affect the supply of the shipping market and shipowners' investment returns. The current research study aims to analyse the factors which affect the investment decision in dry bulk shipping along with the challenges and risks of this sector. The current research study is secondary research in which data is gathered from different sources. The result of the study has indicated that the shipping business has similarly seen a contrary theme in which the oversupply of weight and the diminished trade have achieved the crashing of cargo rates low to the extent that the associations become ill-suited to meet their practical expenses and premium cost. The offers and the investment upsides of the chosen organisations have been changed because of altering cargo rates in the market. The examination of the development and benefits of the organisations has likewise shown that in the five years of screening, it has been seen that the common upsides of

these organisations have shifted a great deal, demonstrating the changes and high vacillations in the cargo spaces of the market. One of the greatest findings of the examination is that the dry bulk area has a high affiliation and relationship with the market.

**Keywords:** Dry bulk shipping, freight rates, investment, shipping industry

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## CHAPTER 1--INTRODUCTION

*An introduction is the first chapter of the dissertation; it details the research background of the selected topic, that is, an analysis of investment in dry bulk shipping. This section also gives a rationale that is the justification of the selected topic. The introduction also gives detail about the aims and objectives of the research to highlight the main purpose of the entire research, which is followed by the research questions and structure of the research.*

### **Research background**

The shipping industry has been facing fluctuation in its shipment management due to many challenges and a turbulent environment. Some of the challenges impact the investment decision, whereas some challenges affect the management of the shipping industry. The dry bulk shipping industry also faces huge turbulence. The ship owners and the investors about their investment in the international dry bulk shipping market as per the condition of the market (BULUT, 2013). The instability of the cargo material and the ship prices stand as the major factors influencing the ship owners' investment decisions, and these factors also regulate the market trends. A wrong prediction about the market trend and investment can result in investment failure and a company's bankruptcy. According to Fan (2021), the Sanguang steamship company was the biggest enterprise company in Japan. In the oil crisis of 1979, the company made a wrong decision about market prediction and investment, resulting in its bankruptcy. During the oil crisis, the company ordered many ships because of low prices, which they aimed to sell at high prices in future for bigger profits. However, the market condition got worse, and the Sanguang Company was rated as a prominent loss-making company in 1981. However, due to demand and excess supply of market capacity, the company also ordered 125 bulk carriers, resulting in extended loans that were then not approved by the banks. Due to the bad financial position of the company, all banks stopped loans it, which eventually led to the company's bankruptcy. It is indicated or claimed that the company's managers and the investing team made wrong predictions about the market trends, which eventually led to the company's bankruptcy during the theatre period. Therefore, the company's investment decision holds great value as it can affect its roots (Gkochari, 2015). Yin et al. (2019) claimed that during the high freight in the market, the shipowners propose to order ships in order to obtain a bigger share of profit in the future.

However, as per the long shipbuilding cycle, if the market freight is contrary to the expectations, the ordered ships can cause a huge loss or burden on the ordering company.

Additionally, the higher cost of operating and maintaining the ships will also break the company's financial position and revenue problem. If the freight rates are predicted to decrease in the future, then instead of buying new shoes, it is much better to order second-hand ships because they are easy to put in the market, which can aid the company in meeting the demand in time (Yin et al., 2019). Nevertheless, in this scenario, the second-hand ship's maintenance cost can put a huge burden on the pocket of the shipping companies. The choice between new and second-hand shipbuilding is very complex for shipping companies and ship owners as it affects the company's overall turnover and financial position (Dai et al., 2015). This makes the investment decision of the company a huge responsibility and a very difficult task.

The shipping industry has a huge history. It has encountered a surge in trade, oil crisis, war, route restrictions, aggressive or turbulent economic environment, and even restricting economic policies by some countries (Cullinane, 1995). These events have generated an inequity in the supply and demand in this industry, leading to higher freight rates. The industry has also observed a reverse trend in which the oversupply of tonnage and the reduced trade have resulted in the crashing of freight rates low to the extent that the companies become unable to meet their operational costs and interest cost. Fan (2021) indicated that investment decisions make the shipping cycle more volatile because they affect the company and its surroundings in the market. It also impacts the demand and supply of freight. Yin et al. (2019) indicate that the companies that are involved in the management and ownership of ships are exposed to huge risks due to the volatility of the market and high risks in investment decisions. However, every business comes with a set of operational risks which companies should be willing to take. These risks are caused by the fluctuations in the EBIT ("Earnings Before Interest and Taxes"), which are determined by the income and expenses of the company. In the shipping industry, the costing variables include freight rates, voyage costs, operational costs and foreign exchange rates. Kavussanos & Visvikis (2006) have claimed that a major part of the financial position of the shipowner is derived from the alterations in the value of the ship (asset), which is very turbulent because of the stage of the shipping cycle. Therefore, ownership risk is also another factor that investors must pay heed to—many risks in dry bulk shipping influence the shipowners' investment decisions and



management practices. The current research study aims to identify the dry bulk shipping industry's risk and how it affects investment and management strategies. The research will focus on the very aspect of the dry bulk shipping industry.

### **Rationale**

The maritime industry has been altered a lot after the financial crisis of 2008, but the dry bulk shipping sector is the most affected. In June 2008, the Baltic dry index (BDI) dropped to 743 from 10,245. The BDI imitates the freight rates of dry bulk shipping. The dry bulk shipping industry has been encountering turbulence because the BDI is maintained at a very low level which has positioned the dry bulk shipping market in trough periods. However, Dinwoodie et al. (2014) indicated that the dry bulk shipping market shows no signs of recovery. Due to lower markets, numerous shipping companies have gone into bankruptcy. The dry bulk shipping market is very transparent, including many small-scale ship owners, lesser market restrictions and open transactions. However, this makes the dry bulk shipping market competitive (Yijie et al., 2018). The companies and the ship owners in the dry bulk shipping are expected to be fully familiar with the market trends and predictably make the investment decision which aids them in thriving in the market. It is why scholars highly research factors influencing the investment decision in dry bulk shipping. Apart from the factors influencing the investment decisions, the risk should also be analysed so that the future ship owner can make an informed decision about the risk and other factors. The current research will also analyse the factors and risks of the dry bulk shipping market. It is the need of time because the shipping industry is thriving after pandemic restrictions were exempted, so the researcher needs to analyse the risk and factors of the dry bulk shipping industry.

The crisis of the 2008 induced definite changes in the shipping market and industry, specifically the dry bulk shipping. The BDI (Baltic Dry Index) that indicates the freight rates of the, markets were observed to be dropped from 10,245 to 743 in the span of 6 months (July to December). It has been indicated that since the year 2008, the BDI of the dry bulk markets has been very low, which has caused a volatile situation for the dry bulk market and shipowners. Dinwoodie et al. (2014) claimed that many shipping companies went into bankruptcy due to the economic breakdown of 2008 and after those post-crisis situations of the market. In the dry bulk shipping market, there are many factors that attract the investors because of the many small ship owners in

the market, and there is transparency in the investments and transactions. Additionally, there is no market barrier in participation. These factors make the shipping market a very competitive market. Yijie et al. (2018) indicated that the shipowners and the business people need to be familiar with the dry bulk market and shipping processes to make investment decisions. They should be aware of the turbulence and fluctuations in the freight rates of the market so that informed investment decisions can be made. The current research is set within a specific past time frame (2005-2009) from the previous decade and argumentation presented in this research is based on, and supported by, the existing research on this time frame. Apart from the analysis of 2005-2009 time frame, the research has also gathered data for the recent years to analyse the performance of the progressing companies from 2005-2009 timeframe.

### **Aims and objectives of the research**

The objectives of the current research study are:

- “To analyse the benefits and characteristics of dry bulk shipping.”
- “To analyse the challenges faced by the dry bulk shipping industry.”
- “To analyse the risk that the dry bulk shipping industry faces.”
- “To investigate the impacts of those challenges on the management and investment functions.”

### **Research questions**

- “How dry bulk shipping is differentiated from wet bulk in regards of performance variables, financial benefits and outcomes?”
- “What impacts the investment decisions and management in the dry bulk shipping industry?”
- What is the risk that the dry bulk shipping industry and the shipping company owner face?

### **Structure of dissertation**

The structure of the dissertation showcases the flow of the information. It also hints toward the type of research. The current research study follows a standard structure based on five chapters.

According to the university, the dissertation is a sizeable work that follows a logical structure to demonstrate the business research problem, knowledge of the research method and a scholarly approach to the selected topic. The current research dissertation contains five chapters that are

*“Introduction, literature review, research methodology, empirical findings and analysis and conclusion”*

The first chapter of the dissertation is an introduction that gives information about the research study's aims and objectives. The introduction chapter is very important because it showcases the actual aims of the researchers behind the research study. The introduction also details the selected topic's background, the rationale for its selection, and how it will make a difference in the academic world. The introduction should be efficient enough to give out the research's main idea and its findings' aims. The second chapter of the dissertation is the literature review. It contains a critical analysis of the previous literature sources. It tells about dry bulk shipping and the types of ships used. The literature review also provides details about the Markowitz portfolio analysis model, a theoretical model used to evaluate the risk and expectations from the market. Apart from these, the literature review also contains details about the factors that impact the investment decision, the demand side and the supply side of the dry bulk shipping market and the impact of covid on dry bulk shipping. The third chapter of the dissertation is about the research methodology. It gives details about the research choices, philosophies and methods. Apart from this, the methodology also highlights the data collection techniques, sampling, data analysis and ethical considerations of the research study. The research methodology can be regarded as the technical aspect of the dissertation. The fourth chapter is empirical findings and analysis, and this chapter includes the detail about the risk of the dry bulk shipping market. It also contains direct data from the Nasdaq Company to highlight the turbulence of the shipping market and its impact on the companies. This chapter fulfils the aims of the research study. The final chapter of the dissertation is the conclusion; it is the simple chapter that contains the summary of the key findings of the dissertation. It also contains limitations of the work along with future recommendations. In the research study, identifying the limitations is very important so that future research can conveniently eliminate similar hurdles. Apart from the basic five chapters, the dissertation structure includes a title page, content page, acknowledgement page, abstract, references and appendix.

## CHAPTER 2--LITERATURE REVIEW

*The literature review contains details about dry bulk shipping and the relevant literature on this topic. The critical analysis of the previous literature has analysed dry bulk shipping. These factors affect the investment decision in dry bulk shipping and the impact of covid-19 on the dry bulk shipping industry. Apart from these, the literature review also provides information about the Markowitz portfolio selection model. The entire literature review is also summarised at the end to highlight the key points.*

### **What is dry bulk shipping?**

Alizadeh & Nomikos (2013) have defined dry bulk shipping as the shipment of raw material in large unpacked parcels. The dry bulk usually consists of raw and unprocessed products destined to be used in global manufacturing and production. The most common products of dry bulk shipping are grains, metal, energy materials, coal, iron etc. which are transported through seaways in the cargo vessels or specialised dry bulk ships in bulk delivery. The BDI (Baltic dry index) is the convenient measure of the price paid for the shipment of bulk materials. The BDI is regarded as the indicator of the economic activity and condition of the market because changes in the BDI are directly associated with the supply and demand of dry bulk products and their export (Počuča & Zanne, 2009). The biggest risk in dry bulk shipping of dry bulk spillage because it is very difficult to clean up because the products are present in larger quantities and are usually liquid.

Numerous types of research have been conducted in the previous years in the shipping and dry bulk sector. Many researchers have analysed the association between freight rates, shipping processes, shipbuilding prices, investment decisions, returns etc. the research study of Alizadeh et al. (2007) evaluated the relationship between dry bulk shipping prices and revenues to refold the investment and divestments aspects of dry bulk shipping. The research study of Syriopoulos and Roumpis (2006) analysed the association between second-hand shipbuilding and trading of the volume of dry bulk shipping. The findings of Syriopoulos and Roumpis (2006) indicated that the trading volume could affect ship investments because demand and supply have a direct

impact on the freight rates of the market. The research study of Merikas et al. (2008) utilises the “vector error correction model to analyse the decision-making in the investment purpose of the shipping sector. However, Dai et al. (2015) utilised GARCH (“the generalised autoregressive conditional heteroskedasticity model”) to study the association between prices of ship and freight rates of the dry bulk market along with the risk management methods. The most noteworthy research studies in the area of ship investment decision-making are by Lun and Quaddus (2008). Lun and Quaddus (2008) indicated that shipyards have the ability to define new shipbuilding processes because of the demand for new shipbuilding and freight rates of the dry bulk shipping or trading market. Haralambides et al. (2004) have claimed that the prices of new shipbuilding are highly influenced by the shipbuilding costs, the capacity of shipyards, the volume of demand, freight rates and prices of second-hand ships. Many researchers define the capacity of the supply of the shipping market as the most influencing factor for the demand and supply in the new shipbuilding market. Hawdonm (1987) indicated through his research that the decline in the shipbuilding orders is caused by the excess in the supply of ship orders which affects the balance between demand and supply of the shipbuilding market and, eventually, the shipbuilding prices.

However, Alizadeh et al. (2007) believed that there is a positive correlation between changes in the prices and demand in the dry bulk market. On the other hand, Syriopoulos and Roumpis (2006) analysed those changes in the supply of the shipping market affect the prices of the ships, whereas changes in the prices affect the volume of trade of the ships. Numerous kinds of research have highlighted shipbuilding as the variable model while studying the shipbuilding process and the shipping industry; however, the changes in the demand and supply eventually affect the investment decision in the dry bulk market. Researchers have identified investment in shipping and shipping finances as the most critical variables in the dry bulk shipping market. Beenstock and Vergotis (1989) have highlighted the link between the freight market in the research study of Tsolakis (2003) equilibrium equation model and the VAR model have been established to study the prices of second-hand ships and dry bulk carriers. However, Syriopoulos and Roumpis (2006) have also established a VAR model for analysing the prices and supply volume of second-hand ships in the dry bulk market. Syriopoulos and Roumpis (2006) have used different economic and econometric methods to derive out the conclusion that turbulence in the freight rates can aid the shipowner in decision-making about the investment for new ships or second-hand ships in the market. Many research studies analysed the volatility of the dry bulk

market and used different qualitative and quantitative methods for the analysis of the investment factors of the dry bulk shipping. To understand the investment and the risk, it is important to first understand the dry bulk shipping and its relevant aspect in light of previous literature sources.

### **Ship types in dry bulk shipping**

In dry bulk shipping, different kinds of ships can be used especially marine cargo ships that can transport large quantities of dry bulk material. The uses of marine cargo ships can be differentiated into five categories: “bulk carrier, general cargo ship, container ship, an oil tanker, and other special ships (such as Ro/Ro ship, LNG/LPG, timber ship, and asphalt ship)”. Bulk carriers are the major carriers of the dry bulk shipping market; the dry material in large quantities is transported through bulk carriers (Fan et al., 2022). The bulk carriers can be of different types. The current literature review has focused on bulk carrier types of marine cargo ships. According to the size of DWT, the bulk carriers are divided into three different types.

#### **Cape size bulk carrier**

It is a ship that has a deadweight of more than 100000 tons. This ship has a length of more than 250m and a width of 32.5m, but this bulk carrier has some route restrictions. This ship cannot pass through the Panama Canal and Suez Canal, which sails through the "cape of good hope" and is named after this route (Fan et al., 2022). This type of ship is highly used for transporting coal and iron, which is known to connect the Pacific and Atlantic oceans. Due to the consistent need for large-scale ships and the development of the shipping industry, cape-size ships have been developed and have reached nearly 140000 to 190000 DWT. Even the largest Cape of Good Hope bulk carrier recorded 400000 DWT (Alizadeh & Nomikos, 2013).



### **Panamax bulk carrier**

The Panama bulk carrier is the ship allowed to pass through the Panama Canal. The ship has to meet the requirements of the canal, which restrict the ship to be not more than 274.32m in length and 3230m in width (Fan et al., 2022). The deadweight tonnage of this ship is between 60 to 100 thousand DWT. The Panama bulk carrier is the mainstream type of ship currently used in international dry bulk cargo shipping. This bulk carrier is the leading transporter of iron, coal and grains.



### **Handy-size bulk carrier**

The handy-size bulk carriers are the ships that have a deadweight of about 20000 to 60000 tons. In this range, the ships with a deadweight of 40000 are referred to as Ultramar and supramax (Fan et al., 2022). These types of ships are used for the transportation of grains, cotton and other agricultural material. These ships are also called small tonnage ships as they have less deadweight and shallow draught and advanced navigation channels, ports, and canals. These ships are not route-restricted because they can fit into any canal (Alizadeh & Nomikos, 2013). Additionally, these types of ships are loaded with loading and unloading equipment which makes these ships convenient for usage. Such ships carry small quantities of cargo on longer routes.





### **Factors that impact the investment decision in the dry bulk shipping**

Huge risks surround the decisions about investment in the shipping industry. Many research studies have analysed the method to predict market trends and make a profitable investment. Many researchers have used investment analysis and the traditional discount cashflow method. Evans (1984) used the traditional discount cash flow method approach. After that, many types of research were conducted their research about investment in the shipping industry. The following section gives details about the demand and supply sides of dry bulk shipping to understand the factors that influence investment decisions.

### **Demand-side of the dry bulk freight market**

The shipping market is the global market for the provision of maritime transport capacity in response to the needs of shippers engaged in international commercial commerce at any given time. Demand for shipping services from cargo owners is the primary driving force behind the worldwide dry bulk shipping market. Dry bulk cargo does not need special packaging if it can fit in the ship's hold (Jing et al., 2008). Typical primary raw materials are iron ore, coal, grain, bauxite, agricultural products, lumber, fertiliser, cement, and so on. Organisations worldwide will use their criteria for categorising dry bulk products (Dai et al., 2015). Agricultural items, forest products, mineral products, fertilisers, processed products, and small bulk iron and steel goods

are some subcategories used by the Drury shipping consulting firm in the United Kingdom. Scientists usually divide dry bulk into three categories: large, small, and other.

The top five most frequently transported dry bulk cargoes are iron ore, coal, grain, bauxite, and phosphate rock. For as long as anyone can remember, they have been a significant player in the dry bulk products transportation industry (Xiao, 2012). Because of their widespread use in industry, agriculture, and other businesses, dry bulk items play a crucial role in global trade. Coal and iron ore, for instance, are used as raw materials in the iron and steel sector, while iron and steel are utilised in a wide range of other heavy industries. Phosphate rock is the foundational ingredient in chemical fertilisers, food is necessary for human survival, and coal is a vital resource in the global energy business since it can generate electricity (Bendall & Stent, 2003). The global economy relies heavily on industry expansion, and dry bulk freight helps make it possible. Iron ore accounts for most of the five types of dry bulk freight that are typically transported. This is because of the great distances between the mines that supply iron ore and steel factories worldwide. Iron ore is a key export from North America and Australia to Europe and Asia. Iron ore mining, processing, and utilisation can be separated into three distinct eras. Location near mines or other sources of raw materials was a major element for the iron and steel industry prior to the 1970s. Shipbuilding technology has come a long way since the 1970s, and as a result, a new breed of massive vessels has emerged (Xiao, 2012). Companies in the iron and steel industries were able to realise economies of scale and hasten the progress of contemporary marine science and technology by avoiding the need to build their operations near the source of iron ore. In the decades after the 1980s, when the gap between the booming Japanese and European auto sectors and the lack of raw materials became apparent, Japan became one of the world's top importers of iron ore. The growth of China's manufacturing sector, especially since the late 1980s, has made the country a major importer of iron ore.

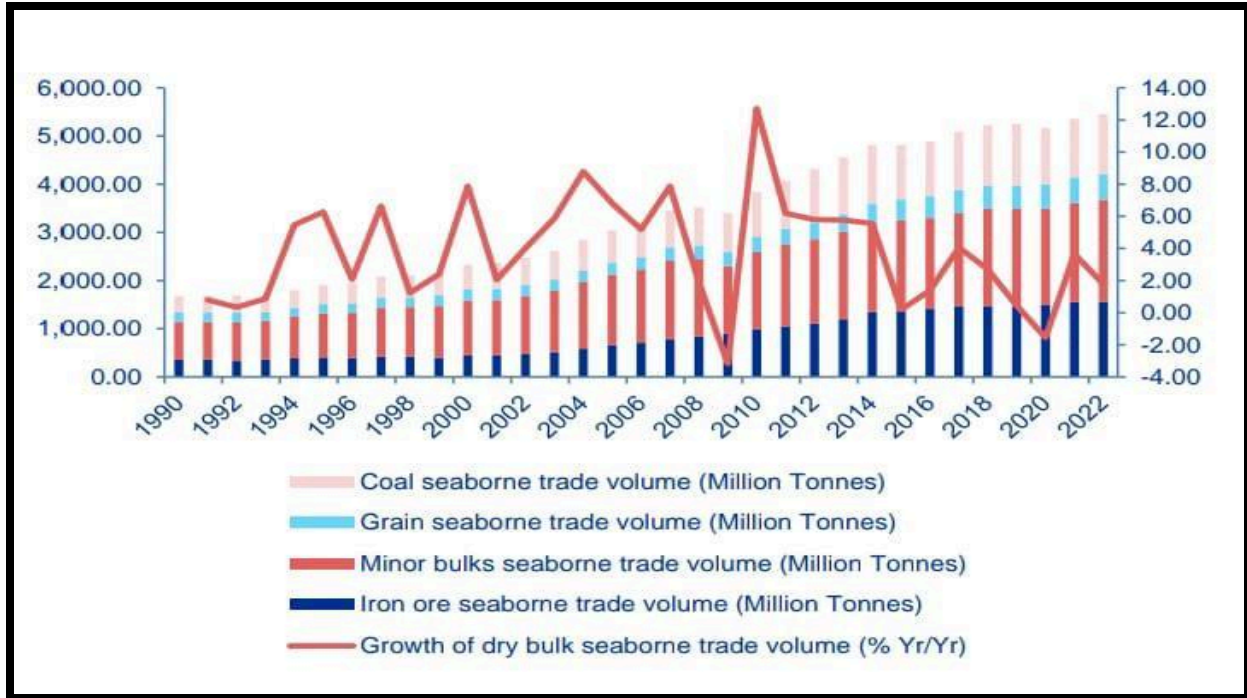


Figure 1 trade volume of dry bulk products (Fan, 2021).

Coal is indispensable in two key ways than any dry bulk resource. Coal is used not just in the energy business but also in the iron and steel industries, making it a crucial raw material. Most coal and iron ore exports from North America, Australia, and South Africa are bound for markets in Europe, Asia, and Japan. Grain, which includes rice, wheat, corn, and other cereals, is the most important dry bulk commodity other than oil. Transporting agricultural goods will be highly unpredictable and subject to seasonal fluctuations. Agricultural powerhouses, including the United States, Canada, South America, and Australia, ship their grains mostly to Japan, Africa, the Far East, and India (Alizadeh & Nomikos, 2013). Bauxite and phosphate rock make up the smallest percentage of the five primary categories of dry bulk freight. Bauxite is a vital raw material for the aerospace and defence industries and is often transported from Africa, Australia, and Jamaica to the Americas and Europe. Morocco, the Red Sea, and the United States are the primary sources of the phosphate rock mined and exported to East Asia, the United States, and Western Europe. During the last decade, the dry bulk cargo transportation industry has expanded dramatically, becoming increasingly important to the world economy. Up to 40% of the world's shipping volume comprises dry bulk cargo. The following elements affect the need for dry bulk shipping (Alizadeh & Nomikos, 2013):

- The expansion of global economies primarily drives the need for dry bulk shipping. The structure of international trade, worldwide business cycles, and severe economic emergencies are only a few global economic elements that will affect the need for dry bulk transportation.
- Moving dry bulk commodities of a given tonnage across a longer distance leads to a greater volume of transportation. Hence this factor influences the demand for transporting dry bulk products.
- Due to international politics and law, there will be restrictions placed on the dry bulk trade. Factors like diplomatic ties between countries, the relative power of political systems, the stability of governments, trade policies, and so on will affect international commerce and the dry bulk trade market. Political events' outcomes are unpredictable, creating uncertainty about their consequences.
- The impact of scientific and technological progress on the need for dry bulk shipment is more gradual and long-lasting than immediate. Increasing productivity is a good by-product of scientific and technical development, which affects the production of dry bulk natural materials and the economies of many nations.
- Natural component(s): Examples of natural factors include the biodiversity of various ecosystems, the accessibility of various ports, the weather patterns of various regions, and so on. Demand factors include changes in natural seasonal situations. Transport demand has noticeable seasonal aspects because of the cyclical nature of transport goods production, consumption, and storage.

### **Supply-side of the dry bulk freight market**

As the primary provider of transport capacity in the worldwide dry bulk shipping sector, dry bulk carriers offer the industry the transport capacity required. Since then, the quantity and value of dry bulk freight have grown substantially. By 2020, the globe is expected to have a total of 12466 dry bulk cargo ships of 925.36 million dwt.

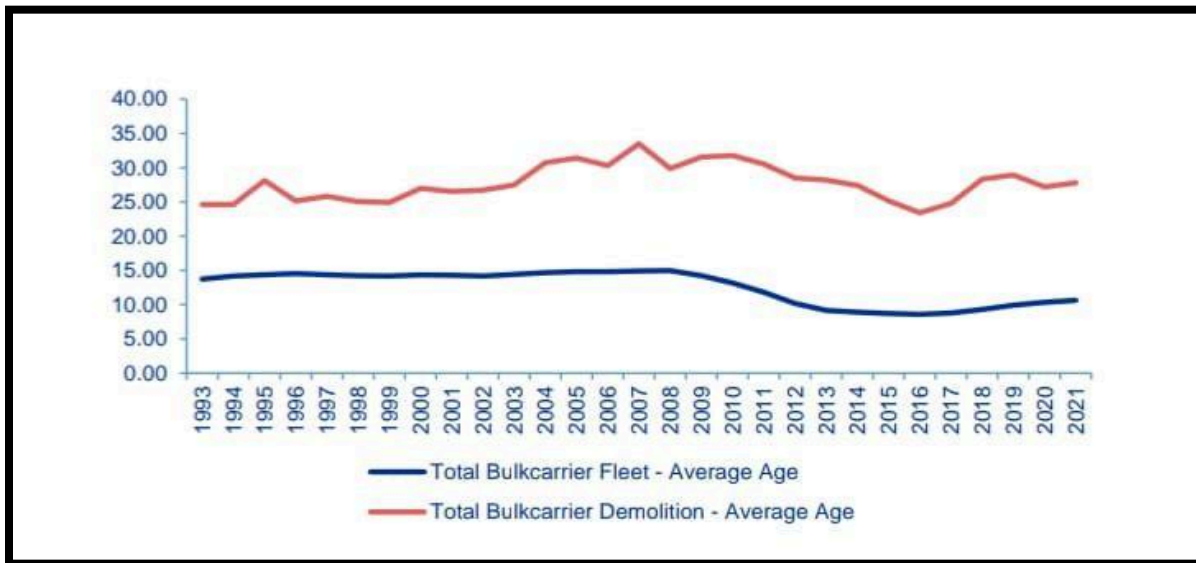
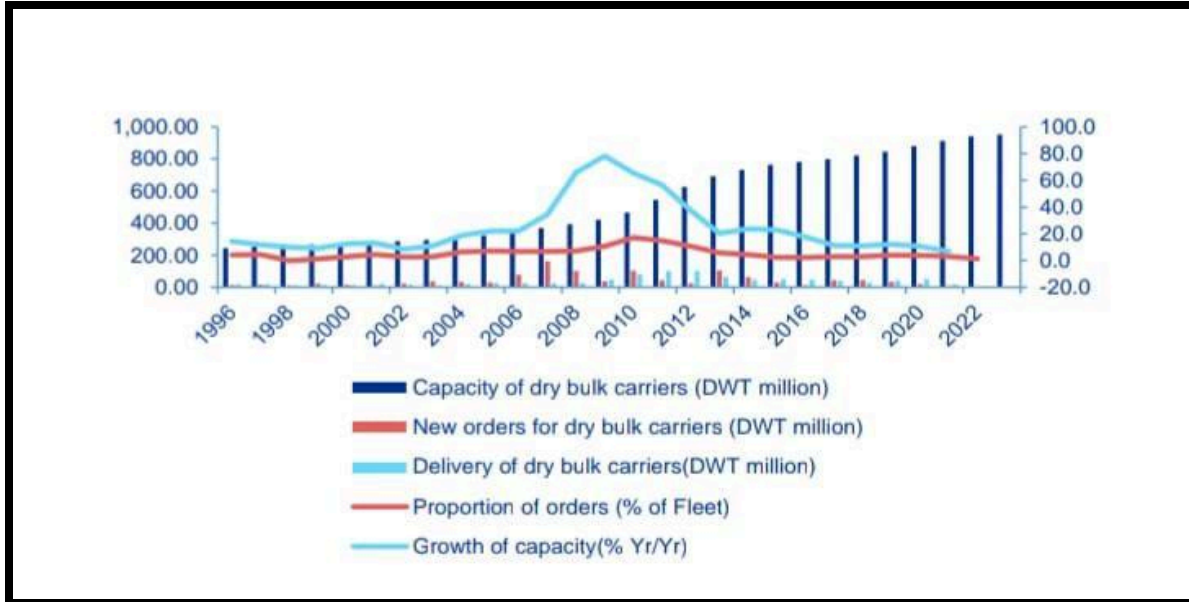


Figure 2 analysis of dry bulk carriers, Source (Lindstad et al 2015)

The international dry bulk market's capacity supply and growth rate from 2001 to 2020 are shown in Figures 4 and 5, respectively. The data originates from Clarkson's shipping information network. Due to low demand and an oversupply of available transport options, the dry bulk industry is expanding its transport capacities at an alarming rate (Jing et al., 2008). Reports indicate that in 2015, there was an excess capacity of more than 30% of dry bulk cargo over the world. There has been pressure on the shipping industry as the rise in transport capacity in recent years has been more than twice the increase in transport demand.

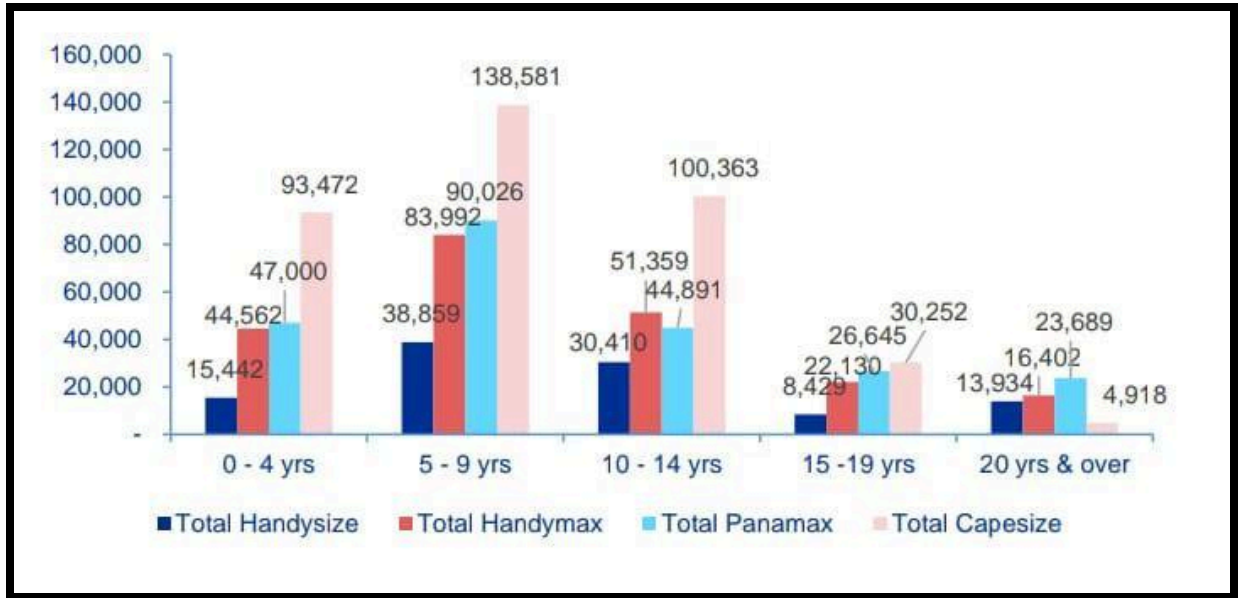


Figure 3 demand in types of dry bulk vessels, Source (Yin et al., 2019)

Based on their design and deadweight tonnage, bulk carriers can be categorised as Cape of Acceptable Hope, Panama, or handy. The handy type is divided into the large handy type and the small handy size based on the difference in tonnage. Figure 6 shows the percentage of total dwt carried by various ship types in the dry bulk market. Capsized means the ship has a deadweight tonnage of more than 80,000 tonnes (Fan et al., 2022). Capsized ships are the only vessels capable of sailing between the Atlantic and Pacific Oceans, and they do it by way of the Cape region. Shipping companies based at the Cape of Good Hope often transport bulk goods like iron ore and coal. Several major sea routes connect North America and Australia with the Far East and South America and Australia with the Far East and Western Europe. Panamax is the largest bulk carrier that can pass through the Panama Canal while fully loaded, with a deadweight of 60,000 to 80,000 tonnes. Coal and grain are Panama's two most common commodities (Fan et al., 2022).

Deadweight tonnes for Handy size and Handymax are 20,000 to 50,000. Tonnage allows us to divide Handy size/Handymax into two distinct size classes: large and small. Huge ships, defined as having a deadweight tonnage of more than 40,000 tonnes, and little ships, defined as having a deadweight tonnage of fewer than 40,000 tonnes, exist side by side. Versatile ships of modest tonnage have greater adaptability to various ports and routes than their larger counterparts (Fan et al., 2022). The dry bulk shipping industry across the globe has seen a rise in the prevalence of

mega-ships in recent years. Enhanced manufacturing technology and shifting transportation needs have led to this shift. There are two main paths that the large ship can take: the first is the large-scale average DWT of dry bulk carriers, and the second is the large-scale structure of dry bulk carriers. The construction of such massive vessels includes the rising popularity of large dry bulk carriers in international trade, the maturation of shipbuilding technology providing a solid technological basis for such vessels, and the need to transport ever-increasing quantities of goods (Bendall & Stent, 2005). The infrastructure for the massive building has been improved thanks to developments in port construction. Commercial operators can reap additional economic benefits from using large ships, such as reduced energy usage per unit of cargo and reduced building costs per unit capacity. Major influences on the accessibility of dry bulk transportation include:

- In shipping in dry bulk, the primary factor influencing the availability of ships on the market is the size of the fleet, which is synonymous with market capacity (Chisté & Gary, 2014). Both the rate of new ship construction, the rate of its utilisation, the rate of demolition of older vessels, and the rate of damage to vessels from external sources determine the capacity. Fleet size has expanded recently to meet market demand in response to rising dry bulk trade volume.
- When the shipping market is bad, and there is more supply than demand, some of the dry bulk ships in the fleet will sit idle. Because of the financial losses that might result from falling ship rent and freight costs, shipowners regularly resort to shipping storage methods.
- The efficiency of the global fleet in moving people and goods around is easily understood to directly impact the availability of transport capacity. As an illustration, the market's supply of transport capacity will be unintentionally impacted by factors like the level of congestion of ships at ports and the efficiency with which commodities are loaded and unloaded at ports (Chisté & Gary, 2014).
- Productivity in ship operations is measured in terms of the dwt hauled per unit of time. The fleet's transport capacity is heavily influenced by operational productivity, also known as operational efficiency, while deciding on fleet size.
- As the dry bulk market has grown, larger ships have been rising thanks to constant improvements in shipbuilding technology. Because of technological advancements, shipping times have decreased, increasing transportation efficiency.

### **Markowitz's model of portfolio selection**

If one had perfect insight into the future, one could invest without worry. If they were given unrestricted discretion, they would select the ideal investment strategy that generated the greatest possible return (Rubinstein, 2002). Given the unpredictability of marine conditions, a ship's captain should constantly be prepared for the worst. The problem at hand is not hedging against a particular future set of circumstances but rather holding a precise mix of physical contracts such that the shipowner has hedged market risk to the proper level, taking into account the probabilities associated with the range of conceivable future occurrences. The Baltic International Freight Futures Exchange (BIFFEX) began trading in London on May 1st, 1985, providing shippers with additional options for hedging against market changes. The Baltic Freight Index (BFI) is used to gauge the health of the dry bulk shipping market by taking the weighted average of the largest deals in the market (Cullinane, 1991a). Owners and charterers vulnerable to a drop in freight rates might hedge their exposure by buying and selling futures contracts reflecting the BFI's estimated future value (Cullinane, 1995). The ideal amount of typical BIFFEX contracts for hedging purposes for a dry bulk market owner will vary depending on the owner's present and anticipated mix of physical contracts in the market.

Every shipping company looks for the optimal mix of futures and physical contracts. Potential gains and losses are both higher. The level of risk an owner is willing to take depends on their situation, values, and goals. That is why there is no such a thing as a transport-friendly climate. If the shipowner invests sufficient money in the actual and the futures contracts, then time charters, voyage charters, freight futures contracts, and so on can all be considered investments. Finding the best hedging plan for a shipowner is a lot like finding the best mix of market investments for an individual investor. This paper uses **Markowitz's (1952)** original portfolio theory for the dry bulk shipping industry to determine an investor's optimal portfolio of market investments and investigate the potential role of BIFFEX in supporting ship owners in creating more adaptable hedging strategies. When used broadly, the Markowitz portfolio selection model can help decision-makers and investors choose the best mix of market assets to achieve their desired level of risk and return. This is achieved by modelling how the level of risk a customer is willing to take affects the ideal investment recommendations. Taking market conditions and ship owner risk attitudes into account as inputs to the portfolio selection process expands the approach's usefulness. The idea is that the standard deviation (SD) of the portfolio's returns over time might



be a basic estimate of the investment's riskiness. Since beta and standard deviation are used to measure an investment's risk, they should also measure the volatility of the investment's returns (Cullinane, 1995). Taking up more risk means that your potential reward is less assured. Since there is no risk involved in making a return if there is no reason to question that it will eventually accrue, this analogy holds true even in the most extreme circumstances. This method's variance is larger than the standard deviation, but the risk assessments of investment options and the subjectively optimal portfolio are the same. Standard deviation is a more visually appealing measure of risk than variance since it is expressed in the same units as the returns. Its significance may be displayed via a graph. However, for analytical clarity, we will utilise variance as the appropriate risk indicator in this paper. The first step in using Markowitz's portfolio theory for ship owners is to take stock of all the market investment options. They represent the ship owner's financial stake in the business, whether large or small.

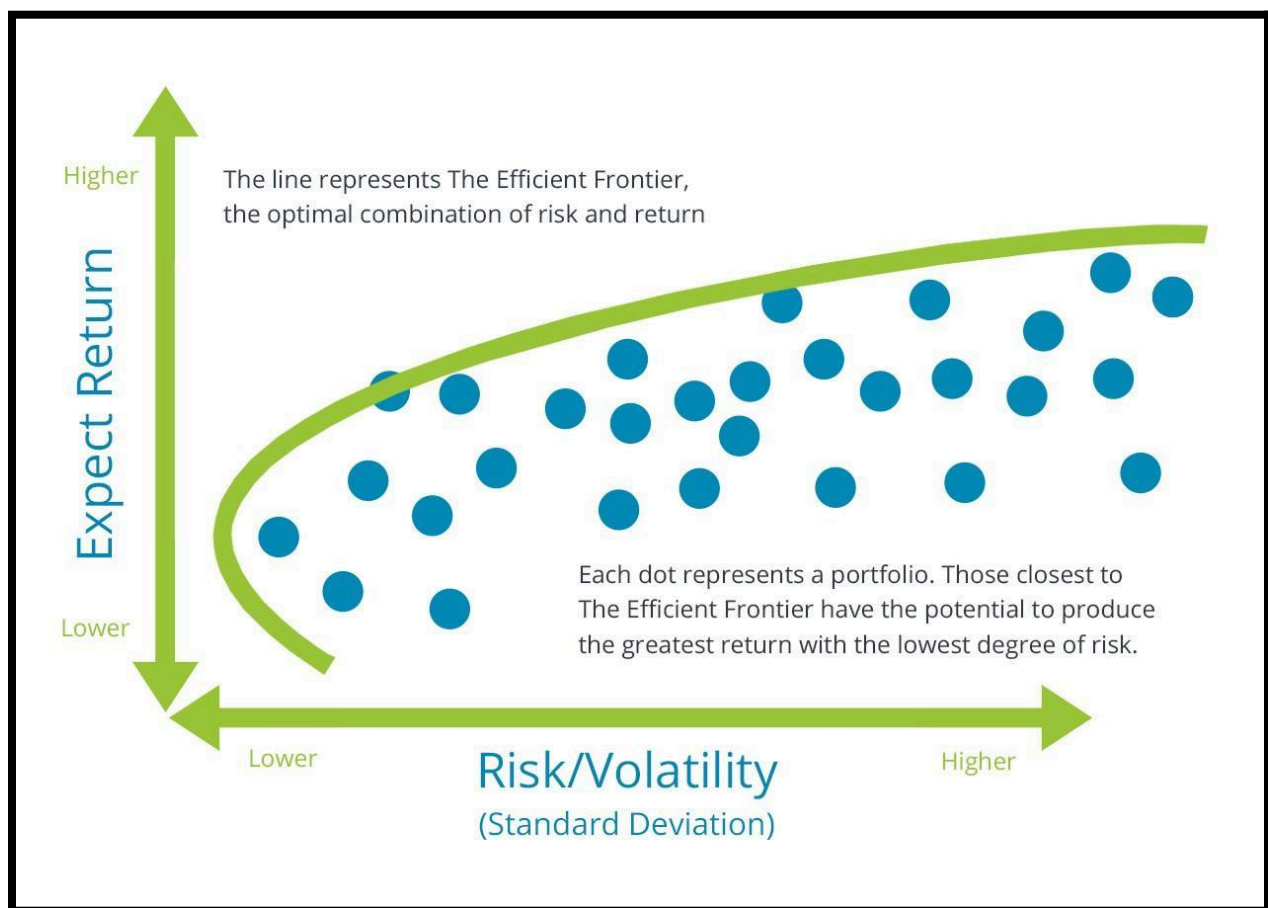


Figure 4 Illustration of Markowitz model of portfolio selection, source (Francis, 2014)

### **Factors that affect the market of dry bulk shipping**

The shipping business cycle can be a best-made sense of the collaboration between supply and demand in maritime transport. The initial step of the shipping cycle, known as the "trough", is portrayed by an abundance of limits. It connects with when ships begin gathering at ports. The freight costs are ordinarily low because of the slow operations of ships. The second step of the shipping cycle is known as "recuperation", in which supply and demand remain closely connected till they arrive in harmony (Stopford, 2009). During this stage, ships start moving out and taking new requests. The freight charges begin expanding. The third step of the shipping cycle is known as the "top", which contains high freight rates on the lookout. Supply and demand are constantly met, so the shipping business works at its pinnacle of benefit. Practically the ships are all in activity. The fourth phase of the shipping cycle, for example, "breakdown", happens when the supply surpasses demand. During that, the freight rates start to diminish. By and by, ships and holders begin collecting in the ports (Chou, 2014). Functional ships start to dial back their operations, which might take more time for products to get conveyed.

The basic role of this composition is to recognise and examine different variables which will influence the everyday business of a dry bulk shipping organisation (Cox, 1979). Recorded beneath are a portion of the variables that will straightforwardly affect the shipping cycle of the dry bulk shipping organisation. These elements will be discussed while keeping in view the four stages of the shipping cycle.

### **Target Market**

The segment qualities of a market that a dry bulk shipping organisation will target assume a significant part in its fruitful activity throughout every one of the periods of the shipping cycle. In the target market, "the determination of courses is of critical significance. That multitude of courses having popularity is fitting to be considered for choice. It is not feasible for another dry bulk shipping organisation to cover all courses. Its operations will rather begin on chosen courses. If the organisation endures a solitary shipping cycle, because of the benefit produced by that business cycle, it will grow and cover the other excess courses" (Schøyen & Bråthen, 2011). The objective market considers the shipping business, which affects the obligation to value proportion of the dry bulk shipping organisation as, without a shrewd choice of maritime

courses, the organisation will experience the ill effects of high obligations making about less money to stay with the running.

### Start-up Costs

Start-up costs consume a large portion of the capital in the recently sent-off dry bulk shipping organisation. The related charge for opening another shipping business is around \$750. The cost connected with protection allows and licenses add up to \$5,000. A sum of \$50,000 will go into leasing an office for the kick-off of the reasonable office. The cost of PCs, printers, fax machines, furniture, phones, recording lodges, security devices and gadgets for an estimated medium office will add up to \$15,000 (Laulajainen, 2007). An authoritative website will cost \$700. A few other extra uses incorporate business cards, signage, and adverts which will add up to \$2,500. A gearless boat of 6,500 to 12,000 TEU goes from \$74 million to \$105 million. For another shipping organisation, buying new ships would not be a decent choice since it would require a ton of assets (Lindstad, Sandaas, and Steen, 2014).

It would be smarter to employ some dry bulk cargo ships on an agreement for a business start-up. A medium-measured dry bulk cargo ship can be leased for \$234,000 daily. Expecting that the dry bulk cargo shipping organisation claims 4 of such vessels working for a month, the all-out related cost for beginning a shipping business will add up to roughly \$30 million. To look for a reliable advancement of dry bulk shipping organisation, the pattern of the general shipping market should be seen to recognise the fourth phase of the shipping cycle, for example, "breakdown", which will eventually help the organisation in finding inactive cargo vocations at decreased rates (Kavussanos & Alizadeh-M, 2001). The advancement of 1-year time contract rates for various bulk transporters is introduced as under:

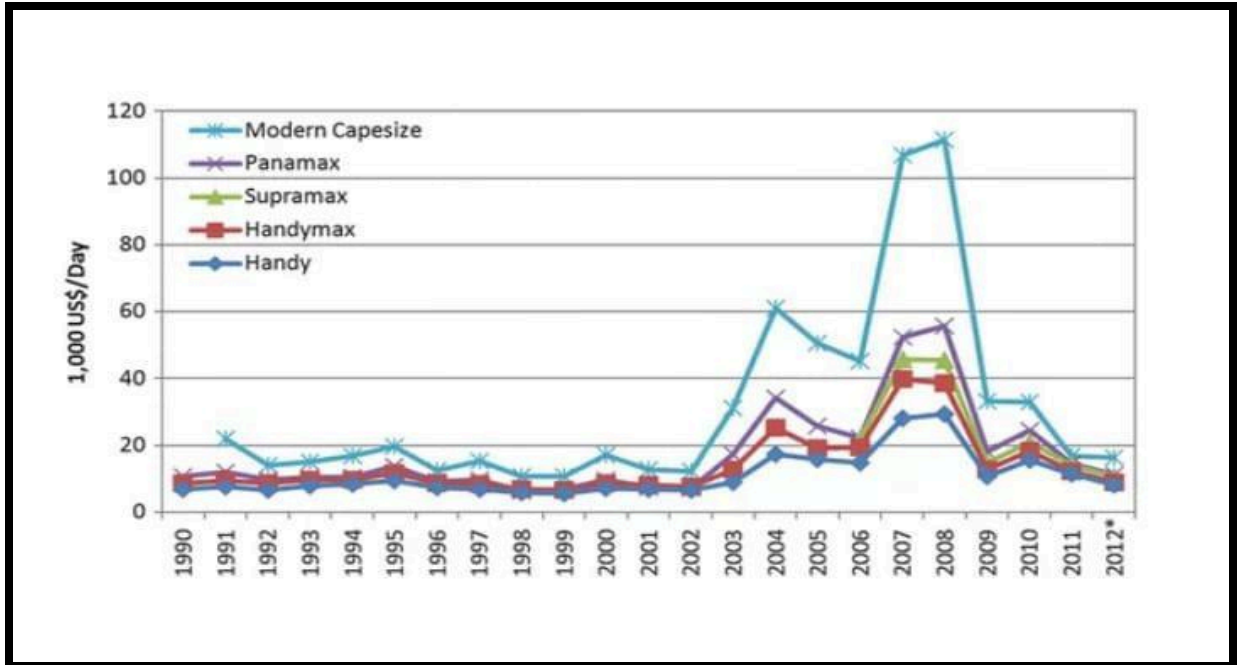


Figure 5 The advancement of 1-year time contract rates, Source (Fan, 2021).

### **Operations and Related Costs**

To the extent that the costs connected with operations are related, these are influenced quite a bit by control, and associations have practically zero power over them. Three of the fundamental costs related to operations which assume a significant part in the total shipping cycle incorporate shelter the board, acquirement, and asset use. The cost includes wages, operational costs and company daily expenses or consumptions, and these are the costs which cannot be regulated during any stage of the cycle (Cullinane, 1991b). However, the variable costs, like vessel support costs; dugout costs, can be controlled and regulated during the shipping cycle stages, especially when the company needs to save assets and reduce its financial burden.

### **Crew Costs**

Crew costs represent over 60% of the absolute working costs (Lasserre, 2014). During high oil costs, crew compensation increments because of expanded demand for gifted and experienced seaward staff. Subsequently, with the coming of low oil costs, when the vessels leave the business, the demand drops thus does the demand for the previously mentioned labour supply. The dry bulk shipping organisation cannot just cut the wages since it will make a gamble of losing great individuals. Crew costs can be controlled and limited during the downturn with brief

length change cycles between 4 to 10 weeks, which will hold the talented and lessen the yearly crew costs.

### **Fortification Administration**

The rising fuel costs have made fortification administration the highest working cost of dry bulk shipping organisations. Fortifications hold over 40% of the functional costs of dry bulk shipping organisations (Catalani, 2007). By utilising new fuel-saving advancements, the organisation can acquaint creative systems with lessened fortification costs. Even though dugout is aware, the dry bulk shipping organisation can accomplish reserve funds for client lower quality energises where accessible.

### **Acquisition**

In many shipping organisations of worldwide impact, the system embraced for reserve funds in cost all through the shipping cycle chiefly contains a decrease in terminal costs, the intermodal costs including feeder's vessel enlists and by utilising demands for citations to know the specific and reasonable time for making new buys. For this situation, while the market is blasting, the dry bulk shipping organisation will exchange with cutthroat port administrators to decrease the costs connected with capacity, treatment of dry bulk, port costs and other assessorial expenses (Goldsby, Iyengar and Rao, 2014). While the market is down, the organisation can complete the market examination to know when the supplier's cost for shipping, rail, and feeders is low and utilise an opportunity to lay out the right valuing structure. Such systems utilised by other shipping organisations have brought about investment funds of up to 10% of the all-out capital.

### **Asset usage**

Dry bulk shipping organisations can take advantage of the stowage arranging and holder armada the board to improve the asset use during box and breakdown. Assuming done correctly, it might reduce the armada size, consequently saving the shipping organisation from the additional lease of inactive ships looking out for ports during low-demand periods (Jing, Marlow, and Hui, 2008).

### **Managing Unexpected Conditions**

It has been observed that sudden and unexpected conditions arise on the market's demand side, just like the covid-19 pandemic. It spread in the entire world in a blink of an eye and disrupted the economy of every sector. Apart from that, the unexpected conditions can include strikes from workers, mechanical breakdowns, and storms in water, piracy, robbery, shipcrash, sinking,

spillage, marine fiasco and natural contamination. A visible and prominent danger can also affect the route and operations of the cargo ships and have a monetary impact. In order to eliminate or reduce the financial losses in terms of sudden situations and natural calamities, the dry bulk companies are opting for protection items, which include body and hardware, guard, shelter protection and insurance etc. (Trucco et al., 2008).

### **Pricing of Dry Bulk Shipping**

The speed and the trend of dry bulk shipping are highlighted throughout the shipping cycle. For an effective marketing setting, the right price is very important. This is the factor that drives the shipping business in the right direction during the supply and demand of freight. According to Alizadeh and Talley (2011), five factors affect the freight rates in the maritime market. This factor includes the world economy, global trading trends, perceived benefits, political stability and transportation costs. From the supply side of the freight market, efficiency, shipbuilding, and cargo value act as major factors. The variables defined above are interconnected, and amalgamation of them gives the pricing of the dry bulk shipping. The model below defines the connection between the variables. To progress in the shipping industry, the shipowners are expected to balance the world economy and legislative problems.

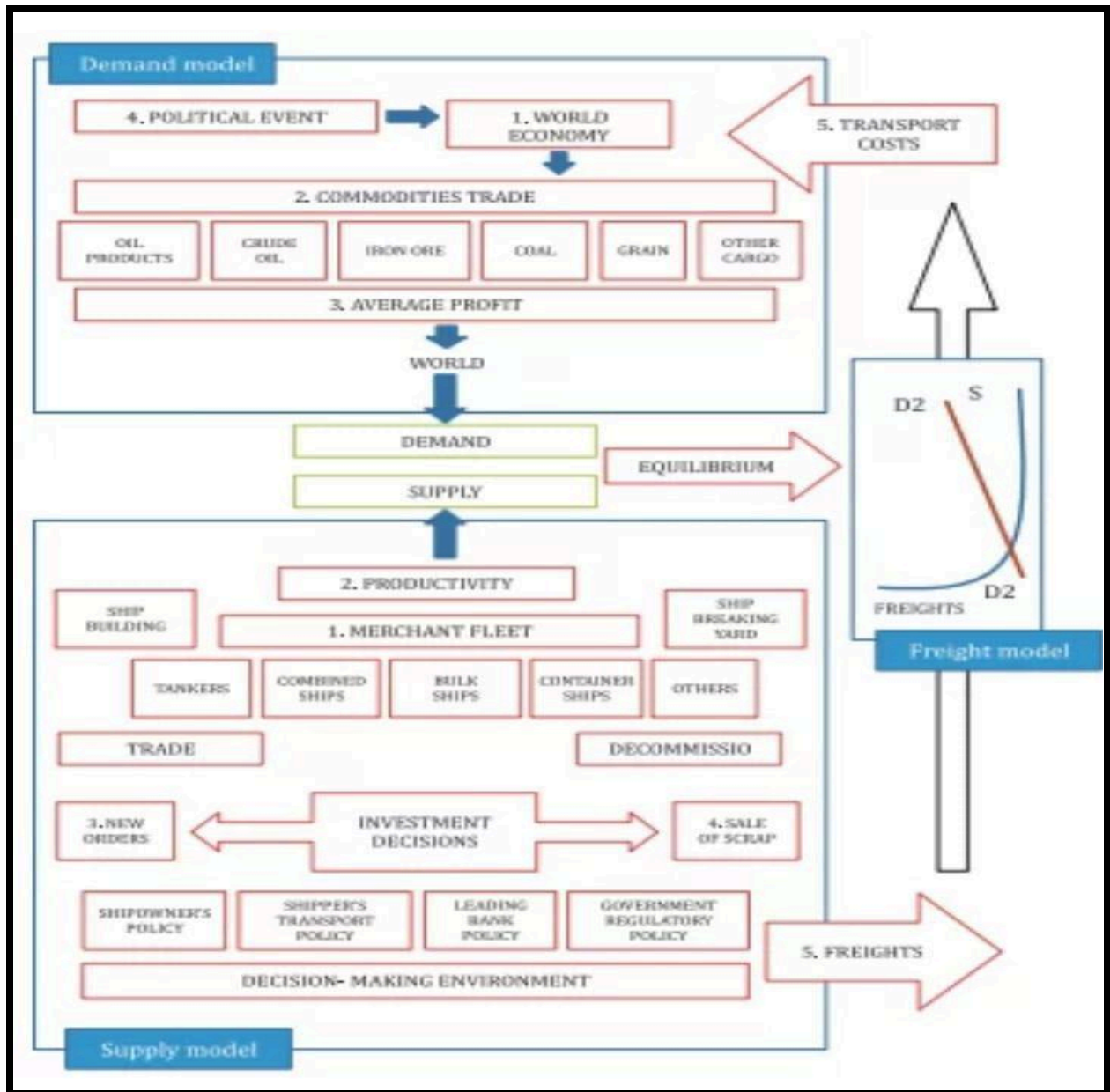


Figure 6 demand and supply model of Dry bulk shipping (Francis, 2014)

### Marketing Procedures

For example, shipping organisations have different marketing procedures for dry bulk shipping. These techniques shift to the state of the market, for example, whether it is going up or down. In this dry bulk shipping organisation, the marketing technique which will be followed will contain the following parts (Plomaritou, 2006):

## **Diagnosis**

The diagnosis of the shipping market in dry bulk shipping will comprise five stages; marketing data framework, examination of marketing climate's statements and open doors, shipping market's division, assessment of each shipping portion and the objective market's decision. The result of this training will be a viable objective market.

## **Arranging**

In arranging, first, the business goals are not entirely settled. From that point onward, the qualities and shortcomings of the organisation will be distinguished. In the third step, suitable marketing steps and methodologies will be distinguished. The last step will involve assessing expected results and finding elective marketing plans.

## **Organisation**

The organisation phase of shipping will confirm what goals are to be fulfilled by specific time constraints and by whom. This is the phase of marketing in dry bulk shipping in which every one of the assets held for marketing is used.

## **Implementation**

Judiciously arranged business plans bringing about the arrangement of fitting transport administrations are a significant piece of the implementation stage. The implementation ensures that the right administrations are given to one side charterer on the perfect opportunity at a fair cost with a reasonable advancement.

## **Control**

Control mostly contains the healing measures and circles back to all the previously mentioned exercises connected with marketing in dry bulk shipping.

## **Maritime Transportation Costs**

Worldwide maritime transportation costs are of extraordinary interest to policymakers and transporters. Taking everything into account, dry bulk shipping handles more than 80% of the absolute volume of worldwide trade through shipping. There are seven maritime transport cost determinants, as the figure makes sense. To have a total and careful what transportation costs can be looked at by the organisation in future, the organisation's experts should think about every one



of the elements displayed in the figure underneath to defeat any unanticipated misfortune in future.

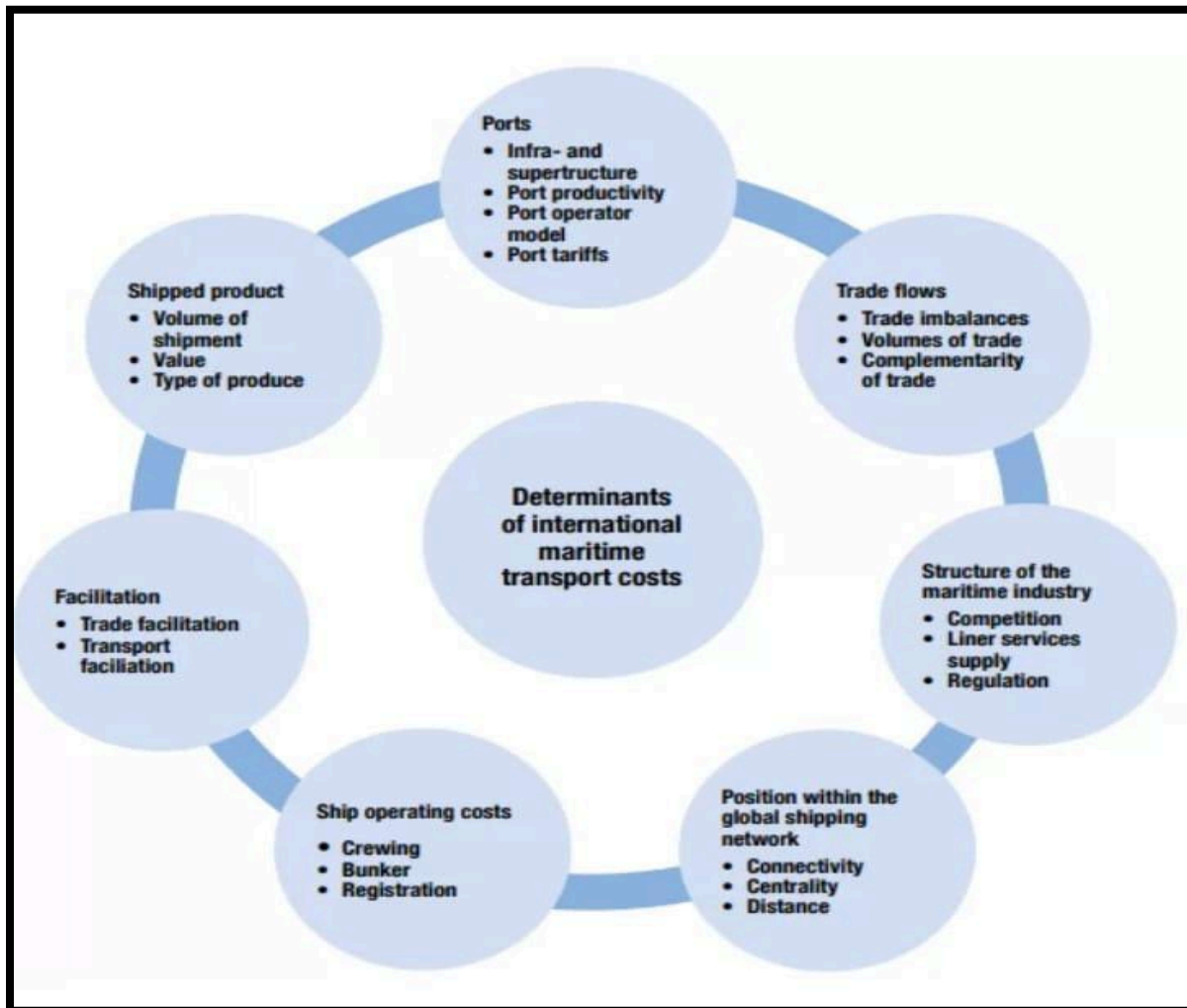


Figure 7 Factors that affect maritime shipping

### Impact of covid-19 on the shipping industry

In 2020, covid-19 spread over the entire world, affecting the countries' health and economy. As international trade was stopped, the shipping industry's economic impact was also observed. During the pandemic, huge turbulence was recorded; however, Bao et al. (2016) suggested that “despite the fundamental fleet expansion, developments in floating storage, scrubber retrofitting, and idle tonnage resulted in remarkable changes in active fleet size in the key segments”. The analysis of the Baltic index gives a clue about the ups and downs of the shipping industry. During quarter 3 of 2020, the Baltic Capsized index (BCI) was shifted to uncharted waters. The

freights of the capsized ships have reached up to 2500 USD daily. The pandemic also imposed a seasonal decline heightened by the China and USA trade war. In terms of commodities, while there were a few minor effects on supply chains, global output and demand had not been significantly impacted; in some cases, governments increased their imports to boost reserves. Brazil's record soybean crop over the summer, which was boosted by increases in US-China trade, would be a turning point for the resiliency of the seaborne grain trade. The global steel industry's negative effects on the iron ore trade have increased seaborne iron ore supplies, and Chinese iron ore imports reached a record in October 2020 (Clarksons Shipping Intelligence Network, 2020b). Several studies have recently been released about the influence of outside factors, such as COVID-19, on the shipping markets. Notteboom assessed important issues in port governance research and Haralambides (2020), including, among others, the development of dynamic approaches to port management governance approaches, targeted approaches to particular port governance issues, and the effects of a cumulative regional and international entanglement of ports.

Additionally, a structural vector autoregressive framework was built using a database of critical economic characteristics for the “Very Large Crude Carriers” (VLCC) market in Kilian et al. (2020), which led to the quantification of the elements that determine these indicators. Regli and Adland (2019) also used time series and fixture data on charter rates to investigate charterers' ability to take advantage of floating storage hedging opportunities. Gavalas et al. study, which proposes a coherent model of shipbuilding performance and evaluates the impacts of a proposed Balanced Scorecard approach, also focuses on the shipbuilding industry in the Bay of Bengal Basin countries. The authors classify the underlying shipyards' dynamics after looking for the triggering levels and the respective weights and importance of the given criteria.

## CHAPTER 3 --RESEARCH METHODOLOGY

*The research methodology is the third section of the paper. It demonstrates the bit-by-bit activity plan of the research study for the data collection decisions. It contains data about the research design and research procedures. The research design and procedures are featured by using the Saunders research onion. The methodology area completely characterises the Saunders research onion and its layers. Aside from the subtleties of Saunder's research onion, the methodology demonstrates the data collection procedure, data investigation, ethical thought and dependability and legitimacy of the research.*

### **What is research?**

Research is the essential normal propensity for the person. A feeling of reasoning and interest leads to research. Research is the result of curious human nature. Since the world's initiation, human beings have been researching and gathering data about social phenomena and nature. Every research study that has been conducted is observational, and the results of the research become hypothesis theories. Kothari (2004) indicates that research is an analytical study conducted by researchers and sociologists. As per Kothari (2004), research methodically examines the social peculiarity or logical interaction to acquire information about that cycle. Research in scholastic research is finished through a bunch of rules and guidelines; the Saunders research onion shows these guidelines. The researchers are supposed to break down various methodology stages to shape a viable and proficient methodology.

### **Saunders research onion**

The research study showcases the perception of the research and the social phenomenon. The research is the accumulation of several stages highlighted in the Saunder research onion. Saunder's research onion is a framework that depicts the anatomy of the onion. The different layers of the onion showcase the methodology layers; each layer has its importance and showcases the research aspects and explanations. The Saunder research onion was developed by "Saunder, Lewis and Thornhill" in their book to assess the research studies and researchers in identifying effective research methodology. According to Saunder et al. (2007), the research methodology is the accumulation of the five stages: "research philosophy, research approach, research strategy, research method, research time frame and data collection". The current study uses Saunder's research onion to recognise the different periods of the methodology. According

to Saunders et al. (2019), the research methodology contains different layers that ought to be perceived because these layers are related. The identification of one stage upholds the conspicuous confirmation of another stage. Saunders, Lewis, and Thornhill encouraged the research onion model to help the students and researchers in the research studies. The Saunders research onion is an uncommonly feasible and helpful model for effectively perceiving the research methodology.

Saunders et al. (2009) have also identified several sub-stages of the methodology layers. For example, in the research philosophy, the research can be of two paradigms that are epistemological and ontological. The Saunders research model is the best instrument to perceive and recommend the most suitable strategy for the method. The subheadings of this part address the different layers of research onion and the periods of technique.

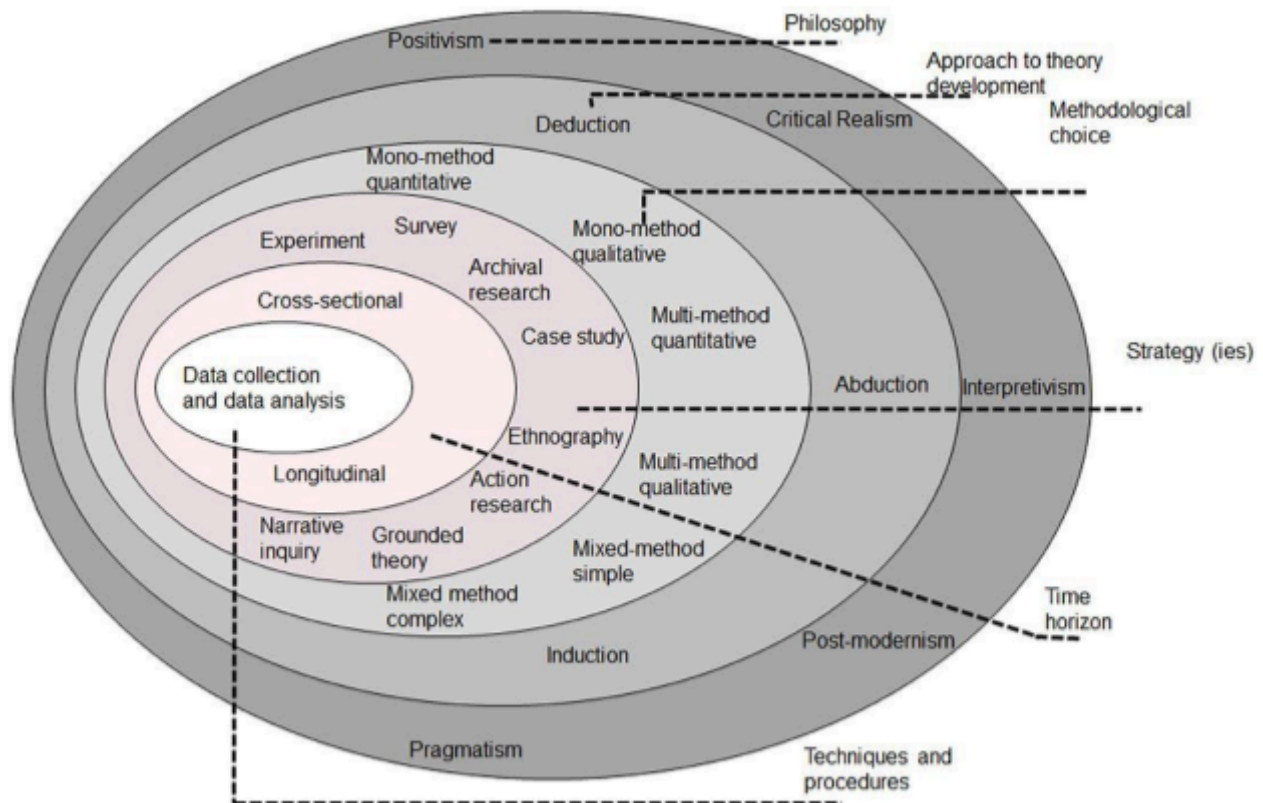


Figure 8 Saunder research onion model

### **The first layer of methodology**

The analysis of the Saunder research onion has indicated that the initial layer of methodology corresponds to research philosophy. It incorporates the basic idea behind the research and how it will be conducted. The research's chief idea and purpose are defined as per the research philosophy. Identifying the research philosophy aids the researchers in identifying the research approach and further research design. Saunder et al. (2007) have indicated that it is very important to identify the research paradigm to identify the research philosophy. All the stages and methodology are defined as per the requirements of the research aim and objectives. The current research study is an epistemological paradigm; epistemological research is conducted to analyse social phenomena through observation and explanations. Saunder et al. (2012) have indicated that epistemological researchers are more inclined towards three research philosophies: "realism, positivism and interpretivism". Each of these research methods of reasoning relates to various sorts of research studies; to choose one, seeing every one of the three, is vital.

#### **"Positivism Epistemology"**

In positivist philosophy, the researchers subjectively observe nature and social phenomena. This philosophy claims that the world and its social nature can be understood and comprehended subjectively. In this type of research, the researcher acts as an objective analyst and as per being the researcher, he dissociates himself from the personal values and opinions about the phenomenon. In this type of research philosophy, the researchers work independently and have no judgmental approach (Cameron and Cost, 2009). However, the current research study does not follow the positivism philosophy because the aims and objectives of the research need a more dynamic approach.

#### **"Realism Epistemology"**

Realism epistemology is another methodology for the epistemological paradigm, and this philosophy is associated with coherent discernment. Saunders et al. (2012) perceived this philosophy as the most sensible philosophy for the two sorts of research procedures. There are two sorts of approaches in the realism philosophy: quick authenticity and essential authenticity. This sort of philosophy relates to the approaches to acting and the impacts of the parts. This sort of research philosophy moreover acknowledges that the fact of the matter is the consequence of intelligent insight and social approaches to acting.

### **"Interpretivism Epistemology"**

The third type of philosophy that epistemology follows is an interpretivism philosophy. It is a highly opted philosophy; the researchers involved in interpretivism research are known as interpretivism. In this philosophy, interpretivism or the researcher simply observes and interprets the factors and the aspects of the research study. According to Azungah (2018), the interpretivism research study assumes that access to reality is provided only through social constructs, which include language, communications, instruments etc. the development of the interpretivism philosophy is highly dependent on the critiques of the positivism philosophy. All three epistemological philosophies are interrelated with each other. The interpretivism philosophy is highly suitable for qualitative research in which theories are tested and explanations are provided because, through this philosophy, the explanation and comprehension are done easily. The interpretivism philosophy is highly linked with the idealism, and it is used to analyse and observe different social phenomena through different perspectives. In this type of philosophy, the researcher acts as a social actor who observes the phenomena from different perspectives.

Moreover, the interpretivism philosophy highly focuses on the meaning of social methods. The current research study follows the interpretivism philosophy because it is highly suitable and aids the researchers in acquiring the aims and objectives of the research. This research philosophy is used to gather data from different sources and interpret their results after analysis.

### **Second layer Research approach**

The second layer of the research onion tends to the research approach. The research approach is portrayed as the developmental game plan of the research study; it includes the strategy for the research focus on which the researchers will finish the research. The research approach analyses the perception; there are two kinds of inductive or clever frameworks (Mayer, 2015). The sensible approach is where research is brought through statically using logical means. However, the inductive approach consolidates speculative methods.

The researchers have picked the inductive approach for stream research; it assists the researcher with translating the perception and looking at it through words (Thomas, 2006). The inductive approach is suitable for Interpretivism thinking and the epistemological paradigm. The gathered data is kept abstract to give elaborative answers to the research questions. The disclosures of the

data accumulated will be checked out through emotional means; hence, the inductive approach best suits the research study.

### **Third layer: Research strategy**

The research decision is the third time of the procedure and the research onion model; it is the strategy for the research study through which data grouping will be finished. It includes the examinations and effort of the researcher to lead the study. The research methodology can be of numerous sorts, which integrates preliminary, relevant examination, grounded speculation, methodical writing audit, etc. The current research strategy has settled on grounded speculation (Saunders et al. 2012). Orderly writing audit research method is more attractive for secondary research. In the orderly writing audit, the researchers gather secondary data, assessments them and draw their results. The researchers execute their results through fundamental assessment in the secondary writing audit.

The researchers of the current research study have chosen an efficient writing survey, as the research has different research questions and the outcomes of those research questions are to some degree long contrastingly; thus, the researcher requires different research systems to lead the study.

### **Fourth layer: Research methods**

The fourth layer of the research onion keeps an eye on the research methods. The research method is the researchers' approach to introducing the work (Saunders et al., 2007). The research strategy can be close to home or quantitative, yet several researchers utilise the two methods. They can be multi-method research or mixed-strategy research. In multi-strategy research, the two methods are utilised to respond to various research questions, yet both are utilised to decide one research question in mixed system research.

The stream research has used the mono method by utilising emotional data. The emotional data helps the researcher introduce the research and spotlight its message. Then again, quantitative data helps the researchers track the research down through quantifiable and mathematical data (Thomas, 2003). The overview is kept emotional only for a predominant assessment and complete portrayal of the outcomes and exposures.

### **The fifth layer of methodology**

The fifth layer of the research methodology relates to the time frame of the research in what time the research data has been gathered. As indicated by Souder et al. (2019), the time skyline of the research can be cross-sectional or longitudinal. The current research study follows a cross-sectional time skyline since every one of the data was gathered in a single time frame. The further layer of the research onion relates to the data collection strategies.

### **Data collection**

The current study is secondary subjective research in which data is gathered through subjective means. As subjective research gives various types of data collection for primary data, the method utilised for secondary data collection is perceptions. Secondary data is the pre-gathered data previously utilised in various research previously. This kind of data collection is time compelling and practical. The research will gather data from online sources and distribute research papers. The data will be gathered through Google scholar, Wiley online library, NCBI, Researchgate, Elsevier, Science direct, CDMI and Proquest etc. The secondary data is selected in this current research because research studies like (Gauci-Maistre, 2009; Fan, 2021) have analysed the performances and investment decision of the top rate companies. The data about the performance and investment decision of the shipping companies in the selected researches have been gathered from the NASDAQ. The research will involve key words for looking at the pertinent writing sources. The keywords incorporate "dry bulk shipping, risk, challenges and investment", etc. by utilising the interesting catchphrase, various appealing articles can be chosen. Detailed and analytical data have been gathered from the secondary literature sources, the secondary data is select because it gives effective information and the analysis done by the previous researchers. NASDAQ is the American stock exchange based in New York City. It is the most active stock trading venue in the US by volume, and ranked second on the list of stock exchanges by market capitalization of shares traded. From the official webpage of NASDAQ the performance in terms of revenues, costs, expenses and investment is gathered. The statistical analysis show in the further section is based on the information collected from secondary literature sources. The researcher will utilise critical inspecting to choose the sources. Critical testing is a kind of



examination where the researcher chooses the sources according to his own choice. This kind of testing is compelling in secondary research.

Notwithstanding, critical testing can prompt bias and prejudice in research. Through research, the researcher has shortlisted ten articles connected with the research goals and questions. In the wake of shortlisting each article, we checked its unwavering quality and realness. For confirmation, the insights concerning the distributions and creators of the research are checked. The researchers have opted for purposive sampling, in which the samples are selected purposively by the researchers by their judgment and opinion. In the current research study, the researcher has selected the most relevant sources, which is why purposive sampling is used. Purposive sampling is a type of non-probability sampling in which the researcher selects the samples as per his preferences and judgment. As for the inclusion criteria, the research sources have been selected that are relevant to the research objectives and research questions. For the data analysis, qualitative content analysis has been selected. The qualitative content analysis aids the researchers in analysing the data from other resources and accumulating them to answer the research questions.

Apart from the previous literature sources, primary data from the NASDAQ Company have also been collected and presented in the last of the finding section in which the current progress of the Top Ship Inc. Company have been highlighted. The research study has selected some NASDAQ-listed shipping companies and has analysed their progress and values. The analysis of the values and the progress gives the idea about the risk and challenges of the company in dry bulk shipping.

<b>“Research protocol”</b>	“Details description”
<b>“Research online databases”</b>	“Science Direct [Elsevier], Web of Science, Google Scholar, Wiley Online, NASDAQ, Research gate”
<b>“Publication types”</b>	“Published and peer-reviewed literature sources were selected, along with authentic web pages for the data collection and NASDAQ data.”

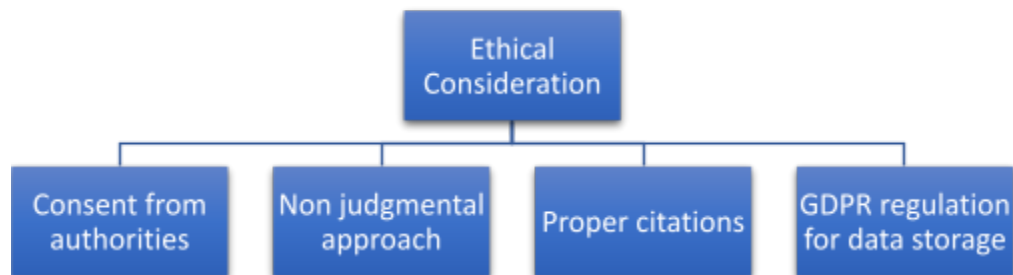
<b>“Language”</b>	“Only articles in the English language were selected”
<b>“Search fields”</b>	“Title, abstract and keywords”
<b>“Search keywords”</b>	“Risk in the shipping industry, dry bulk shipping, challenges in dry bulk shipping, shipping investment factors, freight rate of dry bulk shipping”
<b>“Inclusion criteria”</b>	“Only articles that studied shipping in the dry bulk sector context were selected.”

After the data collection, data analysis was started. The research has involved thematic analysis for the data investigation gathered through secondary sources. The thematic analysis helps the research partition the substance of sources into various subjects so that answers can be created. The topical examination is a quantitative examination wherein the data is separated into various sets per subject and investigated afterwards. Thematic analysis is a functioning course of reflexivity where the researcher's capacity and expertise play an extraordinary part. In the current research study, the data is separated into various subjects set as the effect of venture the executives in encouraging imagination, benefits of task the board, advantages of innovativeness in engineering etc.

### **Ethical considerations**

Ethical contemplations are viewed as the ethical constraints of the research study. These ethical constraints defend the privileges of the researchers and the members. In addition, these restrictions likewise secure the data and kill any data break in the research study. The ethical constraints of primary research are different from those of secondary research. The ethical constraints of the primary research incorporate informed assent from the members, intentional interest, obscurity and privacy. In secondary research, the ethical restriction is utilised to get the data. The attention to the ethical furthest reaches of the research guarantees its unwavering quality and legitimacy. In the current research study, the researcher has kept the rule and guidelines of the "data assurance act, 2018" (Gov.Uk, 2022) and GDPR. Aside from this guideline, the researcher has dealt with different limitations, taken assent from specialists, and

gained a non-judgmental approach. They have guaranteed appropriate in-text references and references.



*Figure 9 Graphical illustration of ethical limitations*

### **Consent from authorities**

In the secondary research, assent from the specialists like teachers and managers are extremely vital; the researchers have taken consent from the specialists to proceed with the research and data collection. The data will be kept in the researcher's PC and individual USB. After finishing the research, the data will be put aside for a long time, and afterwards, it will be erased.

### **Nonjudgmental approach**

In secondary research, the conviction and inclinations of the researcher can start bias and prejudice in the research study, and the researcher is supposed to gain a non-judgmental approach. In secondary research, the researcher ought to examine and decipher the outcomes non-convictions ought to be shared; in this way, in the current research study, the researcher has obtained a non-judgmental approach to dispose of the gamble of bias.

### **Proper citations and references**

In secondary research, citation and referencing hold great value; in secondary research, the researcher gathers data from previously published sources. A lack of citation and referencing can

cause ethical issues, which can affect the authenticity of the research; therefore, researchers need to focus on proper referencing and citation in secondary research.

### **Technical check of the research**

The technical aspect of the research study needs to be evaluated in order to maintain the authenticity and the credibility of the research. Generally, the technical aspects of the research include a discussion of the validity of research, reliability of research, ethical limitations and the generalizability of the research. The researcher has ideally focused on this technical aspect to maintain the integrity of the research study.

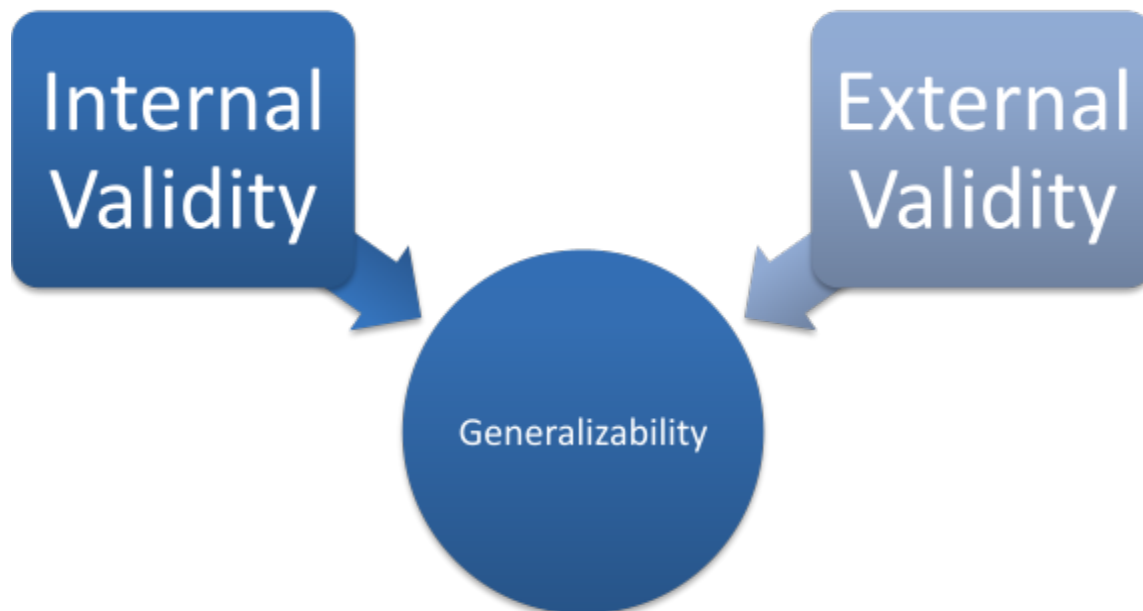
### **Reliability of the research**

The reliability of the research is the name of the consistency of the research. When accurate results are achieved again and again, then the result is said to be reliable. When a consistent result is achieved through multiple checking, and when the result is not influenced by the external factors, then the research is said to be reliable and successful because, in the research where the results are altered during multiple checking, it indicates that some error was caused during research. Honor & Smith (2015) have defined research reliability as “the degree to which the consequence of the research is consistency and validity”. The research reliability indicates towards the successfulness of the research study. In the current research study, the research has analysed the results effectively and has evaluated the secondary sources efficiently to detect any type of error or inconsistency. The research has successfully adhered to and followed the underlined and the standard method of data collection and analysis to avoid any type of error. Thenasegaran (2009) claimed that the reliability of the research is more concerned with the quantitative results because they can be calculated again and again, whereas in the qualitative research, the observations can be different, so analysing the reliability of the qualitative research is a complex task.

### **Validity of the research**

The validity of the research indicates the authenticity and the trustworthiness of the research study. The research validity indicates that how effective the research is and how well the results

of the research study are represented. The validity indicates that the results that are gained in a closed setting with selected participants should be similar to the open environment in a real-world setting with excessive participants. Thanasegaran (2009) defined the validity of the research as “The extent to which the results really measure what they are supposed to measure”. In the research study, the validity is directly linked to the generalizability of the research, and in the aspect of generalizability, there are two domains of validity that is internal validity and external validity. The internal validity is defined as the “*the extent to which the observed results represent the truth in the population we are studying and, thus, are not due to methodological errors*” whereas the external validity is defined as “*the extent to which the results of a study are generalizable to patients in our daily practice, especially for the population that the sample is thought to represent*”. The validity of the research is analyzed in the earliest stages when the participants are selected, and the data is collected. A slight error in the validity of the research can have hazardous effects on the results of the research and technical aspects of the research.



*Figure 10 relation of validity with generalizability*

### **Generalizability of the research**

The validity of the research ensures the generalizability, when the research is conducted and results are derived, it should be ensured that the results are applicable to the entire population

and the concerned areas. Carminati (2018) defined generalizability as the extent to which the result of the study is effective and useful for the bigger populations and the general world. The reliability and the validity work for the generalizability of the research.

## CHAPTER 4--RESULTS AND FINDINGS

*The fourth chapter of the dissertation details the collected data from secondary sources and the NASDAQ. The data from these sites give an elaborative idea about the risk and investments of shipping companies in the dry bulk sector. This chapter has analysed the data and achieved the research's aim.*

### **Risk in the shipping industry for owners**

The ups and downs in EBIT are a source of "operational risk," which every shipping firm must be prepared to accept to stay in business (EBIT). The risk involved is proportional to the degree to which the company's revenue and expenses fluctuate. Freight prices, trip expenses, operational expenses, and currency exchange rates play a role in the shipping industry. The asset value of a ship, which varies substantially with the phase of the transportation cycle, is a major contributor to the shipowner's total cash flow condition. Therefore, investors should also consider the risk associated with owning a business (Kavussanos & Visvikis, 2006). The failure of a ship's counterparty to fulfil their end of a transaction is the source of counterparty risk, another important factor for shipowners and managers to consider (Dash, 2004; Smith & Walter, 2003). The probability of default is defined as the possibility that the default will occur in exchange for reimbursement (freight/hire), which is always high in the case of maritime transportation.

Another thing that might hinder a company's ability to make money is the possibility of accidents and losses on board a vessel. A shipowner/manager needs to consider interest and currency rates, just as it is for any other foreign business. Exposure to these risks may be disastrous for a business in the shipping sector due to the high revenue and expenses (Kavussanos, 2009).

Since business cycles affect several sectors of the economy, shipping trends tend to mirror the economy as a whole. If a shipowner wants to reduce his vulnerability to market fluctuations, he has to have a firm grasp of the cycles that underpin the shipping sector. It is important to separate long-term developments from more recent trends. Cournot used the phrase "secular trend" to describe the prior long-term cycle (Cournot, 1927). These reoccurring patterns have been seen for quite some time and are used to separate short-changes in the economy that is short-term against the longer-term tendencies that have been seen (Pietersz, 2009). These changes, which may be hard to predict and are often brought on by changes in technology, the economy, or the geography of a company's target market, can significantly impact businesses, regardless of their

current success or failure. The 'business cycle,' the second kind of cycle, is perhaps the most important. Understanding the shipping industry's business cycle and the elements that influence it is crucial. It is common for shipping cycles to go through four stages: a low point, a period of recovery, a peak, and a subsequent decline. In his analysis of the marine business during the last 266 years, Martin Stopford (2008) identifies 22 cycles and notes a trend toward shorter cycle durations. The usual cycle time has dropped from 12.5 years in 1743 to 7.5 years in 2003 due to technological developments and enhanced global connectivity. When market cycles are shorter, market recoveries and crashes are more abrupt because each stage lasts for a shorter time. So that they may cash in on upswings and protect themselves against downturns, shipowners need access to accurate prediction tools. The third cycle is seasonal, most evident in the shipping business. When demand is strongest during specific times of the year, the cost of transporting certain goods tends to rise. Late September and October see the North American crop arrive at sea for transit, resulting in a spike in grain movements and a correspondingly high demand for oil shortly before winter.

### **Investment in the dry bulk sector**

The dry bulk market may be broken down into two separate categories, the first of which is based on vessel size (Capesize, Panamax, Handymax, and Handysize) and the second on vessel employment (three various types of contracts) (spot, 1-year time charter, and 3-year time charter). There are 12 (3x4) projects to pick from when considering these two sets combined and making the right investment decision for each call for knowledge of profit margins, standard deviation, and correlation coefficient. Table 1,2,3 displays the average and standard deviation of monthly earnings from 12 independent projects between December 1991 and May 2009 (GAUCI-MAISTRE JEAN-PIE, 2009). Our hypothesis is supported by the data in the table, which shows that 1) shorter contract durations generate higher revenues and 2) bigger vessel sizes are appropriate for a smaller number of trade routes, increasing the risk involved (standard deviation).



Type of dry bulk ship	Mean TCE	S.D (standard deviation)
Capesize	30,489	31,129
Panamax	18,634	17,463
Handymax	14,591	11,450
Handy size	11,239	8,643

*Table 1 summary of spot rates of dry bulk vessel*

Type of dry bulk ship	Mean TCE	S.D (standard deviation)
Capesize	28,759	28,402
Panamax	14,895	13,277
Handymax	14,584	11,459
Handysize	11,289	8,033

*Table 2 1-year charter rates of dry bulk vessel*

Type of dry bulk ship	Mean TCE	S.D (standard deviation)
Capesize	24,246	19,055
Panamax	12000	7699
Handymax	12353	6991
Handysize	10,182	5052

*Table 3 3-year charter rates of dry bulk vessel*

Researchers indicated how these four vessels fared throughout three contracts (three-year time charter, one-year time charter, and spot). In addition, the correlation coefficient is calculated by studying the profitability and standard deviation of monthly data from 1991-2009 obtained from Clarkson's Shipping Intelligence Network. Considering the wide variation in time charter rates

for Capsize bulk carriers between December 1991 and May 2009, a three-year contract is the longest in the shipping business. Rates varied from \$8,000 to \$107,500 per day, with a daily volatility average of \$19,058. During this time period, the average charter rate was just \$24,246. This low rate contributed to a high standard deviation in profits, which amounted to 79% of the mean. Based on the mean earnings plus three standard deviations, the maximum daily income would be \$81,420 at the 99% confidence level.

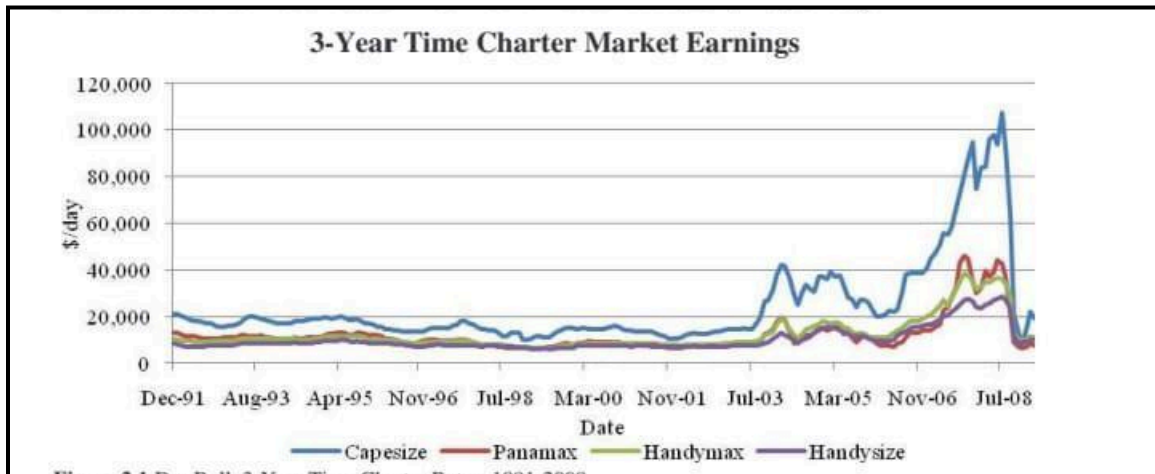


Figure 11 3-year charter market earnings (Gauci-Maistre, 2009)

Three-year comparisons of Panamax and Handymax time charter rates provide some interesting insights. Freight prices for a Panamax bulk carrier varied between \$6,150 and \$46,250 per day between December 1991 and May 2009, while Handymax bulk carrier rates varied between \$6,500 and \$38,500 per day over the same period. The industry benchmark is that even the tiniest ships generated more money than a Panamax bulker. The Handymax sector fared better than its Panamax counterpart, bringing home an average of \$12,353 compared to only \$2,000 for the Panamax sector (GAUCI-MAISTRE JEAN-PIE, 2009). Daily fluctuations in the Handymax market were also lower, averaging \$6,991. It is worth noting, however, that Handymax profits fell short of Panamax industry averages. Instead, the statistics show that, with 99% certainty, Handymax profits would top out at \$33,326 per day, while Panamax earnings would top out at \$35,070 per day—a difference of only \$1,744 per day.

The daily standard deviation for the Handy size market was the lowest, at \$5,051. During the period under consideration, the market's range was \$6,025 to \$28,375, with the low point being well below the earnings of any of the key industries. Earnings per day had a far smaller range of

possibility, with 99% of the time anticipating earnings to be less than \$25,335. The annual rate dispersion for a Capsize bulk ship from December 1991 to May 2009 is, unsurprisingly, considerably more staggering than that of the three-year time charter. The market had a daily low of \$7,800 and a daily high of \$137,200. During this time period, the average annual income was \$28,759. Plus, not much was assured statistically since daily earnings would never exceed \$113,962. There is still a large buffer zone here for average daily income (based on the mean earnings plus three standard deviations)

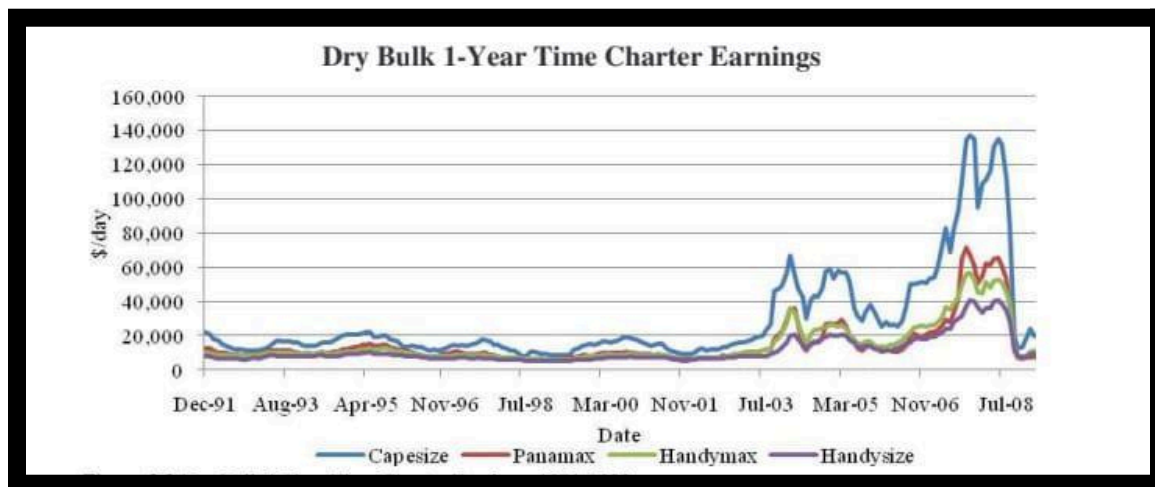


Figure 12 1-year charter earning of dry bulk (Gauci-Maistre, 2009)

One-year charter earnings in the Panamax and Handymax sectors deviate somewhat from the three-year time charter rates trend. The latter made an average of \$14,894 over the whole period, whereas Handymax averaged \$14,584 daily. Although the Panamax industry's mean profits were only \$310 more than the Handymax industries in one year, the difference in expected earnings for 99% of the time climbed to \$5,761 in favour of Panamax boats. As before, the Handymax market had higher daily earnings (\$5,813) than the Panamax market (\$5,063), which saw the lowest profits. This was only one of several standard features that filtered down to shorter-term agreements. Between the market highs, however, the Panamax sector had a daily advantage of almost \$15,000.

The correlation between vessel size and profit volatility was also verified. With a standard deviation of earnings of \$13,276 per day, the Panamax market is far more volatile than the

Handymax market, where it is just \$11,459 per day. The Handy sector's Profits were the most stable overall, ranging from \$5,088 to \$40,800 daily on average. Throughout this period, the average daily wage was \$11,288. Additionally, the market stability was increased by lowering the forecast price range, with a standard deviation of \$8,035 and earnings not anticipated to exceed \$35,393 daily 99% of the time. Finally, a few factors must be considered before determining a profit from the spot market. Larger vessels have more market access to Time Charter Equivalent (TCEs) and spot earnings indexes than Handy-classed vessels do. Because Handy size vessels are chartered for so many different routes and cargoes, it is quite difficult to construct a spot earnings index for all of them. Since Clarkson does not provide this information, we will instead consider the trip-time charter rates for the Handymax class and the six-month time charter rates for the Handy size market. Once again, the huge salary gap between short-term and long-term contracts is shocking. However, some surprising results may be drawn from the data. The first major finding runs counter to common business wisdom on the effects of short-term contracts: neither average profitability nor volatility increased for all businesses. It would seem that larger markets fared better than Handy markets in their spot market trading activities.

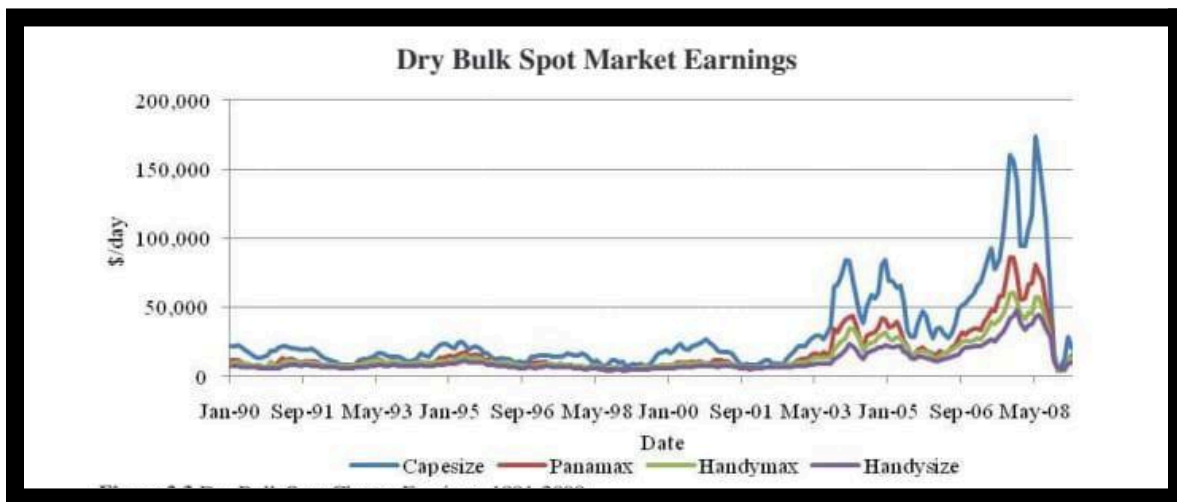


Figure 13 dry bulk spot rates, source: (Gauci-Maistre, 2009)

Rates for a day on a Capsize bulk carrier ranged from \$4,095 to \$173,703, with an average of \$30,488 between December 1991 and May 2009. The lowest-priced of the three charter types is the nadir, while the highest-priced, the peak, costs almost \$66,000 more each day than the

one-year time charter equivalent. The astonishing \$31,129 daily standard deviation much exceeds typical earnings for the business sector as a whole. There was already a lot of uncertainty in the market, and the fact that freight rates had the same probability of going up to \$123,875 (based on the mean earnings plus three standard deviations) as they had of going down to below the breakeven barrier further heightened it. Using the standard deviation of profits as a proportion of average profits gives us a measure of how volatile monthly spot profits are in the Capsize industry: 102%. Profits for shipping companies that primarily service the Capsize market may be far more than required to run the business and turn a regular profit or so low as to be inconsequential. To put this in perspective, Stopford (2008) notes that monthly volatility of 10% or more is quite unusual across most industries. The market for Panamax boats is now quite close to that of Capsize vessels, with freight prices dropped to \$4,191 per day, the lowest of all charter parties. In a similar vein, the peak of the market was \$86,244, which was over \$40,000 more each day than the peak of the daily profits chart from the previous year.

The earnings standard deviation also increased from \$1,464 to \$1,463, or 94% of the average salary of \$17,463. When comparing average earnings across markets, the Panamax sector emerged victorious, especially when compared to lengthier charter parties. By comparing Panamax spot pricing with Handymax trip charter rates, we can see a clearer and more distinct market structure emerge. The Handymax sector has smaller profitability than the Panamax sector at its lowest point. Similar to how earnings were much higher at the Panamax market's height compared to the Handymax market's peak, the same can be said for the market's low point. The Panamax market was more analogous to the Capsize market because of its higher average profitability and more freight rate volatility. The Handymax business had a little increase in average salaries, from \$14,591 to \$14,591, but a far larger variation in earnings, from \$3,985 to \$61,013 per day. There was an average daily profit of \$11,449, which is lower than the most optimistic scenario presented by the time charter. The standard deviation of annualised earnings decreased by 1% from the prior year's baseline after a period of moderate pay growth and a little reduction in earnings fluctuations. Finally, while evaluating the profitability of the Handy size fleet, it is useful to keep in mind that time charters for six months provide earnings that are most analogous to spot rates. Therefore, comparing salaries to those in other businesses may be instructive, but it is possible to introduce some degree of distortion into the picture. In the Handy size industry, a six-month time charter still provides a solid benchmark for evaluating

longer-term charters. After accounting for inflation, the profit margin expanded to between \$4,788 and \$48,125 per day, far surpassing the revenues from a Handymax voyage charter. What is interesting is that salaries fell by around 2% over the course of a year to a total of \$11,240. If earnings volatility rises even a little each day, the average profits over the whole period are 77% more likely to change favourably than adversely. Consequently, the Handy industries had a similar standard deviation in earnings relative to the averages of their respective markets.

### **Application of Portfolio Theory to Dry Bulk Market**

The interdependencies between assets, in addition to their individual characteristics, must be taken into consideration while building a portfolio. The coefficient of correlation between measures indicates the risk in investment. When taking into account bulk carriers and different contract lengths, all dry bulk markets seem to be very consistent. There was a robust link between the Capesize and Handymax markets, irrespective of charter duration. For instance, during a three-year period, the Capesize and Panamax markets showed a strong correlation in terms of time charter profits, whilst the Handy size and Panamax markets showed a lesser correlation, although one that strengthened as the charter party duration shrank.

	<b>Capesize</b>	<b>Panamax</b>	<b>Handymax</b>	<b>Handy size</b>
<b>Capesize</b>	100			
<b>Panamax</b>	95	100		
<b>Handymax</b>	98	95	100	
<b>Handy size</b>	98	93	99	100

*Table 4 3-year charter earnings (in percentage)*

	<b>Capesize</b>	<b>Panamax</b>	<b>Handymax</b>	<b>Handy size</b>
<b>Capesize</b>	100			
<b>Panamax</b>	98	100		
<b>Handymax</b>	98	97	100	
<b>Handy size</b>	99	96	99	100

*Table 5 1-year charter earnings (in percentage)*

	<b>Capesize</b>	<b>Panamax</b>	<b>Handymax</b>	<b>Handy size</b>
<b>Capesize</b>	100			
<b>Panamax</b>	99	100		
<b>Handymax</b>	98	98	100	
<b>Handy size</b>	97	97	99	100

*Table 6 Spot market earnings (in percentage) source (Gauci-Maistre, 2009)*

Since there is little to no link between the profitability of Panamax and Handy size vessels, three-year term charter parties are the most financially sound choice. However, it rapidly becomes clear that a portfolio with simply these two ships would be poor (full findings in Annex A). The expected return is \$11,091, with a potential range of \$6,242. Earnings from a fleet of Handymax or Handy size boats might average \$11,267 per year, with a standard deviation of \$5,924. The observed value is 53% less than the predicted one. When compared to the best possible outcomes, the Panamax and Handy size combination had a lower anticipated return and a higher standard deviation in the portfolio analysis. The least productive combination was a Capesize with a Panamax. Even though there is no evidence to suggest that these two vessels are abnormally connected, a portfolio that includes these two firms has a low standard deviation (\$13,091) and a highly anticipated return (\$18,123). It has been shown that a Handy size vessel's

earnings are positively correlated with those of a Panamax vessel by a factor of 0.96 for a one-year contract. However, portfolio theory yields very speculative expected outcomes. The Handymax + Handy size bundle is the most secure option, with a projected return of \$12,936 and a standard deviation of \$9,643, or 75% of the anticipated return. The portfolio analysis of the Capesize-Panamax combo, which regrettably performed poorly, was conducted. The anticipated return is just \$13,017 despite the high expected return of \$21,827 and the comparatively large standard deviation of \$20,254.

Lastly, the Intermarket correlations stress how distinct the annual time charter market is from the spot market. Capesize-Handysize had a large standard deviation (95% of the anticipated return) but a low correlation to other assets in the portfolio test. The Capesize-Panamax combo performed the poorest once again, with a forecasted return of just \$23,833 and a standard deviation of only \$23,658 (an astounding 99% of the projected returns). With Handymax-Handysize, the ROI has always been above par. Even though the predicted return of \$12,915 was the lowest of the measures we looked at, the earnings standard deviation was even lower, coming in at only 77%. There is limited opportunity for fluctuation in the financial returns (earnings) on investments in dry bulk vessels, as shown by the high degree of correlation (equal to 93%) across all profits when looking at data from a range of contract periods. According to the available data, businesses in these sectors are more likely to fail in the face of a sudden and severe fall in market conditions, like the one we are now seeing as a consequence of the ongoing financial crisis. Specialists in specific fields (like Capesize and Spot) coexist with generalists who provide a broad range of services within these overlapping markets (like Capesize and Handymax).

### **Data from NASDAQ**

The success of these businesses was measured by taking an average of their stock price from December 2005 through June 2009. The grand total was 186. We were forced to begin our investigation with data from December 2005 since we were unable to locate any earlier information for any of the 21 firms. In December 2005, an index value of 100 was added to the data in order to standardise the information and allow for a more straightforward comparison of stock prices. Considering weekly average exchange rates for each currency and inflation would



have been required to convert share prices into a single currency since various stock exchanges use different currencies. Four firms listed on the NASDAQ stock exchange met the criteria here: “FreeSeas Inc., TopShips Inc., DryShips Inc., and GasLNG Ltd.”.

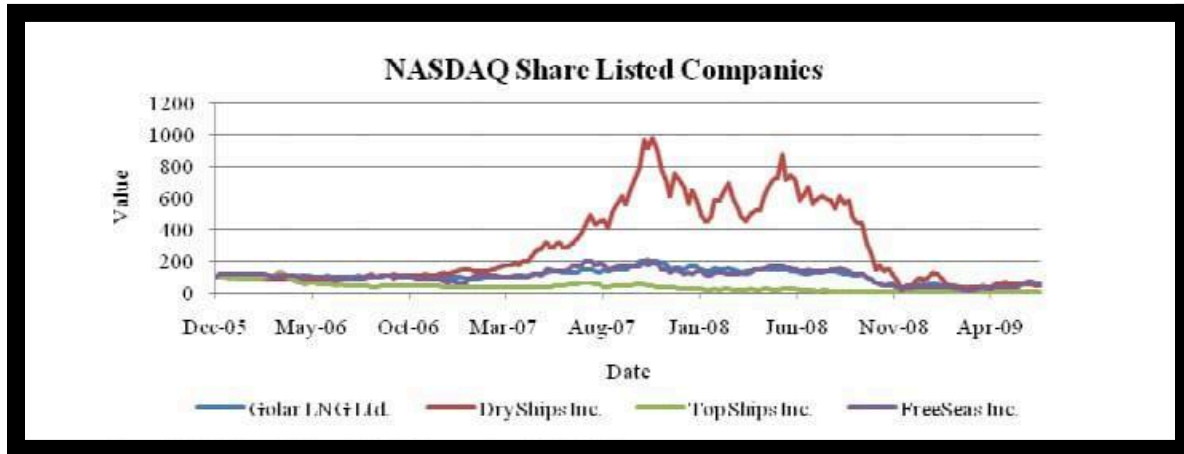


Figure 14 NASDAQ share listed companies

Company	Mean earnings per week	S.D
Dryships Inc.	107	39
Topships Inc.	287	255
Golar LNG Ltd.	36	28
Freaseas Inc.	105	45

Table 7 Summary of NASDAQ share-listed companies (Gauci-Maistre, 2009)

Based on our econometric modelling, we found that DryShips Inc. would be the most profitable (287 points) and have the least variation from the mean (89%). Compared to Golar LNG Ltd. and Free Seas Inc., DryShips Inc.'s mean was almost twice as high. During that time period, the FreeShips stock market index went from its all-time low of \$242 to its all-time high of \$982, a remarkable increase of 4,000 per cent. If profits were distributed as the mean plus three standard deviations, then 99.9% of the time, the stock price would be less than 872 points. According to

the company's website, DryShips Inc. is the parent company of 37 dry bulk cargo vessels with a total deadweight of almost 3 million tonnes. There are seven Capesize ships, fourteen Panamax ships, and three Supramax ships in this fleet (DryShips Inc., 2009). Two semi-submersible rigs, capable of working in deep waters and hazardous conditions, allow the organisation to expand (Thomson Reuters, 2009). At present, the corporation uses period time charters, motorboat charters, the spot constitution market, and dry general cargo pools for hedging and scheduling its ships; spot rates trips; time charters; agreements of affreightment; and forward cargo agreements (DryShips Inc., 2009). In the list of Nasdaq-listed companies, Golar LNG had the lowest standard deviation and a mean index value of 36%. Golar LNG proved to have the lowest standard deviation as a level of the mean record esteem, at 36%.

Furthermore, the organisation remained steady over the three and a half years while profiting from the market blast all through 2007 and 2008. The mean worth of 107 was likewise more delegated of the scope of the file esteem, which tumbled to 22 and rose to 196. The organisation is taken part in the acquisition, ownership, activity, and sanctioning of Fluid Gaseous petrol (LNG) transporters, Drifting Storage Re-gasification Units (FSRU) and Drifting Power Age Plant (FPGP) through its auxiliaries, and the advancement of liquefaction projects. On July tenth 2009, the organisation's fleet consisted of 13 vessels and a half-value interest in an LNG transporter. Vessels are contracted under long-haul sanctions and medium-term, five-year market-related sanction contracts with Shell. The Golar Mazo, which the Chinese Petroleum Corporation jointly owns, is under an 18-year time contract that terminates in 2017 (Thomson Reuters, 2009). TopShips Inc. is worth focusing on, not for the best reasons. Thomson (2009) indicated that “The mean worth was impressively lower than the other organisations, yet the organisation actually encountered a 78% standard deviation, All the more critically, while any remaining organisations took benefit of the new super-cycle, which deciphered in higher stock worth, TopShips Inc.'s share esteem showed a consistent downfall from 2007 to 2009”. This moderately enhanced shipping organisation works in two bulk fragments: big haulier and dry bulk. As of July 27, 2009, the organisation's fleet consisted of 18 vessels: three Panamaxes, two Handymaxes and eleven Items, with a total conveying limit of over 0.8 million dwt (Thomson Reuters, 2009). The Item big hauliers are typically sanctioned to convey refined petroleum items, or raw petroleum yet are equipped to ship synthetic substances likewise. To enhance profit from investments, their strategy is centred on expanding their fleet by sector and size fragments (TOP

Ships Inc., 2008). Their fleet deployment strategy incorporates a blend of both period time sanctions and spot market journey contracts (TOP Ships Inc., 2008). At long last, FreeSeas Inc. spends significant time working nine vessels through completely owned auxiliaries in the dry bulk sector. The organisation centres on the Handy size and Handymax sectors, with a total dwt ton of roughly 268,166 (Thomson Reuters, 2009). FreeSeas utilises its vessels in a blend of spot contract market, period time sanctions and in dry bulk transporter pools. This shifts to create harmony between anticipated incomes while likewise attempting to boost benefits during repetitive blasts (Free Oceans Inc., 2009). Free Oceans Inc. shares had a mean of 105 places, higher than that of TopShips over the last three and a half years. Share esteem topped in 2007, in accordance with many shipping organisations, as the BDI was blasting.

The above analysis and the data gathered from the NASDAQ were gathered and analysed using different literature sources. The data above give information about the top companies in dry bulk shipping with estimated high revenues. The data below is recent data about the above-selected companies also gathered from NASDAQ. The above data in this section is achieved from the secondary literature sources whereas the current data is gathered from the official website of NASDAQ. The current data is gathered to analyse the performance of the progressing companies of 2009 timeframes. This gives hints about the consistency or the progress of the companies over the years. The table below showcases the total revenue, profit, earnings and income of dry ships Inc. in recent years (U.S.: Nasdaq, 2022).

*Table 8--Statistics of dryShip Inc.*

<b>Title</b>	<b>30-Jun-19</b>	<b>31-Mar-19</b>	<b>31-Dec-18</b>	<b>30-Sep-18</b>
<b>Total Revenue</b>	40.49	43.08	49.26	49.56
<b>Gross Profit</b>	8.97	19.17	24.06	25.6
<b>Operating Income</b>	-8.57	4.89	11.05	16.47
<b>Net Income</b>	-12.72	1.45	5.83	11.6

Additionally, table 9 gives details about the TopShips Inc. Company. The company flourished in the following years and balanced out the downfall of 2009. The TopShips Inc. have shown mixed progress but is prevailing, indicating effective investment decisions and implementation of management strategies (U.S.: NASDAQ, 2022).

*Table 9-- Income statements of TopShips Inc. (U.S.: NASDAQ, 2022)*

	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>
<b>Sales revenue</b>	41.05 M	66.09 M	60.22 M	56.37 M
<b>Gross income</b>	10.57 M	27.42 M	23.67 M	31.43 M
<b>Expense</b>	9.66 M	18.08 M	20.96 M	7 M

If we analyse the scenario of the listed companies from a different perspective, the portfolio for the investor will be altered, and such investors will select to maximise their investments because of the little risk ratio; however, as indicated in the chapter, that investment is highly associated with risk. Assuming that the investor is risk neutral, the top five companies will be different. From the entire analysis, the top two portfolios can be identified in which one is NASDAQ listed company and the other two are different; hence the variation in the market and its relation with the frights rates and shared values can also be observed. It is observed that the standard deviation does not reduce if the returns of the company decrease. However, since risk-neutral investors seek maximum returns, then three portfolios can be considered. The largely selected companies are observed to be having highest earnings in the dry bulk sector.

## CHAPTER 5--CONCLUSION AND RECOMMENDATIONS

*The conclusion is the final chapter of the dissertation; this chapter gives effective information about the findings of the research and also gives a summary of the entire research study. Apart from the summary of findings and research, the conclusion chapter also gives research limitations and future recommendations. This chapter gives a glimpse of the entire research work.*

### **Summary of findings**

The shipping industry has been confronting vacillation in its shipment executives because of many challenges and a tempestuous climate. A portion of the challenges influences the investment choice, though a few challenges influence the administration of the shipping industry. The current research study examined the risk and investments managements in the dry bulk shipping area. Dry bulk shipping is the shipment of unrefined substances in huge unloaded packages. For the most part, the dry bulk comprises crude and natural items bound to be utilised in worldwide assembling and creation. The most well-known results of dry bulk shipping are grains, metal, energy materials, coal, iron etc. which are moved through seaways in the freight vessels or specific dry bulk ships in bulk conveyance. Changes in the BDI are directly connected with the organic market of dry bulk items and their product. The greatest risk in dry bulk shipping of dry bulk spillage since it is extremely challenging to tidy up because the items are available in larger amounts and are normally fluid.

The dry bulk shipping industry additionally faces immense fluctuations. The ship owners and the financial backers about their investment in the worldwide dry bulk shipping market according to the state of the market. The delicacy of the freight material and the boat costs are the central point's impacting the ship owners' investment choice, and these factors likewise control the market patterns. The industry has likewise noticed an opposite pattern in which the oversupply of weight and the decreased exchange have brought about the crashing of cargo rates low to the degree that the organisations become unfit to meet their functional expenses and premium expense. Research has demonstrated that investment choice makes the shipping cycle more

unpredictable in light of the fact that they influence the organisation and its environmental elements in the market. It additionally influences the interest and supply of cargo. Research demonstrates that the organisations that are associated with the administration and ownership of boats are presented with enormous risks because of the unpredictability of the market and high risks in investment choices. Be that as it may, each business accompanies a bunch of functional risks which organisations ought to take. These risks are brought about by the changes in the EBIT not entirely settled by the pay and costs of the organisation. The shipping industry's costing factors incorporate cargo rates, journey costs, functional expenses and unfamiliar trade rates. Research has guaranteed that a significant piece of the monetary place of the shipowner is obtained from the changes in the worth of the ships (resource), which is extremely fierce as a result of the phase of the shipping cycle. Hence, ownership risk is likewise another component that financial backers should notice. Many risks in dry bulk shipping impact the shipowners' investment choices and the board rehearses. An off-base forecast about the market pattern and investment can bring about investment disappointment and an organization's insolvency. During the high cargo in the market, the shipowners propose to arrange ships to get a greater portion of the benefit from here on out. Notwithstanding, according to the long shipbuilding cycle, on the off chance that the market cargo is in opposition to the assumptions, the arranged ships can cause a tremendous misfortune or weight on the requesting organisation.

Moreover, the greater expense of working and keeping up with the ships will break the organisation's monetary position and income. In the event that the cargo rates are anticipated to diminish from now on, rather than purchase new shoes, it is greatly improved to arrange recycled ships since they are not difficult to place in the market, which can help the organisation in satisfying the need in time. However, in this situation, the recycled boat's support cost can put a gigantic weight on the pocket of the shipping organisations. The decision between new and recycled shipbuilding is extremely intricate for shipping organisations and ship owners as it influences the organisation's general turnover and monetary position. This pursues the investment choice of the organisation, a colossal obligation and an extremely challenging errand. Because of lower markets, various shipping organisations have gone into insolvency. The dry bulk shipping market is extremely straightforward, including some limited scale transport owners, lesser market limitations and open exchanges; be that as it may, this makes the dry bulk shipping market serious. The organisations and the ship owners in dry bulk shipping are

supposed to be completely acquainted with the market patterns and typically settle on the investment choice which helps them flourish in the market. It is the reason scholars profoundly research factors that impact the investment choice in dry bulk shipping. Aside from the factors impacting the investment choices, the risk ought to likewise be dissected so the future ship owner can come to an educated conclusion about the risk and different factors. The current research will likewise investigate the factors and risks of the dry bulk shipping market. It is the need of time on the grounds that the shipping industry is flourishing after pandemic limitations were excluded, so the researcher needs to investigate the risk and factors of the dry bulk shipping industry.

Through the data gathered through secondary and primary sources, it has been concluded that “there is a close relationship between a company's performance and its shipping strategy, Companies like Golden Ocean Group Ltd., DryShips Inc. and Excel Maritime all developed a specialised strategy, focusing on owning and operating large vessels in the dry bulk market”. The shares and the investment values of the selected companies have been observed to be altered due to altering freight rates in the market. The analysis of the progress and values of the companies has also indicated that in the five years of screening, it has been observed that the shared values of these companies have varied a lot which indicates the changes and high fluctuations in the freight rates of the market. Another of the biggest finding of the research is that the dry bulk sector has a high association and correlation with the market. The findings chapter has indicated this correlation through the standard deviation of earnings and risk investments.

### **Limitation of research and future recommendations**

Every research study has some limitations, and the identification of the limitation of research aids future researchers in conducting effective research. Identifying limitations is a necessary process; the limitations encountered in the conduct of the current research include difficulty in data collection. The current research study is based on secondary data for the analysis of factors that affect investment decisions and strategic management of dry bulk shipping. However, it is recommended that gathering primary data from the actual dry bulk shipping company can be more beneficial and precise. The data collected from the previous literature sources can be outdated, and the shipping industry is the fastest-growing industry which has major turbulences and unexpected situations. It is recommended for future researchers to conduct primary research

and also to conduct comprehensive research because dry bulk shipping is an advance and highly important sector of dry bulk shipping. Few literature sources were found during research that identified the risks of only the dry bulk shipping sector. Apart from this limitation, the current research study is complete and has successfully achieved the research aims and objectives.



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