

*How Are Flexible Tanks Becoming  
A Solution For Wine In Bulk  
Transportation?*

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Abstract

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Past decades have proven that logistics is taking a crucial role in both domestic and international trade. Additionally, logistics have played an essential role in wars recorded in past human history. Bulk shipping is becoming an increasingly attractive option for wine shippers around the world because this method of shipping allows transporting up to 13,400 litres more of the product when compared to the conventional method of wine transportation, which dramatically cuts transportation costs.

The United Kingdom currently stands as one of the largest economies in the world. 95 percent of imports, coming into United Kingdom arrive by sea in value terms. The main cause for that is the geographical position of the country. Therefore, the sea freight market is very large in the country and highly competitive. In 2013, the United Kingdom was the second largest wine importer country after the USA.

This thesis will investigate one of the services provided by the company JH Hillebrand Group, which is packing the wine in flexible tanks, which are placed into containers. That makes product transportation possible over longer distances for a discounted freight rates. The purpose of this thesis is to provide a comprehensive overview of the ocean borne bulk transportation of wine, specifically focusing on the practice of Flexitank utilisation for efficient the transportation of the considered product.

In order to answer research question "How Are Flexible Tanks Becoming a Solution for Wine in Bulk Transportation?" the author has conducted a small interview involving companies who are providing Flexitanks, as well as wine shippers. The result shows that Flexitank is a favourable solution for wine transportation in practise, as well as in a theory.

Key words: logistics, transportation, wine, Flexitank, packaging, JF Hillebrand Group

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## 1. INTRODUCTION

The author of this thesis is currently studying at Lahti University of Applied Sciences, and is completing her Bachelor's degree in International Trade. As part of the programme's syllabus, aspiring candidates have been required to write a thesis on a topic that will investigate international trade features in depth, to get a further understanding of the industry. Bulk shipping is becoming an increasingly attractive option for wine shippers around the world because this method of shipping allows transporting up to 13,400 litres more of the product when compared to the conventional method of wine transportation, which dramatically cuts transportation costs. It was decided to concentrate on a topic that can be focused in the logistics industry. Additionally, the writer familiarized herself with sea freight traffic, while completing her internship in a company called JF Hillebrand Group, located in the United Kingdom. This thesis will investigate one of the services provided by the company, which is packing the product in flexible tanks, which are placed into containers. That makes product transportation possible over longer distances for a discounted freight rates. The purpose of this thesis is to provide a comprehensive overview of the ocean borne bulk transportation of wine, specifically focusing on the practice of Flexitank utilisation for efficient the transportation of the considered product.

### 1.1 Background

Past decades have proven that logistics is taking a crucial role in both domestic and international trade. Additionally, logistics have played an essential role in wars recorded in past human history. As an example, Alexander the Great has quoted that in any of his failures in war, the man in charge of logistics activities was the first to blame (Mieghem, 1998). Another example is provided by Napoleon is that the main reason for his failure to attack Russia was because of the poor logistics management and lousy understanding of the enemy's situation. (Saul, 2012)

## 1.2 Case company

The chosen topic for this thesis was inspired by the author's past working experiences as she committed to work at a company called JF Hillebrand Group, in one of its branch offices, geographically located in Southampton, United Kingdom. JF Hillebrand is a highly specialized logistics company that was founded in 1844, Mainz, Germany. Nowadays, JFH operates in 88 different countries across the world, and has approximately 11600 customers. The company is working in the global transportation of beverages market, and concentrates on transporting wines and spirits in bottles and bulk. After a few months of working for JFH, the author decided to do an in-depth study on the bulk transportation of wine. Considering the fact that the writer is attending a course centred on "International Trade", it was considered relevant as well as appropriate to research and further explore this particular field. (JF Hillebrand Group, 2010)

## 1.3 The United Kingdom's background

The United Kingdom currently stands as one of the largest economies in the world. According to (Trading Economics, 2015) it is on the sixth place on the top ten list. Although the country has developed greatly, its economic history has had its ups and downs. During the 60's and 70's there was a time when the living standards were substantially raised, but at the same time the UK suffered from high levels of competition from other countries and consequently, this deficit threatened the country's economy. However, United Kingdom managed to reclaim its previous position by devaluation in 1968, which had a positive impact on the GDP, as it can be seen in Figure 1. (Pettinger, 2010). At the same time it is relevant to mention that the increased import and export flows had a great impact on the country's economy development (Saaed & Hussain, 2015).



Figure 1: United Kingdom GDP Growth Rate (Trading Economics, 2015)

The 70's was a decade of great relevance for the United Kingdom as it joined the European Commission, when it had an all-time high GDP growth reaching 5 percent in 1973, but at the same time it was a traumatic economic decade of high rates of inflation and stagnation, which is called "stagflation". This phenomenon was seen when the economy suffered from a negative economic cycle as the general level of prices in the economy increased and the production of goods as well as the provision of services slowed down and declined (Grimsley, 2015). However, Figure 2 shows that the UK had a rapid economic growth, which was heavily encouraged by the deregulation of the mortgage market, large tax cuts and growth of credit to create a consumer bubble (Pettinger, 2012).

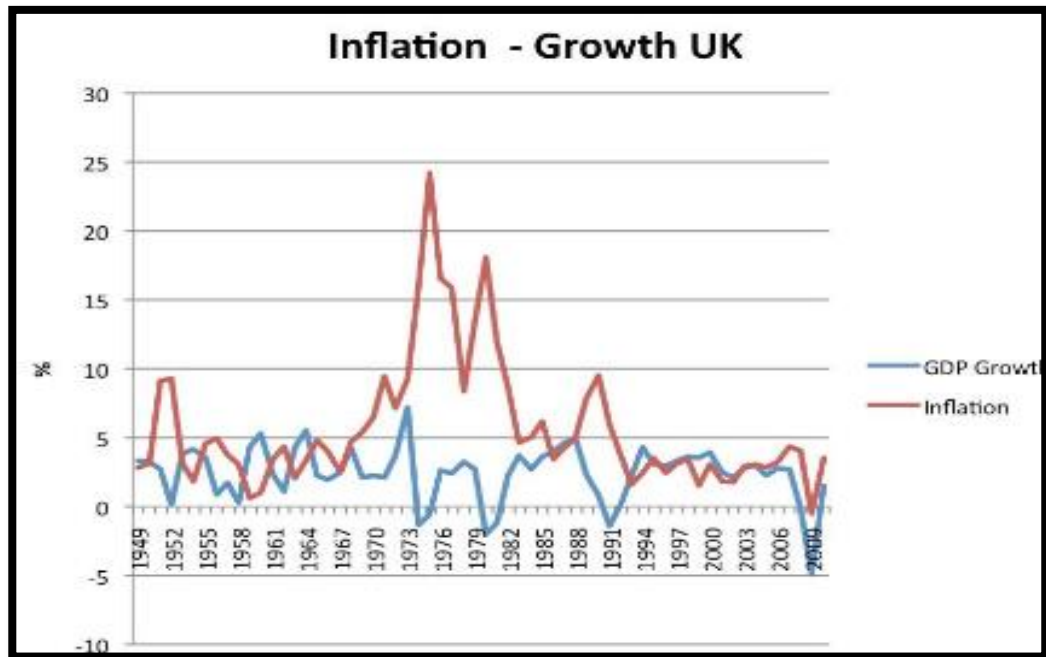


Figure 2: Inflation – Growth in the UK (Economics Help, 2012)

World economies are tender to fluctuate; likewise the United Kingdom's economy fluctuated. After the 1970's, the UK was faced with numerous difficulties, but as previously mentioned, it became one of the most powerful economies. In terms of freight traffic between years 1980 and 2000, according to the UK Port Freight Statistical Releases (Department For Transport, 2015), freight traffic has been increasing steadily by an average growth rate of 1.5 per cent per year, which equates to 35 per cent in total. The statistics prove that imports as well as exports traffic flows, both, has increased in 2014 by 1 per cent. (Department For Transport, 2014) As a matter of fact, the thesis will concentrate on the wine bulk transportation using flexible tanks as a method of packaging. Thus it is important to mention that bulk liquid transportation has accounted for a majority of all traffic with 40 per cent. (Department For Transport, 2015)

There are different types of modes transportation: air, sea and land. The thesis will concentrate on the bulk ocean borne transportation of wine products by means cargo ships. A large variety of goods can be carried by

ships (Barnhart & Laporte, 2007, p. 193). According to (The Global Facilitation Partnership for Transportation and Trade, 2013), 80 per cent of world trade is covered by sea freight; hence, it has a greater impact on global economies as it substantially outperforms alternative modes of transportation.

#### 1.4 Thesis objectives, research questions and limitations

The thesis aims to provide the reader with a deeper understanding concerning the bulk transportation of wine in the sea freight market in the United Kingdom, to create a thorough analysis and final summary of the services provided by the considered company. Secondly, JF Hillebrand Group will have the opportunity to present an account of its performance with all details and analysis to its customers. As a result, the information and facts provided will be further supported by relevant and reliable academic resources, including books, websites, journal articles, interviews and finally facts provided by the company itself.

Thus, a research question is set: *How are flexible tanks becoming a competitive solution for wine in bulk transportation?*

In order to produce a thorough investigation, answer the research question and attain the objectives of this project, sub-questions are compiled as follows:

- What is a bulk liquid and how can it be transported?
- How do different packaging types in transportation differ from each other?
- Why are flexible tanks a competitive solution for the sea transportation of bulk liquid in the freight market?
- How could Flexitanks be optimized/enhanced, to provide a competitive advantage and encourage its usage amongst potential customers?



## 1.5 Limitations

This thesis will concentrate mainly on how wine could be transported in bulk, over long distances, using different packaging methods, with an analysis aiming to prove that the flexible tank is currently the most effective commercial solution for transportation when liquid bulk cargoes are concerned. Additionally, this thesis focuses on the analysing ocean freight market on the international, European and United Kingdom's level. This thesis will include an analysis only of the most used packaging methods for wine shipments.

## 1.6 Research approach

According to (Phillips & Burbules, 2000, p. 31) research is a process of making claims and then refining some of them for claims that are more strongly warranted. As portrayed on chapter 1.3, research questions were found; which naturally calls for a research strategy to be designed. As the topic of this thesis has been modified to a question, the research will not be descriptive, but rather explanatory. Punch suggests that explanation and description represent two different levels of understanding. On one hand, describing is familiar with drawing a picture of how things are proceeding or what has happened, whilst on the other, explaining is finding a reason for events or things, to be able to answer how and why they have come to be what they are (Punch, 2013).

A variety of informational sources were used to support this thesis. In a theoretical framework various types of data were included. As the case company is willing and able to provide undisclosed information, it was decided to use the JF Hillebrand's reports as primary data, and further support it with secondary data sources such as books, journals, the internet and articles to create an objective piece of work. Moreover, with English as a third language, additional reference tools such as dictionaries were used throughout. In this study, the writer concentrated on the thesis

questions, as a result, the theory was proposed from the collected data. Lastly, although a question has been used as the topic of this thesis, a deductive research method was applied. According to Research Methodology, deductive approach is starting to work from more general information to the more specific. In other words, researcher starts to analysing very broad range of information and at the end he originates a specific conclusion. (Research Methodology, 2015) As part of the research the author chose the qualitative research method, and the reasoning behind this approach will be explained in more depth in chapter 4.

As part of the thesis, a research must be conducted. First of all, the method of research to be used, whether qualitative or quantitative, must be decided. Qualitative method concentrates on understanding the aspect as a whole, but experimenting and verification are main emphases of quantitative research (Ghuri & Gronhaug, 2002, p. 86). Table 1, shows how qualitative and quantitative research methods are differentiated traditionally.

Table 1: Difference between qualitative and quantitative research methods  
Source: NewMR, 2015

<b>Traditional perceptions</b>	<b>Qualitative research</b>	<b>Quantitative research</b>
<b>Data collection</b>	Focus groups Depth interviews Accompanied shops	Surveys Audits
<b>Quantity of data</b>	Small	Large
<b>Nature of data</b>	Unstructured, e.g. verbal comments	Structured, e.g. survey responses to closed questions
<b>Focus</b>	Why? How do things work?	What? How many?
<b>Output</b>	A description	Projectable numbers

As the Table 1 above illustrates, the quantitative method collects data, concentrates on surveys and audits, which results in numerical data, diagrams and statistics. On the other hand, qualitative method focuses on verbal expression and conceptualization is the main tool to analyse. Commonly, researchers have chosen either one of the two research methods. Occasionally, some investigators prefer to use a combination of both methods. (Schreier & Fielding, 2001)

One of the crucial details what must be taken into account while conducting any studies, is the validity and reliability of gathered information. It is a feature of accurate and consistent research. The author chose the qualitative research method that has its own validity and reliability criteria. In relation to qualitative, reliability is how trustworthy the generated data and procedures are. It must be proved that findings can be revisited in various circumstances. Validity in qualitative research has been criticized, as the validity can be lousy in researcher bias as collected and recorded data is interpreted based on personal perspectives. (Roberts P. et al, 2006) Additionally, participants may not be motivated enough to complete questionnaires accurately, with full interaction and concentration, as it could be completed with a present interviewer. (Reja, et al., 2003)

## 1.7 Theoretical framework

The theoretical review of this work is the subject of the flexible tank as a solution in the bulk transportation of wine. The topic has been comprehensively researched in specialist economics literature. Furthermore, Flexitank is a concept of one of JF Hillebrand's branches - Transocean Bulk Logistics.

Firstly, it is important to understand the sea freight market, in general. Thus the first chapter concentrates on the analysis of that particular market, with a goal to point out possible advantages and disadvantage. Secondly, to provide a wider overview of the product, Chapter 2 investigates the bulk mobilisation of wine and its alternative methods of transportation over long distances. At the same time, different methods of transportation were analysed. Lastly, the thesis shifts its focus and concentrates on the Flexitank as a means for transportation itself.

As a matter of fact, the Flexitank is one of JF Hillebrand's main source of competitive advantage, thus, it is relevant to provide a detailed investigation of that service. Following that, to ensure research unbiasedness and produce the most efficient analysis possible, the author explored these issues with certain criticism, despite the fact that she may be biased towards the company based on her past relationship to the company concerned. On chapter 3, the author will be collected data from other primary sources - a customer, to provide an unbiased and independent overview of the topic. The same chapter also, tells which method of research was chosen and is further supported by academic sources.

## 2. TRANSPORTATION OF BULK LIQUID AND SEA FREIGHT

According to Cristini (2015), transportation is the most crucial role in supply chain operations, as it allows for the movement of goods from the place where it was initially manufactured to the place where it is ultimately demanded. Globalisation gives favourable circumstances to keep manufacturing bases distant from consumption regions. Transportation costs are considered largest part of the total costs, thus, the efficiency of the method of transportation chosen is greatly relevant, as it has a straight connection to the cost-efficient success in the supply chain. (Kasilingam, 1999, pp. 157-159). There are five main different transportation modes, which include: road, rail, pipelines, maritime, and air. Each transportation mode has key operational and commercial advantages as well as properties. However, the actual needs and characteristics of each specific situation ultimately determine which mode is deemed suitable, or whether a combination of intermodal solutions should be chosen, which is also known as multimodal transport. (Rodrigue & Comtois, 2013) However each transportation mode has its pros and cons, as described on Table 2.

Table 2: Transportation modes with features (William D Perreault Jr, 2010, p. 342)

Mode	Transporting Features					
	Cost	Delivery speed	Number of locations served	Ability to handle a variety of goods	Frequency of scheduled shipments	Dependability in meeting schedules
Truck	High	Fast	Very extensive	High	High	High
Rail	Medium	Average	Extensive	High	Low	Medium
Water	Very low	Very slow	Limited	Very high	Very low	Medium
Air	Very high	Very fast	Extensive	Limited	High	High
Pipelines	Low	Slow	Very limited	Very limited	Medium	High

The Table 2 illustrates trucks as the most beneficial and ideal transportation mode comparing to rail, water, air and pipelines. Transporting by road is highly flexible and rapid. A truck can safely deliver cargo from the base of manufacture to its final destination without transshipments. Additionally, the road transportation is a reliable method of transport, which is expected to meet delivery schedules and while remaining cost effective. However, from an international point of view, transportation by road is a highly costly option and far less productive. Rail transportation allows goods to be transported between long distances and it has the ability to mobilise a vast quantities of cargoes in a single trip, providing greater economies of scale. Additionally, rail transportation is immune to any difficulties traffic may present; which significantly increases the reliability of rails over roads. However, railing can be inflexible for the reason that connections from the supplier to the customer can be complex, which may incur higher costs and longer transit time periods as cargo is destined towards its final destination.

Pipelines are the most inefficient mode of goods transportation. Routes are limited, as they can be laid only under water or on land. The pipeline network is important in the freight market. However, it can only carry oil or gas, which means that the ability of handling a wider variety of goods is very limited.

The airfreight transport market is highly competitive. The delivery speed is extremely high when compared to the other modes. Air transport makes delivering to multiple locations a possibility, but the ability to handle different products is very low. Usually, this transportation mode is chosen when the goods must be delivered rapidly and in small quantities. The greatest disadvantage of airfreight is that it is highly expensive and imposes significant ramifications on the environment. At last, the characteristics and circumstances of each situation will determine the most suitable mode of transportation (Lambert, 2011);(Rodrique & Bowen, 2013, pp. 108-114).

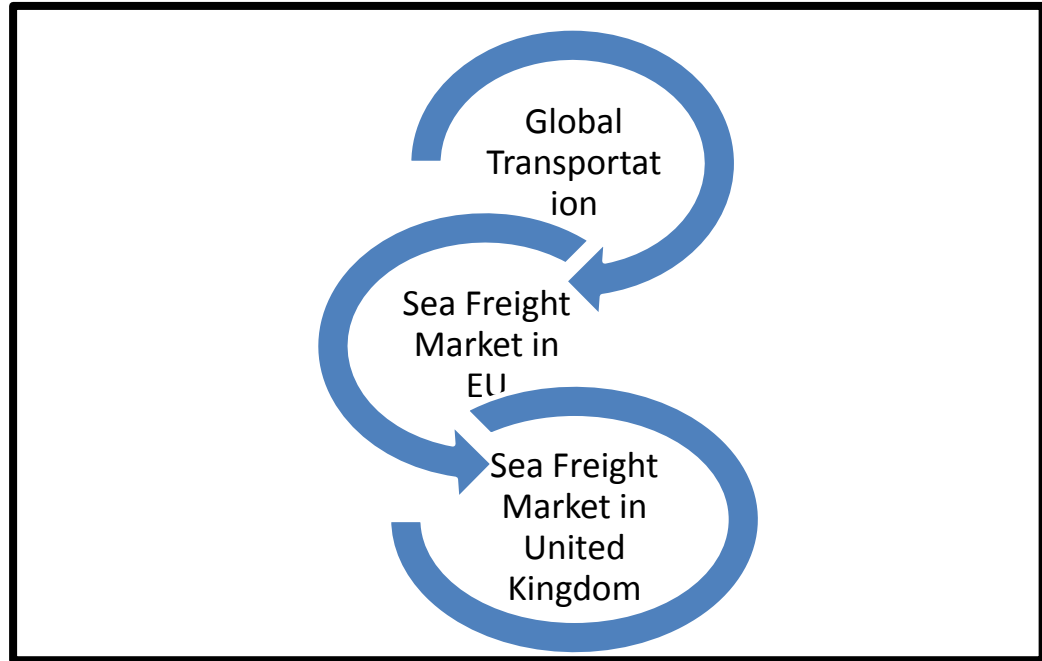


Figure 3: Illustration of Chapter 2 Flow.

The figure 3 illustrates the theory flow of chapter 2, in regards to help the reader and writer to get a wide understanding.

## 2.1 Global ocean trading

History proves that oceans have had a significant importance to civilizations around the globe, particularly as a means of transportation. With the lapse of time, market became highly globalized and as a result shipping volumes soared. The situation has not changed much, as the transportation of goods by sea has rapidly become essential to global trade. To cut the economic history in short, it must be mentioned that from the 1950s up until the latest economic crisis, international trade had a growth of almost twice the size of the whole economic activity. Only from 2000 to 2008, world trade has growth at an average rate of 5.4 per cent year on year.

As a matter of fact, approximately 23 per cent of the world trade is going between countries with a common border. That percentage has been stable over recent decades. However, it is important to understand that, between continents, trade differs depending on the level of development of each country. According to the World Ocean Review, sea freight is mainly utilized when the cargo in question is transported between countries with no common borders. (Bucker, et al., 2014, p. 164)

Globalization and world trade growth have had a major impact on the shipping industry. However, the result of institutional and technological factors must be considered as well. The trade agreement GATT (General Agreement on Tariffs and Trade) or better known as WTO (World Trade Organization) gave a driving force for world trade. Radical improvements in communication and information technology have dramatically reduced the costs of accessibility and mobility. As a result, the production process and new network connections, such as just-in-time production, offshoring and outsourcing, gave the logistics industry an opportunity to progress and develop. Demand has radically increased and in turn, costs have been minimized. Correspondingly, the rapid growth of ship size has been a major trend over the past few decades, as well as the technological advances and organizational improvements that have been practiced in port management.

Vessels are essential tools for the transport of ocean freight. Marine innovations have improved ships significantly, starting from their size that has been increased substantially. Furthermore, the creation of a larger vessel gave an opportunity to reduce shipping costs per load unit for crew, demurrage, servicing, ship maintenance, fuel and insurance – economies of scale. In the same way, ports must meet the expectations of their customers, by expanding and investing on infrastructure and providing high-quality services. Nevertheless, these developments are highly costly assets that require vast amounts of capital and financing; which may present financial difficulties for both port owners and operators.



Velocity is one of the most decisive factors when transportation is considered. Although, sea freight is not the fastest mode of transportation, the average speed of commercial vessels has increased. In nautical terms, speed is measured in knots, where one knot equates to one nautical mile per hour, which is equal to 1853 meters (1.8 km) per hour. The average speed of a merchant vessel is approximately 15 knots. Notwithstanding, the invention of screw propellers and in particular double propeller has increased the average speed of new ships significantly to 25-30 knots, which is 45-55 kilometers an hour. It is equally important to point out, that the modern designing of vessels has had an incredible impact on their speed and consumption. Nowadays, modern vessels are built from aluminum and composite materials, to reduce construction cost, fuel consumption and increase the safety at the same time. (Bucker, et al., 2014)

## 2.2 Sea freight market in Europe

Based on the findings by the (United Nations International Maritime Organization, 2014 p.3), it can be argued that the shipping industry covers the carriage of 90 per cent of world trade. Complementary to this, short sea shipping is relevant for Europe, as it promotes European trade competitiveness, maintaining significant transport links, keeping down unit costs of transport, facilitating Eastern European integration and finally, relieving congestion from land based networks. Short sea shipping includes any vessel no bigger than 6,000 GT (Gross Tones) of weight. However, statistics prove that larger ships can also be seen in short sea shipping and smaller vessels are also active in some deep-sea routes. (European Conference of Ministers of Transport, 2001). To better understand the difference between deep and short sea traffic the table is presented below on Table 3:

Table 3: Deep and Short Sea Transportation Within and Out of Europe (European Conference of Ministers of Transport, 2001)

		Number (%)	GT (%)	DWT (%)	Average age (Years)	Average GT
EU	Deep Sea	42.7	92.1	93.3	14	25 958
	Short Sea	57.3	7.9	6.7	20	1 654
Rest of Europe	Deep Sea	37.3	88.6	90.8	13	24 598
	Short Sea	62.7	11.4	9.2	21	1 882
Rest of the World	Deep Sea	31.5	90.4	91.1	13	27 155
	Short Sea	68.5	9.6	8.9	18	1 319

The table above shows that the average size of short sea vessels is generally similar worldwide, approximately 1,500 GT (Gross Tones). In contrast, deep-sea shipping is significantly higher, averaging 25,000 GT. (European Conference of Ministers of Transport, 2001)

According to the European Conference of Ministers of Transport, the favorable geography, extensive coastlines and networking limited land areas of Europe allow the European short sea shipping industry to possess more strategic advantages than other regions. As the technology and market mechanisms in Europe are highly developed, there is a possibility for an after-market for ageing vessels. Additionally, European short sea shipping is able to provide a base of expertise as well as capacity for participation in new markets. (European Conference of Ministers of Transport, 2001)

The traffic between EU-28 (2013) is relatively different by many reasons. According to (Eurostat, 2015), higher shares of short sea shipping between countries depends on geographical features, for example, the length of the coast line and number of inhabited islands, but also it is important to point out that the amount of feeder vessels from or to hub ports has an impact on the short sea shipping transport share. Another essential point is that countries in the same sea regions, with their own

coastline are taking very high shares of their own shipping traffic, as a result of the partner ports. Table 4 below lists the top 5 countries with their corresponding share of gross weight of goods in different seas and oceans. The United Kingdom is in the lead with a record of 315.6 million tones in year 2013. However, it can be noticed, that the country is shipping mostly to the North Sea. Italy holds the same position. Shipping takes place across most of the Mediterranean Sea. Turkey is surrounded by the Black and the Mediterranean Sea and it can also be seen it holds a large percentage of shipping. Notwithstanding, Netherlands is the exception. The largest share of short sea shipping of the country is the Baltic Sea. Overall, the latest statistics shows that the total tonnage of short sea shipping in highly active EU ports decreased by 1.8 percent from 2012 to 2013. However, we have recently seen minor but stable reverse after years of economic downturn in Europe in 2009. (Eurostat, 2015).

Table 4: Gross Weight of Goods in Million Tones (Eurostat, 2015)

Country	Oceans/Seas						Total
	Atlantic	Baltic	Black	Mediterranean	North	Others	
UK	93.5	39	2.5	28.3	149.4	2.9	315.6
Italy	5.3	6.9	36.1	204.4	6.6	13	272.3
Turkey	9.6	5.8	85.3	137.6	21.2	12.2	271.7
Netherlands	28	79.9	10.9	32.4	74.6	36.9	262.7
Spain	34.5	13.3	14.7	95.2	25	13.3	196

### 2.3 Sea freight market in the United Kingdom

Previous chapters have described the sea freight market in general and how it works on a global level. Additionally, the writer concentrated on investigating the sea freight market within the European Union. This chapter shifts its focus to the sea freight market in the United Kingdom.

According to the Logistics Report from year 2014 (Freight Transport Association, 2014), 95 percent of imports, coming into United Kingdom arrive by sea in value terms. The main cause for that is the geographical position of the country. The United Kingdom is located in Western Europe, between the North Atlantic Ocean and the North Sea. That is to say the country is surrounded by water and conveniently sea freight is the most popular transport mode in international trade. (Central Intelligence Agency, 2015). Therefore, the sea freight market is very large in the country and highly competitive. The country's economy and trade has developed over time and as a result the United Kingdom has made big investments in a new generation of UK deep water ports. The major ports in the country are Felixstowe, Southampton, London Tilbury, London Gateway and Liverpool. In recent years, Southampton, Felixstowe as well as London Gateway ports have been modified to allow the accommodation of new, and larger vessels and remain competitive. (Department for Transport, 2012).

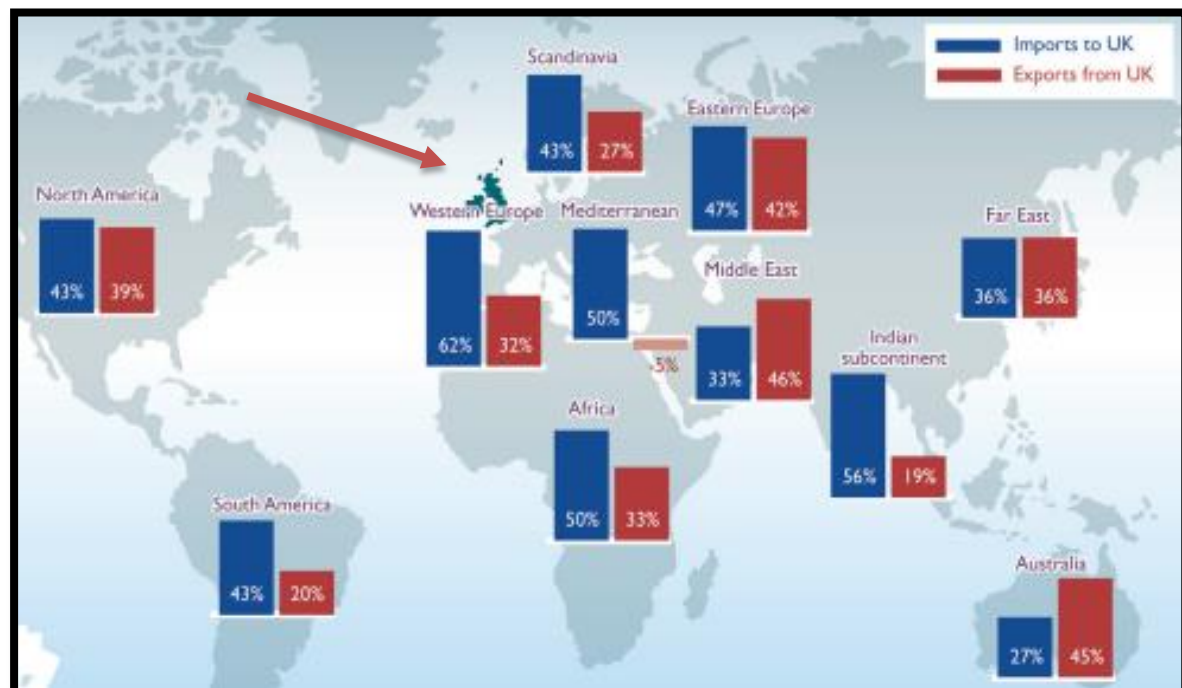


Figure 5: Deep Sea Market Sentiment in 2013 (Freight Transport Association, 2014)

Figure 5 above illustrates where the United Kingdom imports and exports to. The Logistics Report reveals that the top five areas from where goods are coming from into the UK are Western Europe 62 percent, the Indian subcontinent 56 percent, Mediterranean 50 percent, Africa 50 percent and Eastern Europe 47 percent. The top five export areas are: Middle East 46 percent, Australia 42 percent, Eastern Europe 42 percent, North America 39 percent and Far East 36 percent.

#### 2.4 Wine imports in the United Kingdom

This thesis is concentrated on wine transportation in bulk. Thus it is relevant to know how much wine is actually imported into the United Kingdom. In 2013, the United Kingdom was the second largest wine importer country after the USA with a total of 1.303,0 million litres of wine, which is 0.70 percent, less than 2012. (Organisation Internationale de la Vigne et du Vin, 2014, pp. 9-10). According to (Just Drinks, 2009), one of the reasons why the percentage has decreased is due to duty tax increases. Since 2008 wine taxation has increased by 54 percent, making the average price for 75 cl of wine £5.26. (The Wine and Spirit Trade Association, 2014, p. 15). JF Hillebrand Group has supported author's research by providing the data sheet with records of wine imports from different countries into the United Kingdom. After analysing the data it has been found that there is a big difference in bottle and bulk wine transportation.

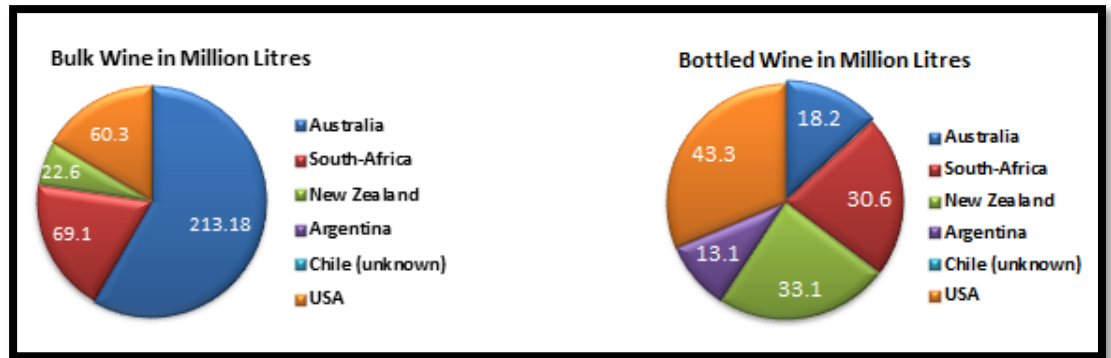


Figure 6: Transported Wine in Bulk and Bottles to the UK (JF Hillebrand Group, 2014)

Figure 6 shows the major wine exporting countries into the UK. The United Kingdom has shipped 213,180,000 litres of wine in bulk from Australia, but bottled wine is substantially lower. The largest amount for bottled wine has been shipped from the USA with a total of 43,300,000 litres. However, bulk wine from the USA is more active than bottled, representing 60,300,000 litres. It must be noticed that the report did not include any data regarding wine imports from Chile. However, the country remains to be one of the largest wine exporting countries for the United Kingdom (Hennicke, 2013). Additionally, the data sheet has included value for bottle shipments from Argentina, but not in bulk.

### 3. WINE IN BULK PACKAGING TYPES IN TRANSPORTATION

Over the years, the way wine has been delivered to consumers has largely changed. The United Kingdom is key consumer of wine for the biggest wine exporting countries such as Spain, Italy, France, Australia, Chile, USA and South Africa. (JF Hillebrand Group, 2014). Researchers were able to trace the timeline of wine transportation, as remnants left behind have been found from past wine transporting methods. There are many different ways of how the liquid was hauled over long distances in ancient times. However the standard method involved the utilization of clay containers called amphora (Figure 7), transported over 5 500 years from Ancient Egypt, Greece and Rome. (Kan Haul, 2015)



Figure 7: Amphora (Archaeology Data Service, 2014)

In the beginning, due to carrying capacity limitations, wine was transported in small quantities. Neither were pots the most convenient way of carrying the good, as they are fragile and therefore, not suitable for long-haul transportation over the land. As a result, the Romans discovered that wine could be transported in bulk using oak barrels. The innovation was found

to be stronger, thus by the 3<sup>rd</sup> century A.D. oak barrels as seen in Figure 8, had completely replaced the amphorae (Kan Haul, 2015).



Figure 8: Oak Barrels (Wine Barrel Creations, 2012)

Around the 1600's, wine was transported in bottles, as this packaging method was thick and strong enough to withstand both sea and land journeys. Even though it was stated earlier that transporting wine in bulk was more secure, in terms of that the product was not staled once arrived to destination, and it was secure from leaking or breaking. However, glass bottles provided better storing options, as it was delivered to its final destination ready for selling and consumption. Additionally, glass bottles kept wine in perfect condition and did not perturb the original flavour of the product. By the 1900's, the bottles and corks became the standard of that particular product industry, and it was not expected that much could change to improve this model. (Kan Haul, 2015)

This chapter aims to explain to the reader which packaging methods are now being used, as well as the advantages and disadvantages of each method. It is relevant to understand that wine transportation can be separated into two forms: bulk and bottled wine transportation. At the end



of the chapter the writer provides a summary of all packaging method, which will aim to answer the main thesis question “*How the flexible tank is becoming a competitive solution for wine in bulk transportation?*”

### 3.1 Transporting in ISO tanks

In the mid 50's, Americans developed the container box. The reason for that was to explore the possibility of using a container as an outer packaging to, traditional cargo sling methods of unloading the product from the truck to a ship, and after vessel arrival, into another lorry to perform a final delivery. This concept did not required less wheels and manpower, while at the same time improving storage and handling methods, making it the most flexible option for the carriage of traditional cargo. By the early 60's, container boxes' dimensions adopted a particular international standard of 20 feet of length (6.1 m), 8 feet of width (2.44 m) and 6 inches (2,59 m) of height – the ISO (International Standards Organization) Frame. The figure 9 represents an example of the standard ISO container.



Figure 9: ISO Container (Clker, 2011)

On the figure above, corners can be seen, which are fitted with a corner casting which allows containers to be placed on railcars, chassis, ships' cell guides or be handled by a spreader (Tankspan Leasing Ltd, 2013). Figure 10 represents the first tank Containers – a cylindrical vessel set within the ISO frame, which were built by the mid 60's. ISO tanks are stainless steel vessels, which were invented for fitting them directly onto standard trucks, rails or ships. The vessel used for wine have a capacity of 26,000 litres (Waste & Resources Action Programme, 2008)



Figure 10: ISO Tank Container (ShippingContainers24, 2013)

The development of the ISO Tank Container made possible the carriage of all types of liquids, for example, portable (food grade), hazardous and non-hazardous liquids, including corrosives, flammable, toxics, as well as explosive. Tank Containers are proven to be safe, cost-effective, and a viable mode of transportation as these limit risks in the process of transferring liquids from one vessel to another. After the Tank Container

has been discharged, it is taken to an appropriate cleaning station to prepare it for the next loading (Tankspan Leasing Ltd, 2013)

The transportation of bulk liquids poses many challenges shippers must familiarize with prevent the spoilage of the product:

- Oxidation
- Cross Contamination
- Taint
- Temperature Fluctuations
- Leaking

That is why different packaging methods for wine in bulk transportation have their own advantages and disadvantages. Starting from oxidation, as it is considered as a main wine spoiler in shipments. Wine makers try to prevent air ingress, because once the wine comes into contact with air, the product oxidises rapidly and “flattens”. Oxidation is a potential problem in large volume shipping in a single container. The reason for the spoiling of the product is a defective seal, which allows oxygen to enter the tank. Careful checking and good housekeeping of ISO tank seals can mitigate potential risks. Another challenge of bulk wine shipping, are contamination and taint. Contamination occurs when the residues from previous cargoes taint the wine being shipped in ISO tanks as these are reused. (Waste & Resources Action Programme, 2008)

Temperature variations during the wine shipping process could be significant. Knock (2014) states that the “Potential detrimental effects include accelerated ageing, loss of fruit, premature browning and reduced levels of protective sulphur dioxide. Furthermore, the high humidity, high temperature conditions of the tropics can induce ‘container rain’ once the ship returns to higher, cooler and drier latitudes, damaging cartons and encouraging the growth of mould and mildew.” However, according to (Waste & Resources Action Programme, 2008), liquids’ large thermal mass prevents significant temperature fluctuations within the body of the container, but the risk is still present. To prevent all possible risks, the refrigerated ISO tank was introduced, which can be set into a particular wanted temperature. Moving on to the challenge of container leaking. It is

obvious that container leakage brings losses, to both the shipper and customer. According to (Vintage Road Haulage, 2015), ISO Tanks are highly unlikely to leak, as tanks are built according to the ISO standard and valves in the tanks must be regularly inspected. Each ISO Tank should have three closures thus all three must fail before the tank starts to leak.

### 3.2 Transporting wine in bottles and cases

The introduction of wine bottles dates back to the 17<sup>th</sup> century, when the coal furnaces allowed for the manufacture of thicker and sturdier glass that was better suited for the transportation and storage of wine. (Salut Wine Co., 2009) The shipping method of transporting wine in the form of glass bottles is not regarded as bulk transport. However, form of packaging is widely used by the industry and remains very common. After investigating this topic, the writer noticed that there is a lot of on-going criticism about this particular method of packaging. In this section, the author examined this topic in greater depth and reveals, which are advantages and disadvantages of transporting wine in glass bottles. Figure 11, represents how bottles are fitted in boxes and safely shipped. Cases are stacked on the pallets, wrapped and placed in the container. Pallets are usually made from either wood or plastic (Cheze, 2012, p. 32).



Figure 11: Wine Packaging Method: Wine in Bottles, Cased (Uline, 2015)

The United Kingdom is a relatively small wine producer and according to (Hartley, 2008, p. 6) this has increased the demand for the product, exceeding 1 billion litres of imported wine; making the United Kingdom the world's largest importer. The bulk shipping of wine has increased dramatically. According to (Vine Talk, 2013), between 2001 and 2010 the amount of wine shipped in bulk by emerging wine producing nations, went from 23% to 43%. However, the percentage of shipping wine in bottles is still significant. One of the reasons why bottles suit shippers better is that small batch vineyards prefer to ship directly in the bottles as it provides an easier way for their product to go from shelves directly to the consumer. (Kan Haul, 2015) Another reason bottle transportation is so widely used is that bulk shipping is not deemed as suitable for luxury products. For example, high quality sparkling wines, produced in the champagne method cannot be shipped in bulk, as well as many other sparkling wines. Additionally, there are some legal restrictions set by various communities that prevent bottling outside the region of production, as for example Rioja. (Knock, 2014)

In order to compare different packaging modes, it is important to first analyse and understand the findings presented at the end of Chapter 3. As ISO tanks were described previously in the chapter, the following fact must be considered. A single 20 feet size container box can haul up to 10,500 litres of bottled wine. (Wrap, 2013). Another significant fact is: oxidation is usual problem in both, bulk shipment, as well as cased (Waste and Resource, 2008, p. 4). However, bottled wine is more secure as it provides better prevention against the oxidation of the product when compared to bulk shipments of wine. When risks are considered, in the case of bulk cargo oxidation, the financial losses are substantial, while one oxidised bottle from 10,000 litres is a rather irrelevant loss. Contamination and taint is common in bottled wine shipments. Bacteria from possible residues or its environment may contaminate and spoil the wine. Contamination results in undesirable smells and tastes, which reduces the overall quality of the product. (Waste and Resource, 2008, pp. 7-9) According to

Transocean, “The condition, invariably blamed on the cork, is the result of a mould that can be transferred to the wine from a variety of sources including wooden barrels or racks, tanks, cardboard, plastic and other types of winery equipment or facilities.” (Trans Ocean Distribution, 2005, p. 10)

Temperature fluctuations are another factor that must be considered as changes in the temperature of the wine can create undesired chemical reactions. Fluctuations in temperature could be large when the wine is shipped, for example, from Australia to United Kingdom. If faulty packaged, the wine will suffer from thermal cyclins, which spoils the quality of the wine. Furthermore, pressure variations may damage seals, allowing oxygen to ingress the bottle and come into contact with the wine. There are temperature-controlled units for transporting available. However, in the majority of wine shipments these units are not commonly used. (Waste and Resource, 2008, pp. 10-12) Lastly, as glass is a relatively fragile material, the risks of bottle damage and wine leakage are very high.

### 3.3 Transporting wine in Flexitanks

According to (Gillis, 2010, p. 41), the history of Flexitank started in the mid-1970s, when shippers from United Kingdom experimented on moving liquids in heavy duty rubberized bladders overseas. Back then, tanks were an expensive type of packaging, costing approximately \$5,000, but were marketed as reusable. Starting from the 1990’s, rubber tanks have been improved by replacing the material with thermo-plastic (PVC). The price has dropped dramatically to \$1850 apiece. The flexitanks have become popular among chemical shippers, for the transport of non-hazardous liquids. However, Gillis states that shippers were not satisfied with the fact that they had to fit the tanks into containers. Consequently, Flexitank manufactures began to offer “supply and fit” service options for their customers. One of the major reason Flexitanks gained such popularity amongst shippers was because they were much lighter in weight

compared to the alternative metal drums loaded into containers. In 2000, Flexitanks became a one-way, disposable market. The price was convenient for customers and the product got a new lay out, made from multiple layers of thin polyethylene. In this chapter, the author investigates the pros and cons of the flexible tank as a packaging method for the bulk transportation of wine overseas. (Gillis, 2010, pp. 41-43)



Figure 12: Flexitank in a Container (Hillebrand Group, 2015)

According to (Dick, 2008), “A Flexitank can be described as a hermetically sealed, collapsible and flexible bag or bladder, which is fitted into a twenty foot Dry Van (DV) or standard container. The Flexitanks commonly used by the industry can hold up to 24,000 litres of liquid cargo. Flexitanks are used for the transportation of non-hazardous liquids.” The case company JF Hillebrand Group is a major Flexitank manufacturer in United Kingdom. According to JFH, the Flexitank can carry industrial products such as polymers, lubricating and transformer oils, surfactants, liquid malt, cement and construction additives, edible oils and speciality chemicals. Additionally Flexitanks can carry food applications such as wine, fruit juice

concentrates and beers. Flexitanks are not reusable, but the material is widely recyclable. (Murphy, 2015).

To make a full comparison of each packaging method, all findings must be understood. As it was previously mentioned, Flexitanks are able to transport 24,000 litres of liquid cargo which in turn allows major wine suppliers to cut transporting costs and bring retail prices lower (Fickling, 2013). While investigating the use of ISO tanks and bottles, the author found that the oxidation of the product is a common problem and flexible tanks are not the exception. One of the most common problems involves defective seals, which allows oxygen to enter the tank. However, the improvements made over the years to this particular method of packaging have decreased the frequency of wine oxidation in general (Probulkwine, 2015). Contamination and taint risks are present in all packaging types. To avoid that risk, it must be ensured that all equipment that may be in contact with wine is adequately sterilized to prevent microbial contamination. As it was mentioned before, Flexitanks are non-reusable thus, sterile for each shipment. However, permeation of compounds could be found in the walls of single use flexitanks, but the risk is quite minimal. To avoid that risk, manufactures have to include barrier layers in a structure of the Flexitanks to prevent the passage of taint compounds.

The next risks considered are temperature fluctuations. According to (Weiskircher, 2008), in the process of shipping wine overseas, the product may undergo substantial temperature fluctuations, thus, in order to preserve the quality of wine, the container must be shipped in a cool environment. However, Weiskircher states, "For wine at 40°C, it is only a matter of days until visual and sensory changes occur and exposing wine to temperatures over 25 degrees for long durations and over 40°C for short duration affects wine quality". The peculiarity of Flexitanks is that the product is shipped in large volumes and the large thermal mass of the wine limits major temperature swings. The reason for the phenomenon is that liquids are closest to the outside of the tanks' heat, and as a result the density of the product decreases causing the wine to rise within the tank. Therefore, there are convections within the tank, which causes the



temperature increase to be dissipated throughout the consistency (Probulkwine, 2015). As the final risk surrounding Flexitanks is the possibility of leakage, damaged containers with sharp edges or screws inside the dry container pose serious threats of loss of product. To prevent this risks, JFH is inspects and properly cleans all employed containers before fitting the Flexitanks in. That way they eliminate the risk of puncturing. However, the risk of faulty manufacturing is still present, but it is relatively low. (Murphy, 2015)

### 3.4 Comparing all packaging types between each other

Previous chapters described various packaging types, and showed that wine is not the easiest product to ship and it requires specialized methods of transport. Shippers must deal with all challenges that may present during the transportation of the product. Inappropriate handling of the product will result in spoiled batches, making wine un-sellable. While investigating chapters 3.1, 3.2 and 3.3, the author did a comparison (Table 5), using Microsoft Excel to better visualise the differences between different packaging methods. Using this table, in this chapter, the writer summarises the findings and will presents why and how *flexible tanks are becoming a competitive solution for wine in bulk transportation*.

Table 5: Packaging Method Comparison

	ISO tank	Bottled/Cased	Flexitank
Volume	26000 l	10500 l	24000 l
Oxidation Risk	High	Medium	High
Contamination Risk	High	High	Low
Taint Risk	High	High	Low
Temperature Fluctuation Inhibition	Medium	Low	Medium
Leaking Risk	Low	High	Medium

Green coloured cells on Table 5 present the best performer out of the packaging methods. It can therefore be deduced that bulk transportation is the safest option. Whilst trading internationally, businesses are faced with large sums of transportation costs (Russell, et al., 2014). Although bottling at the plant best suits small vineyards or shippers who are producing high quality wine. (JF Hillebrand Group) Progressively, more and more international companies are realising that shipping wine in bulk and bottling closer to the point of sale is more beneficial for the business. Only considering the first line on Table 5, which is the carrying capacity for each packaging type, shows that a standard container holds approximately 12,000 bottles of wine packed in the boxes. The ISO tank and Flexitank can carry at least of 24,000 bottles without taking up additional space. Another, highly appreciated factor is that shipping in bulk is creating significant environmental benefits.

The bottling packaging method appeared as not cost-effective for wine transportation overseas as ISO Tanks and Flexitanks are comparably cheaper. Considering the carrying capacity of both methods, the ISO tank is slightly more advanced than the Flexitank. However, the residue left after offloading the ISO could be significantly greater than after the offload of a Flexitank. Additionally, the rent and shipping costs of ISO Tanks are higher (S&W International Chemical Logistics Ltd., 2012). In terms of contamination and taint risk, Flexitanks is the best option, as it is non-reusable, which means that it is sterile each time, where ISO Tanks require through cleaning procedures after each load. Temperature fluctuation inhibition is medium for both packaging methods. However, ISO Tanks are more vulnerable to weather posed threats, while Flexitanks are protected by a containerized box. ISO Tanks are manufactured from more resistant materials that greatly reduce leaking risks. However, companies who are providing Flexitanks as a packaging method are making sure that the container provided for fitting is Flexitank graded. This means that container must be first grade, without any damages. Each container is carefully inspected before Flexitank fittings to cover the Flexitank from any potential damages. (JH Hillebrand Group)

## 4. OPEN-ENDED QUESTION INTERVIEW AND ANALYSIS

### 4.1 Questionnaire design and formulation

The thesis will include the questionnaire with open-ended questions. It means that the answerer will not have limitations of answering for questions, as it does not admit to a limited number of definite answers. (OECD, 2003). The reason why the author chose the open-ended question method in her research is, because she believed that participants could produce a much more diverse set of answers. It is the author's opinion that the process of deciding and designing the questionnaire was the hardest part of the whole thesis. Flexitank is not common topic for investigation and the author struggled to find relevant ideas for the research. Wine transportations are carried out by logistics forwarders and shippers, thus it would be beneficial for the thesis to involve both parties; companies who are providing logistics for bulk wine, and actual customers who are using logistics companies for wine transportation. The main idea of the research is to find out, what packaging methods logistics companies are able to provide to wine shippers and in return, what packaging methods companies are using in their product transportation.

While designing the survey, the risks surrounding open-ended questions were kept in mind. Additionally, it appears that the market of Flexitanks is highly competitive in United Kingdom. The researcher could not ask specific questions regarding to Flexitanks. As a result, the author had to modify questions so that they would not expose any restricted information from the companies. In the end, the author conducted a research with five open-ended questions that gave relevant information to conduct a comprehensive data analysis.

Firstly, the researcher made a background investigation on British companies that are providing logistics services for wine. It appeared that there just a few number of companies who are providing beverage

logistics. However all of them are operating at a high level. To assure companies of confidentiality, the researcher made an agreement that guarantees that the companies will not be publicly exposed. Thus, it was decided to use a fictional letter while analysing the received data. Logistics companies were named as A, B and C. Wine shipper companies were named as X, Y, and Z. In terms of choosing wine shippers in the UK, the process of finding companies was much easier in a comparison. The researcher had the support from the case company JF Hillebrand Group and it was agreed with the general manager of the company's Southampton branch office that he could assist to find wine shipper companies to participate in the questionnaire. As it was previously proved on the theoretical section of this thesis, Flexitanks are the most optimal choice for the bulk transportation of wine, thus it was decided to investigate whether companies endorse that cognition, which in theory should support earlier findings.

#### 4.2 Data acquisition process

This chapter is meant to present a holistic view on how the survey was done in practice and how it was analysed with the aim of contributing to the following steps in answering the thesis question and supporting earlier findings. There are approximately 5 companies in the whole country who are providing logistics services for wine shippers and one of them is the case company. The researcher approached companies by calling them using a mobile phone. Lamentably, one of the companies refused to participate, thus there were only three companies left to approach. However, each of the remaining companies agreed to participate in the survey, but only two provided answers by the requested deadline. The survey was answered by e-mail, as there was no opportunity to run an actual interview, due to the lack of time of the responders.

Gathering information from wine shippers was less complicated, as the case company gave its full support for the completion of the thesis. However, as questioned wine shippers are current customers of JFH, all questions had to coordinate with the case company. Additionally, to gain as much relevant information as possible, the researcher planned 5 questions for both parties, but the formulation of questions is contrasting. Additionally, while questioning wine shippers, substituting the word “wine” for “New World Wine”. The reason for this change was that all questioned wine companies concentrate on the transportation of wine from non-traditional wine growing areas of Europe and the Middle East. However, the general idea of the questions remained unchanged to make the analysis possible.

#### 4.3 Packaging methods used and wine supplier countries

Firstly, the researcher wanted to find where wineries are shipping their wine and what kind of packaging methods they employ. According to the answers provided by the questioned wine companies, all three companies are shipping from Chile and the U.S.A, and only X and Y mentioned shipping from Australia, New Zealand and South Africa. Additionally, logistics companies have been asked what countries they provide logistics services to. It was found that companies, A, B and C are all shipping worldwide, especially from active wine supplier countries. Table 6, proves that logistics companies are providing their services in countries where wine is imported by British companies. This question has supported the previous mentioned list of currently active wine supplier countries (Ciatti, Global Wine and Grape Brokers, 2015, pp. 1-9). However, it is relevant to remember the risks of open-ended questions. Although it was not stated in the questionnaire, the researcher has found evidence from the website that, for example A is providing services from New Zealand,

Table 6: Wine origin countries imported from to the UK by wineries X, Y and Z and provided logistics from by companies A, B and C

	Australia	New Zealand	Chile	USA	South Africa	Argentina
Wine Shipper X	A, C	C	A,C	A,C	C	A
Wine Shipper Y						
Wine Shipper Z						

In regards to packaging methods, the answers provided by the wineries prove most are using Flexitanks and ISO Tanks to transport wine in bulk, and only company Z has mentioned that they are shipping bottled wine. Company X left the question of what packaging methods they are using unanswered, but according to JF Hillebrand Group's records, this company uses both ISO Tanks and cased transportation. As it is shown on Table 7, Flexitanks are the preferred packaging method for wine. In return, logistics companies have been asked what packaging methods they are able to provide for their wine customers. As it can be seen on Table 7, all companies are providing Flexitanks. Only companies A and C provide ISO tank transportation services and only B and C provide cased transportation. It is clear, that all companies provide the preferred Flexitank method. However, ISO tanks transportation is used as well, hence company B could consider providing this service.

Table 7: Packaging methods used by wine shippers X, Y and Z and provided by A, B and C

	Flexitank	ISO Tank	Bottled
Wine Shipper X	A,B,C	A,C	B,C
Wine Shipper Y			
Wine Shipper Z			

#### 4.4 Why are Flexitanks the solution for bulk wine transportation?

As Flexitanks were deemed the preferred packaging method for bulk wine transportation, the researcher wanted to find out why companies believed so. The formulation of questions for wine shippers asked why they saw Flexitanks as a good solution for their product and in return, logistics companies were asked why they thought it was a good solution for their customers. The aim of this question was to understand, first of all, how Flexitanks are a solution in practice, and not only in theory, and is determine whether there shared goals and a common understanding between logistics providers and wine shippers. After analyzing the data, the researcher found that companies had different opinions. Certainly, must be remembered, that as it is open-ended question, answerer might forget to mention some information or simply didn't have motivation to spend longer time with answers. However, comprehensive data was received from both sides.

Table 8: Various advantages of Flexitank

	Wine Shipper	Logistics Company
One way transport	Z	A
Cost effective	Y, X, Z	A, B, C
Capacity is competitive	Z	B, C
Limited supply of ISO Tank	Y	
Easier to offload	X	
Less risk of tainting	Z	A
Less risk of oxidation		A
Additional Employment at DC		B

Table 8 perfectly portrays the answers provided by each company that participated in the questionnaire. After analyzing the final data, it has been found that answers perfectly support the theory from chapter 3.4. One of the facts why Flexitanks are competitive is that it is a one-way packaging

and transportation method as it does not return to its place of origin, but can be debugged and recycled which benefits both parties. Whereas, ISO Tanks, for example, must be returned or off hired. The carrying capacity of Flexitanks is still highly competitive, even though ISO Tanks can carry up to 2,000 tones more. Company C stated “ISO Tanks can carry more wine than a Flexitank, but pro rata, the cost of using the Flexitank system is cheaper.” Also, it must be mentioned, that the risk of tainting is lower when wine is packed and transported in Flexitank. Finally the fact that the Flexitank is more cost effective in comparison to all other packaging methods is clear. Additionally, all other advantages, at the end, lead to company’s financial savings.

To understand how often wine shippers take advantage of Flexitanks’ capacity, it was decided to ask, firstly, logistics companies, what size of Flexitank they provide. In return, wine shippers were asked what sizes they used. The question aimed to confirm whether the size 24,000 liters worked well in practice and not only in theory. For wine shippers, the question “What Flexitank sizes do you use in your New World Wine shipments and why” was formulated. Each company has answered that they are using the biggest bag available (24000L) and only company X has mentioned that shipping from US requires different sizes of Flexitanks, due to rail and road weight regulations, varies from 20000 – 24000 liters. In return logistics companies were asked as follows: “What size of Flexitank do you provide and why”. It appears that all companies, in general, provide Flexitanks starting from 15000L, but each one stated that 99% of wine shippers use 24000L bags. The reason why 24000L is the maximum is due to weight limitations around the world (Ward, 2015).

#### 4.5 Disadvantages of Flexitank

To make a critical review of Flexitanks as a packaging method, it was decided to ask, what logistics companies and wine shippers think are main disadvantages of the product. Additionally, it is relevant to see, from



different perspectives, what similarities were found in their answers. After analyzing the data, the result was very clear and main disadvantage is the risk of liquid leakage. Table 9 aims to provide a better picture of the disadvantages related to Flexitank utilization.

Table 9: Flexitank disadvantages

	Wine Shipper	Logistics Company
Leakage	X, Y	B, C
Contamination		B
Used only for larger traders		B
Off load residue	Y	
Not suitable for premium wine	Z	

While analyzing the data, it was noticed that wine shippers were more specific with their answers than logistics companies. Moreover, logistics company A answered the question claiming that the company is confident in their Flexitank services and does not see any technical or operational disadvantages in this practice. The probability of Flexitanks leakage was proved as one of the main weaknesses of that packaging method. However, companies are also concerned about spoiling the quality of the wine by contamination. As logistics company B stated “contamination could destroy whole loads, unlike the bottled product”. Additionally, the same company mentioned very detailed advantages of the Flexitank: only large wine traders are benefiting from Flexitank cost effectiveness. That way of packaging does not suit small wineries. Moreover, that is a negative factor for Flexitank providers, as they cannot target all sizes of companies. After comparing the pros and cons of Flexitanks from the answers of different participants, the main conclusion the researcher made is that Flexitanks are a solution for the bulk transportation of wine.

#### 4.6 Development of Flexitank

As the final question, logistics companies were asked how they perceived the development of the Flexitank. The reason why only logistics companies were asked was because they share an interest to improve the quality of their product for their customers. In turn, it was decided to ask wine shippers, what advantages Flexitanks present. Even though the question is similar to “why do you think Flexitanks are a solution for wine in bulk transportation”, the aim was to collect as much data and information possible. Company A sees that the future will provide oxygen barrier materials for Flexitank manufacturing, to protect wine in transit. Furthermore, the company is expecting to release Flexitanks suitable to fit into 40 feet containers, to maximize cost-effectiveness. Company B also mentioned that improvements could be made in developing tanks for smaller traders. That means that logistics companies could expand their customer base. Company C, mentioned the development of a very usual problem - leakage. It was stated “Flexitank will become better designed and more robust leading to less leakage issues”. Resolving this problem will give an opportunity for logistics companies to make their customers feel more confident. Asking wine shippers what the main advantages were, only proved once again that cost-effectiveness and economies of scale are the main advantages of transporting wine in Flexitank.

## 5. SUMMARY

The objective of this thesis was to find out if the Flexitank packaging method is becoming a solution for wine in bulk transportation. The reason for such topic is that the author is working for JF Hillebrand Group in Southampton, United Kingdom, who is providing Flexitank services for wine shippers. It was decided that the exploration of this topic could be beneficial for the author's career and at the same time for JFH.

Wine transportation in bulk has been practised for decades and the packaging methods for transportation have improved. As it was found the most important factor when considering the methods of wine transportation are costs, which is measured by cost per litre. Wine in Flexitanks can be transported by road, rail and sea. However, the most common transportation mode for wines is by sea, loaded onto cargo vessels. The reason for that is, because wine manufacturing countries are often distant from key wine importing countries. The sea-freight market has globalized crucially. Firstly, vessels have improved, and that had an impact on seaport development. Trading unions are driving international trade, as trading between countries becomes easier and faster, that in turn again, has a positive impact on transportation costs. This thesis is, however, concentrated on the transportation of wine in Flexitanks from countries, such as Australia, USA, New Zealand, Chile, South Africa and Argentina, to the United Kingdom.

The Flexitank market is highly competitive in United Kingdom. There are only a few companies who are providing such product/service for wine shippers. It was found that the United Kingdom mainly imports wine in bulk and the bottling process takes place in the country. Wine shippers believe that this method is more cost-effective. Wine is also shipped in other forms of packages such as ISO Tank and bottles. However the findings reveal that Flexitanks are the most optimal packaging method. To make an objective research, the theory was supported with practical findings. That is why the author decided to conduct a questionnaire for logistics companies who are providing that service and wine shipper companies

who are using Flexitanks. The survey has proven that the theory is objective, precise and accurate. Finally, the question of this thesis "*How are flexible tanks becoming a solution for wine in bulk transportation?*", has been answered using both; theoretical as well as practical findings. Wine shippers believe that Flexitanks are the most favourable packaging method for wine in bulk transportation and that statement is supported by the theory.

The author faced a number of challenges while conducting this study. Firstly, the questionnaire posed numerous challenges. Secondly, the Flexitank market is highly competitive, hence, difficult to convince companies to participate in the research as some expressed confidentiality concerns. As a result, the answers were restraint and there was no possibility to contact companies at my request for further questions. Due to that fact that the data analysis was not as objective as it was requested to be. The researcher of this thesis found that the Flexitank topic is not a popular topic for academic research. Hence, there were challenges to find reliable and trusted academic sources to further support the findings presented on the theory and data analysis sections.

This thesis is just a small-scale and limited study exploring different packaging methods for wine transportation into the United Kingdom. The result has been achieved through investigation, interviews and JF Hillebrand Group's experience and knowledge. That information might conflict with experts in this field. The recommendation could be useful for new and growing wine shippers or companies who are providing Flexitanks. Further studies on Flexitank investigating the product from technical point of view could open new opportunities for product improvement

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## 7. APPENDICES

### APPENDICE 1. Interview for wine shippers

“My name is Alisa Aaltonen and I am a student from Finland currently writing my dissertation for Lahti University of Applied Sciences. At the same time I am employed, as an export logistics operator, by Transocean Bulk Logistics which is a part of JF Hillebrand Group. As a topic I have chosen to investigate how the Flexitank is becoming a solution for New World Wine bulk transportation. As a part of the thesis I am conducting a research with the idea to find out various opinions of companies who are using flexitanks and other packaging types for their New World Wine transportation.

I would like to invite you to take part in my research study, because you are one of the leading companies in the United Kingdom who are importing wine in bulk using different packaging methods. If you agree to participate, please complete all 7 questions as accurate as possible which should take approx. 15-20 minutes of your time. Your responses are voluntary and will be personally confidential. Responses will not be identified by individual. If you have some questions about this research or questionnaire, please feel free to contact me. My e-mail address is [a.aaltonen@jfhillbrand.com](mailto:a.aaltonen@jfhillbrand.com)

Thank you very much for your time and support. “

1. **What New World Wine countries are you shipping wine from and which packaging methods are you using for transportation?**
2. **Why do you think Flexitanks are good solution for NWW bulk wine transportation?**



3. *What Flexitank sizes do you use in your NWW Bulk shipments and why?*
  
4. *In your opinion, what are the main advantages about NWW Bulk transportation in Flexitanks? Why would you recommend using this way instead of other NWW packaging methods?*
  
5. *In your opinion, what are the main disadvantages about NWW Bulk transportation in Flexitanks?*

“My name is Alisa Aaltonen and I am a student from Finland currently writing my dissertation for Lahti University of Applied Sciences. As a topic I have chosen to investigate how the Flexitank is becoming a solution for wine bulk transportation. As a part of the thesis I am conducting a research with the idea to find out various opinions of companies who are providing flexitanks and other packaging types for wine shippers.

I would like to invite you to take part in my research study, because you are one of the leading companies in the United Kingdom who are providing Flexitank for your customers. If you agree to participate, please complete all 6 questions as accurate as possible and it takes approx. 15-20 minutes of your time. Your responses are voluntary and will be personally confidential. Responses will not be identified by individual. Please note that while analysing responses in the thesis the **NAME OF THE COMPANY WILL BE REPLACED BY THE LETTER X.** If you have some questions about this research or questionnaire, please feel free to contact me. My e-mail address is [aistenok91@gmail.com](mailto:aistenok91@gmail.com)

Thank you very much for your time and support.”

1. **Which packaging method logistics are you able to provide for your customers from wine industry and please name at least five top countries?**
  
2. **Why do you think Flexitanks are good solution for bulk wine transportation?**
  
3. **What sizes of Flexitank do you provide for all of your customers and why?**
  
4. **In your opinion, which are the main advantages about transportation bulk wine in Flexitanks? Why would you recommend using this way instead of other bulk liquids packaging methods?**

5. *In your opinion, which are the main disadvantages about transportation in Flexitanks?*

6. *Looking to the future, how would you see the development of Flexitank?*