Turmoil in the Shipping Industry: Implications for Today's Global Supply Chains

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Abstract

This exploratory article addresses the reasons for the crisis that struck the shipping industry with the bankruptcy of South Korea's Hanjin Corporation in August 2016 and further outlines some of the ongoing and far-reaching implications for today's global supply chains. The article also outlines a few of the structural challenges facing the shipping industry and finally, identifies some strategies to alleviate these challenges. There are very few journal articles addressing the shipping industry woes; this article is an attempt to help students of supply chain management comprehend the challenges facing the shipping industry and consequently today's global supply chains.

Introduction

The supply chains of today are the backbone of globalized economies of the world. It is common knowledge that even a simple product such as a laundry detergent used in the washing machine of a household might have ingredients and packaging products sourced from different parts of the world. A DVD player sitting in a family room might have materials and components that have travelled around the world multiple times. One of the main reasons for these supply chains to have been effective and efficient in the last few decades is the shipping industry. Today, that industry is getting antiquated, inefficient, and unprofitable. This in turn is affecting the global supply chains. This article examines the reasons for the crisis in the shipping industry and proposes some strategies to alleviate the challenges. Falling prices, lack of orders on some routes, being less competitive compared to other modes of transport, and failing to generate sufficient revenues are some of the major issues facing the shipping industry. We will also examine the market share of the major shipping companies as well as the alliances amongst the companies which are shaping up in the recent past. Some of the surprise causes for the crisis which include the expansion of the Panama and the Suez Canals are also discussed.

In August 2016, when Hanjin Shipping of South Korea, formerly, the world's seventh biggest shipping company, filed for bankruptcy, the industry had to deal with the biggest problem in its history (Hanjin Shipping Bankruptcy, 2016). Examining the shipping industry's revenues and profits over the past several years indicate that the industry did not collapse overnight. An analogy can be drawn between the current shipping industry crisis and the financial crisis of 2008. During the 2008 financial crisis, although the market's inevitable stumble was predicted by many, the financial world was not ready to accept that there were basic structural deficiencies until the 150-year old Lehman Brothers filed for Chapter 11 bankruptcy. This phenomenon is known as the boiling-frog syndrome when human systems cannot sense gradual changes in the external business or other environments just like a frog may not biologically sense gradual changes in temperature. The fall of Lehman Brothers was a wake-up call to the financial institutions that did not heed repeated warnings from experts who clearly articulated for nearly a decade the ills of financial industry deregulation and subprime mortgages. This is very similar to what is being experienced by the shipping industry since 2016. The crisis was realized on a large scale only after Hanjin filed for bankruptcy even though there was a prolonged period of over-capacity, falling prices and lack of trade (Paris and Hovland, 2015; Paris, 2016, Tovey 2015). This led to Hanjin being suspended of its alliances with other companies and finally filing for bankruptcy. More shipping companies are likely to be faced with the same fate if preventive measures are not taken.

Figure 1: Similarity between the Shipping Crisis of 2016 and the Financial Crisis of 2008

Hanjin Files for Bankruptcy

Until recently, Hanjin was the seventh biggest container shipping industry in the world with a market share of 3% and a capacity of over 700,000 twenty-foot equivalents (TEUs). The biggest shipping company, in comparison, has a capacity of 3 million TEUs. Nearly 8% of the trade volume between the U.S. Pacific Coast and Asia was handled by Hanjin. While many of the shipping companies are facing problems, Hanjin was the first major shipping line to be dragged down into bankruptcy. As of June 2016, Hanjin had accrued a total debt of $5.41 billion. When it applied for bankruptcy, it had $14 billion in goods that were marooned at sea on the ships since many ports refused Hanjin ships from docking because of their inability to pay the stevedore fees. Companies such as Samsung had tens of millions of dollars' worth goods stuck on Hanjin ships. In addition, to avoid losing more ships to creditors waiting on land, Hanjin ships were dropping anchor at sea. The disruption of the shipping industry was not restricted to Hanjin. Importers and exporters who booked with other lines were also finding their freight blocked on Hanjin because of the alliances in the industry. This resulted in Hanjin's alliances with China COSCO, Yang Ming Marine Transport Corp and Evergreen Marine Corp Taiwan Ltd being suspended. The crisis had a huge humanitarian impact also. Thousands of Hanjin workers were stranded at sea making them and their families major victims of this crisis. The only way forward for Hanjin was to file for bankruptcy. We will examine the state of the industry and some of the reasons for this turmoil.

Current State of the Shipping Industry

The "modern" shipping industry originated in the 19th Century in the North Sea ports of Germany, Denmark and Netherlands. In the later part of the 20th Century, many mega companies rose to importance in China and Far East Asia. It is important to note that amongst the top ten shipping companies in the world, the latest entry was in 1978, nearly 40 years back, and most of the top ten companies have been in existence for 50 to 150 years. Hanjin was the youngest company in the top 10 before it got bankrupt. No new shipping company has been able to get into the top ten list recently. The management of these companies is conservative and the management styles are antiquated. This has made the changes in the industry moving at the speed of an ice-berg! The data of the year of origin and employee size is shown in Table 1. It is also worth noting that the biggest company in terms of employers is the China Ocean Shipping Company (COSCO). It has the highest number of employees which is almost equal to the total number of employees combined of all the other top ten companies put together. The Chinese economy is not humming at the rate at which it was growing in the last two decades and this over-capacity in that country's industry is a cause for concern (Einhorn, 2016).

Table 1: Overview of the Shipping Industry (Source: company web sites)

	TOP SHIPPING COMPANIES	HEADQUARTERS	FOUNDED	EMPLOYEES
1	Hapag-Lloyd	Hamburg, Germany	1847	9,500
2	Hamburg Süd Group	Hamburg, Germany	1871	5,360
3	A.P. Moller–Maersk Group	Copenhagen, Denmark	1904	89,000
4	China Ocean Shipping (Group) Company (COSCO)	Beijing, China	1961	130,000
5	Evergreen Marine	Taoyuan City, Taiwan	1968	3,389
6	Orient Overseas Container Line (OOCL)	Hong Kong	1969	6,000
7	Mediterranean Shipping Company S.A. (MSC)	Geneva, Switzerland	1970	24,000
8	Yang Ming Marine Transport Corp.	Hong Kong	1972	4,860
9	United Arab Shipping Company (UASC)	Dubai, U.A.E.	1976	-
10	CMA CGM Group	Marseille, France	1978	22,000

Table 2 shows the top ten shipping companies and their share of the shipping market (MoversDB.com, 2016). It shows that the shipping industry is concentrated. The top three companies, A P Moller Maersk, MSC and CMA CGM Group, account for a little more than 35% of the total market share and the top ten companies make up about 60% of the overall market share in the industry. Each of the top four companies also have over one million TEU in capacity. Most of the shipping companies in the world operate in conjunction with other companies who ply their trade in the same region. They form alliances and partnerships to ensure reduction in operating costs. This also helps them fill their ships to the maximum capacity. However, this makes their businesses highly intertwined and also prevents the industry from innovating and adopting new changes. The 2m Alliance, between A P Moller-Maersk, Mediterranean Shipping and Hyundai M M accounts for 30% of the total market share. Other important alliances are the Ocean Alliance, between CMA CGM Group, COSCO Container Lines, Evergreen Line and OOCL, The other big Alliance is between Hapag-Llyod, Hanjin Shipping, UASC, Yang Ming Marine Transport, UASC, MOL and NYK Line, which was deeply affected during the Hanjin bankruptcy. The only top ten shipping company that does not work in an alliance is the Hamburg Suud.

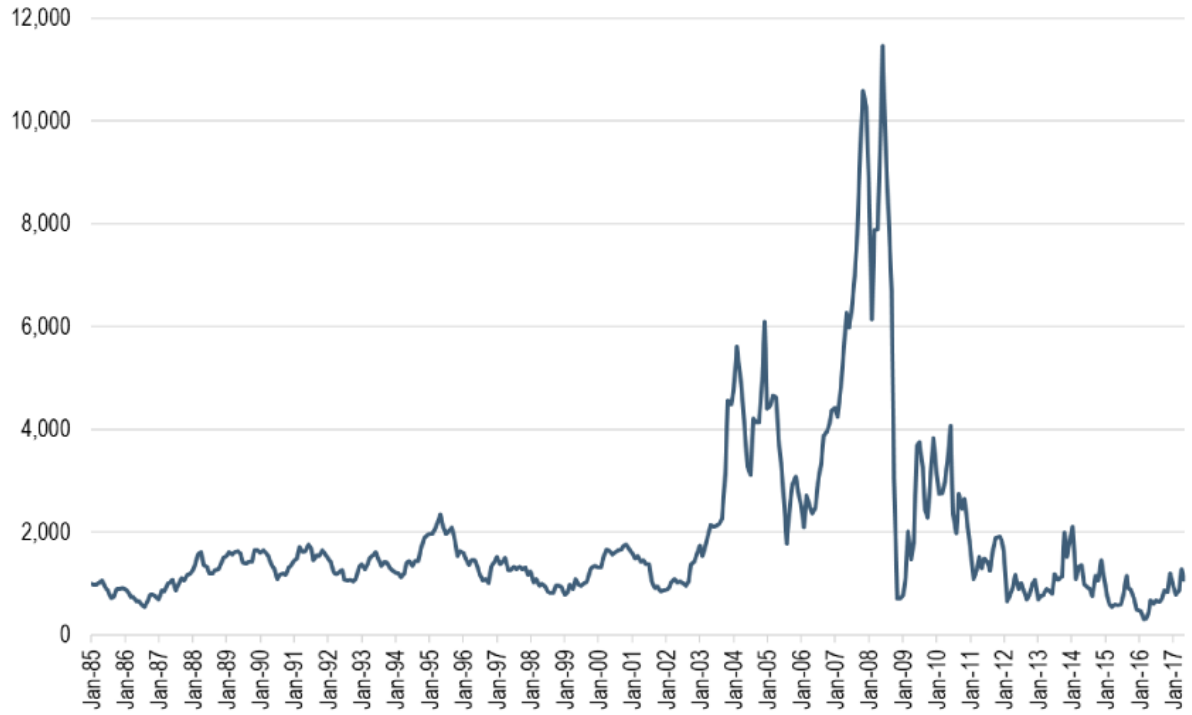
Table 2 Top Ten Shipping Companies by Size (Source: company web sites)

	TOP SHIPPING COMPANIES	TEU	MARKET SHARE
1	A.P. Moller–Maersk Group	3,012,172	14.70%
2	Mediterranean Shipping Company S.A. (MSC)	2,659,489	13.30%
3	CMA CGM Group	1,799,291	8.80%
4	China Ocean Shipping (Group) Company (COSCO)	1,539,618	4.60%
5	Evergreen Marine	929,700	4.60%
6	Hapag-Lloyd	916,439	4.20%
7	Hamburg Süd Group	646,918	3.40%
8	Orient Overseas Container Line (OOCL)	565,113	2.80%
9	Yang Ming Marine Transport Corp.	560,677	2.70%
10	United Arab Shipping Company (UASC)	544,680	2.60%

Shipping Industry Woes

The Baltic Dry Index (BDI), which started in 1985, provides the price to ship major kinds of raw materials by sea. It is based on the data provided by major shipping agents around the world shipping goods across all major sea routes and four different sizes of ships (details in the next section). BDI is an economic indicator issued daily by the London-based Baltic Exchange. It naturally follows the demand for commodities. Figure 2 shows the Baltic Dry Index, courtesy of Bloomberg. The BDI data shows two major trends. The first is the astronomical increase in the last decade from nearly 1,000 in 2002 to over 11,000 right before the financial crisis. The second is the precipitous drop post-2008 with a slight recovery in 2011-12. Of major interest is the drop of the index from nearly 1,200 in August 2015 to less than 300 in early 2016 which precipitated the fall of Hanjin and the trouble for the entire industry. Even the biggest shipping companies have not been able to avoid the wrath of the falling prices. Majority of the companies continue to record losses. This is not just due to the loss of demand but also due to the overcapacity of ships. Maersk reports that until mid-2014, the expansion of trade outpaced the growth in the fleet capacity. However, since then, the fleet capacity has grown disproportionately. In 2016, the top ten shipping companies had ships on order representing nearly 20% increase in container capacity while trade was almost flat. The challenge with the shipping industry is the time lag between the decision to increase the capacity and the actual increase (Glave, Joerss, and Saxon, 2014). It takes anywhere between two to three years to receive a ship that has been ordered. Reducing capacity is highly improbable.

Figure 2: Baltic Dry Index from 1985 to 2017 (Source: Bloomberg; BDIY:IND)



There are different classifications of ship sizes but the following four are the most commonly used terminology for ships: Handysize, Supramax, Panamax, and Capesize, in increasing order of capacity. The biggest sized ships are the Capesize ones which weigh more than 100,000 dead weight tons. They are so big that they could not go through the Panama Canal or the Suez Canal. They are known as "Cape"size since these ships have to sail around the Cape of Good Hope on the southern tip of Africa or the southern tip of South America when goods are shipped between Asia and the east cost of the Americas. The Panamax ships weigh between 60,000 to 80,000 dead weight tons and could pass through the Panama Canal. The Supramax weighs between 45,000 to 59,000 dead weight tons, and the smallest ones, Handysize between 15,000 to 35,000 dead weight tons. The biggest sized ships (Capesize) account for 62% of the dry bulk traffic even though they make up only 10% of the world fleet. The smaller sized Handysize and Supramax account for 71% of the world fleet but make up only 18% of the dry bulk traffic.
Table 3: Ship Size Classification (Source: Raunek, 2017)

Ship Classification	Dead Weight Tons	Approx. Length in meters	% of World Fleet	% of Dry Bulk Traffic
Capesize	100,000+	300	10%	62%
Panamax	60,000-80,000	225	19%	20%
Supramax	45,000-59,000	175	37%	18%
Handysize	15,000-35,000	150	34%	

There is an infinite number of potential shipping routes that can be used for commercial circulation, but the configuration of the global shipping routes is relatively simple (Rodrigue, 2016). The main axis is a corridor linking North America, Europe and Pacific Asia through the Suez Canal, the Strait of Malacca and the Panama Canal. The core routes are the ones without which there would be limited cost effective maritime shipping alternatives and would seriously impair global trade. Among those are the Panama Canal, the Suez Canal, the Strait of Hormuz (Arabian/Persian Gulf), the Strait of Gibraltar, and the Strait of Malacca. These are the five most important locations in the global trade of goods and commodities. The secondary routes support the main maritime routes as alternatives, but would still involve a notable detour. These include the Magellan Passage (tip of South America), the Cape of Good Hope, the Dover Strait, the Sunda Strait and the Taiwan Strait. Railroad has been used as an alternative to ships in some cases. For example, goods from Asia to the eastern United States could reach the west coast of the U.S. and travel by rail to the east coast. Similarly, goods from Asia to Western Europe, instead of going through the Strait of Malacca and the Suez Canal, can be directly sent on rail via the trans-Siberian route. However, the trains are significantly less efficient than ships. Typically, a ship can carry at least 16 times more than a train. In many cases, the focus is more on cost than time. If time is the only major criterion, then train would be the preferred option in many cases but if time and cost are both important, ship would be the preferred option. A related concern is piracy on the high seas. While the piracy in the Somalian region close to the Suez Canal has subsided in the recent past, the problems in Malaysia, Indonesia and Singapore around the straits of Malacca and Singapore are on the rise (McCauley, 2014).

The Panama Canal expansion that was completed in 2016 took nine years and $5.4 billion. Only time will tell if it is a boon or a bane to the shipping industry. The Canal's new larger locks were opened amid questions about the impact they would have on the uncertain global trade and container shipping environment (Jervis, 2016). The new locks measuring 1200 feet by 160 feet can accommodate container ships that carry up to about 13,000 TEUs, depending on the design. All ports however may not see the containerized cargo growth they were counting on to justify their investments in dredging and terminals. Container lines need all the help they can get. Industry analysts predict that the carrier's losses could hit $10 billion this year because of overcapacity that has dropped rates to record lows. Carriers have struggled to fill big super-sized ships they ordered in a bid for economies of scale.
The original Suez Canal took 10 years and thousands of lives to build. The recent expansion was completed in a hurry in just about one year in 2015. It took nearly $10 billion for the expansion and it is less clear if the economic benefits of what was claimed to be "Egypt's gift to the world" would really materialize (Feteha, 2015). A study on the revenues of the Suez Canal, before and after the expansion, indicates that expansion has not been able to live up to the expectations. Although the Suez controls about 7% of the global trade, the expansion of the Panama Canal the following year was a major competition for goods being shipped from Asia to the East Coast of the United States. Global trade would have to increase by 9% for the Suez Canal income to rise in line with the Egyptian government's expectation! But global trade grew only by 5% in the last two decades. The revenues of the Suez Canal in 2016 haven't been encouraging either.

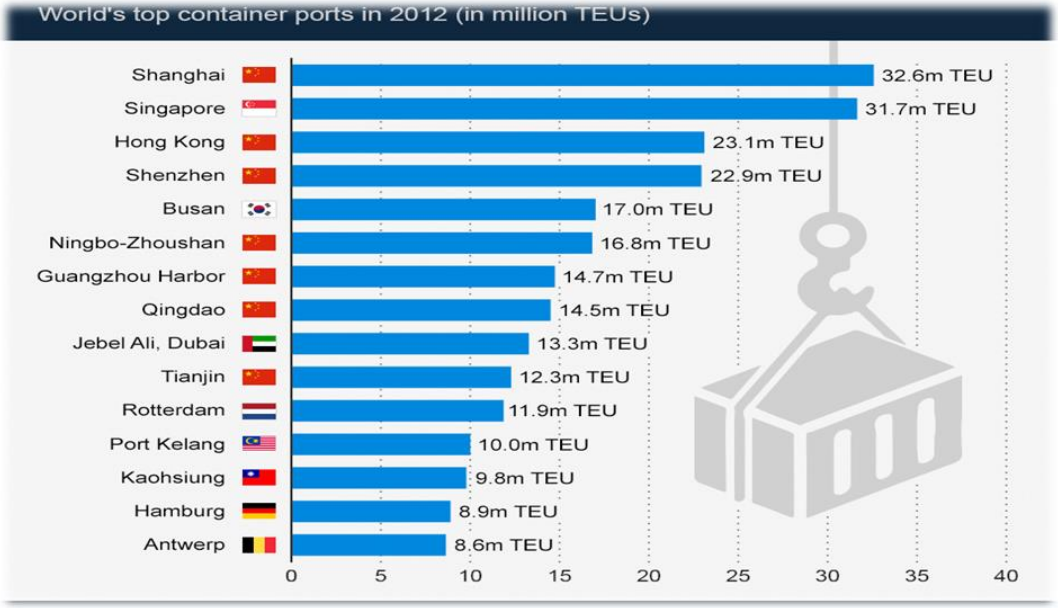
The expansions of the Suez and Panama Canals, more than 150 and 100 years of age respectively, have been in response not only to the heightened volume of global trade but also to the sizes of the ships tripling in the last 30 years.

Another major issue facing the shipping industry is pollution. Super-sized cargo ships are also major polluters. Some estimate that the carbon-di-oxide emission from 16 ships equals the emission from all the cars in the world. Periodic accidental spills and discharges causes release of toxic chemicals and oils into the water bodies.

Shipping today accounts for 3% of global CO_2 emissions, which is higher than the emissions from several big industrialized countries. More alarmingly, shipping could account for 17% of CO_2 emissions by 2050 if the industry is unregulated. This is a growing concern with the ever-increasing risks associated with global warming.

Another concern is the uneven capacity of the ports around the world (World Shipping Council, 2016). On one hand, Asia has over-built capacity which makes their ports less cost-effective. On the other hand, many European and North American ports are not fully geared to receive the super-size ships of today and are in the process of expanding their ports. Seven of the top ten busiest container ports are in China and eleven out of the top fifteen are in East Asia. The busiest ports of Europe-- Rotterdam, Hamburg, and Antwerp along with the port in Dubai make up the top 15. Shanghai and Singapore are the busiest ports in Asia while Los Angeles/Long Beach (adjacent to each other) and New York/New Jersey are the busiest ports in the U.S. Shanghai services an average of 32.6 million twenty-foot equivalent units (TEUs) of containers and Singapore servicing 31.7 m TEU. In comparison, Los Angeles/Long Beach ports handle nearly 10 million TEUs and the Port of New York/New Jersey handles only about 5 million TEUs. This indicates an over capacity in China. Asia has built up immense capacity and will need huge volumes to break even. The amount of capital spent on these ports is enormous and the current trade rates are not helping the ports to make any profit.

Figure 3: World's Busiest Ports (Source: World Shipping Council)



Summary of Major Challenges

- Shipping companies are not very agile and history suggests that there has been little or no change in the management of the industry in the last 50 years. Most of the companies are private and family-owned which makes the decision-makers unanswerable to shareholders.
- This crisis in the industry did not occur overnight and was predicted to happen since a long time. But none of the companies gave importance to the warnings and continued ordering more TEUs as a result of which there is now a surplus of supersize container ships running without full load. The demise of Hanjin has shook the shipping industry. Over-capacity has been a major issue with respect to demand. The world fleet has doubled in size between 2010 and 2014 whereas the demand has remained the same.
- Piracy is another constraint for the ships. Pirates have always targeted the container ships especially those travelling through Malacca and Somalia. The ransoms being demanded have increased drastically. With this, the shipping industries are spending enormous amount on the insurance for those ships travelling through the treacherous waters. In addition, the more sophisticated pirates of Southeast Asia do not take any hostages; they just steal millions of dollars' worth of cargo including oil that they could sell in the black-market.

- Ever since the expansion of the Suez and the Panama Canals was announced, the shipping companies have started ordering bigger sized vessels that would allow them to maintain and expand their market share. But this is affecting the smaller ships in operation which do not have enough demand. Also, not all the ports in different parts of the world are geared to cater to the supersize ships.
- Pollution is a major concern for the shipping industry. The mega size ships of some of the big shipping companies together account for more pollution than many countries. Because these ships are on the high-seas, their pollution is not as visible as that of the automobiles. The shipping industry has to gear towards heightened regulation.
- The overcapacity of ports in China, in particular, and Asia, in general, is of concern. These ports were built when these economies were humming with double-digit growth but have now reduced to lukewarm levels of growth.
- The ship routes have had competition from new and old railroad systems. Among the new railroad systems, China has a regular direct freight train service to Germany, Europe's largest economy. The plan is to create a similar regular route between China and Spain. The train's 82 shipping containers transport goods made in Zhejiang province, including spinning tops for children and cutting tools. The train returns to China with wine, olive oil and cured ham. The world's longest rail route, from Yiwu in east China, to Spain will have an impact on the shipping industry.

Strategies to Alleviate the Challenges

- The overcapacity in the shipping industry can be addressed by laying up ships until the prices go up. Laying up a ship is just not operating it temporarily. This can avoid huge operating costs. The company must decide whether it is a hot lay-up or a cold lay-up. A hot lay-up is when the ship is kept in a condition that it can be recommissioned fairly quickly while a cold lay-up is when it can take weeks for the ship to be recommissioned. Companies may want to strategically identify the number of ships to be in cold lay-up. The cost to keep in cold lay-up is low and it would result in lesser losses comparatively. Although this would result in no revenues for those ships, it could still be better than incurring huge losses by running empty or less than full load ships. This will also result in lower capacity and consequently the prices may go up. Bringing the ships back from lay-up at that time can be more efficient.
- After the demise of Hanjin in 2016, consolidation and cooperation within the shipping industry has become more important. It will help reduce the cost of operation. As most of the routes have many ships from different companies operating together and making the best use of the available cargo space can contribute towards reducing the cost of operation. The 2m alliance of the two biggest shipping companies (A.P. Moller-Maersk) and the Ocean Alliance of the 3rd, 4th, and 5th biggest shipping companies (CMA CGM, COSCO, and Evergreen) are examples of such alliances. More closely tied operations of these shipping companies, just like in the airline industry in recent times in Europe and the U.S., can help sustain growth and avoid bankruptcy.
- Another leaf out of the airline industry can be the use of a hub-and-spoke system. For example, a 600-seater Airbus 380 is used to take many passengers from two major cities/hubs and then multiple smaller Boeing 737 can be used to transport passengers from the hubs to smaller destinations. This hub-and-spoke system requires less capacity and results in significant reduction of operating costs. In the shipping industry, it will help tackle the problem of the ship sizes. With the expansion of the Panama and the Suez Canals, more firms have upgraded to bigger sized ships. This has created a new problem of finding the right balance of the fleet of ships. Companies can use a combination of large and small ships that they or their alliance partners own and create their own hub-and-spoke systems. There can be Capesize or Panamax vessels plying between big ports such as Shanghai and New York/New Jersey while smaller Handysize ships can be used to ship from these mega ports to smaller ports.
- Transit time in the Panama Canal is very long and is causing delays which are directly affecting the revenues for companies. Travelling around the continent will help reduce the transit time when compared to travelling through the Panama Canal. With the reduction in oil prices globally, travelling around the continent can be a better alternative to avoid the huge waiting time at the ports. Delays in shipment can be reduced to a great extent and the extra fuel cost may not be prohibitive.

- Other strategies such as being highly proactive about tackling environmental regulations, piracy, etc. are a necessity for today's shipping companies.

Conclusion

The shipping industry is going through a turmoil in the last few years mainly due to over-capacity and lack of growth. The bankruptcy of Hanjin Shipping in 2016 was just the tip of the ice-berg and there are more problems to come if the companies in the industry do not take appropriate and swift actions. This article summarizes the major problems and challenges facing the industry and also outlines some strategies for the companies to withstand the crisis and rebound in the near future. Several research angles for supply chain students and scholars can be explored including simulation and optimization models for fleets, usage of different ports using hub-and-spoke systems, employment of a variety of routes taking into account the travel time, delays, and costs associated with each route, etc. Shipping industry is the backbone of today's global supply chains and the industry's robust health is crucial to the success of these supply chains and broader economies of many countries. This article is an attempt to raise the awareness of supply chain scholars to pay more research attention to the shipping industry.

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